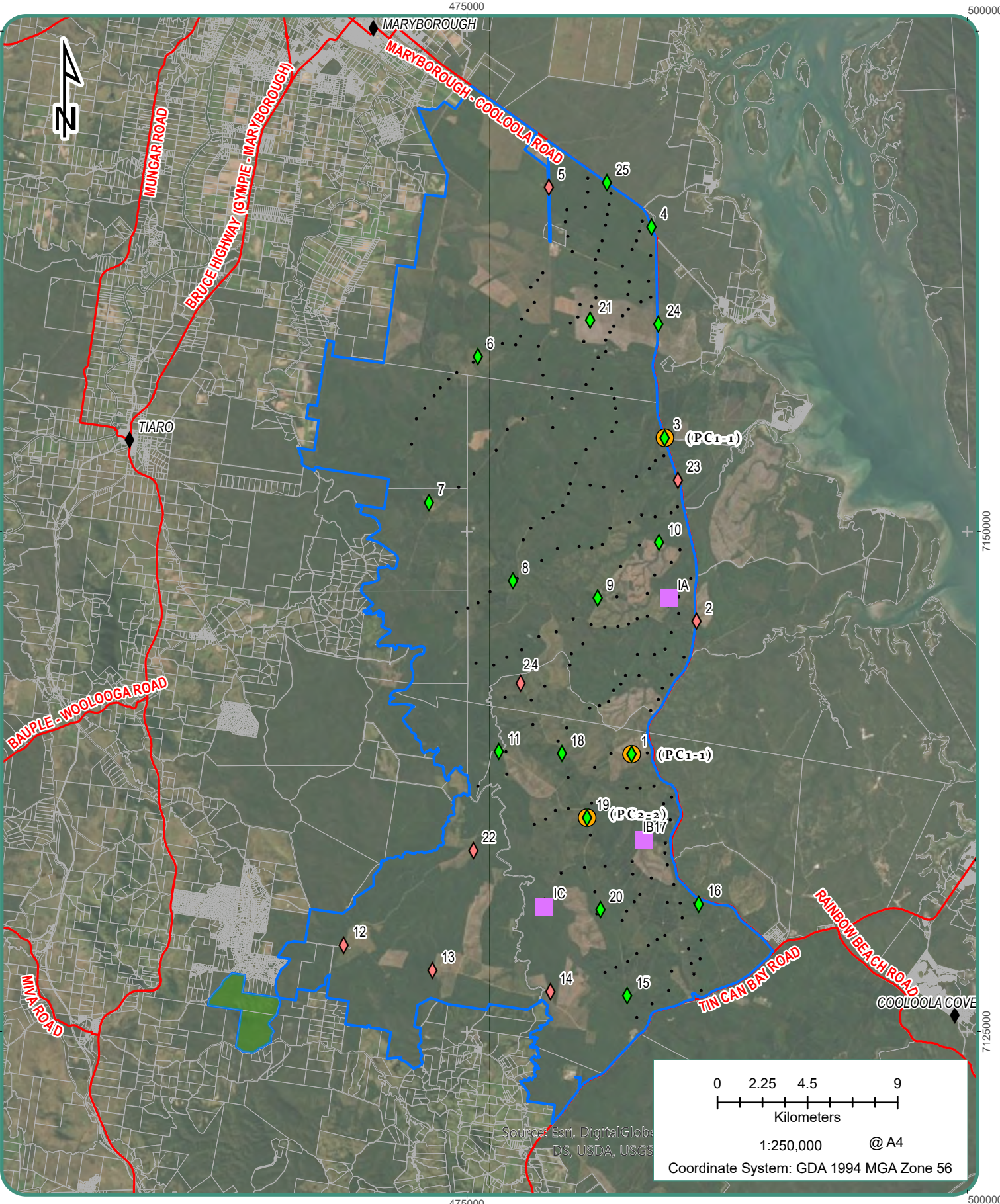


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TITLE:
Bird Survey Locations

MAP NO: Figure 3

PROJECT: Forest Wind Holdings Pty Ltd -
 Bird & Bat Utilisation Survey

- LEGEND**
- FWH Turbine locations (170m Ø)
 - ◆ Bird monitoring locations
 - ◆ Reference sites
 - 2016/2017 surveys
 - Incidental observation
 - State controlled roads
 - ▭ Project Area (PLA)
 - ▭ Property boundaries
 - Native state forest



Date: 10/02/2020

Data Source:
© State of Queensland (Department of Natural Resources, Mines and Energy) 2019.

3.4.4 Bat Utilisation Survey

The echolocation calls of insectivorous bats were recorded using two (2) ultrasonic detectors (Songmeters) (SM2BAT® and SM4BAT) and stored on compact flash memory cards for later computer analysis and identification. The detector locations were selected based on:

- attempts to maximise diversity of bat species detected; and
- the degree to which the locations represent fauna habitat types within the Project Area (PLA).

Detectors were placed on the ground or on trees in suitably open areas (to maximise acoustic clarity) or flyways. Detectors were deployed across the Project Area (PLA) between 14 February 2019 and 26 March 2019. Songmeters were moved on a weekly basis over the 6-week period, which equates to 80 nights of recording. Batteries were changed each week and data was downloaded before re-deployment. All bat calls recorded were sent to a qualified and experienced bat-call analyst (Greg Ford; Balance Consulting) for identification.

A third songmeter (SM4) was also deployed during the same period. The SM4 records acoustic sounds such as frogs, birds and flying-foxes. Thirty-four (34) nights of acoustic recording was also undertaken across five locations during the same 6-week period.




Table 5 identifies each site of Songmeter deployment with a brief habitat description. Refer to Figure 4 for bat monitoring locations.



A grey-headed flying-fox (GHFF) assessment was undertaken in accordance with the recommended DoEE (2019) survey approach. Given GHFF occupies most areas in their distribution in highly irregular patterns, surveys based on animal sightings are unlikely to be reliable (DoEE, 2019). A more effective survey method is to search appropriate databases and other sources for the locations of camps, and to conduct vegetation surveys to identify feeding habitat (DoEE, 2019).



An inventory of the current status of 14 historical flying-fox camps within and near the scoping area was carried out on 7 December 2016 by Premise Australia (Premise, 2017). The locations of the flying-fox camps were informed by the DoE National Flying-fox Monitoring Viewer (DoEE, 2015) and DES flying-fox roost monitoring locations (Department of Environment and Heritage Protection, 2016a). Species present and estimated camp size were recorded. The flying-foxes were observed leaving one camp (the closest camp to the Project Area (PLA)) for the evening to understand the general direction of travel relative to possible placement of turbines, although the dispersal direction may also be influenced by climatic conditions and food availability.



The DoEE National Flying-fox Monitoring Viewer (informed by the DoE, National Flying-fox Monitoring Program (NFFMP) – flying-fox census) was again reviewed in 2019 to assess the status of the flying-fox camps in the region, given that camps fluctuate over time (abundance and species present). The NFFMP determines camp activity, camp size and which of the four (4) flying-fox species are utilising the camp (grey-headed flying-fox (GHFF), little red flying-fox (LRFF), spectacled flying-fox (SFF) and black flying-fox (BFF)).



Table 5 Bat Monitoring Locations



Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
1	SM2BAT ¹	14/02/2019	20/02/2019	6	-25.93565	152.86038	Mature pine forest. Less than 500m from remnant patch (SM4BAT was deployed in adjacent remnant for same period to compare difference between pine/remnant within flying distance). Large black feral cat observed.	
2	SM4BAT ¹	14/02/2019	20/02/2019	6	- 25.93553762	152.8518821	Remnant. Iron bark, <i>E. propinqua</i> (grey gum), <i>Corymbia citriodora subsp. variegata</i> (spotted gum), <i>C. intermedia</i> (pink bloodwood), lantana and grass trees. HBT present. Less than 1km from above pine forest and deployed over same nights to compare difference in utilisation.	
3	SM4 ²	14/02/2019	20/02/2019	6	- 25.72005957	152.7239289	Logging Creek (acoustic recorder only ie. birds, frogs and flying-fox)	




Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
4	SM2BAT ¹	20/02/2019	27/02/2019	7	- 25.62811728	152.8205834	Mature pine plantation in northern end of site	
5	SM4BAT ¹	20/02/2019	27/02/2019	7	- 25.67289676	152.8120367	Young pine plantation. Proximate to above mature pine and deployed over same nights to compare utilisation between young and mature pine.	


Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
6	SM4 ²	20/02/2019	27/02/2019	7	- 25.82897261	152.7823004	Sugarloaf Creek. Permanent creek in Project Area (PLA). Deployed on <i>Melaleuca</i> .	
7	SM2BAT ¹	27/02/2019	4/03/2019	5	- 25.72060523	152.7240862	Logging Creek. Permanent creek in Project Area (PLA). Deployed 11:30am.	

Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
8	SM4BAT ¹	27/02/2019	4/03/2019	5	-25.74517199	152.7224208	<p>Deployed in mature pine. Weedy understorey of lantana, ciratro and blue billy-goat weed.</p> <p>Proximate to Logging Creek (western side of site) to compare between remnant creek line and mature pine utilisation. Same nights.</p>	
9	SM4 ²	27/02/2019	4/03/2019	5	-25.88919476	152.755775	<p>Tinana Creek approximately 50 m upstream from Raintree Bridge. Creek appears in good condition in this area and appears to flow permanently. Pools, riffles, shaded areas, good instream structure, tanin stained. Approx 7m wide.</p>	

Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
10	SM4BAT ¹	4/03/2019	14/03/2019	10	- 25.8028659 4	152.7933323	Remnant patch of native vegetation including <i>Corymbia</i> sp. and hollows	
11	SM2BAT ¹	4/03/2019	14/03/2019	10	- 25.83658447	152.7772792	Pine plantation. Pine approximately 10m tall. Bracken fern. Weedy understorey, lantana. To compare pine utilisation to above remnant. Same nights.	

Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
12	SM4 ²	4/03/2019	14/03/2019	10	- 25.91570605	152.7544686	Sandy Creek. Permanent Creek running through Project Area (PLA).	
13	SM2BAT ¹	14/03/2019	20/03/2019	6	- 25.74430054	152.8473066	Semi-mature pine plantation. Bracken fern undergrowth.	

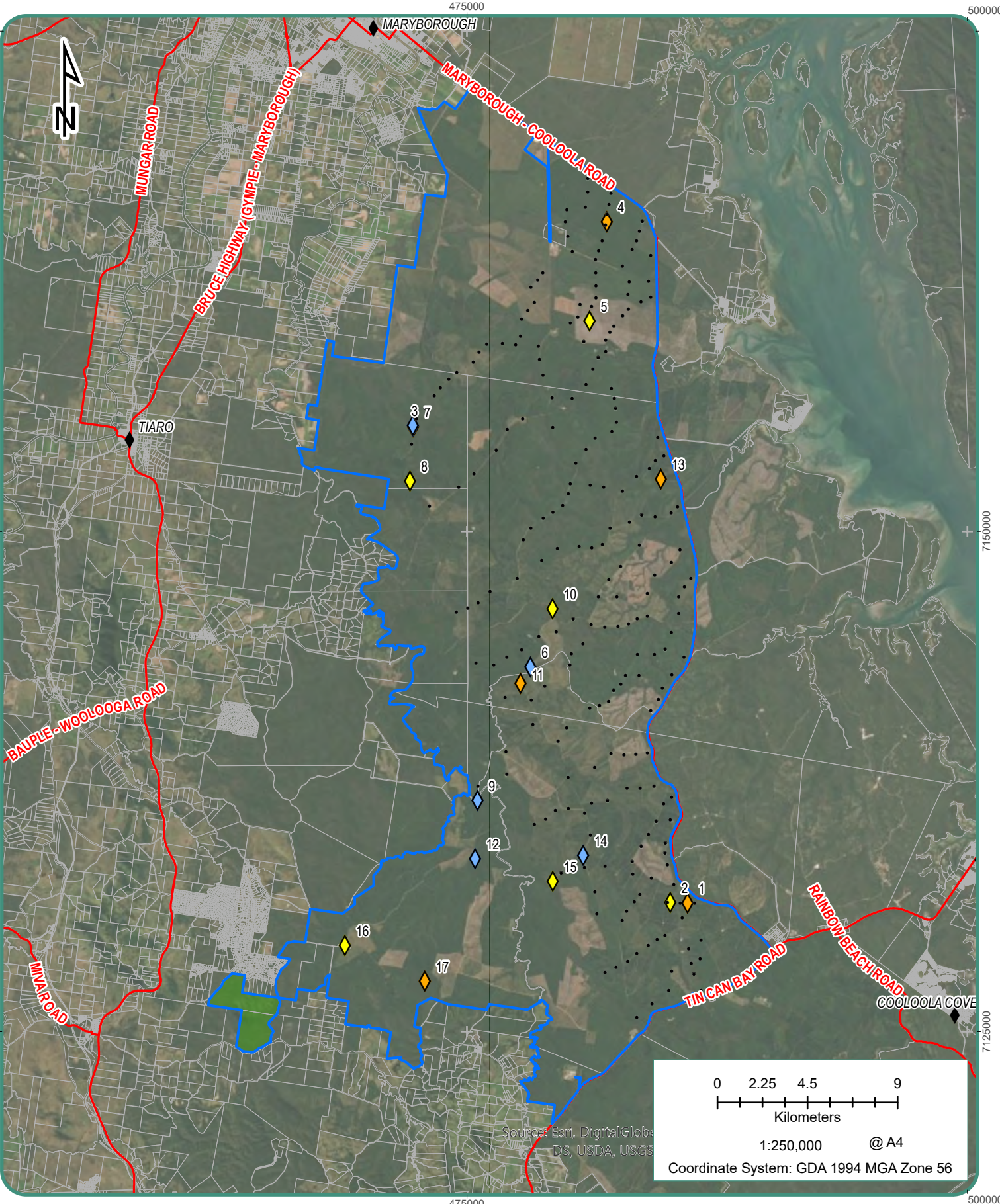
Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
14	SM4 ²	14/03/2019	20/03/2019	6	- 25.91409343	152.8084228	Scrubber Creek. 40m west of crossing. Ephemeral. Series of pools with pine debris in some areas.	
15	SM4BAT ¹	14/03/2019	20/03/2019	6	- 25.92587903	152.7931573	Remnant patch just north of Tinana Creek crossing. Large remnant area full of spotted gums HBTs. Regrowth <i>Allocasuarina littoralis</i> and <i>Corymbia sp.</i> Good habitat for microbats due to proximity of water and abundant small hollows.	
16	SM4BAT ¹	20/03/2019	26/03/2019	6	- 25.95451283	152.6895083	Southern end of site (sw). In young pine up to approx 8m high.	

Site	Machine ID	Start Date	End Date	Nights recorded	Lat	Long	Habitat Description	Photo Log
17	SM2BAT ¹	20/03/2019	26/03/2019	6	25.97079857	152.7293415	<p>Young pine (1-2m high). Abundant coarse woody debris (pine spoil from previous harvest). Weedy. No remnant vegetation proximate to location. Large open areas due to all young pine.</p>	

¹ - SM2BAT and SM4BAT are ultrasonic recorders which specifically record echolocations of microbat species.

² - SM4 is an acoustic recorder which records audible sounds such as mega-bats (flying foxes), birds and frogs. This machine does not record echolocations of micro-bat species. This machine was specifically targeted in areas of potential flying-fox foraging and creek lines considered suitable for amphibian activity.

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TITLE:
Bat Survey Locations

MAP NO: Figure 4
PROJECT: Forest Wind Holdings Pty Ltd - Bird & Bat Utilisation Survey

LEGEND

- FWH Turbine locations (170m Ø)
- ◆ SM4BAT1
- ◆ SM2BAT1
- ◆ SM42
- State controlled roads
- ▭ Project Area (PLA)
- ▭ Property boundaries



Data Source:
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Date: 10/02/2020

3.4.5 Nocturnal Surveys

Nocturnal surveys were undertaken to assist with identifying flying-fox presence within the Project Area (PLA). Surveys were undertaken in 2016 at the closest known flying-fox camp (at the time of survey this was Anderleigh Road Camp at Maaroom which was not active in 2016) to monitor the direction of dispersal in the evening, although this may vary depending on climatic conditions and food source availability.

Targeted nocturnal surveys were undertaken by 2-personnel over a 2-night period in June 2019 within the NSF portion of the Project Area (PLA). Powerful owls and greater gliders were targeted during this survey within the NSF. Additional nocturnal surveys were undertaken by 2-personnel 1-week later using spotlights in remnant woodland habitat within the Project Area (PLA) over a 2-night period, also in June 2019. The timing was selected following the nocturnal survey in the NSF portion of the Project Area (PLA) where GHFF were observed feeding in remnant eucalypt woodland. The NSF portion of the Project Area (PLA) was able to be used as a reference site for the Project Area (PLA).

3.4.6 Aquatic Surveys

Aquatic surveys were undertaken during some BUS surveys whilst traversing the site between BUS location. These rapid assessments included brief habitat assessments and dip-netting if considered possible habitat for threatened aquatic fauna.

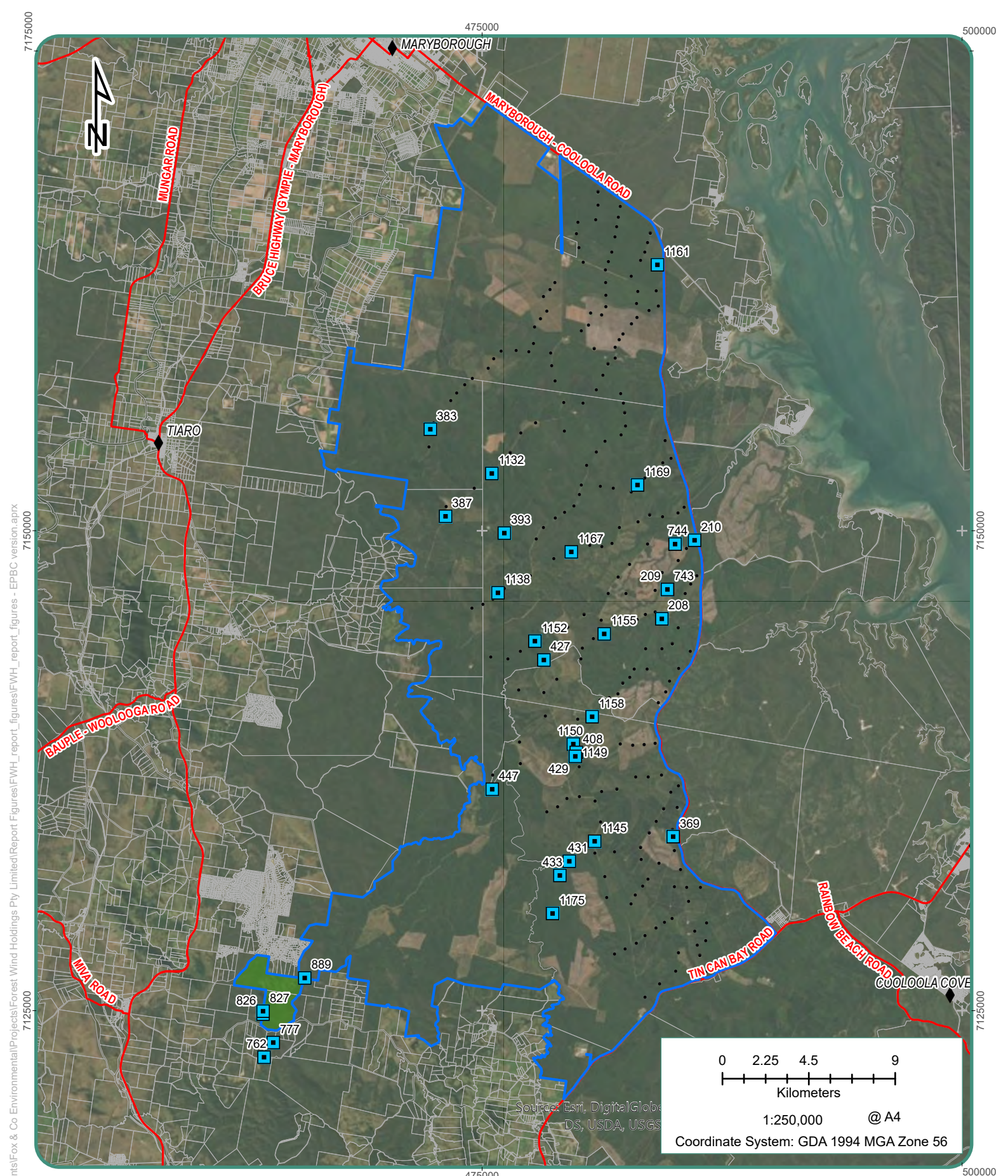
Additional aquatic assessments were undertaken on 17-19 June 2019 and 9 January 2020. Aquatic assessments involved dip-netting and habitat assessments for threatened aquatic species. Refer to Figure 5 for aquatic assessment sites.

3.4.7 Koala Surveys

Koala surveys were undertaken in the NSF portion of the Project Area (PLA) using a trained koala scat detector dog from the University of the Sunshine Coast (USC). A total of 20 surveys were undertaken over two (2) days on State Forest Lot 1419FTY1697. The age of koala scats is defined in Table 6.

Table 6 Koala Scat Age Category (USC, 2019)

Scat Categories	Age / Days	Characteristics
1	1 day old or less	Very fresh (covered in mucus, wet)
2	Couple of days old	Fresh (shine and odour)
3	Couple of weeks old	Medium fresh (shine or odour when broken)
4	Months old	Old (no shine, no odour)
5	More than a few months old	Very old and discoloured



TITLE:
Aquatic Survey Locations

MAP NO: Figure 5

PROJECT: Forest Wind Holdings Pty Ltd

- LEGEND**
- ◆ Populated places
 - FWH nominal turbine locations
 - Aquatic survey point
 - State controlled roads
 - ▭ Project Area (PLA)
 - ▭ Property boundaries
 - Native state forest



Date: 10/02/2020

Data Source:
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4 RESULTS

4.1 Desktop Results

4.1.1 Likelihood of Occurrence

Desktop searches identified 12 fish species, 23 amphibians, 184 birds, 20 mammals (excluding bats), 7 bats, 23 reptiles (including 3 freshwater turtles) and 406 plant species recorded within the Project Area (PLA) since 1971 (refer Appendix E). Most species are least concern under the NC Act or not listed under the EPBC Act.

Not all the threatened species indicated through desktop information are expected to occur within the Project Area (PLA) due to the absence of suitable habitat for some species. Table 7 and Table 8 lists the threatened fauna and threatened flora species that are at least moderately likely to potentially occur within or immediately adjacent to the Project Area (PLA). Further details are provided in the Likelihood of Occurrence Tables in Appendix D.

Table 7 Threatened Fauna Species Potentially Occurring in Project Area (PLA)

Scientific Name	Common Name	EPBC Act ¹	NC Act ²	GRC ³
Reptiles				
<i>Eelseya albagula</i>	Southern (white-throated) snapping turtle	CE	E	-
<i>Elusor macrurus</i>	Mary River Turtle	E	E	-
Amphibians				
<i>Adelotus brevis</i>	Tusked Frog	-	V	-
<i>Crinia tinnula</i>	Wallum Froglet	-	V	-
<i>Litoria cooloolensis</i>	Cooloola sedgefrog	-	NT	-
<i>Litoria freycineti</i>	Wallum Rocketfrog	-	V	-
<i>Litoria olongburensis</i>	Wallum Sedge Frog	V	V	-
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	-
Mammals				
<i>Petauroides volans volans</i>	Southern greater glider	V	V	-
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	-	-
<i>Phascolarctos cinereus</i>	Koala	V	V	LPS
<i>Ornithorhynchus anatinus</i>	Platypus	-	SLC	LPS
<i>Tachyglossus aculeatus</i>	Short-beaked echidna	-	SLC	

Scientific Name	Common Name	EPBC Act ¹	NC Act ²	GRC ³
<i>Xeromys myoides</i>	Water mouse	V	V	-
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	V	V	-
Fish				
<i>Maccullochella mariensis</i>	Mary River cod	E	-	LPS
<i>Nannoperca oxleyana</i>	Oxleyan Pygmy Perch	E	V	-
<i>Neoceratodus forsteri</i>	Australian lungfish	V	protected species under the <i>Qld Fish and Oyster Act 1914</i>	-
<i>Pseudomugil mellis</i>	Honey Blue Eye	V	V	-
Crustaceans				
<i>Tenuibranchiurus glypticus</i>	Swamp crayfish	-	E	
Birds				
<i>Hirundapus caudacutus</i>	White-throated Needletail	V, MT, LM	SLC	-
<i>Rostratula australis</i>	Australian painted snipe (Syn. <i>Rostratula benghalensis</i>)	E, LM, MW	V	-
<i>Pezoporus wallicus wallicus</i>	Ground parrot	-	V	-
<i>Ninox strenua</i>	Powerful owl	-	V	-
Listed Migratory Species				
Migratory Marine Birds				
<i>Apus pacificus</i>	Fork-tailed Swift	MM, LM	SLC	-
Migratory Terrestrial Species				
<i>Cuculus optatus</i>	Oriental cuckoo	MT	SLC	-
<i>Monarcha melanopsis</i>	Black-faced monarch	MT, LM	SLC	-
<i>Monarcha trivirgatus</i> (syn. <i>Symposiarchus trivirgatus</i>)	Spectacled Monarch	MT, LM	SLC	-
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	MT, LM	SLC	-
<i>Rhipidura rufifrons</i>	Rufous Fantail	MT, LM	SLC	-

Scientific Name	Common Name	EPBC Act ¹	NC Act ²	GRC ³
Listed Marine Species				
<i>Anseranas semipalmata</i>	Magpie Goose	LM	LC	-
<i>Ardea alba (Syn. A. modesta)</i>	Great Egret, White Egret	LM	LC	-
<i>Ardea ibis</i>	Cattle egret (Syn. <i>Bubulcus ibis</i>)	LM	LC	-
<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle	LM	LC	-
<i>Merops ornatus</i>	Rainbow bee-eater	LM	LC	-
<i>Coracina tenoriostris</i>	Cicadabird	LM	LC	-

¹ – EPBC Act: CE – Critically endangered, E – Endangered, V – Vulnerable, MM – Migratory Marine, MT – Migratory Terrestrial Species, MW – Migratory Wetland Species, LM – Listed Marine Species

² NC Act - E – Endangered, V – Vulnerable, SLC – Special Least Concern, LC – Least Concern

³ – Gympie Regional Council Local Priority Species (LPS)

Table 8 Threatened Flora Species Likely to Occur in the Project Area (PLA)

Scientific Name	Common Name	EPBC Act	NC Act
<i>Acacia attenuata</i>	-	V	V
<i>Boronia rivularis</i>	Wide Bay boronia	-	NT
<i>Fontania rostrata</i>	-	V	V
<i>Macadamia integrifolia</i>	Macadamia nut	V	V
<i>Macrozamia pauli-guilielmi</i>	Pineapple Zamia	E	E
<i>Pterostylis chaetophora</i>	-	-	E
<i>Samadera bidwillii</i>	Quassia	V	V
<i>Xanthostemon oppositifolius</i>	Southern Penda	V	V

4.1.1.1 Flying-foxes

There are three (3) species of megabats (flying-foxes) known to occur in the region.

1. Grey-headed flying-fox (GHFF) (*Pteropus poliocephalus*) – (EPBC Act – Vulnerable, NC Act – Least Concern)
2. Little red flying-fox (LRFF) (*Pteropus scapulatus*) – (EPBC Act – Not Listed, NC Act - Least Concern)
3. Black flying-fox (BFF) (*Pteropus alecto*) – (EPBC Act – Not Listed, NC Act – Least Concern)

Flying-fox camps are sometimes mixed with GHFF and LRFF, and more often with GHFF and BFF with numbers and presence varying over time due to the nomadic nature of flying-foxes and food availability.

4.1.1.1.1 Grey-headed Flying-fox

There are seven (7) GHFF camps within 50km of the Project Area (PLA) that have been occupied by GHFF within the past 2 years.

1. Glenwood Varley Road (53)
2. Maaroom, Esplanade (209)
3. Goomboorian, Anderleigh Rd Ginger Creek (55)
4. Maryborough, Kent Street (88)
5. Maryborough, Albion Rd Wetlands (Island Plantation) (87)
6. Gympie (53)
7. Woocoo (171)

The definition of a Nationally Important GHFF Camp is defined for the management of GHFF and Spectacled Flying-fox camps, specifically relating to *in-situ* camp management. Camps that have contained $\geq 10,000$ GHFF in more than one year in the last 10 years, or have been occupied by more than 2,500 GHFF permanently or seasonally every year for the last 10 years (*EPBC Policy Statement, September 2015*).

As such, the closest Nationally Important GHFF camps are Maaroom, Glenwood Varley Road, Gympie and Woocoo, which are 4km, 14km, 30km and 40km away from the nearest turbine location, respectively (refer Appendix A, Figure 7).

Additional flying-fox camps are shown on Figure 7, Appendix A. These camps have either been surveyed and no flying-foxes were found (as per the NFFMP), or are considered inactive and/or have not had any flying-fox activity for seven (7) years or more.

Table 9 provides a summary of the latest GHFF camps/counts (DoEE, NFFMP).

Table 9 Grey-headed flying-fox Camps within 50km of the Project Area (PLA)

Camp Name/ ID	Distance from turbines (km)		Counts/Category	Date of survey activity	Notes
	Minimum	Maximum			
Glenwood Varley Road (53)	16km	39km	16,000 – 49,000 (category 5)	August 2018	$\geq 10,000$ GHFF 3 times in the last 10 years (2012, 2015, 2018)
Maaroom, Esplanade (209)	4km	42km	500 – 2,499 (category 2)	May 2018	$\geq 10,000$ GHFF twice in the last 10 years (2015, 2017)
Goomboorian, Anderleigh Rd Ginger Creek (55)	9km	49km	2,500 – 9,999 (category 3)	August 2018	
Maryborough, Kent Street (88)	12km	51km	1-499 (category 1)	May 2018	No GHFF in November 2018

Camp Name/ ID	Distance from turbines (km)		Counts/Category	Date of survey activity	Notes
	Minimum	Maximum			
Maryborough, Albion Rd Wetlands (Island Plantation) (87)	14km	55km	10,000 – 15,999 (category 4)	May 2017	
Gympie (59)	30km	66km	500-2,499 (category 2)	February 2018	Nationally Important GHFF Colony
Woocoo (171)	40km	65km	>50,000 (category 6)	November 2018	Nationally Important GHFF Colony. Located in Woocoo National Park

4.1.1.1.2 Black Flying-fox

The black flying-fox is Least Concern under the NC Act and not listed under the EPBC Act. The black flying-fox is a migratory species that roosts in large numbers high in the tree canopy during the day. Females become pregnant before the bats disperse into generally smaller camps for the winter. They re-congregate into large camps during spring and summer, when birthing occurs (Australian museum, 2020).

Table 10 shows the black flying-fox camps within 50km. They are often mixed camps with BFF and/or GHFF and fluctuate over time. The Gympie camp has historically (since 2012) had the most numbers of BFF of the camps within 50km of the Project Area (PLA). Black flying-foxes have a general home range of 15 – 30km, however can travel over 50km from their camp to a feeding area (Australian museum, 2020). The largest BFF camp in the area is 30km from the nearest point of the Project Area (PLA) boundary and therefore is at the extent of its general home range when dispersing to feed. Dispersal between camps in the area is unknown and will depend on food availability.

Table 10 provides a summary of the latest BFF camps/counts (DoEE, NFFMP).

Table 10 Black Flying-fox Camps within 50km of the Project Area (PLA)

Camp Name/ ID	Distance from turbines (km)		Counts/Category	Date of survey activity	Notes
	Minimum	Maximum			
Maryborough, Kent Street (88)	12km	51km	2,500-9,999 (category 3)	November 2018	Sometimes mixed camp with GHFF and LRFF
Maaroom, Esplanade (209)	4km	42km	10,000 – 16,000 (category 4)	May 2017	No BFF since May 2018 census.
			2,500 – 10,000 (category 3)	May 2018	
Gympie (59)	30km	66km	2,500-9,999 (category 3)	November 2018	Was cat 5 in Aug 2017 and Feb 2018

Camp Name/ ID	Distance from turbines (km)		Counts/Category	Date of survey activity	Notes
	Minimum	Maximum			
					(16,000 – 49,999). Often mix camp with GHFF

4.1.1.1.3 Little Red Flying-fox

Table 11 shows the little red flying-fox camps within 50km. They are often mixed camps with BFF and/or GHFF and fluctuate over time. Camps in Gayndah, Hervey Bay and Noosaville seasonally have category 6 (>50,000) camps although these also fluctuate over the years. All three camps are greater than 50km from the Project Area (PLA). Dispersal between camps in the area is unknown and will depend on food availability.

Table 11 provides a summary of the latest LRFF camps/counts (DoEE, NFFMP).

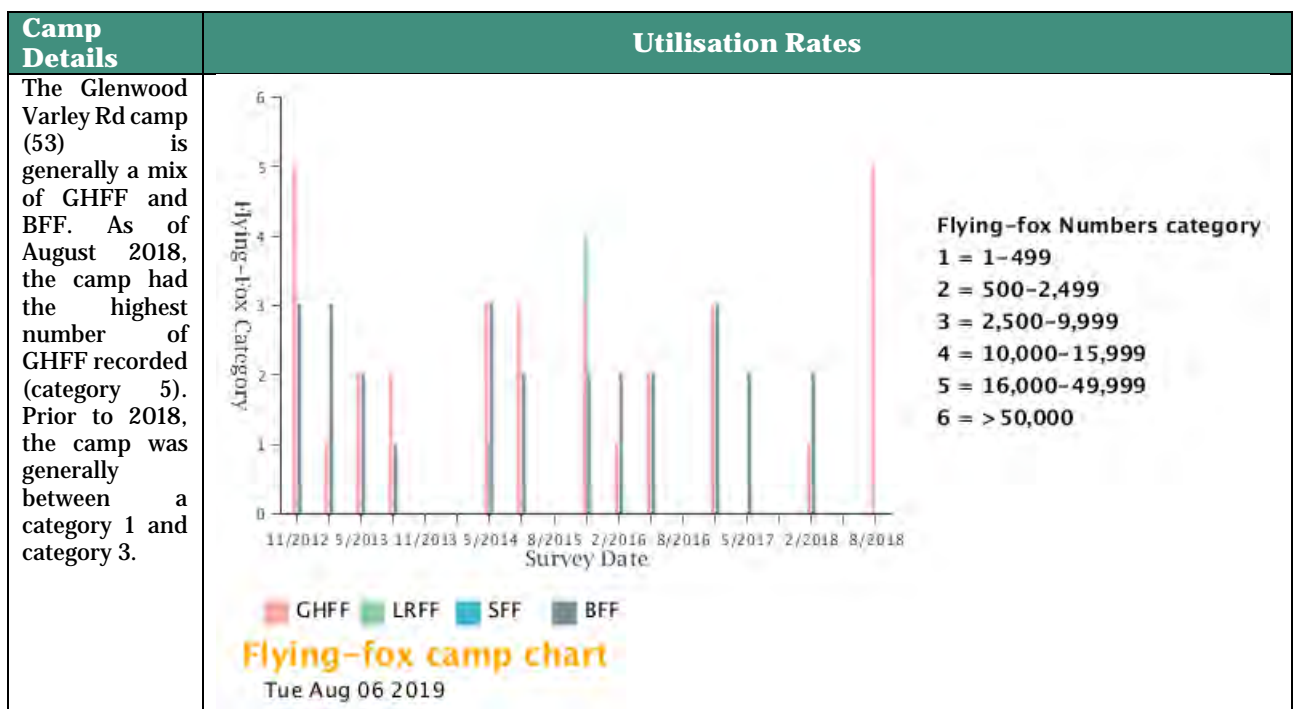
Table 11 Little Red Flying-fox Camps within 50km of the Project Area (PLA)

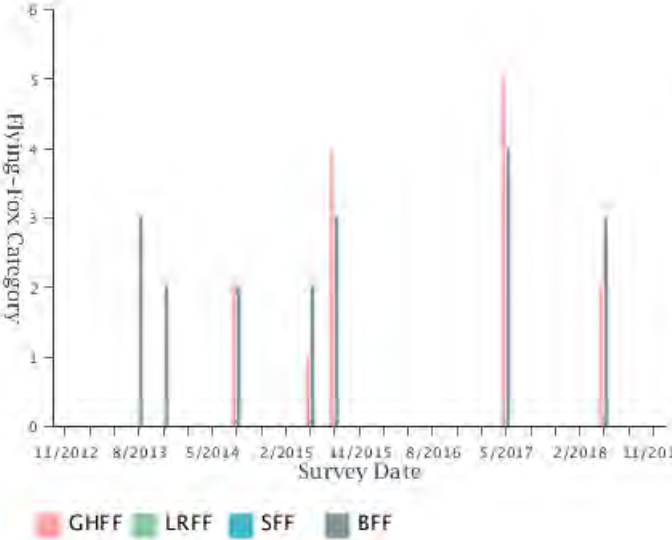
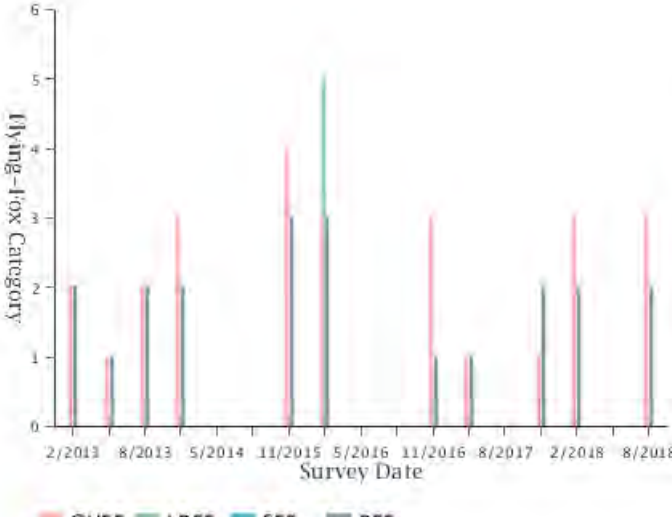
Camp Name/ ID	Distance from turbines (km)		Counts/Category	Date of survey activity	Notes
	Minimum	Maximum			
Glenwood Varley Road (53)	16km	39km	10,000 – 16,000 (category 4)	November 2015	2015 is only active presence between 2012 and 2018
Goomboorian, Anderleigh Rd Ginger Creek (55)	9km	49km	16,000 – 49,999 (category 5)	February 2016	No LRFF present in camp since 2015 census.
Gympie (59)	30km	66km	16,000 – 49,999 (category 5)	February 2016	No LRFF present in camp since 2016 census. Was Cat 6 (>50,000) in Feb 2013.
Maryborough, Kent Street (88)	12km	51km	500-2,499 (category 2) 10,000 – 16,000 (category 4)	February 2018 February 2019	No LRFF in Nov 2018 census. Active LRFF presence in camp x4 since 2012.

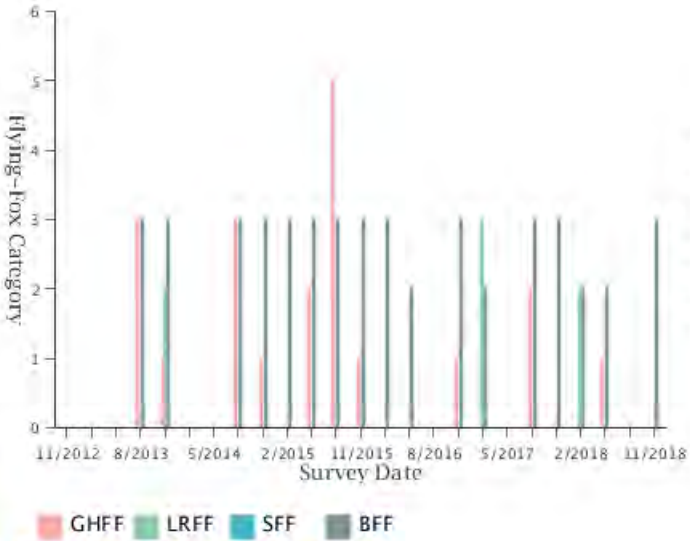
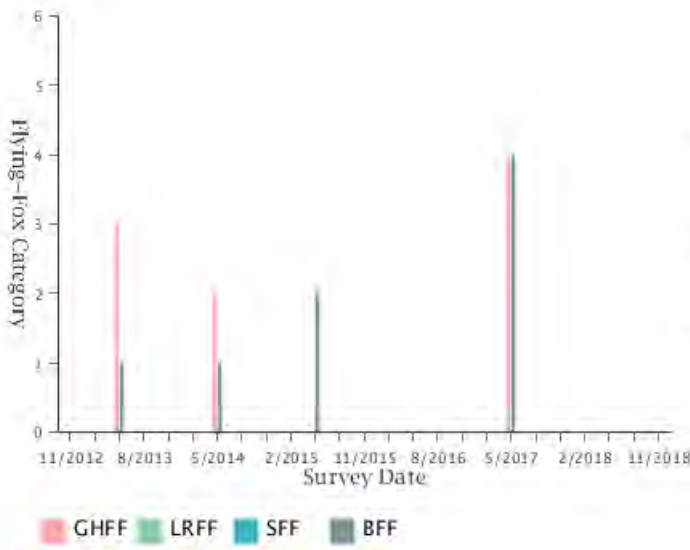
Camp Name/ ID	Distance from turbines (km)		Counts/Category	Date of survey activity	Notes
	Minimum	Maximum			
					Cat 3 (Feb 2017) Cat 2 (Nov 2013) Cat 4 (Feb 2019) Was Cat 6 (>50,000) in Feb 2013.

Table 12 shows the camp utilising rates of GHFF, BFF and LRFF since 2012, demonstrating the fluctuation in camp utilisation over time.

Table 12 Flying-fox Camp Utilisation (2012-2019)



Camp Details	Utilisation Rates
<p>Maaroom (209). A mix of GHFF and BFF. This camp was a category 2 in May 2018. This camp was surveyed by Premise on 7 December 2016 and was inactive. It was active the following year in 2017 as a category 5 camp and is now a category 2 camp.</p>	 <p>Flying-fox Numbers category 1 = 1-499 2 = 500-2,499 3 = 2,500-9,999 4 = 10,000-15,999 5 = 16,000-49,999 6 = > 50,000</p> <p>Flying-fox camp chart Tue Aug 06 2019</p>
<p>Anderleigh Rd (55) A mix of GHFF and BFF. This camp was surveyed by Premise in December 2016 and was an active category 3 camp. It was surveyed again by Premise in October 2018 and was an active category 3 camp. Inactive since bridge upgrades (March 2019) may have caused some disturbance to the camp.</p>	 <p>Flying-fox Numbers category 1 = 1-499 2 = 500-2,499 3 = 2,500-9,999 4 = 10,000-15,999 5 = 16,000-49,999 6 = > 50,000</p> <p>Flying-fox camp chart Tue Aug 06 2019</p>

Camp Details	Utilisation Rates
<p>Maryborough, Kent Street (88). The camp currently consists of BFF. It was a Category 1 GHFF camp in May 2018 and prior to that fluctuated generally between a Category 1 and Category 3 GHFF camp. It was a Category 5 GHFF in August 2015.</p>	 <p>Flying-fox Numbers category 1 = 1-499 2 = 500-2,499 3 = 2,500-9,999 4 = 10,000-15,999 5 = 16,000-49,999 6 = > 50,000</p> <p>Flying-fox camp chart Wed Aug 07 2019</p>
<p>Maryborough, Albion Rd Wetlands (Island Plantation) (87). Category 4 GHFF in May 2017. The camp is a mix of GHFF and BFF at approximately the same ratio in numbers.</p>	 <p>Flying-fox Numbers category 1 = 1-499 2 = 500-2,499 3 = 2,500-9,999 4 = 10,000-15,999 5 = 16,000-49,999 6 = > 50,000</p> <p>Flying-fox camp chart Wed Aug 07 2019</p>

Camp Details	Utilisation Rates
<p>Gympie (53) (Nationally Important GHFF Colony).</p> <p>It was a category 5 and 6 GHFF colony between August 2014 and November 2015.</p> <p>This colony has declined in GHFF numbers since 2016. It is a mix of GHFF and BFF.</p> <p>It has been a category 3 or less since May 2016.</p>	<p>Flying-fox Numbers category</p> <ul style="list-style-type: none"> 1 = 1-499 2 = 500-2,499 3 = 2,500-9,999 4 = 10,000-15,999 5 = 16,000-49,999 6 = > 50,000 <p>Flying-fox camp chart Wed Aug 07 2019</p>
<p>Woocoo (171) (Nationally Important GHFF Colony) Situated in Woocoo National Park.</p> <p>This camp has generally been a category 6 camp since 2012 (decrease in GHFF numbers in 2017). It has historically been a mix of GHFF, LRFF and BFF.</p>	<p>Flying-fox Numbers category</p> <ul style="list-style-type: none"> 1 = 1-499 2 = 500-2,499 3 = 2,500-9,999 4 = 10,000-15,999 5 = 16,000-49,999 6 = > 50,000 <p>Flying-fox camp chart Wed Aug 07 2019</p>

4.1.1.2 Regional Ecosystems

There is a network of remnant RE throughout the Project Area (PLA). Often it is associated with creek and drainage lines which historical and ongoing pine plantation practices have avoided. This has created a network of often disconnected remnant vegetation patches throughout the pine plantation. Within these areas twenty-seven (27) REs are mapped on DES RE mapping (Table 13). DES RE mapping is shown on Figure 8, Appendix A.

Table 13 Mapped RE within the Project Area (PLA)

RE	Description	VM Act Status	Biodiversity Status
12.2.11	<i>Corymbia tessellaris</i> +/- <i>Eucalyptus tereticornis</i> , <i>C. intermedia</i> and <i>Livistona decora</i> woodland on beach ridges in northern half of bioregion	LC	NC
12.3.4	<i>Melaleuca quinquenervia</i> , <i>Eucalyptus robusta</i> woodland on coastal alluvium	OC	OC
12.3.5	<i>Melaleuca quinquenervia</i> open forest on coastal alluvium	LC	NC
12.3.6	<i>Melaleuca quinquenervia</i> +/- <i>Eucalyptus tereticornis</i> , <i>Lophostemon suaveolens</i> , <i>Corymbia intermedia</i> open forest on coastal alluvial plains	LC	NC
12.3.7	<i>Eucalyptus tereticornis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> +/- <i>Melaleuca</i> spp. fringing woodland	LC	OC
12.3.11	<i>Eucalyptus tereticornis</i> +/- <i>Eucalyptus siderophloia</i> , <i>Corymbia intermedia</i> open forest on alluvial plains usually near coast	OC	OC
12.3.12	<i>Eucalyptus latisinensis</i> or <i>E. exserta</i> , <i>Melaleuca viridiflora</i> var. <i>viridiflora</i> woodland on alluvial plains	LC	NC
12.3.13	Closed or wet heathland. Characteristic species include <i>Melaleuca thymifolia</i> , <i>Banksia robur</i> , <i>Xanthorrhoea fulva</i> , <i>Hakea actites</i> , <i>Leptospermum</i> spp. and <i>Baeckea frutescens</i> . Occurs on seasonally waterlogged Quaternary alluvial plains along coastal lowlands.	LC	NC
12.3.14	<i>Banksia aemula</i> low woodland on alluvial plains usually near coast	OC	OC
12.3.16	Complex notophyll to microphyll vine forest on alluvial plains	E	E
12.3.17	Simple notophyll fringing forest usually dominated by <i>Waterhousea floribunda</i>	OC	E
12.5.1	Open forest complex with <i>Corymbia citriodora</i> subsp. <i>variegata</i> on subcoastal remnant Tertiary surfaces. Usually deep red soils	LC	NC
12.5.4	<i>Eucalyptus latisinensis</i> +/- <i>Corymbia intermedia</i> , <i>C. trachyphloia</i> subsp. <i>trachyphloia</i> , <i>Angophora leiocarpa</i> , <i>Eucalyptus exserta</i> woodland on complex of remnant Tertiary surfaces and Cainozoic and Mesozoic sediments	LC	NC

RE	Description	VM Act Status	Biodiversity Status
12.5.6c	<i>Eucalyptus pilularis</i> open forest +/- <i>E. siderophloia</i> , <i>E. propinqua</i> , <i>Corymbia intermedia</i> , <i>E. microcorys</i> , <i>E. acmenoides</i> , <i>E. tereticornis</i> , <i>E. biturbinata</i> , <i>Lophostemon confertus</i> with <i>E. saligna</i> , <i>E. montivaga</i> at higher altitudes. Occurs on remnant Tertiary surfaces. Usually deep red soils	E	E
12.5.7	<i>Corymbia citriodora</i> subsp. <i>variegata</i> +/- <i>Eucalyptus portuensis</i> or <i>E. acmenoides</i> , <i>E. fibrosa</i> subsp. <i>fibrosa</i> open forest on remnant Tertiary surfaces. Usually deep red soils	LC	NC
12.5.9	Sedgeland to heathland in low lying areas on complex of remnant Tertiary surface and Tertiary sedimentary rocks	OC	OC
12.5.10	<i>Eucalyptus latisinensis</i> and/or <i>Banksia aemula</i> low open woodland on complex of remnant Tertiary surface and Tertiary sedimentary rocks	LC	NC
12.5.12	<i>Eucalyptus racemosa</i> subsp. <i>racemosa</i> , <i>E. latisinensis</i> +/- <i>Corymbia gummifera</i> , <i>C. intermedia</i> , <i>E. bancroftii</i> woodland with heathy understorey on remnant Tertiary surfaces	OC	OC
12.9-10.4	<i>Eucalyptus racemosa</i> subsp. <i>racemosa</i> woodland on sedimentary rocks	LC	OC
12.9-10.3	<i>Eucalyptus moluccana</i> open forest on sedimentary rocks	OC	OC
12.9-10.17b	<i>Eucalyptus acmenoides</i> , <i>E. major</i> , <i>E. siderophloia</i> +/- <i>Corymbia citriodora</i> subsp. <i>variegata</i> open fores on sedimentary rocks. (b) <i>Corymbia citriodora</i> subsp. <i>variegata</i> mixed open forest to woodland. Other commonly occurring canopy trees include <i>Eucalyptus acmenoides</i> , <i>Angophora leiocarpa</i> , <i>E. siderophloia</i> , <i>E. carnea</i> , <i>E. longirostrata</i> and <i>C. intermedia</i> . Other species that may be present locally include <i>Eucalyptus tereticornis</i> , <i>E. crebra</i> , <i>E. fibrosa</i> subsp. <i>fibrosa</i> and <i>E. exserta</i> . <i>Lophostemon confertus</i> (tree form and whipstick form) often present in gullies and as a sub-canopy or understorey tree. Mixed understorey of grasses and shrubs. Hills and ranges of Cainozoic and Mesozoic sediments usually with > 1000mm rainfall per annum	LC	NC
12.11.5	<i>Corymbia citriodora</i> subsp. <i>variegata</i> woodland to open forest +/- <i>Eucalyptus siderophloia</i> / <i>E. crebra</i> , <i>E. carnea</i> , <i>E. acmenoides</i> , <i>E. propinqua</i> on metamorphics +/- interbedded volcanics	LC	NC
12.12.5	<i>Corymbia citriodora</i> subsp. <i>variegata</i> , <i>Eucalyptus crebra</i> woodland on Mesozoic to Proterozoic igneous rocks	LC	NC
12.12.7	<i>Eucalyptus crebra</i> woodland on Mesozoic to Proterozoic igneous rocks	LC	NC
12.12.12	<i>Eucalyptus tereticornis</i> , <i>Corymbia intermedia</i> , <i>E. crebra</i> +/- <i>Lophostemon suaveolens</i>	OC	OC

RE	Description	VM Act Status	Biodiversity Status
	woodland on Mesozoic to Proterozoic igneous rocks		
12.12.15b	<i>Lophostemon confertus</i> open forest +/- <i>Eucalyptus microcorys</i> , <i>E. siderophloia</i> , <i>E. carnea</i> , <i>E. propinqua</i> and vine forest species often present in understorey. Occurs in gullies and exposed ridges on Mesozoic to Proterozoic igneous rocks often amongst vine forest	LC	NC
12.12.16	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks	LC	NC
non-rem	Non-remnant areas such as pine plantations	n/a	n/a

OC = Of Concern, LC = Least Concern, NC = No Concern at Present, E = Endangered

Most REs are avoided on the Project Area (PLA) due to specific site selection of the wind turbines and associated infrastructure. There will be no clearing of RE for construction of the wind turbines or hardstand areas as they are all located within pine plantation areas. Clearing in riparian areas is expected to be negligible during upgrades of existing waterway crossings.

4.1.1.3 Threatened Ecological Communities

Vegetation along Tinana Creek (shown on Figure 8, *Premise, 2017*) (Appendix F) has been identified as the one (1) location within the Project Area (PLA) with Lowland Rainforest of Subtropical Australia identified as 'likely to occur' by the DoEE mapping (Ecological communities of National environmental significance TEC (Nov 2016), DOE).

RE 12.3.16 and RE 12.3.17 are mapped along Tinana Creek and can be representative of the Threatened Ecological Community (TEC) listed under the EPBC Act – Lowland Rainforest of Subtropical Australia, where the requirements of the RE description, key diagnostic characteristics and condition thresholds are met.

4.1.1.4 Essential Habitat

Areas of EH for Wallum froglet (*Crinia tinnula*) and Wallum rocketfrog (*Litoria freycineti*) which are listed as vulnerable under the NC Act, are mapped within remnant vegetation in the Project Area (PLA). Areas of EH for koala (*Phascolarctos cinereus*) which is listed as vulnerable under the EPBC Act and NC Act, are mapped within remnant vegetation, including riparian areas in the NSF portion of the Project Area (PLA). EH for *Macrozamia pauli-guilielmi* (Pineapple Zamia) is also mapped in the NSF portion of the Project Area (PLA) associated with the remnant eucalypt forests (Figure 9, Appendix A).

No turbines, operations/construction compounds or access tracks are within mapped EH.

4.1.1.5 Protected Plants Flora Survey Trigger Map

Turbine locations and ancillary infrastructure within the Project Area (PLA) have been situated to avoid mapped protected plant 'flora survey trigger' areas (Figure 10, Appendix A). These mapped areas identify 'high-risk areas' where endangered, vulnerable or near threatened plants (EVNT) are present or are likely to be present. Should any access tracks within the Project Area (PLA) require widening and occur within a mapped 'flora survey trigger' area, the area will be surveyed in accordance with the Flora Survey Guidelines – Protected Plants v2.01 (Wildlife and Threatened Species Operations, Department of Environment and Science (DES) 31 May 2019).

4.2 Field Survey Results

The Project Area (PLA) is dominated by exotic pine plantation. Remnant Eucalypt woodland and Melaleuca forest occurs throughout the plantation as a mosaic of small remnant patches. Often these are associated with waterways and drainage lines and can easily be seen on the RE mapping (refer Figure 8, Appendix A).