Threatened Glider Baseline Surveys

Woolgoolga to Ballina Pacific Highway upgrade

Sections 3 - 11 (Glenugie to Ballina)

October 2016

Pacific Highway Upgrade: Woolgoolga to Ballina

Threatened Glider Baseline Surveys Sections 3-11 (Glenugie to Ballina)

Version 2 – Final Report

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Cover Photo: Squirrel Glider (Petaurus norfolcensis) photographed during mid-glide phase (B. Taylor)

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1. Introduction

The Woolgoolga to Ballina (W2B) Pacific Highway Upgrade received State approval under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 24 June 2014 and the Federal approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 14 August 2014. The Threatened Glider Management Plan (TGMP) (RMS et al. 2015) was developed to meet the requirements of State Ministerial Condition of Approval (MCoA) D8 and components of MCoA D2. None of the glider species addressed in the plan are listed under the EPBC Act.

The TGMP identifies potential impacts of the upgrade on two threatened glider species - squirrel glider (Petaurus norfolcensis) and yellow-bellied glider (P. australis) (collectively referred to as 'threatened gliders'). Both species are listed as vulnerable by the NSW *Threatened Species Conservation Act 1995* (TSC Act) and inhabit open forests and woodlands throughout the ranges and coastal areas of north-east NSW although the yellow-belled glider is largely absent from the highly fragmented alluvial floodplains and coastal heathlands. Numerous records of both species occur within 10km of the project alignment (RMS et al. 2015).

The TGMP proposes a number of mitigation measures aimed at ensuring the continued viability of squirrel glider (SqG) and yellow-bellied glider (YbG) populations in the project area. Such measures aim to:

- Minimise fragmentation and loss of habitat;
- Provide functional crossing opportunities (including crossing structures);
- Maintain connectivity for daily movements and gene flow;
- Minimise edge effects.

In order to assess the effectiveness of the proposed mitigation measures, the TGMP details a comprehensive monitoring program. A component of this program is glider population monitoring. The stated objective of glider population monitoring is:

> "To establish if there is a difference in occupational abundance of threatened gliders or activity levels before, during and after the project".

In order to achieve this objective, the TGMP states that population monitoring will occur at:

- Impact sites - mitigated sites such as widened medians and crossing structures within 100m of the road edge;
- Control sites - unmitigated sites within 100m of the road edge;
- Reference sites – sites >300m from the project.

The TGMP directs that baseline monitoring will occur before, during and after construction and that occupational abundance will be compared between these periods for impact, control and reference sites. Further, monitoring will be conducted every three months (four times annually) to sample for seasonal variability.

The current report refers to pre-construction threatened glider baseline surveys conducted in Sections 3-11 (Glenugie to Ballina). Baseline surveys within Sections 1 and 2 were completed in February 2015 (Sandpiper Ecological 2015).

1.1 Scope

Sandpiper Ecological was contracted by Roads and Maritime Services (RMS) in May 2015 to undertake threatened glider pre-construction baseline surveys within Sections 3-11. The scope for services (letter dated 27 April 2015) included:

- Conduct baseline monitoring at 10 mitigated (impact) sites (as described in the TGMP (Table 1)), 10 unmitigated (control) sites and 10 sites away from the road upgrade (reference sites);
- Each impact and control site will feature paired transects (i.e. total of 20 transects each) and reference sites will feature a single transect (total of 10 transects);
- Complete four seasonal surveys prior to commencement of construction;
- Complete two non-consecutive night surveys/transect/season;
- Conduct yellow-bellied glider call playback followed by 30 minutes spotlighting for each survey;
- Complete a basic habitat assessment of each survey transect;
- Record weather data and key habitat attributes, such as species flowering, during each survey.
- Submit draft report for review.

Table 1: Baseline aerial crossing (impact) sites located in sections 3, 6 and 7 of the W2B Upgrade.

Section	Structure/Site Name	Recommended Chainage	Recommended Structure
3	Glenugie South	35540	Glide pole
3	Glenugie North	37230	Rope bridge
3	Tucabia South	48100	Glide pole
3	Tucabia North	53850	Rope bridge
6	Mororo	99550	Glide poles
7	Tabbimoble South	111550	Glide poles
7	Tabbimoble Mid	112500	Rope bridge
7	Tabbimoble North	115880	Rope bridge
7	Tabbimoble Veg Median	114100-121100	Vegetated median
7	Tabbimoble Land Bridge	118800 (or 118620)	Land bridge with glide poles (or glide poles)

The following report presents results of pre-construction threatened glider baseline surveys conducted in sections 3, 6 and 7 of the W2B Pacific Highway upgrade. The report includes a discussion of the results of these surveys and proposes a number of management recommendations.

2. Methods

2.1 Study Area

The study area included sections 3, 6 and 7 of the W2B Pacific Highway upgrade, between Glenugie and Tabbimoble and habitat within 1km of the project alignment (impact and control sites) and habitat surrounding reference site areas up to 4km from the project alignment (Figures 1a-1g). The study area is

located within the north coast bioregion and experiences a largely sub-tropical climate (NSW NPWS 2003).

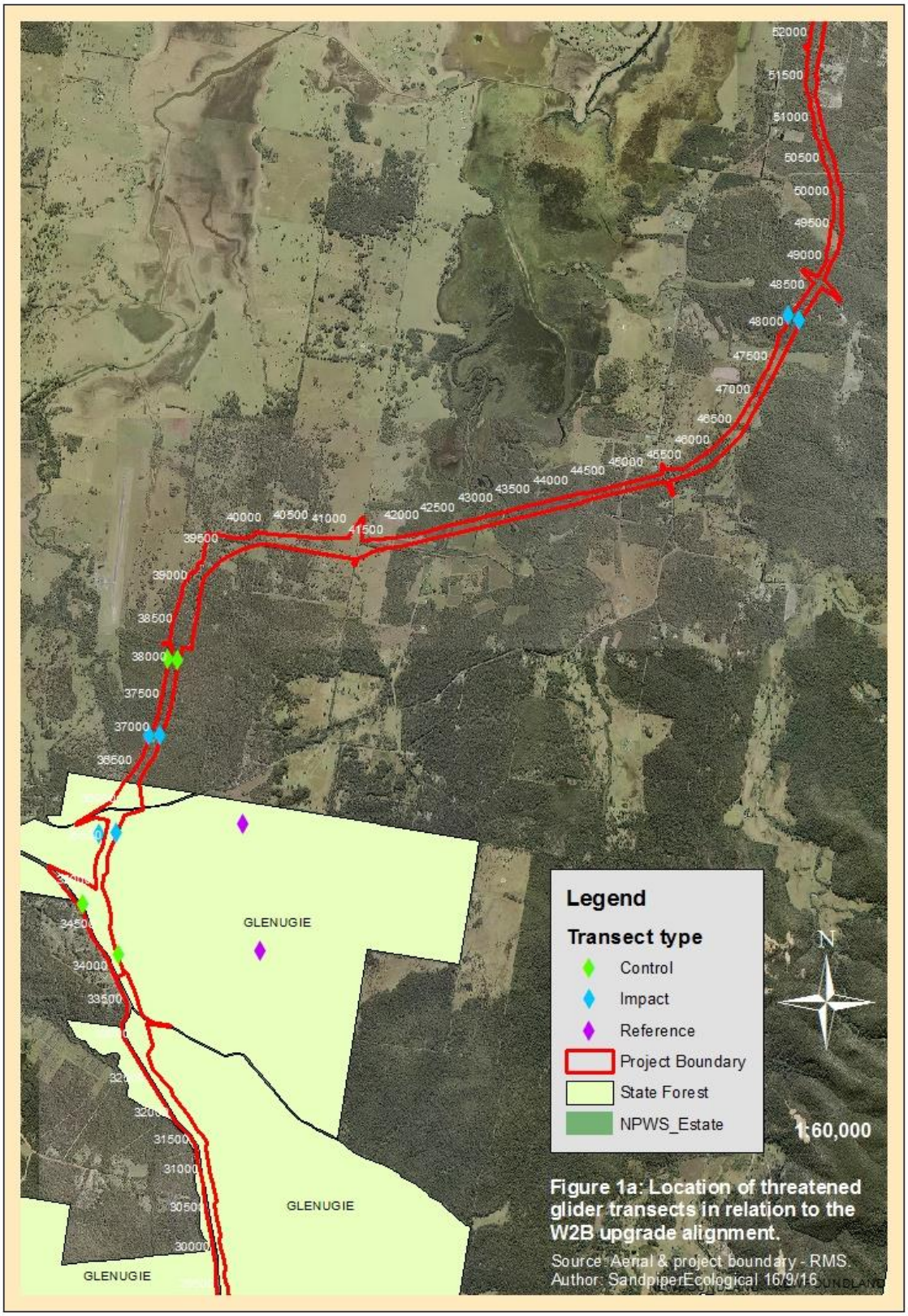

Figure 1a: Threatened glider impact, control and reference transects along sections 3-11 of the W2B Pacific Highway upgrade alignment.

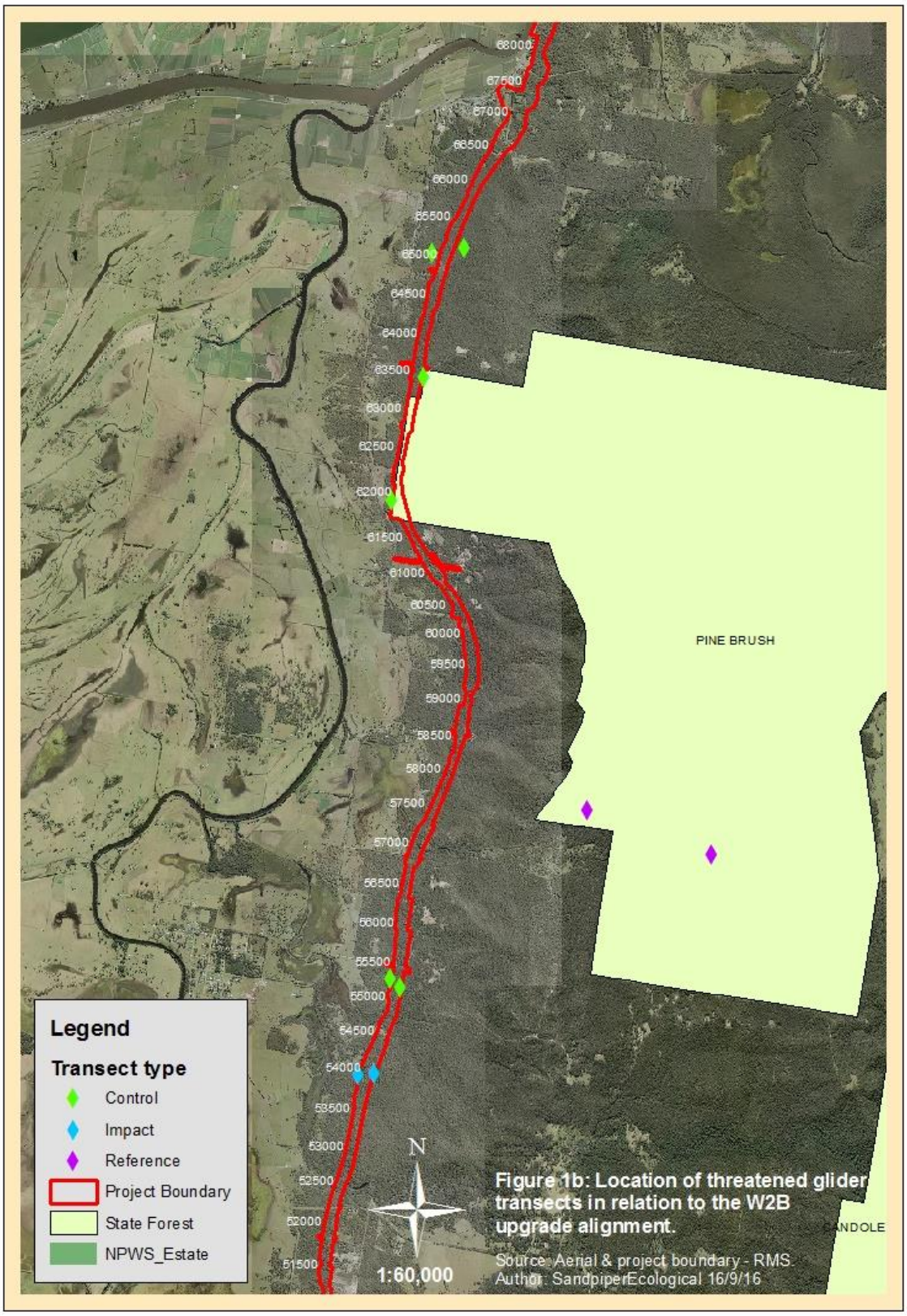

Figure 1b: Threatened glider impact, control and reference transects along sections 3-11 of the W2B Pacific Highway upgrade alignment.

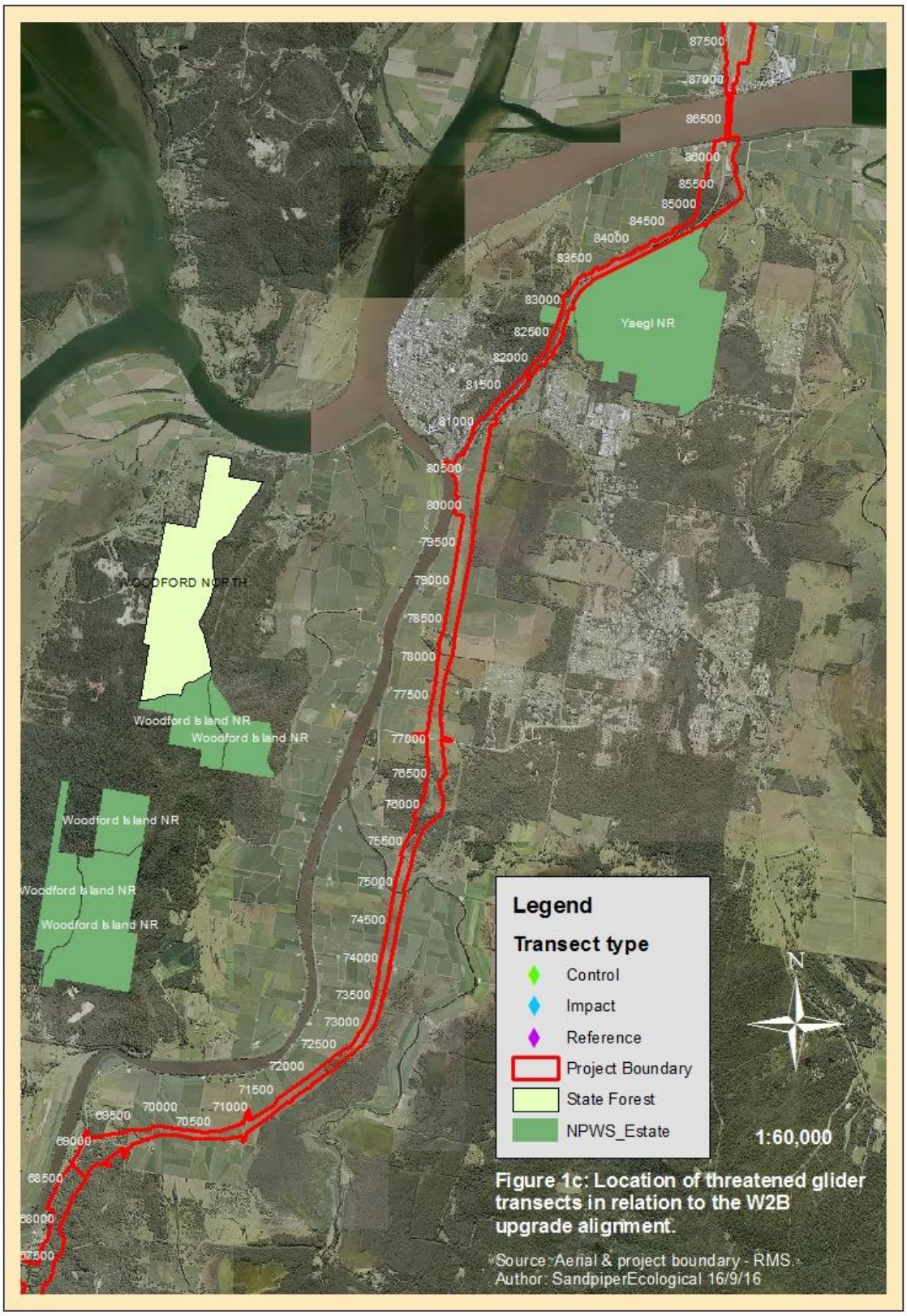

Figure 1c: Location of threatened glider transects in relation to the W2B upgrade alignment.

Figure 1c: Threatened glider impact, control and reference transects along sections 3-11 of the W2B Pacific Highway upgrade alignment.

Figure 1d: Threatened glider impact, control and reference transects along sections 3-11 of the W2B Pacific Highway upgrade alignment.

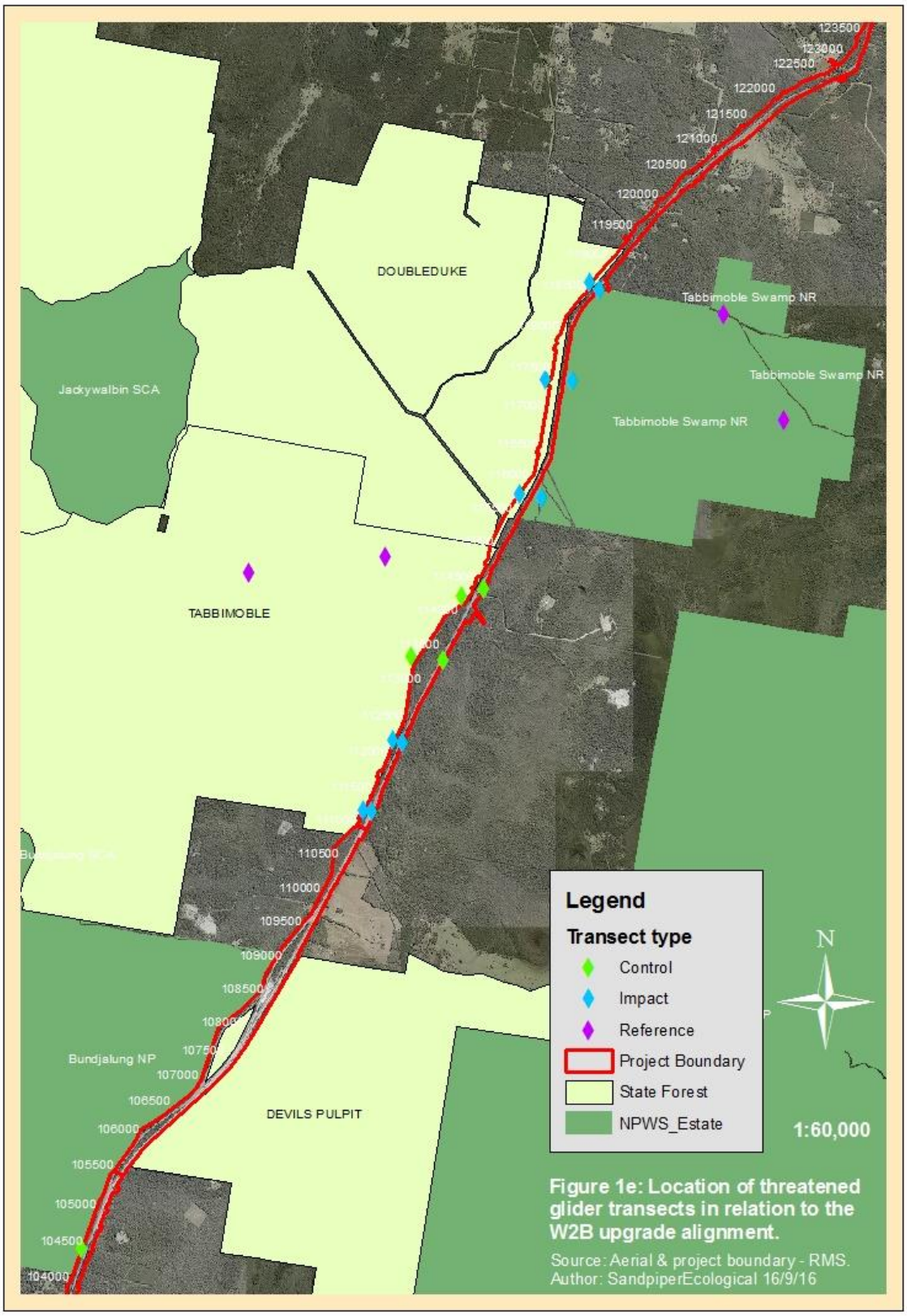

Figure 1e: Threatened glider impact, control and reference transects along sections 3-11 of the W2B Pacific Highway upgrade alignment.

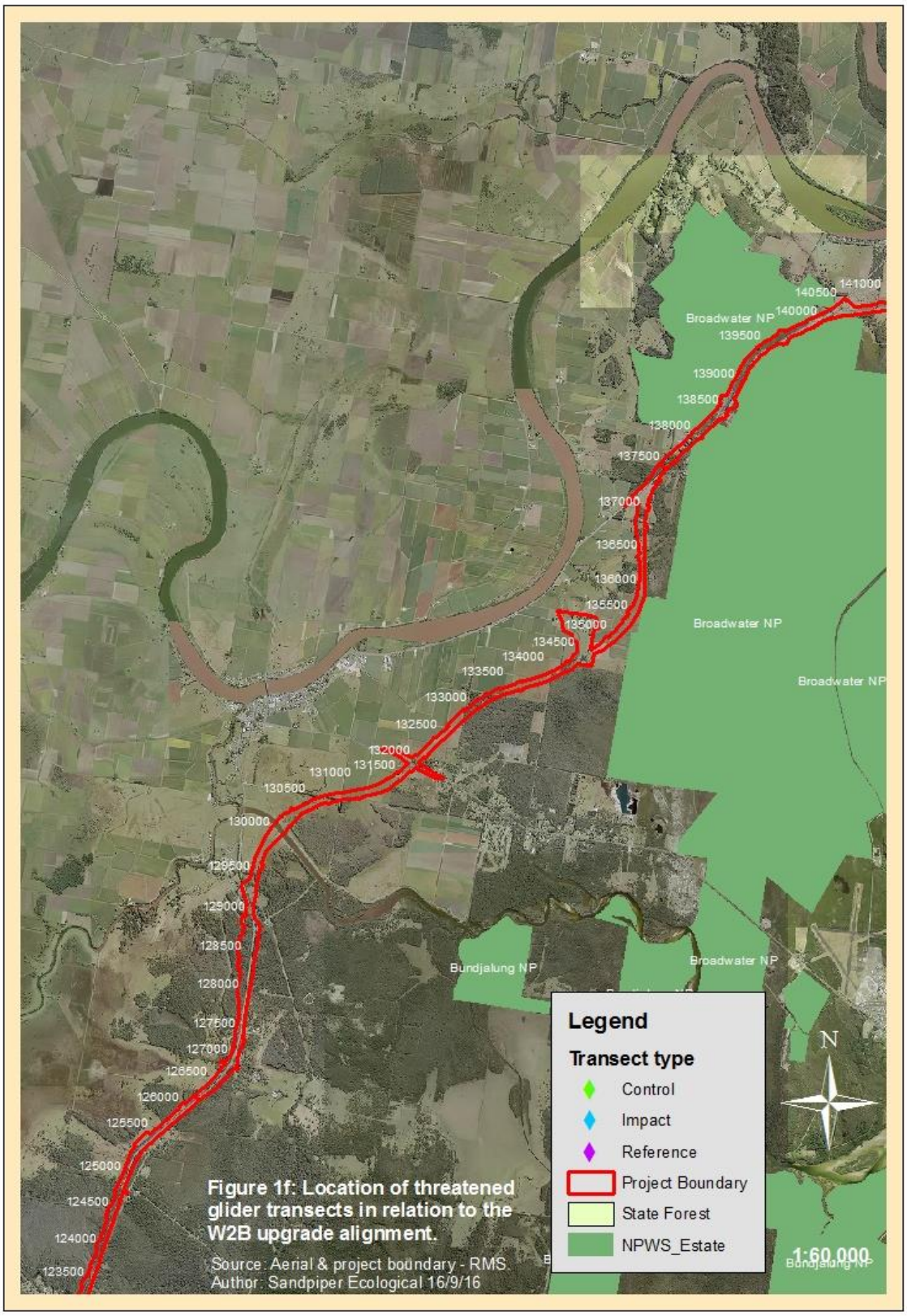

Figure 1f: Threatened glider impact, control and reference transects along sections 3-11 of the W2B Pacific Highway upgrade alignment.

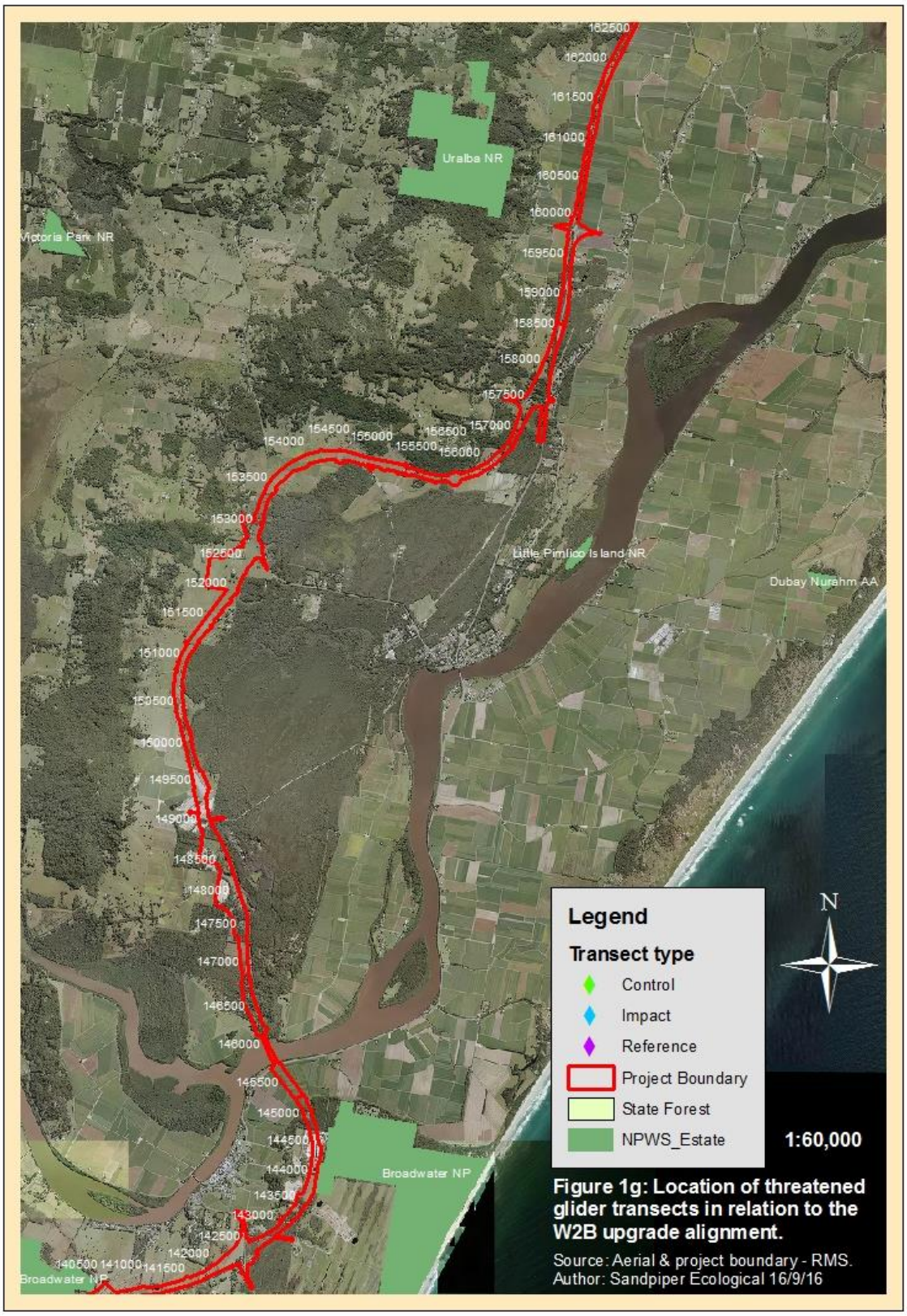

Figure 1g: Threatened glider impact, control and reference transects along sections 3-11 of the W2B Pacific Highway upgrade alignment.

2.2 Site Selection

Survey transects were established at impact, control and reference sites (Table 2). Site inspections and transect establishment was conducted between 10-27 June 2015. Transects were positioned within dry open forest habitat or a combination of dry open forest and moist open forest or swamp forest. Where possible, transects were positioned on existing tracks and within the highest quality available habitat suitable for the target species. To ensure long-term forest tenure of baseline sites, every effort was made to locate transects on crown land.

For impact sites, a transect was positioned either side of the road in the vicinity of each of the 10 aerial crossing locations described in Table 8.4 of the TGMP (Table 1). Transects were 500m long and mostly ran parallel to, and within 200m of, the upgrade alignment. For control sites, the project scope recommended that 10 paired transects be established >1km from impact sites and within equivalent forest habitat. However, due to the close proximity of some impact transects in the Tabbimoble area and limited extent of forest cover adjacent the project alignment, only nine paired control transects could be established. Locating adequate control transects also required relaxing the minimum distance between impact and control transects from 1km to 500m. For reference sites, 10 transects were located within equivalent forest habitat featuring YbG and/or SqG records >1km from impact or control sites.

Table 2: Location of impact, control and reference transects positioned in sections 3, 6 and 7 of the W2B Upgrade.

Section	Site Name	Transect ID	Approx. Chainage at center of transect		
			Impact	Control	Reference
3	Glenugie South	GS-east	35700	34050	-
		GS-west	35700	34750	-
3	Glenugie North	GN-east	37050	38000	-
		GN-west	37050	38000	-
3	Glenugie Reference	G-r-north	-	-	35800
		G-r-south	-	-	33950
3	Tucabia South	TucS-east	48250	55250	-
		TucS-west	48250	55350	-
3	Tucabia Mid	TucM-east	-	63500	-
		TucM-west	-	61850	-
3	Tucabia North	TucN-east	54050	65300	-
		TucN-west	54050	65100	-
3	Tucabia Reference	Tuc-r-north	-	-	57900
		Tuc-r-south	-	-	57200
6	Mororo	Mor-east	99600	98500	-
		Mor-west	99600	98600	-
6	Mororo Reference	Mor-r-north	-	-	100100
		Mor-r-south	-	-	98100
6 & 7	Tabbimoble South	TabS-east	111350	101400	-
		TabS-west	111350	104550	-
7	Tabbimoble Mid	TabM-east	112350	113550	-
		TabM-west	112350	113550	-
7	Tabbimoble North	TabN-east	115950	114550	-
		TabN-west	115950	114550	-
7	Tabbimoble Veg Median	TabVM-east	117400	-	-

		TabVM-west	117400	-	-
7	Tabbimoble Land Bridge	TabLB-east	118850	-	-
		TabLB-west	118850	-	-
7	Tabbimoble Nature Reserve Reference	TabNR-r-nth	-	-	118700
		TabNR-r-sth	-	-	117300
7	Tabbimoble Double Duke State Forest Reference	TabDD-r-north	-	-	114750
		TabDD-r-south	-	-	114300
Total Transects			20	18	10

2.3 Site Assessment

A basic habitat assessment of all impact, control and reference transects was undertaken between 11 March to 15 April 2016. Assessment involved two ecologists walking the length of each transect and noting the following site features:

- Habitat Type.
- Dominant upper canopy species.
- Dominant mid-lower canopy species.
- Hollow bearing trees, number of hollows and hollow size class.
- Topographic position.
- Physical disturbance.
- Fire history.
- Presence of easements, roads, etc.
- Habitat connectivity.

To estimate the abundance of tree hollows and hollow size classes, an assessment was conducted at 100m and 400m along each transect. Trees within 50m of the assessment point (i.e. ~1 ha area) were inspected for the presence of hollows. The number of viable hollows (i.e. >10mm diameter and >100mm deep) and the size class of each hollow (small (10-50mm), medium (50-150mm), large (150-300mm), extra-large (>300mm)) was recorded. On completion of field assessments, the extent of forest connectivity surrounding each transect was determined by interrogating aerial imagery.

2.4 Spotlight Surveys

Baseline spotlight surveys were conducted on all transects during four seasons - winter and spring 2015, summer 2015/16 and autumn 2016. Transects were surveyed on two non-consecutive nights each season. Two experienced ecologists conducted the surveys concurrently on nearby transects (i.e. one observer/transect) and the order and allocation of transects was rotated to avoid bias. Spotlight surveys were of 30 minutes' duration and preceded by YbG call playback. Playback included a five-minute listening period, five minutes of playback followed by spotlighting. Surveys began at least 45-60 minutes after sunset and were completed by 0100hrs EST. Surveys were conducted between third quarter and first quarter moon phases.

Survey periods extended between 17 June and 20 July 2015 (winter), 7 September and 8 October 2015 (spring), 7 December 2015 and 14 January 2016 (summer) and 7 March and 6 April 2016 (autumn). Weather conditions were generally fine during surveys with occasions of light showers. Surveys were abandoned during persistent or moderate showers. Full details of survey weather conditions and effort are provided in Table A1 Appendix A.

3. Results

3.1 Arboreal Mammal Detections

Nine arboreal mammal species were detected across the 48 transects during the four survey sessions (Figure 2). Feathertail glider (Acrobates sp.) was the most commonly detected species and was recorded on 33 transects (69% of all transects). It was followed by greater glider (Petauroides volans) and common brushtail possum (Trichosurus vulpecula) on 22 transects (46%), sugar glider (Petaurus breviceps) on 21 transects (44%), squirrel glider on 19 transects (40%), common ringtail possum (Pseudocheirus peregrinus) on 13 transects (27%), yellow-bellied glider on 11 transects (23%), brush-tailed phascogale (Phascogale tapoatafa) on three transects (6%) and short-eared brushtail possum (Trichosurus caninus) on two transects (4%).

The five glider species (feathertail, sugar, squirrel, yellow-bellied, greater) were more commonly detected on impact and reference transects whereas the three species of possum (common ringtail, common brushtail, short-eared brushtail) were more commonly detected on control transects. Brush-tailed phascogale, a strongly arboreal dasyurid, was detected on impact transects only. Most observations were of single individuals although some transects featured two or three individuals. The most individuals of a single species detected on a transect was five squirrel gliders recorded at Tucabia south reference transect which was located in Pine Brush State Forest. Full details of spotlight surveys are provided in Table B1, Appendix B.

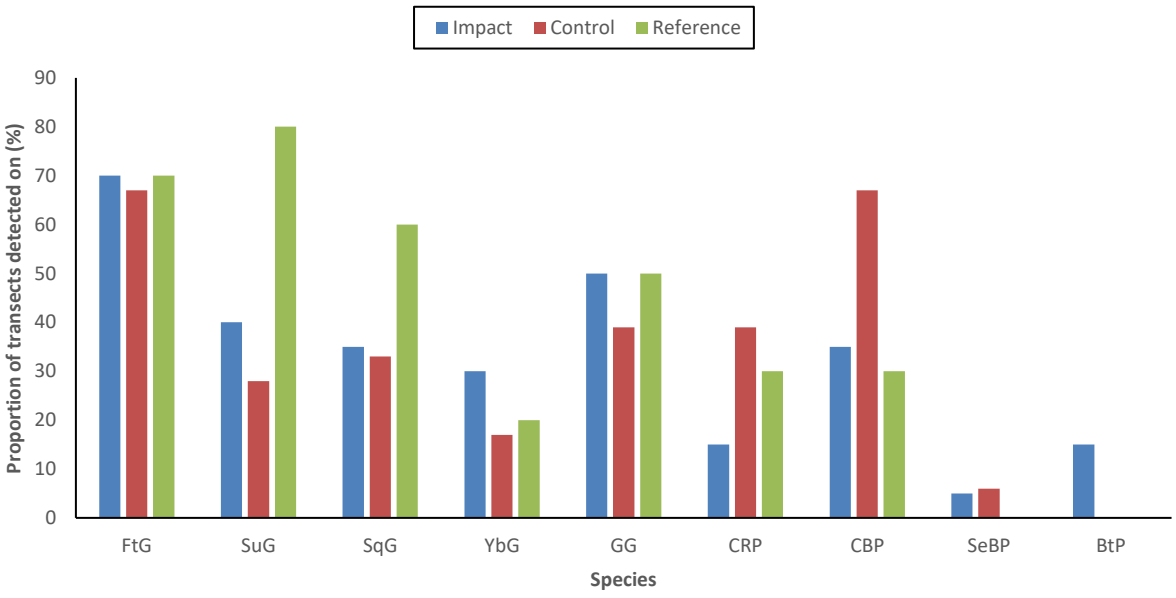

Figure 2: Proportion of impact, control and reference transects where arboreal mammal species were detected on. Survey data pooled for four seasons (8 surveys). FtG = feathertail; SuG = sugar glider; SqG = squirrel glider; YbG = yellow-bellied glider; GG = greater glider; CRP = common ringtail possum; CBP = common brushtail possum; SeBP = short-eared brushtail possum; BtP = brush-tailed phascogale.

3.2 Threatened Glider Detections

SqG and YbG were detected on 19 and 11 of the 48 transects, respectively, during the four survey seasons (Table 3). Across different transect types, SqG and YbG were each detected on seven (35%) and six (30%) of 20 impact transects, six (33%) and three (17%) of 18 control transects and six (60%) and two (20%) of 10 reference transects, respectively. Combined, either or both species of threatened glider were detected on 50%

of impact and control transects and 60% of reference transects. The Tucabia area recorded the highest rate of detection with either or both species of threatened glider detected on 83% of 12 transects, followed by Glenugie (50% of 10 transects), Mororo (50% of six transects) and Tabbimoble (35% of 20 transects).

The minimum number of individuals recorded at each site varied between zero and five (Table 3). This metric is based on the assumption that unless an individual glider can be reliably identified and distinguished (e.g. distinct physical features), subsequent survey detections of an individual of the same species on the same transect is assumed to be the same individual. The figures are therefore conservative as subsequent individual detections may not be the same individual. On occasions when threatened gliders were detected, 60% of detections (i.e. 18 of 30 detections) were of single individuals. This was more pronounced for YbG (82% of YbG detections) compared to SqG (47% of SqG detections). Detection of two individuals on a survey transect accounted for 27% of detections and was more frequent for SqG (32%) compared to YbG (18%). Detection of three or more individuals only occurred for SqG and accounted for 21% of all SqG detections.

Table 3: Threatened glider detections and minimum number of individuals recorded during 8 surveys. Y = yellow-bellied glider; S = squirrel glider. Transect: i = impact, c = control, r = reference; Position: e = east, w = west, n = north, s = south.

Transect Type/ID	Winter		Spring		Summer		Autumn		Minimum No. Individuals	
	1	2	1	2	1	2	1	2	Y-bellied	Squirrel
Impact										
TabLB-ie									0	0
TabLB-iw									0	0
TabVM-ie									0	0
TabVM-iw									0	0
TabN-ie		Y							1	0
TabN-iw									0	0
TabM-ie			S x2						0	2
TabM-iw									0	0
TabS-ie									0	0
TabS-iw									0	0
Mor-ie									0	0
Mor-iw			Y; S	Y					1	1
TucN-ie	Y	S			S		S	S x3	1	3
TucN-iw	S	S x2							0	2
TucS-ie	S	S x4	S		S			S x2	0	4
TucS-iw	Y	S x3; Y	S x2; Y				S		1	3
GN-ie						Y			1	0
GN-iw		Y			Y		Y	Y	1	0
GS-ie									0	0
GS-iw					S			S	0	1
Control										
TabN-ce	S								0	1
TabN-cw									0	0
TabM-ce									0	0
TabM-cw								Y	1	0
TabS-ce									0	0
TabS-cw									0	0
Mor-ce		Y x2							2	0
Mor-cw									0	0
TucN-ce		S							0	1
TucN-cw									0	0
TucM-ce									0	0
TucM-cw	S	S	S			S x2			0	2
TucS-ce	S x2	S x2					S		0	2
TucS-cw		S x2	S	S	S x2		S	S	0	2

GN-ce	Y x2								2	0
GN-cw									0	0
GS-ce						S			0	1
GS-cw									0	0
Reference										
TabNR-rn				S	S			S	0	1
TabNR-rs								S	0	1
TabDD-rn								S	0	1
TabDD-rs									0	0
Mor-rn									0	0
Mor-rs		Y		S; Y					1	1
Tuc-r-n			S		S x2	S x2		S	0	2
Tuc-r-s	Y	S x5	Y				S	S x2	1	5
G-r-n									0	0
G-r-s									0	0

3.3 Threatened Glider Site Occupancy

The TGMP directs that a BACI design will be used to compare the proportion of each transect type (i.e. impact/control/reference) occupied by YbG and SqG 'before and after' construction. If the highway upgrade is adequately mitigated, then the proportion of occupied impact transects should not decline relative to reference transects or control transects.

To calculate occupancy, survey data for each transect has been pooled for the four survey sessions. Transects where YbG or SqG were detected during any of the four survey sessions have been scored as 'occupied' by that species for the pre-construction period. Such an approach controls for seasonal variation in transect use.

For both species, occupation rates at impact and reference transects were greater than at control transects. For SqG, occupation rates (impact/control/reference) were 35%/33%/60% and higher than those for YbG at 30%/17%/20% (Figure 3).

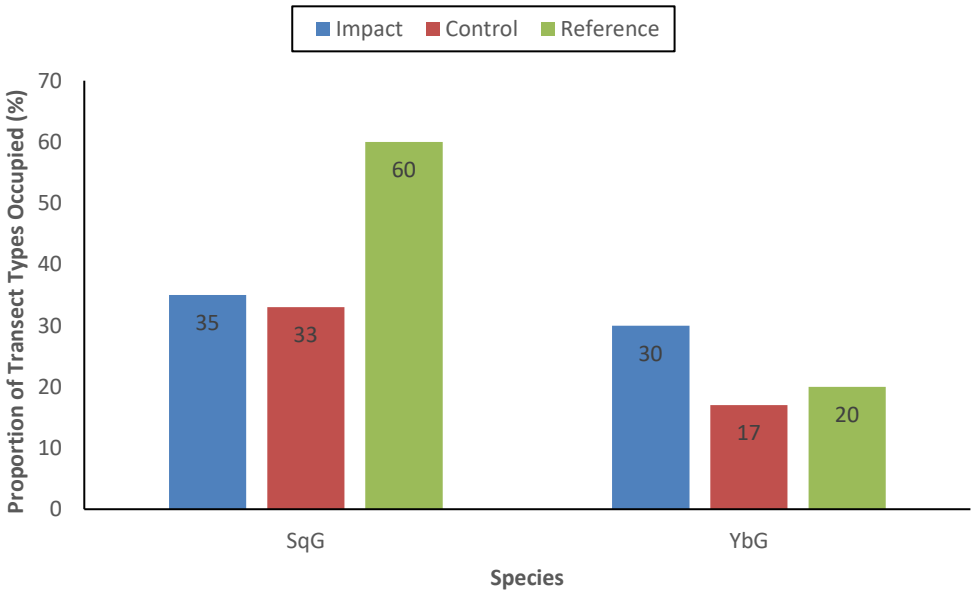

Figure 3: Comparison of impact, control and reference site occupation rates for yellow-bellied gliders (YbG) and squirrel gliders (SqG).

In order to review the adequacy of survey effort in determining occupation, detection records were plotted to generate an accumulation curve. An accumulation curve graphically displays the effect of survey effort on the number of transects featuring new SqG and/or YbG detections. A flattening out of the accumulation curve, or asymptote, suggests that sufficient survey effort has been expended.

As shown in Figure 4, the curve gradient varies for SqG and YbG. The SqG plot shows a consistent, gradual rise in new detections with increasing number of surveys, including two new detections in the final survey. The YbG curve is somewhat flatter reflecting fewer new detections with increasing survey effort although a new detection was recorded in the final survey. This suggests that at least eight surveys are required, particularly for squirrel gliders, to achieve a reasonable level of confidence in determining the presence/absence of threatened gliders on each survey transect.

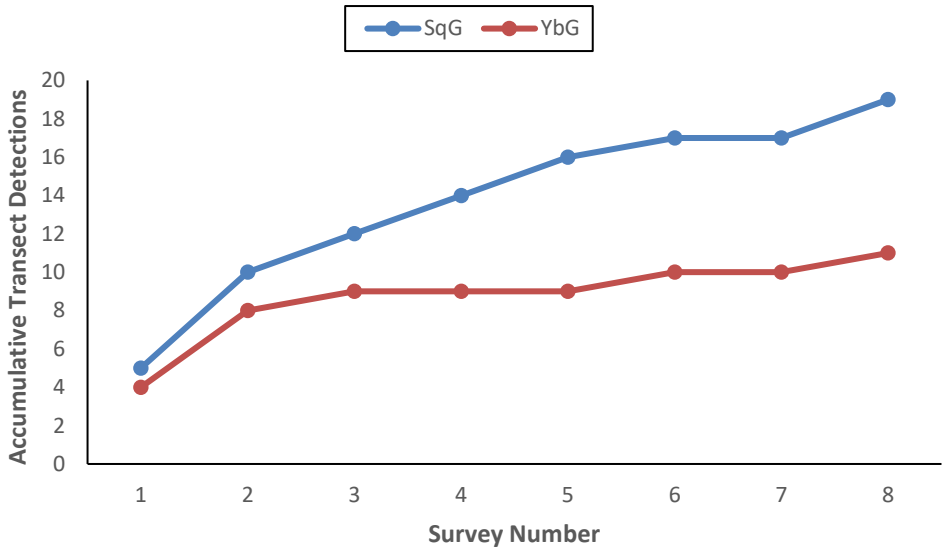

Figure 4: Accumulation curve of new threatened glider transect detections across four seasons (8 surveys). YbG = yellow-bellied glider; SqG = squirrel glider.

3.4 Site Assessments

All transects were located in dry open forest (DOF) or a combination of DOF and swamp forest (SF) or moist open forest (MOF) (Table 4). Estimated hollow abundance was highly variable between sites and transects and ranged from 2.5 hollows/ha at Glenugie south control east (GS-ce) to 26 hollows/ha at Tabbimoble vegetated median impact east (TabVM-ie). All transects featured some anthropogenic disturbance with past logging and tracks the most common. Evidence of fire history varied considerably across sites and ranged from recent (previous 12 months) to 5-10 years. All transects were located in continuous forest that featured varying levels of minor clearing and/or fragmentation. No transects were located within vegetated corridors.

Eucalypt flowering (a primary food source) varied across seasons and sites. Observed seasonal flowering included:

- Winter - red mahogany (Eucalyptus resinifera), spotted gum (E. maculata), white stringy bark (E. globoidea), coastal banksia (Banksia integrifolia);
- Spring - tallow wood (E. microcorys), spotted gum, forest red gum (E. tereticornis), white stringybark;
- Summer - grey ironbark (E. siderophloia), spotted gum;

- Autumn - pink bloodwood (Corymbia intermedia), coastal banksia, blackbutt (E. pilularis), broad-leaved paperbark (Melaleuca quinquenervia), spotted gum, grey box box (E. moluccana).

Further details of site assessments are presented in Table C1, Appendix C.

Table 4: Summary of transect habitat assessments. Transect: i = impact, c = control, r = reference; Orientation: e = east, w = west, n = north, s = south; Habitat Type: DOF = dry open forest, SF = swamp forest, MOF = moist open forest; Hollow Size Class: s = small (10-50mm diam.), m = medium (55-150mm), l = large (150-300mm), vl = very large (+300mm).

Transect	Habitat Type	Mean hollows/ha (size class)	Fire History	Disturbance/ Easements	Forest connectivity	Coordinates at Center of Transect (UTM)	
						Easting	Northing
TabLB-ie	DOF; SF	6.5 (s,m,l)	5-10 yrs	Logging; track; clearing	Continuous forest; minor road bisects	527582	6773203
TabLB-iw	DOF	8.5 (s,m,l)	5-10 yrs	Logging	Continuous forest	527452	6773308
TabNR-rn	DOF, SF	4.5 (s,m,l)	>5yrs	Logging, tracks	Continuous forest	529178	6772891
TabNR-rs	DOF, SF	24 (s,m,l)	>5yrs	Logging, tracks	Continuous forest	529960	6771525
TabVM-ie	DOF	26 (s,m,l,vl)	<5 yrs	Logging ; tracks	Continuous forest	527232	6772031
TabVM-iw	DOF	13.5 (s,m,l,vl)	>5 years	Logging, tracks,	Continuous forest	526888	6772045
TabN-ie	DOF	21.5 (s,m,l,vl)	>5 yrs	Logging ; tracks	Continuous forest	526826	6770530
TabN-iw	DOF,MOF	10.5 (s,m,l)	>5 years	Logging, fencing, tracks.	Continuous forest	526550	6770577
TabN-ce	DOF, SF	11 (s,m)	<5yrs	Logging, tracks	Continuous forest; minor cleared patches	526094	6769344
TabN-cw	DOF	12.5 (s,m,l)	<5years	Tracks, rubbish, logging	Continuous forest	525803	6769255
TabDD-rn	DOF	7 (s,m)	<5yrs	Logging, tracks	Continuous forest	524826	6769767
TabDD-rs	DOF	4.5 (s,m,l,vl)	<5yrs	Logging, tracks	Continuous forest	523057	6769560
TabM-ce	DOF	6.5 (s,m,l)	>5yrs	Logging, tracks	Continuous forest	525557	6768428
TabM-cw	DOF	22.5 (s,m,l)	<5yrs	Logging, tracks	Continuous forest	525151	6768474
TabM-ie	DOF	10 (s,m,l)	<5 years	Logging, track	Continuous forest	525033	6767369
TabM-iw	DOF	11.5 (s,m,l,vl)	<5 years	Logging, tracks	Continuous forest	524907	6767395
TabS-ie	DOF	4 (s,m)	>5 yrs	Logging ; clearing, road	Continuous forest	524651	6766470
TabS-iw	DOF	25 (s,m,l,vl)	>5yrs	Track, logging	Continuous forest	524533	6766500
TabS-ce	DOF	12 (s,m)	<5yrs	Tracks, logging, clearing	Continuous forest; minor cleared patches	521327	6757919
TabS-cw	DOF, SF	9 (s,m,l,vl)	<5 years	track	Continuous forest	520905	6760849
MOR-ie	DOF	14 (s,m,l,vl)	+/- 5yrs	Logging, tracks	Continuous forest	522418	6756590
MOR-iw	DOF	8 (s,m)	>5yrs	Logging, hwy; easement	Continuous forest; partially fragmented	522276	6756457
MOR-ce	DOF	18 (s,m,l)	+/- 5yrs	Logging, tracks	Continuous forest	522970	6755546
MOR-cw	DOF	6.5 (s,m,l,vl)	<5yrs	Logging, rest area; easement	Continuous forest	522700	6755572
MOR-rn	DOF, SF	14.5 (s,m,l)	<5yr	tracks	Continuous forest	523152	6757392
MOR-rs	DOF	11.5 (s,m)	+/- 5yrs	Logging, tracks	Continuous forest	524147	6755441
TucN-ce	DOF	7 (s,m)	>5 years	Tracks, logging.	Continuous forest; minor cleared patches	513756	6727507
TucN-cw	DOF	16 (s,m,l)	4-6 years	Logging, mining, grazing, tracks	Continuous forest; minor cleared patches	513342	6727435
TucM-ce	DOF	5.5 (s,m,l)	>5 years	Logging, tracks, grazing	Continuous forest	513240	6725830
TucM-cw	DOF,MOF	5 (s,m,l,vl)	>5 years	Tracks, fencing.	Continuous forest; minor cleared patches	512830	6724245

Tuc-r-n	DOF	5.5 (s,m)	<5 years	Logging, fire, grazing, tracks	Continuous forest	515344	6720259
Tuc-r-s	DOF	11.5 (s,m,l)	>5 years	Logging, tracks, grazing	Continuous forest	516956	6719676
TucS-ce	DOF	17.5 (s,m,l)	>5years	Logging, grazing, tracks	Continuous forest; minor cleared patches	512932	6717966
TucS-cw	DOF	11 (s,m)	>5 years	Logging, grazing, tracks	Continuous forest; minor cleared patches	512812	6718078
TucN-ie	DOF; SF	8.5 (s,m,l,vl)	<5yrs	Logging, clearing, grazing, tracks	Continuous forest; minor cleared patches	512595	6716859
TucN-iw	DOF	5.5 (s,m)	<5yrs	Logging, clearing, grazing, tracks	Continuous forest; partially fragmented	512402	6716841
TucS-ie	DOF	22 (s,m,l,vl)	>5 years	Logging, grazing, tracks, fencing	Continuous forest; minor cleared patches	511823	6711239
TucS-iw	DOF	22 (s,m,l,vl)	>5 years	Logging, grazing, tracks, fencing	Continuous forest; minor cleared patches	511679	6711293
GN-ce	DOF	9.5 (s,m,l)	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches	503802	6706855
GN-cw	DOF	6.5 (s,m,l)	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches	503680	6706878
GN-ie	DOF	5.5 (s,m,l)	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches	503577	6705891
GN-iw	DOF	5 (s,m)	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches	503440	6705889
GS-ie	DOF	7.5 (s,m)	<1year	Logging, tracks, grazing	Continuous forest	503004	6704630
GS-iw	DOF	8.5 (s,m,l)	<1year	Logging, tracks, grazing	Continuous forest	502783	6704623
GS-ce	DOF	2.5 (s,m)	<1 year	Logging, tracks, grazing, fire	Continuous forest; minor cleared patches	503049	6703073
GS-cw	DOF	5 (s,m,vl)	<5 years	Tracks, fences, roads, logging	Continuous forest; partially fragmented	502577	6703722
G-r-n	DOF	3 (s,m)	<2 years	Extensive logging, tracks, grazing	Continuous forest	504645	6704742
G-r-s	DOF	6.5 (s,m,l)	<2 years	Extensive logging, tracks, grazing	Continuous forest	504872	6703121

4. Discussion

4.1 Threatened Glider Site Occupancy

Vegetated medians and engineered aerial crossing structures increasingly feature in major road and highway upgrades in eastern Australia. While use of such structures has been reported for a range of arboreal fauna (e.g. Goldingay et al. 2013; Soanes et al. 2015; Taylor & Goldingay 2013; Taylor & Rohweder 2013), little is known about the effects of aerial crossings on the viability of local populations (Soanes et al. 2013; Taylor & Goldingay 2012). The aim of the current study was to establish pre-construction baseline data on the presence/absence (i.e. occupation) of threatened gliders at mitigated (impact) and unmitigated (control) roadside sites and at sites away from the road upgrade (reference) in sections 3, 6 and 7 of the W2B upgrade.

Results of the eight surveys showed varied rates of YbG and SqG occupation across sites and site types. Both species occupied relatively more impact transects than control transects with SqG recorded on 7/20 (35%) impact transects and 6/18 (33%) control transects. By contrast, YbG were recorded on 6/20 (30%) impact

transects and 3/18 (17%) control transects. Reference transects (n = 10) also featured higher occupation rates than control transects with SqG recorded on 60% and YbG 20% of transects. Higher occupation rates are expected at impact and reference sites because they largely feature higher quality habitat and are generally in proximity of known threatened glider records. Despite this, when records are combined, either or both species of threatened glider were detected on 50% of impact and control transects and 60% of reference transects.

The spatial array of threatened glider detections was unevenly distributed. Occupation rates were markedly higher in the Tucabia area with either or both species of threatened glider detected on 83% of 12 transects, compared to Glenugie (50% of 10 transects), Mororo (50% of six transects) and Tabbimoble (35% of 20 transects). The Tucabia area is removed from the existing highway and features the greatest level of habitat heterogeneity and thereby greater diversity of floristic resources. The Tucabia area also features a relatively high mean hollow abundance (11.4 ±6.4 hollows/ha). All sites feature varying levels of anthropogenic disturbance, particularly logging and tracks, although this was more pronounced in parts of Glenugie and Tabbimoble.

4.2 Survey Effort and Complementary Datasets

The data gathered across eight surveys clearly demonstrates the strong relationship between survey effort and rates of occupation. The accumulation curve described in Figure 7 reinforces the need for multiple surveys across all seasons to confidently determine site occupation. Indeed, 90% of all transect detections for either species was not achieved until the sixth survey and new detections of both species still occurred in the final survey. Importantly, surveying across four seasons helps control for changes in distribution of floral resources and surveying twice during each season helps control for smaller scale variations in movement patterns. Overall, the data suggest that at least eight surveys across four seasons are required, particularly for detection of squirrel gliders, to build a robust dataset with which to confidently determine rates of occupation. The effectiveness of a BACI experimental design is largely contingent on robust datasets. The current survey records provide such a dataset which should enable meaningful before and after construction comparisons to be made. This dataset will be further enhanced by inclusion of threatened glider occupation rates derived from sections 1 and 2 baseline population surveys (Sandpiper Ecological 2015). Combined, the two datasets provide greater replication and a greater level of confidence with which to determine population responses to the highway upgrade.

To further assist in determining population level responses, particularly during the operational phase, arboreal fauna records gathered during the clearing phase, glider road mortality monitoring and aerial crossing monitoring should be included in population assessments. Clearing phase arboreal fauna records will likely complement existing spatial records. Glider road mortality monitoring will assist in determining if and where mortality is occurring and any spatial relationship to crossing structure locations. This is particularly important because road mortality has been implicated in lower apparent survivorship of squirrel gliders residing along the Hume highway in Victoria (McCall et al. 2010). The results of aerial crossing monitoring clearly have important implications for roadside glider populations and gene flow (see Goldingay et al. 2013). Indeed, the broad goal of the Biodiversity Connectivity Strategy (BCS) is to maintain connectivity in the landscape as well as enhance connectivity where *feasible* and *reasonable* near the road corridor (W2BPA 2012). The BCS further states that the connectivity goal for populations of YbG and SqG affected by the highway upgrade is to '*promote gene flow and provide functional crossing opportunities*'. This is particularly so for YbG because little is known about the species willingness to use road crossing structures.

4.3 Other Arboreal Mammals

Another feature of the current baseline surveys is the comprehensive dataset it has generated on occupation rates of other arboreal mammals. Seven other species of arboreal mammal were detected across the 48

transects during the four survey seasons. Notably, two of these were threatened species - brush-tailed phascogale (6% of all transects) and greater glider (46% of all transects). The brush-tailed phascogale is listed as Vulnerable by the NSW TSC Act and the greater glider was recently listed as Vulnerable by the Commonwealth EPBC Act. Importantly, the highest occupation rates for greater glider and brush-tailed phascogale were at impact sites (50% and 15%, respectively). Greater gliders were also recorded at 50% of reference sites and 39% of control sites. The records of these and other arboreal mammals will be useful in subsequent comparisons, particularly if they reveal similar population responses to the highway upgrade as SqG and YbG. Arboreal mammal records from impact sites will also assist in assessing use and effectiveness of crossing structures during the operational phase.

4.4 Crossing Structure Type and Location

Consideration should be given to using the current baseline data to further inform crossing structure design and placement. This particularly relates to threatened brush-tailed phascogale records. Brush-tailed phascogale was detected at impact sites Glenugie South east and Tucabia South east and west. Both of these sites are recommended for glide poles and their complementary, near-by sites (i.e. Glenugie North and Tucabia North) recommended for rope bridges. These recommendations were largely based on results of targeted surveys (Sandpiper Ecological 2014), BioNet atlas records and a prediction that yellow-bellied gliders were more likely to use glide poles than rope bridges to cross large canopy gaps. Squirrel gliders are known to use glide poles and rope bridges to cross major roads (Soanes et. al 2015; Taylor and Goldingay 2013) and brush-tailed phascogales, which are highly arboreal (and non-volant), are known to use rope bridges (Soanes et al. 2015; Sandpiper Ecological 2016).

It may, therefore, be preferable to swap the recommended crossing structure types at these locations. That is, at Glenugie impact sites, install a rope bridge (instead of glide poles) at ch.35540 (Glenugie South) where brush-tailed phascogale and squirrel glider were detected and install glide poles (instead of a rope bridge) at ch.37230 (Glenugie North) where yellow-bellied gliders were detected. At Tucabia impact sites, install a rope bridge (instead of glide poles) at ch.48100 (Tucabia South) where brush-tailed phascogale, squirrel glider and yellow-bellied glider were detected and install glide poles (instead of a rope bridge) at ch.53850 (Tucabia North) where yellow-bellied gliders and squirrel gliders were detected.

A final consideration regards greater gliders. In light of their recent Federal listing, unapproved components of the W2B project featuring greater gliders will be required to mitigate impacts on their population viability. We are not aware of any records of greater glider use of crossing structures although aspects of their behavioural ecology may make them more inclined to use rope bridges rather than glide poles. Greater gliders were recorded at impact sites recommended for glide poles (n = 1), a rope bridge (n = 4) and a land bridge (n = 1). Aerial crossing monitoring at sites featuring greater glider records will, therefore, be important for gaining possible insights on their use and/or preference for crossing structure type.

5. Recommendations

1. Conduct operational phase monitoring (four seasons, two surveys/season) of all baseline sites, as per the Threatened Glider Management Plan.
2. Threatened glider occupation rates derived from section 1 and 2 baseline surveys should be combined with occupation rate data from sections 3, 6 and 7 baseline surveys to generate a more robust dataset with which to assess population responses to the highway upgrade.
3. Fauna records obtained during the clearing phase, operational phase aerial crossing monitoring and road mortality monitoring should be used to complement operational phase threatened glider population monitoring.

4. At crossing structure locations in Glenugie, install a rope bridge (instead of glide poles) at ch.35540 (Glenugie South) and install glide poles (instead of a rope bridge) at ch.37230 (Glenugie North).
5. At crossing structure locations in Tucabia, install a rope bridge (instead of glide poles) at ch.48100 (Tucabia South) and install glide poles (instead of a rope bridge) at ch.53850 (Tucabia North).

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Appendix A – Survey Effort and Weather Conditions

Table A1: Survey effort and weather data from baseline spotlight surveys for threatened gliders in sections 3, 6 and 7 of the W2B upgrade.

Transect	Date	Order	Observer	Temp	Humidity	Cloud %	Wind	Rain	Moon	Start	Finish
TabLB-ie	22/6/15	3	TW	12.9	98.9	Nil	Msb	Nil	1st 1/4	1959	2031
	24/6/15	2	BT	18.9	95.1	100	Msb	Light	1st 1/4	1905	1936
	9/9/15	4	NP	15.5	71	0	Nil	Nil	3rd 1/4	2102	2136
	14/9/15	3	BT	16.7	89	0	Nil	Nil	New	2006	2038
	17/12/115	5	BT	21	89	0	Nil	Last 24h	1/4	2328	2359
	13/1/16	2	NP	23.5	91	20	Msb	Nil	0/4	2135	2207
	17/3/16	2	BT	23	91	20	Nil	Nil	1/4	2030	2102
	5/4/16	1	NP	21	75	10	Nil	Nil	0/4	1838	1910
TabLB-iw	22/6/15	3	BT	12.9	98.9	Nil	Msb	Nil	1st 1/4	1958	2030
	24/6/15	2	TW	18.9	95.1	100	Msb	Light	1st 1/4	1905	1936
	9/9/15	4	BT	15.5	71	0	Nil	Nil	3rd 1/4	2102	2136
	14/9/15	3	NP	16.7	89	0	Nil	Nil	New	2006	2038
	17/12/115	5	NP	21	89	0	Nil	Last 24h	1/4	2328	2359
	13/1/16	2	BT	23.5	91	20	Msb	Nil	0/4	2135	2207
	17/3/16	2	NP	23	91	20	Nil	Nil	1/4	2030	2102
	5/4/16	1	BT	21	75	10	Nil	Nil	0/4	1838	1910
TabNR-rn	18/6/15		TW	14.5	92.3	10	Msb	Nil	New	2150	2228
	22/6/15	4	BT	12.9	98.9	Nil	Msb	Nil	1st 1/4	2058	2130
	9/9/15	3	NP	15.5	71	0	Nil	Nil	3rd 1/4	2012	2045
	14/9/15	4	BT	15.2	96	0	Nil	Nil	New	2058	2132
	17/12/115	4	BT	21.4	86	0	Nil	Last 24h	1/4	2244	2315
	13/1/16	3	NP	22.9	93	10	Msb	Nil	0/4	2222	2255
	17/3/16	1	BT	22.8	88	20	Nil	Nil	1/4	1948	2022
	5/4/16	2	NP	17.2	80	0	Nil	Nil	0/4	2128	2000
TabNR-rs	18/6/15		BT	14.5	92.3	10	Msb	Nil	New	2201	2233
	22/6/15	4	TW	12.9	98.9	Nil	Msb	Nil	1st 1/4	2058	2130
	9/9/15	3	BT	15.5	71	0	Nil	Nil	3rd 1/4	2012	2045
	14/9/15	4	NP	15.2	96	0	Nil	Nil	New	2058	2132
	17/12/115	4	NP	21.4	86	0	Nil	Last 24h	1/4	2244	2315
	13/1/16	3	BT	22.9	93	10	Msb	Nil	0/4	2222	2255
	17/3/16	1	NP	22.8	88	20	Nil	Nil	1/4	1948	2022
	5/4/16	2	BT	17.2	80	0	Nil	Nil	0/4	2128	2000
TabVM-ie	22/6/15	5	TW	12.9	96.9	Nil	Msb	Nil	1st 1/4	2150	2221
	24/6/15	3	BT	14.1	97	100	Msb	Nil	1st 1/4	2005	2038
	8/9/15	6	BT	16.6	88	40	Msb	Nil	3rd 1/4	2308	2342
	10/9/15	1	NP	16.5	86	80	Msb	Nil	3rd 1/4	1827	1859
	17/12/115	6	BT	21	89	0	Nil	Last 24h	1/4	0018	0050
	13/1/16	1	NP	23.5	91	20	Msb	Nil	0/4	2042	2115
	17/3/16	3	BT	23	85	10	Nil	Nil	1/4	2112	2149
	5/4/16	3	NP	20.8	82	0	Nil	Nil	0/4	2025	258
TabVM-iw	22/6/15	5	BT	12.9	96.9	Nil	Msb	Nil	1st 1/4	2155	2230
	24/6/15	3	TW	14.1	97	100	Msb	Nil	1st 1/4	2007	2040

	8/9/15	6	NP	16.6	88	40	Msb	Nil	3rd 1/4	2308	2342
	10/9/15	1	BT	16.5	86	80	Msb	Nil	3rd 1/4	1827	1859
	17/12/115	6	NP	21	89	0	Nil	Last 24h	1/4	0018	0050
	13/1/16	1	BT	23.5	91	20	Msb	Nil	0/4	2042	2115
	17/3/16	3	NP	23	85	10	Nil	Nil	1/4	2112	2149
	5/4/16	3	BT	20.8	82	0	Nil	Nil	0/4	2025	258
TabN-ie	22/6/15	2	TW	14.8	98.7	15	Nil	Nil	1st 1/4	1856	1926
	24/6/15	1	BT	18.9	95.1	100	Nil	Nil	1st 1/4	1800	1835
	8/9/15	5	BT	16.6	88	40	Msb	Nil	3rd 1/4	2215	2250
	10/9/15	2	NP	17.1	92	80	Nil	Light	3rd 1/4	1925	1958
	17/12/115	3	BT	21.2	91	10	Nil	Nil	1/4	2155	2226
	13/1/16	1	NP	24.7	87	20	Msb	Nil	0/4	2044	2116
	17/3/16	4	BT	23	85	10	Nil	Nil	1/4	2158	2330
	5/4/16	4	NP	20.8	82	0	Nil	Nil	0/4	214	2145
TabN-iw	22/6/15	2	BT	14.8	98.7	15	Nil	Nil	1st 1/4	1852	1928
	24/6/15	1	TW	18.9	95.1	100	Nil	Nil	1st 1/4	1800	1830
	8/9/15	5	NP	16.6	88	40	Msb	Nil	3rd 1/4	2215	2250
	10/9/15	2	BT	17.1	92	80	Nil	Light	3rd 1/4	1925	1958
	17/12/115	3	NP	21.2	91	10	Nil	Nil	1/4	2155	2226
	13/1/16	1	BT	24.7	87	20	Msb	Nil	0/4	2044	2116
	17/3/16	4	NP	23	85	10	Nil	Nil	1/4	2158	2330
	5/4/16	4	BT	20.8	82	0	Nil	Nil	0/4	214	2145
TabN-ce	18/6/15	##	BT	13.9	96.2	Nil	Nil	Nil	New	1952	2027
	23/6/15	3	TW	17.3	91	100	Nil	Nil	1st 1/4	1956	1927
	8/9/15	4	BT	16.2	92	60	Msb	Nil	3rd 1/4	2110	2143
	10/9/15	3	NP	17.2	78	50	Msb	Nil	3rd 1/4	2018	2055
	17/12/115	2	BT	21.4	80	30	Nil	Last 24h	1/4	2109	2144
	13/1/16	3	NP	22.1	98	20	Msb	Nil	0/4	2235	2311
	17/3/16	6	BT	22.1	93	10	Nil	Nil	1/4	2332	2404
	5/4/16	5	NP	19.7	82	0	Nil	Nil	0/4	2159	2230
TabN-cw	18/6/15	##	TW	13.9	96.2	Nil	Nil	Nil	New	1950	2021
	23/6/15	3	BT	17.3	91	100	Nil	Nil	1st 1/4	1955	2028
	8/9/15	4	NP	16.2	92	60	Msb	Nil	3rd 1/4	2110	2143
	10/9/15	3	BT	17.2	78	50	Msb	Nil	3rd 1/4	2018	2055
	17/12/115	2	NP	21.4	80	30	Nil	Last 24h	1/4	2109	2144
	13/1/16	3	BT	22.1	98	20	Msb	Nil	0/4	2235	2311
	17/3/16	6	NP	22.1	93	10	Nil	Nil	1/4	2332	2404
	5/4/16	5	BT	19.7	82	0	Nil	Nil	0/4	2159	2230
TabDD-rn	18/6/15		TW	13.9	96.2	Nil	Nil	Nil	New	2051	2127
	22/6/15	1	BT	14.8	98.7	15	Nil	Nil	1st 1/4	1748	1822
	8/9/15	3	NP	16.2	92	60	Msb	Nil	3rd 1/4	2012	2045
	10/9/15	4	BT	17.2	78	50	Msb	Nil	3rd 1/4	2110	2143
	17/12/115	1	BT	22.5	69	50	Msb	Last 24h	1/4	2029	2102
	13/1/16	2	NP	24.7	87	20	Msb	Nil	0/4	2135	2210
	17/3/16	5	BT	22.6	91	10	Nil	Nil	1/4	2240	2315
	5/4/16	6	NP	19.7	82	0	Nil	Nil	0/4	2245	2316

TabDD-rs	18/6/15		BT	13.9	96.2	Nil	Nil	Nil	New	2055	2128
	22/6/15	1	TW	14.8	98.7	15	Nil	Nil	1st 1/4	1851	1926
	8/9/15	3	BT	16.2	92	60	Msb	Nil	3rd 1/4	2014	2047
	10/9/15	4	NP	17.2	78	50	Msb	Nil	3rd 1/4	2110	2143
	17/12/115	1	NP	22.5	69	50	Msb	Last 24h	1/4	2029	2102
	13/1/16	2	BT	24.7	87	20	Msb	Nil	0/4	2135	2210
	17/3/16	5	NP	22.6	91	10	Nil	Nil	1/4	2240	2315
	5/4/16	6	BT	19.7	82	0	Nil	Nil	0/4	2245	2316
TabM-ce	18/6/15	##	TW	18.8	87.1	Nil	Nil	Nil	New	1846	1916
	23/6/15	2	BT	19.8	90.2	90	Msb	Nil	1st 1/4	1855	1928
	8/9/15	2	BT	16.2	92	60	Msb	Nil	3rd 1/4	1914	1948
	10/9/15	6	NP	16.9	79	40	Nil	Nil	3rd 1/4	2255	2328
	16/12/115	2	BT	22	85	10	Msb	Nil	1/4	2119	2152
	13/1/16	5	NP	21.5	98	0	Nil	Nil	0/4	2420	2452
	16/3/16	4	BT	20.9	99	50	Nil	Past 24hr	1/4	2220	2252
	6/4/16	1	NP	21.5	93	5	Msb	Nil	0/4	1835	1910
TabM-cw	18/6/15	##	BT	18.8	87.1	Nil	Nil	Nil	New	1849	1923
	23/6/15	2	TW	19.8	90.2	90	Msb	Nil	1st 1/4	1858	1929
	8/9/15	2	NP	16.2	92	60	Msb	Nil	3rd 1/4	1914	1948
	10/9/15	6	BT	16.9	79	40	Nil	Nil	3rd 1/4	2255	2328
	16/12/115	2	NP	22	85	10	Msb	Nil	1/4	2119	2152
	13/1/16	5	BT	21.5	98	0	Nil	Nil	0/4	2420	2452
	16/3/16	4	NP	20.9	99	50	Nil	Past 24hr	1/4	2220	2252
	6/4/16	1	BT	21.5	93	5	Msb	Nil	0/4	1835	1910
TabM-ie	18/6/15	##	BT	18.8	87.1	Nil	Nil	Nil	New	1745	1816
	23/6/15	1	TW	19.8	90.2	90	Msb	Nil	1st 1/4	1752	1826
	8/9/15	1	BT	16.2	92	50	Nil	Nil	3rd 1/4	1826	1858
	10/9/15	5	NP	16.9	79	40	Nil	Nil	3rd 1/4	2204	2237
	16/12/115	1	BT	22	85	10	Msb	Nil	1/4	2028	2100
	13/1/16	4	NP	22.1	98	20	Msb	Nil	0/4	2328	2402
	16/3/16	3	BT	20.9	99	50	Nil	Past 24hr	1/4	2130	2202
	6/4/16	2	NP	21.5	93	5	Msb	Nil	0/4	1935	2007
TabM-iw	18/6/15	##	TW	18.8	87.1	Nil	Nil	Nil	New	1748	1722
	23/6/15	1	BT	19.8	90.2	90	Msb	Nil	1st 1/4	1752	1826
	8/9/15	1	NP	16.2	92	50	Nil	Nil	3rd 1/4	1826	1858
	10/9/15	5	BT	16.9	79	40	Nil	Nil	3rd 1/4	2204	2237
	16/12/115	1	NP	22	85	10	Msb	Nil	1/4	2028	2100
	13/1/16	4	BT	22.1	98	20	Msb	Nil	0/4	2328	2402
	16/3/16	3	NP	20.9	99	50	Nil	Past 24hr	1/4	2130	2202
	6/4/16	2	BT	21.5	93	5	Msb	Nil	0/4	1935	2007
TabS-ie	18/6/15		TW	14.5	92.3	10	Msb	Nil	New	2250	2327
	23/6/15	4	BT	17.3	91	100	Nil	Nil	1st 1/4	2057	2130
	7/9/15	5	NP	15.3	98	40	Mlb	Past 24	3rd 1/4	2224	2256
	9/9/15	5	BT	15.1	73	0	Nil	Nil	3rd 1/4	2158	2230
	15/12/15	4	BT	22.6	87	80	Msb	Nil	1/4	2303	2333
	12/1/16	1	NP	25.1	91	100	Msb	Nil	0/4	2039	2112

	16/3/16	2	BT	22.7	84	100	Msb	Past 2hr	1/4	2050	2120
	4/4/16	5	NP	22.1	67	5	Nil	Nil	0/4	2245	2316
TabS-iw	18/6/15		BT	14.5	92.3	10	Msb	Nil	New	2252	2328
	23/6/15	4	TW	17.3	91	100	Nil	Nil	1st 1/4	2100	2133
	7/9/15	5	BT	15.3	98	40	Mlb	Past 24	3rd 1/4	2224	2256
	9/9/15	5	NP	15.1	73	0	Nil	Nil	3rd 1/4	2158	2230
	15/12/15	4	NP	22.6	87	80	Msb	Nil	1/4	2303	2333
	12/1/16	1	BT	25.1	91	100	Msb	Nil	0/4	2039	2112
	16/3/16	2	NP	22.7	84	100	Msb	Past 2hr	1/4	2050	2120
	4/4/16	5	BT	22.1	67	5	Nil	Nil	0/4	2245	2316
TabS-ce	17/6/15		TW	15.7	99	10	Mlb	Last 12h; lvs wet	New	1933	2003
	23/6/15	5	BT	17.3	91	100	Nil	Nil	1st 1/4	2201	2230
	7/9/15	4	NP	15.3	98	40	Mlb	Past 24	3rd 1/4	2124	2155
	9/9/15	6	BT	13.4	78	10	Msb	Nil	3rd 1/4	2258	2330
	15/12/15	5	BT	21.4	97	40	Nil	Nil	1/4	2358	2430
	12/1/16	2	NP	23.9	97	100	Nil	Nil	0/4	2135	2210
	16/3/16	1	BT	22.7	84	100	Msb	Lt shwr	1/4	1955	2028
	4/4/16	4	NP	22.1	67	5	Nil	Nil	0/4	2140	2213
TabS-cw	17/6/15		BT	15.7	99	10	Mlb	Last 12h; lvs wet	New	1942	2016
	23/6/15	5	TW	17.3	91	100	Nil	Nil	1st 1/4	2156	2226
	7/9/15	4	BT	15.3	98	40	Mlb	Past 24	3rd 1/4	2124	2155
	9/9/15	6	NP	13.4	78	10	Msb	Nil	3rd 1/4	2258	2330
	15/12/15	5	NP	21.4	97	40	Nil	Nil	1/4	2358	2430
	12/1/16	2	BT	23.9	97	100	Nil	Nil	0/4	2135	2210
	16/3/16	1	NP	22.7	84	100	Msb	Lt shwr	1/4	1955	2028
	4/4/16	4	BT	22.1	67	5	Nil	Nil	0/4	2140	2213
MOR-ie	17/6/15		TW	16	100	10	Msb	Last 12h; lvs wet	New	2045	2115
	24/6/15	4	BT	15.7	82	80	Msb	Nil	1st 1/4	2110	2144
	7/9/15	3	NP	18	91	40	Nil	Past 24	3rd 1/4	2025	2056
	14/9/15	5	BT	15.2	96	0	Nil	Nil	New	2158	2234
	15/12/15	1	BT	22.9	86	90	Nil	Last 24h	1/4	2025	2100
	12/1/16	3	NP	25	92	100	Nil	Nil	0/4	2235	2307
	15/3/16	3	BT	23.5	89	80	Msb	Light shwr	1/4	2132	2204
	4/4/16	1	NP	24	65	40	Nil	Nil	0/4	1901	1933
MOR-iw	17/6/15		TW	19.2	96.7	50	Nil	Last 12h; lvs wet	New	1820	1852
	24/6/15	6	BT	13.7	98	70	Nil	Nil	1st 1/4	2332	2403
	7/9/15	2	NP	17.4	96	50	Nil	Past 24	3rd 1/4	1918	1952
	14/9/15	7	BT	17	83	0	Msb	Nil	New	2354	2428
	15/12/15	3	BT	22.6	87	80	Msb	Nil	1/4	2214	2250
	12/1/16	5	NP	21.1	82	40	Nil	Nil	0/4	2422	2455
	15/3/16	2	NP	24	72	90	Mlb	Lt shwr	1/4	2035	2107
	4/4/16	3	BT	23.5	62	10	Msb	Nil	0/4	2040	2111
MOR-ce	17/6/15		BT	21.1	87.2	60	Nil	Last 12h; lvs wet	New	1740	1816
	24/6/15	5	BT	15.7	82	80	Msb	Nil	1st 1/4	2212	2245

	7/9/15	2	BT	17.4	96	50	Nil	Past 24	3rd 1/4	1918	1952
	14/9/15	6	NP	17	83	0	Msb	Nil	New	2259	2234
	15/12/15	2	BT	22.9	86	90	Nil	Last 24h	1/4	2130	2203
	12/1/16	4	NP	21.1	82	40	Nil	Nil	0/4	2334	2407
	15/3/16	1	BT	24	72	90	Msb	Past 24h	1/4	1950	2020
	4/4/16	3	NP	23.5	62	10	Msb	Nil	0/4	2040	2111
MOR-cw	17/6/15		TW	21.1	87.2	60	Nil	Last 12h; lvs wet	New	1735	1805
	24/6/15	6	TW	13.7	98	70	Nil	Nil	1st 1/4	2330	2400
	7/9/15	1	NP	17.4	96	50	Nil	Past 24	3rd 1/4	1833	1906
	14/9/15	7	NP	17	83	0	Msb	Nil	New	2354	2428
	15/12/15	3	NP	22.6	87	80	Msb	Nil	1/4	2214	2250
	12/1/16	5	BT	21.1	82	40	Nil	Nil	0/4	2422	2455
	15/3/16	1	NP	24	72	90	Msb	Past 24h	1/4	1950	2020
	4/4/16	2	BT	23.5	62	10	Msb	Nil	0/4	1956	2028
MOR-rn	17/6/15		BT	16	100	10	Msb	Last 12h; lvs wet	New	2053	2126
	24/6/15	4	TW	15.7	82	80	Msb	Nil	1st 1/4	2122	2156
	7/9/15	3	BT	18	91	40	Nil	Past 24	3rd 1/4	2025	2056
	14/9/15	5	NP	15.2	96	0	Nil	Nil	New	2158	2234
	15/12/15	1	NP	22.9	86	90	Nil	Last 24h	1/4	2025	2100
	12/1/16	3	BT	25	92	100	Nil	Nil	0/4	2235	2307
	15/3/16	3	NP	23.5	89	80	Msb	Light shwr	1/4	2132	2204
	4/4/16	1	BT	24	65	40	Nil	Nil	0/4	1901	1933
MOR-rs	17/6/15		BT	19.2	96.7	50	Nil	Last 12h; lvs wet	New	1832	1906
	24/6/15	5	TW	15.7	82	80	Msb	Nil	1st 1/4	2212	2245
	7/9/15	1	BT	17.4	96	50	Nil	Past 24	3rd 1/4	1833	1906
	14/9/15	6	BT	17	83	0	Msb	Nil	New	2259	2234
	15/12/15	2	NP	22.9	86	90	Nil	Last 24h	1/4	2130	2203
	12/1/16	4	BT	21.1	82	40	Nil	Nil	0/4	2334	2407
	15/3/16	2	BT	24	72	90	Mlb	Lt shwr	1/4	2035	2107
	4/4/16	2	NP	23.5	62	10	Msb	Nil	0/4	1956	2028
TucN-ce	25/6/15	5	BT	15.9	89	90	Msb	Nil	1st 1/4	2219	2255
	15/7/15	3	NP	12.1	78	90	Nil	Nil	New	2015	2050
	15/9/15	5	BT	15.5	92	0	Nil	Nil	New	2255	2329
	6/10/15	1	NP	23.1	44	0	Msb	Nil	3rd 1/4	1845	1918
	7/12/15	1	NP	24.8	78	10	Nil	Nil	0/4	2026	2053
	14/12/15	6	BT	20.4	86	20	Nil	Nil	0/4	118	153
	9/3/16	5	BT	20.7	92	0	Nil	Past 24hr	0/4	1158	1233
	14/3/16	6	NP	22.6	84	20	Nil	Nil	1/4	2412	2446
TucN-cw	25/6/15	5	TW	15.9	89	90	Msb	Nil	1st 1/4	2219	2255
	15/7/15	3	BT	12.1	78	90	Nil	Nil	New	2015	2050
	15/9/15	5	NP	15.5	92	0	Nil	Nil	New	2255	2329
	6/10/15	1	BT	23.1	44	0	Msb	Nil	3rd 1/4	1845	1918
	7/12/15	1	BT	24.8	78	10	Nil	Nil	0/4	2026	2053
	14/12/15	6	NP	20.4	86	20	Nil	Nil	0/4	118	153
	9/3/16	5	NP	20.7	92	0	Nil	Past 24hr	0/4	1158	1233
	14/3/16	6	BT	22.6	84	20	Nil	Nil	1/4	2412	2446
TucM-ce	25/6/15	4	BT	16.9	86	90	Mlb	Nil	1st 1/4	2113	2146
	15/7/15	4	NP	12.1	78	90	Nil	Nil	New	2125	2200

	15/9/15	4	BT	15.5	92	0	Nil	Nil	New	2150	2228
	6/10/15	2	NP	20.1	62	0	Msb	Nil	3rd 1/4	1951	2025
	7/12/15	2	NP	24.8	78	10	Nil	Nil	0/4	2127	2159
	14/12/15	5	BT	20.4	86	20	Nil	Nil	0/4	0015	0048
	7/3/16	5	BT	21.1	89	10	Nil	Nil	0/4	1228	1259
	10/3/16	5	NP	22.1	92	10	Nil	Nil	0/4	2355	2429
TucM-cw	25/6/15	4	TW	16.9	86	90	Mlb	Nil	1st 1/4	2119	2150
	15/7/15	4	BT	12.1	78	90	Nil	Nil	New	2125	2200
	15/9/15	4	NP	15.5	92	0	Nil	Nil	New	2150	2228
	6/10/15	2	BT	20.1	62	0	Msb	Nil	3rd 1/4	1951	2025
	7/12/15	2	BT	24.8	78	10	Nil	Nil	0/4	2127	2159
	14/12/15	5	NP	20.4	86	20	Nil	Nil	0/4	0015	0048
	7/3/16	5	NP	21.1	89	10	Nil	Nil	0/4	1228	1259
	10/3/16	5	BT	22.1	92	10	Nil	Nil	0/4	2355	2429
Tuc-r-n	25/6/15	3	TW	16.9	86	90	Mlb	Light	1st 1/4	2009	2044
	15/7/15	5	BT	10.2	99	70	Nil	Nil	New	2229	2303
	15/9/15	3	NP	16.9	81	0	Msb	Nil	New	2042	2120
	6/10/15	3	BT	17.9	53	0	Mlb	Nil	3rd 1/4	2048	2124
	7/12/15	3	NP	20.5	85	5	Nil	Nil	0/4	2228	2304
	14/12/15	4	BT	22.3	76	80	Nil	Nil	0/4	2315	2355
	7/3/16	4	NP	20.5	88	10	Nil	Nil	0/4	2328	1204
	10/3/16	4	BT	22	89	10	Nil	Nil	0/4	2304	2340
Tuc-r-s	25/6/15	3	BT	16.9	86	90	Mlb	Light	1st 1/4	2009	2044
	15/7/15	5	NP	10.2	99	70	Nil	Nil	New	2231	2305
	15/9/15	3	BT	16.9	81	0	Msb	Nil	New	2042	2120
	6/10/15	3	NP	17.9	53	0	Mlb	Nil	3rd 1/4	2048	2124
	7/12/15	3	BT	20.5	85	5	Nil	Nil	0/4	2228	2304
	14/12/15	4	NP	22.3	76	80	Nil	Nil	0/4	2315	2355
	7/3/16	4	BT	20.5	88	10	Nil	Nil	0/4	2328	1204
	10/3/16	4	NP	22	89	10	Nil	Nil	0/4	2304	2340
TucS-ce	15/7/15	2	NP	14.9	81.2	100	Nil	Nil	New	1902	1936
	20/7/15	4	BT	15.7	74	10	Nil	Nil	New	2125	2159
	15/9/15	2	BT	16.9	81	0	Msb	Nil	New	1935	2008
	6/10/15	5	NP	14.8	66	0	Calm	Nil	3rd 1/4	2250	2327
	7/12/15	5	NP	17.8	91	0	Nil	Nil	0/4	0038	0113
	14/12/15	3	BT	22.3	76	80	Nil	Nil	0/4	2226	2259
	7/3/16	3	BT	20.5	88	10	Nil	Nil	0/4	2234	2305
	10/3/16	2	NP	23.6	78	10	Nil	Nil	0/4	2050	2124
TucS-cw	15/7/15	2	BT	14.9	81.2	100	Nil	Nil	New	1902	1936
	20/7/15	4	NP	15.7	74	10	Nil	Nil	New	2125	2159
	15/9/15	2	NP	16.9	81	0	Msb	Nil	New	1935	2008
	6/10/15	5	BT	14.8	66	0	Calm	Nil	3rd 1/4	2250	2327
	7/12/15	5	BT	17.8	91	0	Nil	Nil	0/4	0038	0113
	14/12/15	3	NP	22.3	76	80	Nil	Nil	0/4	2226	2259
	7/3/16	3	NP	20.5	88	10	Nil	Nil	0/4	2234	2305
	10/3/16	2	BT	23.6	78	10	Nil	Nil	0/4	2050	2124
TucN-ie	15/7/15	1	NP	14.9	81.2	100	Nil	Nil	New	1750	1822
	20/7/15	3	BT	15.7	74	10	Nil	Nil	New	2014	2051
	15/9/15	1	BT	18.3	75	0	Mlb	Nil	New	1825	1902
	6/10/15	4	NP	14.8	66	0	Calm	Nil	3rd 1/4	2155	2230

	7/12/15	4	NP	18.6	90	0	Nil	Nil	0/4	2335	2405
	14/12/15	2	BT	22.6	73	70	Msb	Nil	0/4	2128	2202
	7/3/16	2	BT	23.9	70	10	Nil	Nil	0/4	2130	2205
	10/3/16	1	NP	23.6	78	10	Nil	Nil	0/4	1955	2028
TucN-iw	15/7/15	1	BT	14.9	81.2	100	Nil	Nil	New	1750	1822
	20/7/15	3	NP	15.7	74	10	Nil	Nil	New	2014	2051
	15/9/15	1	NP	18.3	75	0	Mlb	Nil	New	1825	1902
	6/10/15	4	BT	14.8	66	0	Calm	Nil	3rd 1/4	2155	2230
	7/12/15	4	BT	18.6	90	0	Nil	Nil	0/4	2335	2405
	14/12/15	2	NP	22.6	73	70	Msb	Nil	0/4	2128	2202
	7/3/16	2	NP	23.9	70	10	Nil	Nil	0/4	2130	2205
	10/3/16	1	BT	23.6	78	10	Nil	Nil	0/4	1955	2028
TucS-ie	16/7/15	1	BT	14.9	65	0	Nil	Nil	New	1755	1832
	20/7/15	5	BT	10.1	97	90	Nil	Spitting	New	2244	2318
	16/9/15	6	NP	14.2	94	10	Nil	Last 24h	New	2342	2417
	6/10/15	6	BT	13.1	74	O	Nil	Nil	3rd 1/4	2355	2428
	7/12/15	6	NP	17.8	91	0	Nil	Nil	0/4	0136	0210
	14/12/15	1	BT	23.3	72	70	Nil	Nil	0/4	2024	2055
	7/3/16	1	BT	23.9	70	10	Nil	Nil	0/4	2023	2056
	10/3/16	3	NP	22.5	83	10	Nil	Nil	0/4	2150	2225
TucS-iw	16/7/15	1	NP	14.9	65	0	Nil	Nil	New	1755	1832
	20/7/15	5	NP	10.1	97	90	Nil	Spitting	New	2244	2318
	16/9/15	6	BT	14.2	94	10	Nil	Last 24h	New	2342	2417
	6/10/15	6	NP	13.1	74	O	Nil	Nil	3rd 1/4	2355	2428
	7/12/15	6	BT	17.8	91	0	Nil	Nil	0/4	0136	0210
	14/12/15	1	NP	23.3	72	70	Nil	Nil	0/4	2024	2055
	7/3/16	1	NP	23.9	70	10	Nil	Nil	0/4	2023	2056
	10/3/16	3	BT	22.5	83	10	Nil	Nil	0/4	2150	2225
GN-ce	16/7/15	3	BT	11.1	49	Nil	Msb	Nil	New	2015	2048
	20/7/15	2	NP	18.4	70	70	Mlb	Nil	New	1844	1917
	16/9/15	3	NP	16.2	83	0	Msb	Last 24h	New	2022	2059
	8/10/15	2	BT	17	86	100	Msb	Nil	3rd 1/4	1930	2004
	8/12/15	2	NP	23	75	0	Msb	Nil	0/4	2108	2145
	10/12/15	3	BT	18.6	94	0	Nil	Past 24hr	0/4	2210	2242
	9/3/16	3	BT	21.3	86	0	Nil	Past 24hr	0/4	2151	222
	14/3/16	2	NP	23.9	76	9	Nil	Nil	1/4	2028	2301
GN-cw	16/7/15	3	NP	11.1	49	Nil	Msb	Nil	New	2015	2048
	20/7/15	2	BT	18.4	70	70	Mlb	Nil	New	1844	1917
	16/9/15	3	BT	16.2	83	0	Msb	Last 24h	New	2022	2059
	8/10/15	2	NP	17	86	100	Msb	Nil	3rd 1/4	1930	2004
	8/12/15	2	BT	23	75	0	Msb	Nil	0/4	2108	2145
	10/12/15	3	NP	18.6	94	0	Nil	Past 24hr	0/4	2210	2242
	9/3/16	3	NP	21.3	86	0	Nil	Past 24hr	0/4	2151	222
	14/3/16	2	BT	23.9	76	9	Nil	Nil	1/4	2028	2301
GN-ie	16/7/15	4	BT	11.1	49	Nil	Msb	Nil	New	2115	2148
	20/7/15	1	NP	18.4	70	70	Mlb	Nil	New	1755	1831
	16/9/15	4	NP	16.2	83	0	Msb	Last 24h	New	2109	2143
	8/10/15	1	BT	17	86	100	Msb	Nil	3rd 1/4	1845	1916
	8/12/15	1	NP	23	75	0	Msb	Nil	0/4	2020	2052
	10/12/15	4	BT	18.6	94	0	Nil	Past 24hr	0/4	2301	2335
	8/3/16	1	BT	23.5	90	90	Msb	Showers	0/4	2015	2048

	14/3/16	1	NP	23.9	76	9	Nil	Nil	1/4	1950	2022
GN-iw	16/7/15	4	NP	11.1	49	Nil	Msb	Nil	New	2115	2148
	20/7/15	1	BT	18.4	70	70	Mlb	Nil	New	1755	1831
	16/9/15	4	BT	16.2	83	0	Msb	Last 24h	New	2109	2143
	8/10/15	1	NP	17	86	100	Msb	Nil	3rd 1/4	1845	1916
	8/12/15	1	BT	23	75	0	Msb	Nil	0/4	2020	2052
	10/12/15	4	NP	18.6	94	0	Nil	Past 24hr	0/4	2301	2335
	8/3/16	1	NP	23.5	90	90	Msb	Showers	0/4	2015	2048
	14/3/16	1	BT	23.9	76	9	Nil	Nil	1/4	1950	2022
GS-ie	16/7/15	2	NP	11.4	48	10	Msb	Nil	New	1914	1948
	20/7/15	6	BT	10.1	97	90	Nil	Spitting	New	2352	2428
	16/9/15	5	NP	15.4	94	0	Msb	Last 24h	New	2231	2306
	8/10/15	3	BT	17.4	86	100	Msb	Nil	3rd 1/4	2032	2107
	8/12/15	3	NP	22.2	80	0	Msb	Nil	0/4	2210	2243
	10/12/15	5	BT	18.1	93	0	Nil	Past 24hr	0/4	2430	0112
	9/3/16	4	BT	21.3	86	0	Nil	Past 24hr	0/4	2245	2317
	14/3/16	3	NP	22.8	93	40	Nil	Nil	1/4	2120	2152
GS-iw	16/7/15	2	BT	11.4	48	10	Msb	Nil	New	1914	1948
	20/7/15	6	NP	10.1	97	90	Nil	Spitting	New	2352	2428
	16/9/15	5	BT	15.4	94	0	Msb	Last 24h	New	2231	2306
	8/10/15	3	NP	17.4	86	100	Msb	Nil	3rd 1/4	2032	2107
	8/12/15	3	BT	22.2	80	0	Msb	Nil	0/4	2210	2243
	10/12/15	5	NP	18.1	93	0	Nil	Past 24hr	0/4	2430	0112
	9/3/16	4	NP	21.3	86	0	Nil	Past 24hr	0/4	2245	2317
	14/3/16	3	BT	22.8	93	40	Nil	Nil	1/4	2120	2152
GS-ce	25/6/15	2	TW	18.9	69	50	Msb	Nil	1st 1/4	1855	1930
	16/7/15	5	BT	9.2	60	Nil	Msb	Nil	New	2245	2317
	16/9/15	2	NP	17.8	85	10	Msb	Last 24h	New	1928	2001
	8/10/15	4	BT	17.2	88	100	Msb	Nil	3rd 1/4	2133	2205
	8/12/15	5	NP	21	86	0	Nil	Nil	0/4	2401	2432
	10/12/15	2	BT	20.2	89	50	Nil	Past 24hr	0/4	2114	2150
	9/3/16	2	BT	22.4	80	10	Nil	Past 24 hrs	0/4	0900	0935
	14/3/16	5	NP	23.1	82	20	Nil	Nil	1/4	2308	2339
GS-cw	25/6/15	2	BT	18.9	69	50	Msb	Nil	1st 1/4	1855	1930
	16/7/15	5	NP	9.2	60	Nil	Msb	Nil	New	2245	2317
	16/9/15	2	BT	17.8	85	10	Msb	Last 24h	New	1928	2001
	8/10/15	4	NP	17.2	88	100	Msb	Nil	3rd 1/4	2133	2205
	8/12/15	5	BT	21	86	0	Nil	Nil	0/4	2401	2432
	10/12/15	2	NP	20.2	89	50	Nil	Past 24hr	0/4	2114	2150
	9/3/16	2	NP	22.4	80	10	Nil	Past 24 hrs	0/4	0900	0935
	14/3/16	5	BT	23.1	82	20	Nil	Nil	1/4	2308	2339
G-r-n	25/6/15	1	BT	18.9	69	50	Msb	Nil	1st 1/4	1750	1821
	16/7/15	6	NP	8.1	62	Nil	Msb	Nil	New	2344	2413
	16/9/15	1	BT	19.1	77	70	Msb	Last 24h	New	1826	1859
	8/10/15	5	NP	17.1	88	90	Nil	Nil	3rd 1/4	2237	2309
	8/12/15	4	NP	21.2	84	0	Nil	Nil	0/4	2310	2345
	10/12/15	1	BT	23.3	74	40	Nil	Past 24hr	0/4	2026	2058
	9/3/16	1	BT	23.6	73	10	Nil	Past 24 hrs	0/4	2005	2040
	14/3/16	4	NP	22.8	83	20	Nil	Nil	1/4	2219	2252
G-r-s	25/6/15	1	TW	18.9	69	50	Msb	Nil	1st 1/4	1750	1825
	16/7/15	6	BT	8.1	62	Nil	Msb	Nil	New	2340	2415

	16/9/15	1	NP	19.1	77	70	Msb	Last 24h	New	1826	1859
	8/10/15	5	BT	17.1	88	90	Nil	Nil	3rd 1/4	2237	2309
	8/12/15	4	BT	21.2	84	0	Nil	Nil	0/4	2310	2345
	10/12/15	1	NP	23.3	74	40	Nil	Past 24hr	0/4	2026	2058
	9/3/16	1	NP	23.6	73	10	Nil	Past 24 hrs	0/4	2005	2040
	14/3/16	4	BT	22.8	83	20	Nil	Nil	1/4	2219	2252

Appendix B – Baseline Survey Fauna Detections

Table B1: Results of spotlighting and call playback on baseline transects in sections 3, 6 & 7 of the W2B upgrade. YbG = yellow-bellied glider; SqG = squirrel glider; SuG = sugar glider; GG = greater glider; FtG = Feathertail Glider; CBP = common brushtail possum; SeBP = short-eared brushtail possum; CRP = common ringtail possum; PO = powerful owl; MO = masked owl; BB = boobook owl; ON = owlet nightjar; WtN = white-throated nightjar; TF = tawny frogmouth; GhFF = grey-headed flying fox; LRFF = little red flying fox. HM = heard movement, HC = heard call; HL = heard glide-land on tree; SE = saw eyeshine; SG = saw glide; SM = saw movement. Easting/Northing = center point of transect.

Transect	Date	Obs-erver	Start	Finish	Fauna	Comments	Flowering	Easting	Northing
TabLB-ie	22/6/15	TW	1959	2031	GhFF			527582	6773203
	24/6/15	BT	1905	1936	GhFF				
	9/9/15	NP	2102	2136	GhFF		Wh Str bk; Acacia		
	14/9/15	BT	2006	2038	GHFF; FtGx2	HM@150e5s forage in wh str bk			
	17/12/115	BT	2328	2359	Nil				
	13/1/16	NP	2135	2207	Nil				
	17/3/16	BT	2030	2102	Nil		B'butt		
	5/4/16	NP	1838	1910	PO; LRFF		Br-l pbk		
TabLB-iw	22/6/15	BT	1958	2030	GhFF		Red mahog	527452	6773308
	24/6/15	TW	1905	1936	Nil				
	9/9/15	BT	2102	2136	GhFF				
	14/9/15	NP	2006	2038	Nil				
	17/12/15	NP	2328	2359	GG	SE380n20e			
	13/1/16	BT	2135	2207	GG; SuG	GG:SE500n40e; SuG:SE450n30e			
	17/3/16	NP	2030	2102	FtG	Sm@400n5w	Pnk BWood, b'butt		
	5/4/16	BT	1838	1910	GHFF, LRFF				
TabNR-rn	18/6/15	TW	2150	2228	Nil			529178	6772891
	22/6/15	BT	2058	2130	ONj				
	9/9/15	NP	2012	2045	ONj				
	14/9/15	BT	2058	2132	SqG	HM@450w10n (529068-6772954)			
	17/12/15	BT	2244	2315	SqG; BO; ONj	SqG:SE100e10n			
	13/1/16	NP	2222	2255	ONj				
	17/3/16	BT	1948	2022	PO, WtNj	C.tinnula calling on track edge	Pnk BWood, coast banksia		
	5/4/16	NP	2128	2000	SqG; LRFF; ONj	Hm@480e2s			
TabNR-rs	18/6/15	BT	2201	2233	CRP	SE@50e30s		529960	6771525

	22/6/15	TW	2058	2130	Nil				
	9/9/15	BT	2012	2045	ONj				
	14/9/15	NP	2058	2132	ONj				
	17/12/15	NP	2244	2315	GG; ONj; WtNj	GG:SE100s20w			
	13/1/16	BT	2222	2255	ONj				
	17/3/16	NP	1948	2022	SuG; PO; LRFF, WtNj	SuG:hc@100n10w; C.tinnula calling on track edge			
	5/4/16	BT	2128	2000	SqG; SuG;TF; LRFF	SqG: se@10s20w; SuG:hc@200s40e	Coast banksia		
TabVM-ie	22/6/15	TW	2150	2221	TF		Spot gum	527232	6772031
	24/6/15	BT	2005	2038	ONj				
	8/9/15	BT	2308	2342	GHFF		Twood, wh str bk		
	10/9/15	NP	1827	1859	TF				
	17/12/15	BT	0018	0050	ONj		Spot gum		
	13/1/16	NP	2042	2115	Nil				
	17/3/16	BT	2112	2149	WtNj, GHFF, LRFF		Pnk BWood		
	5/4/16	NP	2025	258	SuG, LRFF	Hm@80s5e			
TabVM-iw	22/6/15	BT	2155	2230	Nil			526888	6772045
	24/6/15	TW	2007	2040	Nil				
	8/9/15	NP	2308	2342	FtG; GHFF	FtG:SG@450s1e	Twood, wh str bk		
	10/9/15	BT	1827	1859	Nil				
	17/12/15	NP	0018	0050	Nil		Spot gum		
	13/1/16	BT	2042	2115	Nil				
	17/3/16	NP	2112	2149	LRFF		Str bk		
	5/4/16	BT	2025	258	LRFF				
TabN-ie	22/6/15	TW	1856	1926	Nil			526826	6770530
	24/6/15	BT	1800	1835	YbG	HC@ 80n50e(526853-6770382); 3x call & glide close in response to playback	Wh Str bk		
	8/9/15	BT	2215	2250	GHFF		Twood, wh str bk		
	10/9/15	NP	1925	1958	FtG, GHFF	FtG:SM@300s5w			
	17/12/15	BT	2155	2226	GG; ONj	GG:SE200s20e			
	13/1/16	NP	2044	2116	Nil				
	17/3/16	BT	2158	2330	LRFF		Pnk BWood		
	5/4/16	NP	214	2145	FtG; LRFF	Sm@100s10w			
TabN-iw	22/6/15	BT	1852	1928	SuG; SeBP	SuG:SM@150s20w; SeBP:SE@300s40e		526550	6770577
	24/6/15	TW	1800	1830	Nil				
	8/9/15	NP	2215	2250	GHFF		Twood, wh str bk		
	10/9/15	BT	1925	1958	NIL				

	17/12/15	NP	2155	2226	TF				
	13/1/16	BT	2044	2116	Nil		l'bk		
	17/3/16	NP	2158	2330	CRP; LRFF	Hm@480s1w			
	5/4/16	BT	214	2145	LRFF		Br-l p'bk		
TabN-ce	18/6/15	BT	1952	2027	SqG	SM in flwring Wh str bk @50n20e(526003-6769163)	Wh str bk	526094	6769344
	23/6/15	TW	1956	1927	GhFF				
	8/9/15	BT	2110	2143	FtG	SM@400s10w	Twood, wh str bk, f red gum		
	10/9/15	NP	2018	2055	Nil				
	17/12/15	BT	2109	2144	Nil		Spot gum		
	13/1/16	NP	2235	2311	Nil				
	17/3/16	BT	2332	2404	Nil				
	5/4/16	NP	2159	2230	LRFF, GHFF				
TabN-cw	18/6/15	TW	1950	2021	Nil		Acacia app.	525803	6769255
	23/6/15	BT	1955	2028	GG; FtG	GG:SE@20e120n; FtG:SG@25w450n	Wh str bk		
	8/9/15	NP	2110	2143	CBP, SuGx2; GHFF	CBP:HM@50s10e; SuG:SE@510s15e	Twood, wh str bk		
	10/9/15	BT	2018	2055	GG; GHFF	GG:SE@400s40w			
	17/12/15	NP	2109	2144	Nil				
	13/1/16	BT	2235	2311	Nil				
	17/3/16	NP	2332	2404	GHFF				
	5/4/16	BT	2159	2230	FtG, LRFF, GHFF		Br-l p'bk		
TabDD-rn	18/6/15	TW	2051	2127	GG	SE@20n20w	Spot gum	524826	6769767
	22/6/15	BT	1748	1822	Nil		Wh str bk		
	8/9/15	NP	2012	2045	Nil		Wh str bk		
	10/9/15	BT	2110	2143	ONj; GHFF				
	17/12/15	BT	2029	2102	Catx3				
	13/1/16	NP	2135	2210	ONj				
	17/3/16	BT	2240	2315	FtGx2; LRFF, GHFF	Sm@200n15w & SG@250n 20w	spot gum		
	5/4/16	NP	2245	2316	SqG; FtG; LRFF, GHFF	SqG:hc@450n20w; FtG:sg @75n15w			
TabDD-rs	18/6/15	BT	2055	2128	SuG; ONj	SM@200s30e	Spot gum	523057	6769560
	22/6/15	TW	1851	1926	GG	SE@400s20e	Marked HBT		
	8/9/15	BT	2014	2047	GG; ONj; TF	GG:SE@50s20e	Wh str bk		
	10/9/15	NP	2110	2143	SuG;ONj; TF	SuG:HC@550s5e			
	17/12/15	NP	2029	2102	WtNj				
	13/1/16	BT	2135	2210	GG	SE250s40w			
	17/3/16	NP	2240	2315	SuG, GHFF, LRFF	hc@200s10w; Glossy bl c'too feeding signs at black sheoak			

	5/4/16	BT	2245	2316	SuG; LRFF	Hm@480s2e	Pnk b'wood, Br-l p'bk		
TabM-ce	18/6/15	TW	1846	1916	Nil		Nil	525557	6768428
	23/6/15	BT	1855	1928	Nil				
	8/9/15	BT	1914	1948	Nil				
	10/9/15	NP	2255	2328	Nil				
	16/12/15	BT	2119	2152	Nil				
	13/1/16	NP	2420	2452	Nil				
	16/3/16	BT	2220	2252	Nil				
	6/4/16	NP	1835	1910	NIL				
TabM-cw	18/6/15	BT	1849	1923	CBP	SE@350s5w	Nil	525151	6768474
	23/6/15	TW	1858	1929	Nil				
	8/9/15	NP	1914	1948	ONj		Acacia spp		
	10/9/15	BT	2255	2328	Nil				
	16/12/15	NP	2119	2152	ONj				
	13/1/16	BT	2420	2452	GG; SuG; ONj	GG:SE2s30sw; SuG:HC20s30e			
	16/3/16	NP	2220	2252	SuG; LRFF	hc@475s10e			
	6/4/16	BT	1835	1910	YbG, FtG, LRFF	FtG:sm@490s20w; YbG: hc@490s20w (saw forage on Pnk BWood blossom)	Pnk BWood		
TabM-ie	18/6/15	BT	1745	1816	Nil		Nil	525033	6767369
	23/6/15	TW	1752	1826	Nil				
	8/9/15	BT	1826	1858	SqGx2	SE@350n10e forage in flwr wh Str bk @525071-6767462	Wh Str bk		
	10/9/15	NP	2204	2237	Nil				
	16/12/15	BT	2028	2100	GGx2	SE150n15w&220n10w	Spot gum		
	13/1/16	NP	2328	2402	Nil				
	16/3/16	BT	2130	2202	Nil		Spot gum		
	6/4/16	NP	1935	2007	GGx2; FtG	GG:se@250n15w&400n15w; FtG:sm@2n15w			
TabM-iw	18/6/15	TW	1748	1722	Nil		Spot. gum; Wh str bk	524907	6767395
	23/6/15	BT	1752	1826	GG	SE@20n40w			
	8/9/15	NP	1826	1858	Nil		Spot gum		
	10/9/15	BT	2204	2237	Nil		Wh str bk; spot gum		
	16/12/15	NP	2028	2100	GG	SE250n20e	Spot gum		
	13/1/16	BT	2328	2402	GG; SuG	GG & SuG:SE200n20e			
	16/3/16	NP	2130	2202	GGx2	2x Se@350n20e			
	6/4/16	BT	1935	2007	Nil				
TabS-ie	18/6/15	TW	2250	2327	Nil			524651	6766470
	23/6/15	BT	2057	2130	Nil		Red mahog		

	7/9/15	NP	2224	2256	Nil				
	9/9/15	BT	2158	2230	Nil		Two of		
	15/12/15	BT	2303	2333	Nil				
	12/1/16	NP	2039	2112	CBP	SE@250n10e; Stephens banded 500n			
	16/3/16	BT	2050	2120	LRFF		Pnk BWood		
	4/4/16	NP	2245	2316	LRFF				
TabS-iw	18/6/15	BT	2252	2328	Nil		Wh str bk	524533	6766500
	23/6/15	TW	2100	2133	Nil				
	7/9/15	BT	2224	2256	Nil		Acacia app.		
	9/9/15	NP	2158	2230	CRP	SE@400n40e			
	15/12/15	NP	2303	2333	SuG	SM@300n5w			
	12/1/16	BT	2039	2112	CRP	SE450n15e			
	16/3/16	NP	2050	2120	FtG	Sm&450n5w	Pnk BWood		
	4/4/16	BT	2245	2316	FtG; LRFF	Sg@150n2w	B'butt		
TabS-ce	17/6/15	TW	1933	2003	Nil		Acacia spp	521327	6757919
	23/6/15	BT	2201	2230	SuG; TF; GhFF	SuG:HC@250n10w			
	7/9/15	NP	2124	2155	Nil		Wh Str bk; twood; acacia sp.		
	9/9/15	BT	2258	2330	Nil				
	15/12/15	BT	2358	2430	SuG	SM300s10e	Spot gum		
	12/1/16	NP	2135	2210	CBP	SE300n10e			
	16/3/16	BT	1955	2028	LRFF		B'butt		
	4/4/16	NP	2140	2213	FtGx2; GHFF, LRFF	FtG:sm@350n5w&350n15e			
TabS-cw	17/6/15	BT	1942	2016	Nil		Acacia spp.	520905	6760849
	23/6/15	TW	2156	2226	Nil				
	7/9/15	BT	2124	2155	Nil		F red gum; Acacia sp.		
	9/9/15	NP	2258	2330	GG	HM@250n5e			
	15/12/15	NP	2358	2430	SuG; CRP; GHFF	SuG:SE@250n10e; CRP:SE250n10e	Spot gum		
	12/1/16	BT	2135	2210	CRP	SE400s10w			
	16/3/16	NP	1955	2028	CRP	Se@100n5e			
	4/4/16	BT	2140	2213	CRP	Se@350n20e	B'butt		
MOR-ie	17/6/15	TW	2045	2115	Nil		Acacia spp.	522418	6756590
	24/6/15	BT	2110	2144	CRP(2)	SE@100s15e			
	7/9/15	NP	2025	2056	Nil		Wh Str bk; Acacia spp.		
	14/9/15	BT	2158	2234	CRP	SE@100s10w			
	15/12/15	BT	2025	2100	ONj				

	12/1/16	NP	2235	2307	ONj				
	15/3/16	BT	2132	2204	TF		B'butt		
	4/4/16	NP	1901	1933	FtG, GHFF, ONj	HM@5n2w			
MOR-iw	17/6/15	TW	1820	1852	Nil		Acacia spp.	522276	6756457
	24/6/15	BT	2332	2403	Nil				
	7/9/15	NP	1918	1952	YbG; SqG; FtG	YbG:HC@50n50w; SqG:SE@450n1w; FtG:SM@490n1e	Wh Str bk		
	14/9/15	BT	2354	2428	YbG	HC@400nw50se (522150-6756480)			
	15/12/15	BT	2214	2250	GHFF		Spot gum		
	12/1/16	NP	2422	2455	FtG; ONj	FtG:SM450s5e			
	15/3/16	NP	2035	2107	SuG; TF	Hc@250n20w	Spot gum		
	4/4/16	BT	2040	2111	LRFF		B'butt		
MOR-ce	17/6/15	BT	1740	1816	FtGx2	FtG: SM@350n5w & 450n/2e	Nil	522970	6755546
	24/6/15	BT	2212	2245	YbGx2	1) HC@400n50e & glided in close; 2) HC@450n60e;			
	7/9/15	BT	1918	1952	FtG, GHFF	FtG: SM@200n10e	Wh Str bk		
	14/9/15	NP	2259	2234	GG	SE@420n1e			
	15/12/15	BT	2130	2203	Nil				
	12/1/16	NP	2334	2407	ONj				
	15/3/16	BT	1950	2020	LRFF		pnk BWood		
	4/4/16	NP	2040	2111	LRFF; ONj				
MOR-cw	17/6/15	TW	1735	1805	Nil		Acacia spp.	522700	6755572
	24/6/15	TW	2330	2400	Nil				
	7/9/15	NP	1833	1906	Nil		Wh Str bk; twood		
	14/9/15	NP	2354	2428	GG	SE@450n5w			
	15/12/15	NP	2214	2250	CRP	SE@200n10w			
	12/1/16	BT	2422	2455	Nil				
	15/3/16	NP	1950	2020	CRP	Sm@400n5e	Spot gum		
	4/4/16	BT	1956	2028	CRP	Se@200n10w	B'butt		
MOR-rn	17/6/15	BT	2053	2126	WtNj; ONj		Acacia spp.	523152	6757392
	24/6/15	TW	2122	2156	SuG	SM@300s10e			
	7/9/15	BT	2025	2056	FtG; ONj	FtG:HL@450e5s			
	14/9/15	NP	2158	2234	CRP	SE@100s40e	Wh str bk		
	15/12/15	NP	2025	2100	BO; ONj				
	12/1/16	BT	2235	2307	ONj				
	15/3/16	NP	2132	2204	Nil				
	4/4/16	BT	1901	1933	GHFF		B'butt		
MOR-rs	17/6/15	BT	1832	1906	Nil		Acacia spp.	524147	6755441

	24/6/15	TW	2212	2245	SuG; YbG	SuG:HC@400n40w; YbG:HC@580n			
	7/9/15	BT	1833	1906	SuG; ONj; GHFF	SuG:HC @150s30e	Acacia spp.		
	14/9/15	BT	2259	2234	SqG; YbG; SuG; FtG	SqG:SE@350n5w (524185-6755575); YbG:HC@400n60e (524250-6755590); FtG:HM@50n1e; SuG:HC@400n30w			
	15/12/15	NP	2130	2203	GG: WtNj	GG:SE150n40w			
	12/1/16	BT	2334	2407	SuG; ONj; GHFF	SuG:HC@510s30e			
	15/3/16	BT	2035	2107	GG	Se@50n40e			
	4/4/16	NP	1956	2028	GG, FtG, ONj	GG:hm@4001e; FtG:sg@150n10w			
TucN-ce	25/6/15	BT	2219	2255	TF			513756	6727507
	15/7/15	NP	2015	2050	SqG; FtG	SqG:SM@350e; FtG:SM@350e			
	15/9/15	BT	2255	2329	ONj				
	6/10/15	NP	1845	1918	CBPx2; CRPx3	CBPx2:HM@150n5e; CRPx2:SE@1n5e; CRP:SE@500n20w	Nil		
	7/12/15	NP	2026	2053	CBPx3; TF	SM@250s20e; 2xSE@350s10e	Nil		
	14/12/15	BT	118	153	CBP	CBP:SE@300n40w			
	9/3/16	BT	1158	1233	ONj				
	14/3/16	NP	2412	2446	Nil				
TucN-cw	25/6/15	TW	2219	2255	Nil			513342	6727435
	15/7/15	BT	2015	2050	TF				
	15/9/15	NP	2255	2329	CBP	SE@80n30e			
	6/10/15	BT	1845	1918	CRP	SE@150n30w	Nil		
	7/12/15	BT	2026	2053	TF; ONj		Nil		
	14/12/15	NP	118	153	CBP; CRP	CBP:HC250n40e; CRP:SE5n10w			
	9/3/16	NP	1158	1233	FtGx2; ONj	Sm@400n5w			
	14/3/16	BT	2412	2446	CBP; TF	Se@50n30e			
TucM-ce	25/6/15	BT	2113	2146	Nil			513240	6725830
	15/7/15	NP	2125	2200	Nil				
	15/9/15	BT	2150	2228	BO; ONj				
	6/10/15	NP	1951	2025	Nil		Nil		
	7/12/15	NP	2127	2159	FtG; ONj	FtG:SM@5s2w	Acacia		
	14/12/15	BT	0015	0048	ONj				
	7/3/16	BT	1228	1259	CBP; CRP; LRFF	CBP:SE@300s20e; CRP:SE@250s20w	P BWood		
	10/3/16	NP	2355	2429	ONj; BbO; TF				
TucM-cw	25/6/15	TW	2119	2150	SqG	HC@50n30e	Banksia integ.	512830	6724245
	15/7/15	BT	2125	2200	SqG; CRP	SqG: HM@20n5w; CRP: HM@100n15e	Banksia		
	15/9/15	NP	2150	2228	SqG; CRP	SqG:HM@1n20w; CRP:SE@60s10w			
	6/10/15	BT	1951	2025	SeBP; ONj	SE@150n20e	Nil		

	7/12/15	BT	2127	2159	CRPx2	SE@80N20e	Acacia		
	14/12/15	NP	0015	0048	SqGx2	SMx2@250n2e			
	7/3/16	NP	1228	1259	FtG; ONj; BbO	FtG:Sm@400n10e			
	10/3/16	BT	2355	2429	ONj				
Tuc-r-n	25/6/15	TW	2009	2044	Nil			515344	6720259
	15/7/15	BT	2229	2303	SuG	HC@300n40w			
	15/9/15	NP	2042	2120	SqG; FtG	SqG:HC@400n20e; FtG:SG@400n1w			
	6/10/15	BT	2048	2124	GG; FtG	GG:SE & FtG:SG @150e1n	Spot gum		
	7/12/15	NP	2228	2304	SqGx2; SuGx2; FtG; ONj	SqG:HC@100n10e, HC@490n30e; SuG:SM@200n5w, HC@120n10e; FtG:SM@200n5e	Grey ibk		
	14/12/15	BT	2315	2355	SqGx2; SuG; CBPx2;ONj	SqG:HC150n40w,SM20n10e; SuG:SM50n20w; CBPx2@150n40w			
	7/3/16	NP	2328	1204	ONj				
	10/3/16	BT	2304	2340	SqG; BO; TF	Se@450n40w			
Tuc-r-s	25/6/15	BT	2009	2044	YbG	HC@350e40n		516956	6719676
	15/7/15	NP	2231	2305	SqGx5; SuG; FtG	SuG:HC@150e40n; FtG:HM@350e30s; SqGx3:HM@350e30s; SqG:HC@5e30s; SqG SE@100e40s; (later spot/heard 3 more SqG around flwring wh strbk)	SqGx3 in flw wh strbk @ 350e30s		
	15/9/15	BT	2042	2120	YbG; CBP	YbG:HC@5e80s; CBP:SE@50e10n	Acacia		
	6/10/15	NP	2048	2124	FtG	SM@400n10w	Nil		
	7/12/15	BT	2228	2304	FtG; CBP; CRP	FtG:SM@200e20s; CBP:HC@100e20n; CRP:SE@350e40s	Grey ibk		
	14/12/15	NP	2315	2355	CBPx3; TF; ONj: cat	CBP:SE@100e10n& 400e20n&400e40n			
	7/3/16	BT	2328	1204	SqG; SuG; ONj	SqG:HC@200e30s; SuG:HC@300e40n	P BWood		
	10/3/16	NP	2304	2340	SqGx2; FtGx2; CBP; ONj; LRFF	SqG:HM@350w5e& HC@400w5n; FtG:sm@1005s & sm@200w5s; CBP:se@100w10s			
TucS-ce	15/7/15	NP	1902	1936	SqGx2	HC@400s & 500s30se	Banksia integ.	512932	6717966
	20/7/15	BT	2125	2159	SqGx2; FtG	SqG:HC@400s20w & SE@500s10w; FtG:HM@50s10e			
	15/9/15	BT	1935	2008	ONj		Acacia		
	6/10/15	NP	2250	2327	ONj		Nil		
	7/12/15	NP	0038	0113	FtG; TF; CBP; BbO	FtG:SM@490s2e; CBP:HC@100s20w			
	14/12/15	BT	2226	2259	CBPx2; BO; TF	CBP:SE10s20w&450s10w			
	7/3/16	BT	2234	2305	SqG; GHFF; LRFF	SqG:SM@200s10w	P BWood		
	10/3/16	NP	2050	2124	FtGx2; ONj; LRFF; GHFF	FtG:SM@100s20e&200s5e			
TucS-cw	15/7/15	BT	1902	1936	Nil		Banksia integ.	512812	6718078
	20/7/15	NP	2125	2159	SqGx2	500s30w HC(alarm)both fighting/chasing			
	15/9/15	NP	1935	2008	SqG	SM@250s5w forage on mistletoe; bettong (pr):100s			

	6/10/15	BT	2250	2327	SqG; CRPx2	SqG:SM@400s2e; CRP:SE@10n10e&450n2w	Nil		
	7/12/15	BT	0038	0113	SqGx2; BO; ONj	SqG:HM@80s10w&HC@150s30w; BO:HC@550s			
	14/12/15	NP	2226	2259	CBP; TF;ONj	CBP:SE75s10e			
	7/3/16	NP	2234	2305	SqG; LRFF	HC@250s30w	P BWood		
	10/3/16	BT	2050	2124	SqG; CRP; ONj; LRFF	SqG:HC@350s40w; CRP:SE@100s20e			
TucN-ie	15/7/15	NP	1750	1822	YbG; GG; GHFF	GG:SG@5s; YbG:HC@550n		512595	6716859
	20/7/15	BT	2014	2051	SqG; CBP; GG	SqG: HC@40s30e; GG:SE@20s60e; CBP:SE@200s5e			
	15/9/15	BT	1825	1902	GG; ONj; BbO	GG:SE@450s10e; Bettong(pr):5s			
	6/10/15	NP	2155	2230	ONj		Nil		
	7/12/15	NP	2335	2405	SqG; FtG; TF	SqG:HM@470s20e;FtG:SM@300s5w	Spot gum		
	14/12/15	BT	2128	2202	GGx2	SE30s50e&450s20e			
	7/3/16	BT	2130	2205	SqG	HC50s20e			
	10/3/16	NP	1955	2028	SqGx2; SqG(pr); CBP; FtGx2	SqG:HM@250n10e & HC&300n30e; SqG/SuG:SM250n10e; CBP:HM@100n5w; FtG:SG@250n10e & SG@400n20e	P BWood		
TucN-iw	15/7/15	BT	1750	1822	SqG; GHFF	HC@10s40w	Spot gum	512402	6716841
	20/7/15	NP	2014	2051	SqGx2; FtG; ON	SqG: HL@40s1e & HL@40s10w; FtG: HL@250s2w			
	15/9/15	NP	1825	1902	GG; FtG	FtG:SM@200n5e; GG:SE@470n50e			
	6/10/15	BT	2155	2230	BbO		Nil		
	7/12/15	BT	2335	2405	ONj				
	14/12/15	NP	2128	2202	GG; CBP; BO; BbO	GG:SE30s30e&300s20e; CBP:SM400s2w			
	7/3/16	NP	2130	2205	GG	Se100s20e			
	10/3/16	BT	1955	2028	FtG; ONj	SG@490n5e			
TucS-ie	16/7/15	BT	1755	1832	SqG	HC@450n20w in flwring blackbutt	Blackbutt; banksia	511823	6711239
	20/7/15	BT	2244	2318	SqGx4; GG	SqG:HC@5s30w,100s40w,300s50w,500s30w; GG:SE@ 150s10e; GGx3 off tsect			
	16/9/15	NP	2342	2417	SqG; FtGx2; BB; ONj	SqG:HC@5s20e; FtG:SM@10s2e&HL@150s5w	Acacia		
	6/10/15	BT	2355	2428	GGx2	SE@10s30e&450s25e	Nil		
	7/12/15	NP	0136	0210	GG; SqG	SqG:HC@300s20e; GG:SE@250s40e			
	14/12/15	BT	2024	2055	GG; MO	GG:SE490n50e; MO:HC490n40ww			
	7/3/16	BT	2023	2056	CBPx2; BtPhasc	CBPx2:SE@300n20w; BtPh:SE@480n10w; SqG hc100nnext to road	B serrata		
	10/3/16	NP	2150	2225	SqGx2	SqG:SE@100s30e&HC@500s40w			
TucS-iw	16/7/15	NP	1755	1832	YbG; FtGx2	YbG:HC@~550n30w(later HC nth of E tsect); FtG:HM@150n1w & SM@500n1e; GGx2 off-tran 200n of E tran		511679	6711293

	20/7/15	NP	2244	2318	SqGx3; FtGx2; YbG; BB; ONj	SqG:HC@10s20w,10s30e,300s40e; YbG:HC@ 200s100e; FtG:SM@0s1w, SG@,250s10w			
	16/9/15	BT	2342	2417	SqGx2; YbG; GG; ONj	SqG:HM@10s20e&HM@15s10e; YbG:HC@100s80w; GG:SE@50s20e			
	6/10/15	NP	2355	2428	Nil		Nil		
	7/12/15	BT	0136	0210	ONj				
	14/12/15	NP	2024	2055	Nil				
	7/3/16	NP	2023	2056	SqG; GG; FtG; BTPhasc; ONj; TF	SqG:SE@400n20e; GG:se@250n30e; BtP:HM@500n10w(diff indiv; seen same time as BtP on E tran)	B serrata		
	10/3/16	BT	2150	2225	GG; CBP	GG:SE@250s20w; CBP:SE@300s40w (SqGx2 near track/off-tran)			
GN-ce	16/7/15	BT	2015	2048	YbGx2	HC@100s30w(viewed on spot gum) & 120s50w (both called simultaneously)	Spotted gum	503802	6706855
	20/7/15	NP	1844	1917	GG, CBP	GG:SE@250n5e; CBP:SE@530n20w			
	16/9/15	NP	2022	2059	Nil		Spot gum; acacia		
	8/10/15	BT	1930	2004	GG	SE@5n30w	Nil		
	8/12/15	NP	2108	2145	GHFF; LRFF		Spot gum		
	10/12/15	BT	2210	2242	GG; CBP	GG:SE@50s60e; CBP:SE@60s30e			
	9/3/16	BT	2151	222	CBP; LRFF	Se@50s5e	Grey box		
	14/3/16	NP	2028	2301	LRFF, GHFF	Little lorikeets along tsect in flwring grey box			
GN-cw	16/7/15	NP	2015	2048	Nil		Spotted gum	503680	6706878
	20/7/15	BT	1844	1917	Nil				
	16/9/15	BT	2022	2059	GG, SuG	GG:SE@200s50w; SuG:HC@50s30w	Spot gum; acacia		
	8/10/15	NP	1930	2004	GG; CBP	GG:SE@250n5w; CBP:SE@400n20w;	Nil		
	8/12/15	BT	2108	2145	GG; CBP; GHFF; LRFF	GG:SE@200n50w; CBP: SE@200n10e	Spot gum		
	10/12/15	NP	2210	2242	GG	SE@450s30w			
	9/3/16	NP	2151	222	GG; LRFF	Se@400s5e	Grey box		
	14/3/16	BT	2028	2301	LRFF, GHFF				
GN-ie	16/7/15	BT	2115	2148	Nil		Spotted gum	503577	6705891
	20/7/15	NP	1755	1831	Nil				
	16/9/15	NP	2109	2143	ONj		Spot gum; acacia		
	8/10/15	BT	1845	1916	FtG; GG	FtG:SG@50n5e; GG:SE@100n40e	Nil		
	8/12/15	NP	2020	2052	GG; FtG; WtNj; GHFF; LRFF	GG:SE@470n10w; FtG:SM@300n2e	Spot gum		
	10/12/15	BT	2301	2335	YbG; GG; SuGx2	YbG:HC@10s80e; GG: SE@100s20e; SuGx2:SE@480s30e; GtF:nth end tran			

	8/3/16	BT	2015	2048	LRFF; GHFF		Grey box		
	14/3/16	NP	1950	2022	GG; LRFF, GHFF	SE@250n5e			
GN-iw	16/7/15	NP	2115	2148	Nil		Spotted gum	503440	6705889
	20/7/15	BT	1755	1831	YbG	HC@450n			
	16/9/15	BT	2109	2143	GG, SuG	GG:SE@350s5w; SuG:SE@200s20e	Spot gum; acacia		
	8/10/15	NP	1845	1916	SuG	SuG:SM@200n2w (GG off-tran 100n)			
	8/12/15	BT	2020	2052	YbG; CBP	YbG:HC@480n80w; CBP:SE@100n30w	Spot gum		
	10/12/15	NP	2301	2335	GG	SE@450s20w			
	8/3/16	NP	2015	2048	YbG; FtGx2	YbG:hc@200n30e; FtG:sm@250n 10 e	Grey box		
	14/3/16	BT	1950	2022	YbG: CBP, LRFF, GHFF	YbG:hc@100n40e; CBP:se@450n30w; Brown Treecreeper @500s			
GS-ie	16/7/15	NP	1914	1948	Nil		Spotted gum	503004	6704630
	20/7/15	BT	2352	2428	Nil				
	16/9/15	NP	2231	2306	Nil		Spot gum; acacia		
	8/10/15	BT	2032	2107	ONj		Nil		
	8/12/15	NP	2210	2243	ONj		Spot gum		
	10/12/15	BT	2430	0112	BtPhasc	SM@480s10w			
	9/3/16	BT	2245	2317	GHFF, LRFF				
	14/3/16	NP	2120	2152	GHFF, LRFF				
GS-iw	16/7/15	BT	1914	1948	Nil		Spotted gum	502783	6704623
	20/7/15	NP	2352	2428	ONj				
	16/9/15	BT	2231	2306	ONj		Spot gum; acacia		
	8/10/15	NP	2032	2107	ONj; Bettong(250s35e)	Bettong: edge of 8-mile rd ~400m E of Pac Hwy @ 2:20am 6/10/15; edge Airport rd ~300m N 8-mile Rd @2121 8/10/15	Nil		
	8/12/15	BT	2210	2243	SqG; ONj	SqG:HC@480s30w	Spot gum		
	10/12/15	NP	2430	0112	CBPx2	SE@20s30e&450s5e; GtF:400s20(multiple ponds with GtF; est 20+)			
	9/3/16	NP	2245	2317	GHFF, LRFF				
	14/3/16	BT	2120	2152	SqG; CBP, GHFF, LRFF	SqG: Se@480s40w, CBP:se @300s30e			
GS-ce	25/6/15	TW	1855	1930	Nil			503049	6703073
	16/7/15	BT	2245	2317	Nil				
	16/9/15	NP	1928	2001	Nil		Spot gum; acacia		
	8/10/15	BT	2133	2205	CBPx2; FtG	CBP:SE@100n10w&400n20w; FtG:SG@300n10e	Spot gum		
	8/12/15	NP	2401	2432	Nil	Bettong ~200N of tsect	Spot gum		
	10/12/15	BT	2114	2150	SqG; FtG; GHFF; LRFF	SqG:HM@480n20w; FtG:SG@300n10w			
	9/3/16	BT	0900	0935	GHFF, LRFF		Grey box		

	14/3/16	NP	2308	2339	LRFF				
GS-cw	25/6/15	BT	1855	1930	CBP	SE@5n15e	Spot gum	502577	6703722
	16/7/15	NP	2245	2317	Nil				
	16/9/15	BT	1928	2001	Nil		Spot gum; acacia		
	8/10/15	NP	2133	2205	Nil				
	8/12/15	BT	2401	2432	CBP	SE@250n20w	Spot gum		
	10/12/15	NP	2114	2150	FtG x2; CBPx3	FtG:SM@150n10e&SM@300n20e; CBP:SEx2@0n10w; HM@370n20w			
	9/3/16	NP	0900	0935	CBP, GHFF, LRFF	Se@200n5e	Grey box		
	14/3/16	BT	2308	2339	LRFF				
G-r-n	25/6/15	BT	1750	1821	SuG	HC@80n30w	Spot gum	504645	6704742
	16/7/15	NP	2344	2413	FtG	SG@80n	Spotted gum		
	16/9/15	BT	1826	1859	Nil		Spot gum; acacia		
	8/10/15	NP	2237	2309	Nil				
	8/12/15	NP	2310	2345	BbO		Spot gum		
	10/12/15	BT	2026	2058	FtG; BbO	FtG:SM@200n10e			
	9/3/16	BT	2005	2040	LRFF, GHFF, BbO		Grey box		
	14/3/16	NP	2219	2252	BbO; GHFF, LRFF				
G-r-s	25/6/15	TW	1750	1825	Nil			504872	6703121
	16/7/15	BT	2340	2415	FtG	HM@50n10w	Spotted gum		
	16/9/15	NP	1826	1859	Nil	GtF @ nthn end, moving in leaf litter	Acacia; ibk		
	8/10/15	BT	2237	2309	CBPx4; TF; ONj	CBP:SE@50n30e(x3) &450n40w	Spot gum; grey ibk		
	8/12/15	BT	2310	2345	BbO; ONj	Bettong ~200mSth of tran	Spot gum		
	10/12/15	NP	2026	2058	FtGx2; LRFF	FtG:SM@250n2w&SM@:540n2w; GtF @ sthn end next to wet rut			
	9/3/16	NP	2005	2040	LRFF, GHFF, BbOx2		Grey box		
	14/3/16	BT	2219	2252	SuG; BO; GHFF, LRFF	HC@250n50w			

Appendix C – Baseline Transect Habitat Assessments

Table C1: Habitat assessment data of threatened glider baseline transects in sections 3, 6 and 7 of the W2B upgrade. Transect: I = impact, c = control, r = reference; Habitat Type: dof = dry open forest, sf = swamp forest, mof = moist open forest; HBT Hollow size classes: s = small (2-5cm), m = medium (5-15cm), l = large (15-30cm), xl = extra-large (>30cm).

Transect	Date	Habitat Type	Upper Canopy tree species	Lower/mid Canopy tree species	Hollows/ha	Topographic position	Fire History	Disturbance/ Easements	Forest connectivity
TabLB-ie	5/4/16	Dof; SF	Needle bk; Pnk b'wood; red mahog; Scribbly gum	Coast banksia, emerg Euc/acacia, black sheoak; Br-l p'bk; swamp box	N:1s2m2L; S:1s5m2L	Lower slope	5-10 yrs	Logging; track; clearing	Continuous forest bisected by minor road
TabLB-iw	5/4/16	Dof	Needle bk; Pnk b'wood; Scribbly gum; red mahog	Coast banksia, emerg Euc/acacia, Leptospermum sp; black sheoak	N:1s5m; S:2s4m5L	Mid slope	5-10 yrs	Logging	Continuous forest
TabNR-rn	18/3/16	Dof & sf	B'butt, Pnk BWood, red BWood, rh-bk Angophora, Scribbly gum	Black sheoak, acacia sp, coast banksia	S:2s2m2L; 2s1m	Flat	>5yrs	Logging, tracks	Continuous forest
TabNR-rs	18/3/16	Dof & sf	B'butt, Pnk BWood,	Black sheoak, acacia sp, br-l p'bk, coast banksia, turpentine	N:4s12m4L; S:9s17m2L	Flat	>5yrs	Logging, tracks	Continuous forest
TabVM-ie	5/4/16	Dof	Wh Str bk; Pnk b'wood; Scribbly gum; red mahog	emerg Euc/acacia, black sheoak	N:6s9m3L S:5s15m12L2xL	Mid slope	<5 yrs	Logging ; tracks	Continuous forest
TabVM-iw	13/4/16	Dof	Spotted gum, White Mahog, p Bloodwood, Tallowwood, Red Mahog.	Forest sheoak, emergent eucs, acacia sp, persoonia sp, Black sheoak.	N: 5s, 5m, 4l. S: 7s, 5m, 1l, 1xl.	Mild slope	>5 years	Logging, tracks,	Continuous forest
TabN-ie	6/4/16	Dof	Wh Str bk; Pnk b'wood; Scribbly gum; red mahog	emerg Euc/acacia, black sheoak	N:5s7m8L2xL; S:7s7m6L1xL	Mid slope	>5 yrs	Logging ; tracks	Continuous forest
TabN-iw	13/4/16	DOF (n), MOF (s)	Grey irnbk, White Mahog, p Bloodwood, sf gg, Mel quin, Forest Red gum, red Mahog, Swamp box	Acacia sp, emergent eucs, forest sheoak.	N: 6s, 4m, 1l. S: 5s, 3m, 2l.	Mid slope	>5 years	Logging, fencing, tracks.	Continuous forest
TabN-ce	18/3/16	Dof & sf	B'butt, Red & white mahog, forest r-gum, swamp box	Black sheoak, acacia sp, br-l p'bk, coast banksia	N:4s7m, S:2s9m	Mid-lower slope	<5yrs	Logging, tracks	Continuous forest; minor cleared patches

TabN-cw	11/3/16	Dof	White mahog, Scribbly gum, p. Bloodwood, tallowwood	Acacia sp, black sheoak, mel nodosa	N: 10s, 2m S: 7s, 5m, 1l	Lower slopes	<5years	Tracks, rubbish, logging	Continuous forest
TabDD-rn	18/3/16	Dof	B'butt, Red & white mahog, wh Str bk, spot gum,	Black sheoak, emerg eucs, acacia sp,	N:6s1m; S:4s3m	Mid slope	<5yrs	Logging, tracks	Continuous forest
TabDD-rs	18/3/16	Dof	Red mahog, spot gum, b-l i'bk; SF grey gum	Black sheoak, emerg eucs, acacia sp,	N:3s1m; S:1s2m1L1xL	Mid slope	<5yrs	Logging, tracks	Continuous forest
TabM-ce	18/3/16	Dof	Scribbly gum, red & white mahogany, pnk BWood	Black sheoak, acacia sp, coastal banksia, Mal. nodosa	N:2s3m1L; S:2s3m2L	Lower slope	>5yrs	Logging, tracks	Continuous forest
TabM-cw	18/3/16	Dof	B'butt, Scribbly gum, Red & white mahogany	Black sheoak, emerg eucs, acacia sp, coastal banksia	N:9s9m5L; S:11s10m1L	Mid slope	<5yrs	Logging, tracks	Continuous forest
TabM-ie	11/3/16	Dof	Grey ibk, Wh mahog, spot gum, Pnk bwood, Scribbly gum	Acacia sp. black oak	N: 8s, 1m, S: 5s, 5m, 1l	Flat	<5 years	Logging, track	Continuous forest
TabM-iw	11/3/16	Dof	P. Bloodwood, White mahogany, spot gum	Acacia sp. swamp box. Forest oak, black sheoak	S:3s4m2l, N:6s5m2L1xL	Flat	<5 years	Logging, tracks	Continuous forest
TabS-ie	6/4/16	Dof	Pnk b'wood; Scribbly gum; red mahog; b'butt	emerg Euc/acacia, black sheoak, Persoonia sp.	N:3s,1m; S:4m	Mid slope	>5 yrs	Logging ; clearing, road	Continuous forest
TabS-iw	11/3/16	Dof	B'butt,pink b'wood, Scribbly gum, wh strbk	Acacia sp., Black sheoak; Mal nodosa; Coast banksia	S:4s6m8L5xL; N:6s12m6L3xL	Flat	>5yrs	Track, logging	Continuous forest
TabS-ce	16/3/16	Dof	wh strbk, spot gum, grey i'bk; SF grey gum	Acacia sp., Black sheoak;	N:3s5m; S:4m	Flat	<5yrs	Tracks/road, logging, clearing	Continuous forest; minor cleared patches
TabS-cw	16/3/16	Dof & SF	I'bk,spot gum, For red gum ; swamp box, pnk b'wood	Acacia sp. black sheoak; swamp box, b-l p'bk	N:4s7m2L; S:1m3L1xL	Lower slope	<5 years	track	Continuous forest
MOR-ie	15/3/16	Dof	pink b'wood, Scribbly gum, wh strbk	Black sheoak, emerg eucs, acacia sp	S:4s2m2L2xL; N:7s8m3L	Mid slope	+&- 5yrs	Logging, tracks	Continuous forest
MOR-iw	11/3/16	dof	s-f grey gum, pink b'wood, wh mahog; tallow wood	Acacia sp.,	S:1s1m; N:7s7m	Flat	>5yrs	Logging, hwy; easemt	Continuous forest; minor cleared patches; partially fragmented
MOR-ce	15/3/16	Dof	B'butt,pink b'wood, Wh Str bk	Turpentine, Black sheoak, emerg eucs, acacia sp	N:6s5m8L4xL; S:7s5m1L	Mid slope	+&- 5yrs	Logging, tracks	Continuous forest
MOR-cw	11/3/16	dof	B'butt, tallow wood, wh mahog; turpentine	Acacia sp., Black sheoak; Mal nodosa	S:1s5m; N:2s1m2L2xL	Flat	<5yrs	Logging, rest area; easemt,hwy	Continuous forest
MOR-rn	17/3/16	Dof & SF	Spot gum, wh mahog, red mahog, pnk BWood	Acacia sp, black sheoak, Mal. nodosa, Mal q-queer l	N:8S6m; S:9s4m2L	Flat	<5yr	tracks	Continuous forest

MOR-rs	15/3/16	Dof	Sf Grey Gum, Spot Gum, n-l I'bk, pnk BWood	Black sheoak, emerg eucs, acacia sp	S:4s5m; N:6s8m	Flat	+&- 5yrs	Logging, tracks	Continuous forest
TucN-ce	13/4/16	DOF	Swamp box, pink Bloodwood, White mahogany	Soapwood, leptospernum sp, acacia sp, black sheoak, cheese tree, banksia sp.	S: 5s, 2m. N: 6s, 1m.	Flat	>5 years	Tracks, logging.	Continuous forest; minor cleared patches
TucN-cw	13/4/16	Dof	Tallowwood, p Bloodwood, swamp box, red Mahog, acacia sp.	Persoonia sp, acacia sp, emergent eucs, soapwood, black sheoak,	S: 7s, 6m, 3l N: 8s, 7m, 1l.	Undulating	4-6 years	Logging, mineral extraction, grazing, tracks	Continuous forest; minor cleared patches
TucM-ce	13/4/16	Dof	P. Bloodwood, grey irnbk, Tallowwood, White Mahog, Blackbutt	Acacia sp, turp, persoonia sp.	N: 3s, 7m, 1l. S: nil	Mild slope	>5 years	Logging, tracks, fencing, grazing	Continuous forest
TucM-cw	13/4/16	Mcf(s) Dof(n)	Brush box, swamp Mahog, turp, mel quin, red Mahog, p Bloodwood	Soapwood, emergent eucs, cheese tree, leptospernum sp. banksia sp, acacia sp, banksia int.	S: 1s, 1l, 1xl. N: 1s, 4m, 2l	Flat with creek gullies, low lying	>5 years	Tracks, fencing.	Continuous forest; minor cleared patches
Tuc-r-n	13/4/16	Dof	Grey irbk, Tallowwood, White Mahog, sf gg.	Acacia sp, soapwood, emergent eucs, forest sheoak, swamp box.	S: 4s. N: 3s, 4m.	Flat with creek gullies	<5 years	Logging, fire, grazing, tracks	Continuous forest
Tuc-r-s	13/4/16	Dof	White mahog, p Bloodwood, turp, spotted gum, grey irbk.	Acacia sp, emergent eucs, black sheoak, persoonia sp.	W: 2s, 6m. E: 8s, 5m, 2l	Mid slope	>5 years	Logging, tracks, grazing	Continuous forest
TucS-ce	13/4/16	Dof	P Bloodwood, Scribbly gum, red Mahog, swamp box, swamp Mahog	Black sheoak, leptospernum sp, persoonia sp, melaleuca sp, emergent eucs, banksia int., banksia sp.	N: 13s, 10m, 2l. S: 4s, 5m, 1l	Sloping	>5years	Logging, grazing, tracks, fencing	Continuous forest; minor cleared patches
TucS-cw	13/4/16	Dof	P Bloodwood, Scribbly gum, red Mahog	Leptospernum sp, persoonia sp, forest sheoak, swamp box, banksia int., banksia sp, acacia sp, emergent eucs,	S: nil. N: 12s, 10m	Sloping	>5 years	Logging, grazing, tracks, fencing	Continuous forest; minor cleared patches
TucN-ie	11/3/16	Dof ; Sf	s-f grey gum, pink b'wood, spotted gum, Scribbly gum	Black sheoak; swamp box	N:1s2m1L; S:3s4m5L1xL	Mid-lwr slope	<5yrs	Logging, clearing, grazing, tracks	Continuous forest; minor cleared patches
TucN-iw	11/3/16	Dof	s-f grey gum, pnk b'wood, tallow wood, grey i'bk	Black sheoak	N:3s3m; S:4s1m	Mid-lwr slope	<5yrs	Logging, clearing, grazing, tracks	Continuous forest; minor cleared patches; partially fragmented

TucS-ie	13/4/16	Dof	Scribbly gum,p Bloodwood, red Magog	Soapwood, persoonia sp, forest sheoak, acacia spp, swamp box, leptospernum sp, banksia sp,	S: 8s, 8m, 2l, 1xl, N: 7s, 8m, 8l, 2xl	Mid slope	>5 years	Logging, grazing, tracks, fencing	Continuous forest; minor cleared patches
TucS-iw	13/4/16	Dof	Scribbly gum, p blood, Tallowwood, red mahogany	Acacia sp, persoonia sp, emergent eucs, soap wood, leptospernum sp.	N: 10s, 10m, 1l S: 9s, 10m, 3l, 1xl	Mid slope	>5 years	Logging, grazing, tracks, fencing	Continuous forest; minor cleared patches
GN-ce	14/3/16	Dof	Spot gum, grey box	emerg euc's; acacia sp	N: 4s3m1L; S: 3s3m5L	Mid	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches
GN-cw	14/3/16	Dof	Br-l i'bk; spot gum, grey box	emerg euc's; acacia sp	N:2s1m; S:6s3m1L	Mid	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches
GN-ie	14/3/16	Dof	Sf Grey Gum, Spot Gum, grey Box, grey I'bk	Black sheoak, emerg eucs, acacia sp	N: 1s, 4m, 2l, S: 2s, 2m	Mid-lwr slope	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches
GN-iw	14/3/16	Dof	Sf Grey Gum, Spot Gum, grey Box, grey I'bk	Black sheoak, emerg eucs, acacia sp	N:3s2m; S:4s1m	Mid-lwr slope	<5years	Logging, tracks, grazing	Continuous forest; minor cleared patches
GS-ie	17/3/16	Dof	Spot gum, sf gg, grey Ironbark, grey box	Acacia sp, emergent eucs, forest she oak, soap wood	S: 9s, 2m. N: 4s	Gradual sloping	<1year	Logging, tracks, grazing	Continuous forest
GS-iw	17/3/16	Dof	Spot gum, sf gg, grey Ironbark, grey box	Acacia sp, emergent eucs, black she oak, f red gum	N: 1s,5m,1l. S: 3s,6m,1l	Gradual sloping	<1year	Logging, tracks, grazing	Continuous forest
GS-ce	17/3/16	Dof	Sf gg, spot gum,g Ironbark, greybox	Black oak, acacia sp. emergent eucs	S: 3s1m. N:1s	Gradual slop	<1 year	Logging, tracks, grazing, fire	Continuous forest; minor cleared patches
GS-cw	17/3/16	Dof	Spot gum, grey box, g Ironbark	Emergent eucs, acacia sp, f red gum	N: 2s3m1xl. S: 3s1m	Sloping	<5 years	Tracks, fences, roads, logging	Continuous forest; minor cleared patches; partially fragmented
G-r-n	17/3/16	Dof	Spotted gum, grey box, grey Ironbark, sf gg	Emergent eucs, acacia sp.	S:2s2m; N:1s1m	Low grade slope	<2 years	Extensive logging, tracks, grazing	Continuous forest
G-r-s	17/3/16	Dof	Grey box, Ironbark, spot gum, sf gg	Emergent eucs, acacia sp. forest oak	S: 3s3m1l. N:2s2m2l	Flat	<2 years	Extensive Logging, tracks, grazing	Continuous forest