



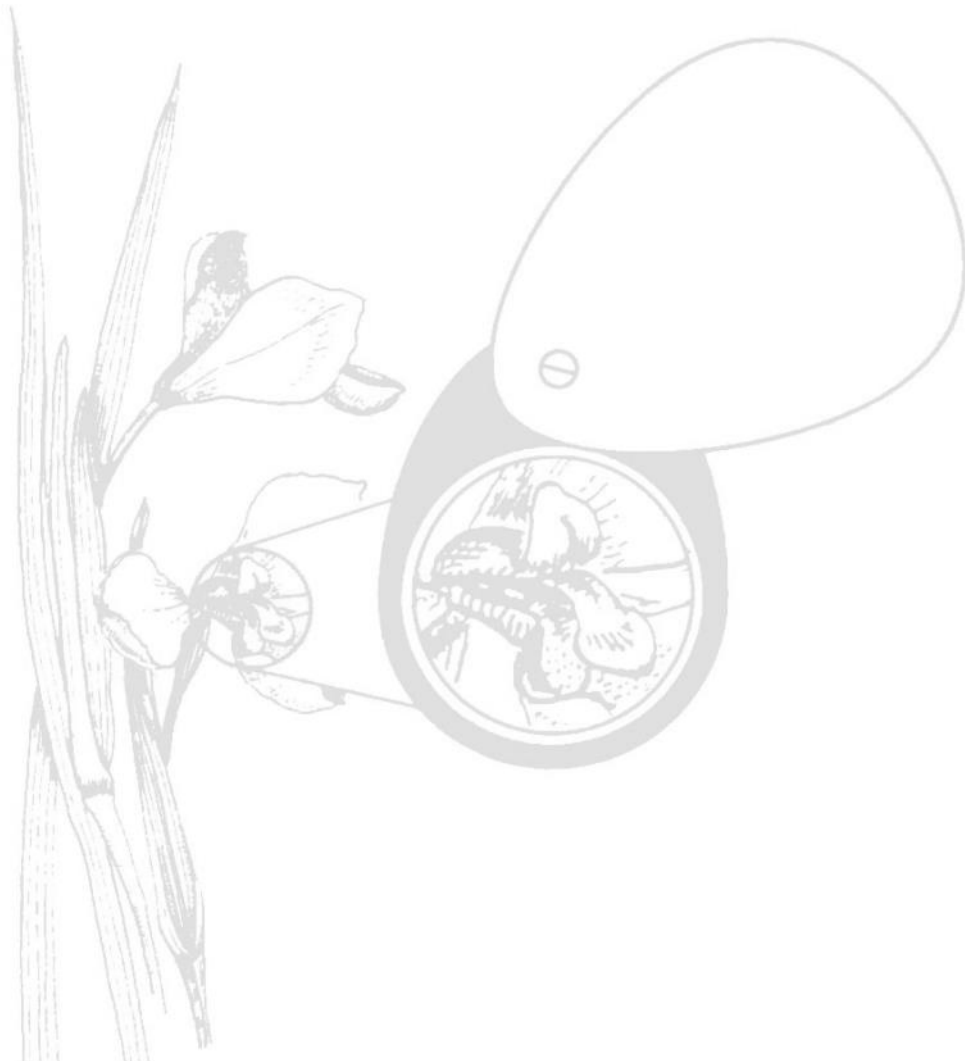
## Triabunna Wind Farm

### Natural Values Assessment

24<sup>th</sup> March 2023

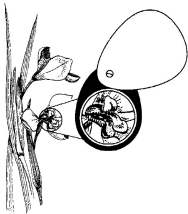
For FERA Australia

FER001



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## SUMMARY

A wind farm comprising 5 turbines was proposed on the Barings Hill area north of Triabunna on Tasmania's east coast. This has been reduced to 4 turbines but information in the vicinity of Turbine 1 is retained. The development will include the construction of 4 turbines on towers and underground grid connection. Barings Hill is in the Tasmanian southeast bioregion and the jurisdiction of the Glamorgan–Spring Bay Council. FERA Australia engaged North Barker Ecosystem Services (NBES) to undertake botanical field surveys and avian and terrestrial fauna habitat assessment of the project area, and to make recommendations to minimise impacts to threatened natural values, particularly regarding limiting the likelihood of significant impacts to Matters of National Environmental Significance (MNES).

NBES undertook field surveys in October 2021. These included flora and fauna habitat surveys compliant with the DPIPWE survey guidelines as well as targeted avian observations from specific observation point to determine bird species present and the number and characteristics of wedge-tailed eagle flights.

An aerial eagle nest search was undertaken in May 2022 within 3 km of eagle of the five proposed turbine locations.

The following findings were made with regard to the vegetation, threatened flora and fauna that is or may be present and relevant high level mitigation actions that should be undertaken.

### Vegetation

Vegetation within the study area is comprised of 8 TASVEG mapping units:

- *Eucalyptus obliqua* dry forest (DOB)
- *Eucalyptus obliqua* forest with broad-leaf scrub (WOB)
- *Eucalyptus pulchella* forest and woodland (DPU)
- *Eucalyptus globulus* dry forest and woodland (DGL)
- Lowland grassy sedgeland (GSL)
- Agricultural land (FAG)
- Regenerating cleared land (FRG)
- Plantations for silviculture – hardwood (FPH)
- Improved pasture with native tree canopy (FAC)

DGL is listed as threatened under the NCA

### Threatened Flora

*Eucalyptus morrisbyi* was recorded on private land. The trees have been planted adjacent to a residential home therefore do not fall under the TSPA.

No other threatened flora were observed.

### Threatened Fauna

Evidence of Tasmanian devils and eastern quolls were present on the site in the form of scats and tracks. No suitable dens were observed on site. One Tasmanian masked owl call was heard on one of the song meters within the north of the site and swift parrots were heard during the daily bird surveys flying over the site on one occasion. Three wedge-tailed eagle nests were found within the aerial surveys. All are north/northwest of the proposed turbine locations in the surrounding gullies.



The proposal is unlikely to cause any significant impacts to Matters of National Environmental Significance. However, the quantification of the potential impact to the wedge-tailed eagle is not known with any certainty due to the viability constraints on completing sufficient flight sampling to construct a collision risk model. Nevertheless, the frequency of collisions is highly likely to be very low based on the low numbers encountered for other windfarms within excess of 40 turbines among 5 - 10 eagle territories.

So, due to the small scale of this wind farm it is likely that this development will have a minimal impact on eagles and other threatened birds including swift parrots and the Tasmanian masked owl. However, should an unacceptable impact be encountered then known mitigation measures should be employed.

Similarly, no significant impacts are anticipated on threatened mammals in particular, or other species.

### **Fauna Impact Mitigation**

No mitigation is proposed at this stage of the assessment process.

### **Weeds**

Seven Declared weeds under the Tasmanian *Weed Management Act 1999* (WMA) were recorded within the survey.

Prepare a *Weed Management Plan* to control 'declared' weeds throughout the works area and environmental weeds within patches of native vegetation. Specifically:

- a. contain the spread of Zone B species and eradicate Zone A species.
- b. plan for targeted pre-works control to reduce propagule pressure during works;
- c. ensure excavated soil from weed affected areas is not spread to weed free areas and preferably is buried beneath 500 mm of fill;
- d. include prescriptions for hygiene measures during work;
- e. clean all machinery upon entering and exiting the site.

### **Legislative Implications**

*Environment Protection and Biodiversity Conservation Act 1999* - Based on the evidence at hand the proposal is unlikely to cause a significant impact to any matters of national environmental significance. It is recommended that a EPBC Self Assessment is completed to demonstrate due diligence.

The Tasmanian (Glamorgan Spring Bay) 2022 – The proposal cannot meet the accepted solution required of the development standards. As such a development application will need to demonstrate compliance with Performance criteria in relation to the standards required of the Natural Assets Code and the Waterways and Coastal Protection Area. The proposal appears to be able to meet these standards based on the information at hand.

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## **1 INTRODUCTION**

### **1.1 Background**

A wind farm and associated underground grid connection consisting of up to 5 wind turbines was investigated on the Barings Hill area north of Triabunna on Tasmania's east coast (Figure 1). The proposal has been reduced to 4 turbines with turbine 1 being omitted. The development will include the construction of 4 turbine-bearing towers. The turbines will stand on a pad, as well as a hardened adjacent pad to accommodate a crane during construction. Each turbine also requires an access road. The project will require a range of ancillary infrastructure, including underground grid connection.

FERA Australia engaged North Barker Ecosystem Services (NBES) to undertake botanical field surveys and fauna habitat assessment of the project area, and to make recommendations to minimise impacts to threatened natural values, particularly regarding limiting the likelihood of significant impacts to Matters of National Environmental Significance (MNES).

### **1.2 Study area**

The site occurs northwest of the Township of Triabunna near Barings Hill which is in the Tasmanian southeast bioregion and the jurisdiction of the Glamorgan–Spring Bay Council. The project area and the surrounding local areas have been subject to a long history of human modification and management, including land clearance/conversion, pastoral agriculture, game management, and forest use. Local terrestrial habitats are consequently heterogeneous with varying apparent levels of human influence.

The turbines are entirely on the cadastral title 209241/1 which is roughly 203 ha in size. The underground grid connection runs through a number of participating properties (Figure 1). The entire survey area included in our investigations is 304.32 ha, which includes the five turbine stands, the underground grid connection options and the property of 209241/1 (Figure 1).

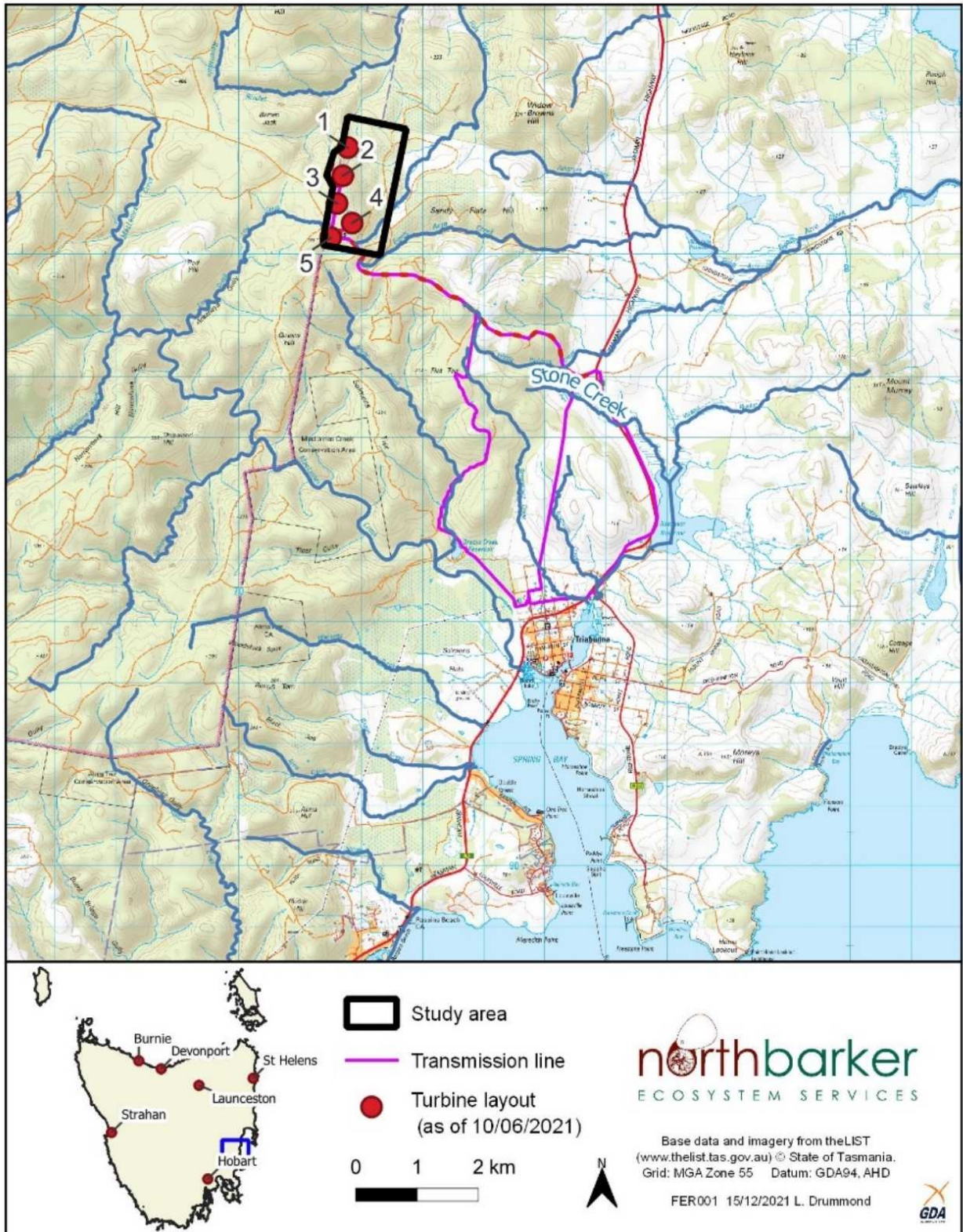


Figure 1. Location map of the study area

## 2 BOTANICAL SURVEY AND FAUNA HABITAT ASSESSMENT

### 2.1 Background Research – supporting data

The following sources were used for biological records from the region to supplement field data collected by NBES:

- Protected Matters database<sup>1</sup> – all matters of national environmental significance that may occur in the area or relate to the area in some way.
- Tasmanian Natural Values Atlas (NVA)<sup>2</sup> – this Department of Primary Industries, Parks, Water and the Environment, Tasmania (DPIPWE) database includes biological records.
- TASVEG 4.0 (and TASVEG Live) digital data – these layers have been field-truthed during ground surveys.

### 2.2 Vegetation mapping

In Tasmania, the primary source on the distribution of vegetation is the state-wide TASVEG<sup>3</sup> mapping database. The compilation of TASVEG has been an iterative process of improvement and refinement upon the original base layer, that was collated from several sources<sup>4</sup>. As a result, data within TASVEG do not completely represent vegetation extent and distribution at a single date. Indeed, some areas are still mapped at a coarser scale than the general 1: 25,000, or based on interpretation of imagery over ten years old<sup>5</sup>. Subsequently, it is standard practice to truth TASVEG data using recent imagery and ground sampling<sup>6</sup>.

Ground sampling was undertaken on foot over the course of four days (October 19<sup>th</sup> 2021- October 22<sup>nd</sup> 2021) by one NBES ecologist. Vegetation was mapped at the community level according to TASVEG 4.0<sup>7</sup>. When a patch was ground sampled, the observer assessed the requisite traits of vegetation structure, floristics, geology and environment to discriminate the patch from any other possible TASVEG units using the descriptions and stepwise keys within the online versions of the current TASVEG companion manual<sup>8</sup>. Boundary discrimination was based on image interpretation and aided by point data collected on a hand-held GPS unit. All ground sampling was undertaken during the daytime, mostly in fine weather due to the potential sampling constraints associated with reduced visibility from rain and/or low light.

Following ground sampling and the collation of data, TASVEG units observed on site were cross-referenced against all vegetation communities listed as threatened under the Tasmanian *Nature Conservation Act 2002* (NCA) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA).

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<sup>1</sup> EPBC Act Protected Matters report, (Commonwealth of Australia) – PMST\_M8WTSE

<sup>2</sup> Natural Values Report\_3\_18\_Oct\_2021.

<sup>3</sup> DPIPWE (2013)

<sup>4</sup> Harris and Kitchener (2005)

<sup>5</sup> Kitchener and Harris (2013)

<sup>6</sup> TVMMP (2013)

<sup>7</sup> DPIPWE 2020, Harris and Kitchener 2005

<sup>8</sup> Kitchener and Harris (2013)

This combination of image interpretation followed by stratified ground sampling and interpolation is consistent with the DPIPWE guidelines for natural values assessments<sup>9</sup> as well as the methods applied within vegetation mapping elsewhere<sup>10</sup> and described in ecological manuals<sup>11</sup>.

### 2.3 Floristic surveys

To support the determination of TASVEG units (as per DPIPWE guidelines)<sup>12</sup> and provide general floristic data, flora was recorded at the species level, within each new vegetation community in accordance with the most recent census of Tasmanian vascular plants<sup>13</sup> using an area search technique based on the Timed Meander Search Procedure<sup>14</sup>; this method requires the observer to continue survey effort until survey yields (new species observations) diminish towards zero. All flora field data were recorded using handheld non-differential GPS units with average location accuracy < 10 m.

In addition, locations of previous threatened flora observations within the project area (based on NVA observation data) were visited for verification of identification and to establish if the species were still present. Declared and environmental weeds, as well as symptomatic evidence of plant pathogens, were searched for and recorded where evident within or close to (such as on an adjacent road) the project area.

Botanical nomenclature follows the current census of Tasmanian plants.

Following ground sampling and the collation of data, TASVEG units, flora and fauna observed on site were cross-referenced against species listed as threatened under the Tasmanian *Threatened Species Protection Act 1995* (TSPA) and the EPBCA.

### 2.4 Fauna field methods

Observations of habitat suitability for terrestrial fauna were made concurrently with the flora surveys, with the minimum survey effort determined by the meandering area search technique<sup>15</sup> and additional effort applied within potential threatened species<sup>16</sup> habitats. For presence/absence<sup>17</sup>, diurnal searching was undertaken for scats and prints throughout the entire flora survey for the Tasmanian devil (*Sarcophilus harrisii*), the eastern quoll (*Dasyurus viverrinus*) and spotted-tailed quoll (*Dasyurus maculatus* ssp. *maculatus*). Scats in particular are often detectable in latrine sites such as at track junctions and creek crossings<sup>18</sup> and can be differentiated using morphometric traits including colour, shape, size and contents<sup>19</sup>.

Suitable burrows or dens for devils and quolls were also searched for during floristic surveys. Characteristics of natal dens for these species include a dry, structurally stable inner chamber, a

<sup>9</sup> DPIPWE (2015)

<sup>10</sup> The Nature Conservancy (1994)

<sup>11</sup> Kuchler and Zonneveld (2012)

<sup>12</sup> DPIPWE (2015)

<sup>13</sup> deSalas and Baker (2021)

<sup>14</sup> Goff *et al.* (1982)

<sup>15</sup> Goff *et al.* 1982

<sup>16</sup> Tasmanian Threatened Species Protection Act 1995 (TSPA) and/or the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBCA)

<sup>17</sup> DSEWPaC (2011); Natural and Cultural Heritage Division (2015)

<sup>18</sup> DSEWPaC (2011)

<sup>19</sup> Triggs (1996)

chamber that is sufficient size for the mother and litter but is not so large as to be un-defendable (which includes an entrance that is a tight fit for the mother), and the presence of nooks and crannies for the young to hide in<sup>20</sup>.

Specific ground and aerial-based habitat surveys were conducted for avian fauna, specifically the Tasmanian masked owls (*Tyto novaehollandiae castanops*) and swift parrots (*Lathamus discolor*) as well as targeted Tasmanian wedge-tailed eagle (*Aquila audax ssp. fleayi*) and white-bellied sea eagle (*Haliaeetus leucogasteri*) utilisation surveys and general presence/absence avifauna surveys – See below.

#### 2.4.1 Wedge-tailed and white-bellied sea eagle

The wedge-tailed eagle is listed as Endangered under both the TSPA and the EPBCA and the white-bellied sea eagle is listed as Marine under the EPBCA. These two Tasmanian eagles typically nest in a range of old growth native forests, with the white-bellied sea eagle being restricted to areas within 5 km of the coastline or inland lakes. Both species usually choose old growth eucalyptus trees in relatively sheltered sites for nesting, although the white-bellied sea eagle is generally less particular due to its restrictive range<sup>21</sup>.

Territories can contain multiple nests and up to five alternative nests have been associated with one range. Nests within a territory are usually close to each other, particularly where habitat is spatially restricted, but may be up to 1 km apart where habitat is locally restricted. Nests in separate territories have not been recorded closer than about 1.8 km from one another (Dr. James Pay Pers. Comm.).

While there are a number of threatening processes the main threat to both species is the continuing decline in productivity as a result of disturbance of breeding birds and loss of nesting habitat. This is exacerbated by high levels of unnatural mortality due to persecution (illegal shooting, trapping and poisoning) and electrocution and collision (with powerlines, vehicles, fences and wind turbines) this has led to a reduction in the mean age of the population, resulting in a reduction in breeding success. They are sensitive to disturbance during the breeding season, which occurs between August and January<sup>22</sup>.

#### **Eagle Utilisation Surveys**

Four observation points were chosen to observe eagles from. Observation points were located as efficiently as possible to gain site coverage of the five turbine sites in areas, thus observation points were either at the point of the turbine location, or close enough to capture two turbines at once (e.g., observation point 3 captured turbine 3 and 4) (Table 1 and Figure 2). The coverage was verified by ground truthing before the survey commenced. The entire site is relatively forested and thus the observation points were situated in areas that were both close to a turbine site and where canopies were thin or within areas of open ground.

Eagle flights were observed from each point in rotating shifts (i.e. early morning, late morning, early afternoon, late afternoon) over four long 12-hour days (including travel to and from observation points and the site). The observation shifts were on average 2-3 hr periods per site between 6:30 am and 6:30 pm. The starting time at each point was rotated between points to gain full day coverage over four days.

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<sup>20</sup> Mooney (unpublished data)

<sup>21</sup> Threatened Species Section (2006)

<sup>22</sup> Threatened Species Section (2006)



The 4 \* 2-3 hr survey period was considered most appropriate as anything less would have made for an extremely long day, resulting in observer fatigue which is a significant challenge when providing long hours of full focus without moving.

The data collected from each flight included: eagle species, age, start and end time of flight, behaviour, height, flight path and direction, distance from observer, prevailing wind. All data were added to an excel spread sheet and analysed and summarised through pivot tables.

### **Eagle aerial nest searches**

The aerial search was undertaken by helicopter<sup>23</sup> on May 20<sup>th</sup> 2022. The survey was undertaken by a team of NBES ecologists. Flights were conducted using Helicopter Resources Tasmania, with a pilot that has many years of experience undertaking eagle nest surveys.

The surveys involved slow flying (5-10 knots) above the tree canopy or where possible, below the adjacent canopy level, such as through gullies and river valleys. In large areas of suitable nesting habitat, transects were flown to ensure complete coverage of the area. Marginal potential habitat was also checked and transects were also flown over areas of plantations to ensure small wildlife habitat clumps and coupes of potential nesting habitat were not missed.

Once a nest was located, its condition and features were described *in-situ*, including with the assistance of 10 x 50 mm binoculars where this enabled the observers to remain distant from the nest. Due to the nature of the task sometimes involving hovering near the canopy, which presents risks to local birds and the observers, nest checks were limited to the time necessary to log their location using a handheld non-differential GPS, Garmin Map 66s and verify their condition (typically less than 1-2 minutes in an area). To further reduce potential disturbance, all nest observations were photographed to be later examined to further inform the condition assessment of each nest. Characteristics of the nest to determine its condition included<sup>24</sup>: fresh green leaves, stick tone (brown or grey), whitewash, algal smears, nest shape (flat-topped or concave bowl), down/feathers, prey remains and bird presence. The integrity of the nest was then given a classification based on it being: prime, viable, derelict or remnant<sup>25</sup>. These factors essentially represent the viability of the nest for breeding.

#### **2.4.2 General avifauna**

Birds other than eagles were specifically targeted to gain an understanding of the site's avifauna and the frequency and occurrence of species across the site.

<sup>23</sup> The recommended method for aerial nest searches within Forest Practices Authority 2014b, Eagle nest searching, activity checking and nest management, Fauna Technical Note No. 1, Forest Practices Authority, Hobart.

<sup>24</sup> Characteristics taken from the Forest Practices Authority's nest activity assessment forms.

<sup>25</sup> Which effectively correspond to the spectrum of poor/average/good/excellent used in the Forest Practices Authority's nest activity assessment forms, but relate more to time since use (and likelihood of use in the near future), with prime being used to describe nests considered likely to be active in recent years, and remnant being those the least likely to be active – consistent with the definitions applied in the past survey of this location and use of similar viability classes in assessments of these species elsewhere:

- Enviro-Dynamics (2019). Helicopter Eagle Nest Survey in North West Tasmania. Report for TasNetworks, July 2019.
- Wiersma, J, Koch, AJ, Livingston, D, Brown, B, Spencer, C, Mooney, N, Munks, S (2009). Eagle Nest Monitoring Project – Year 1 2007–08, Establishing monitoring sites and investigating the relationship between nesting success of the Tasmanian wedge-tailed eagle and environmental variables, report to Roaring 40s and the Forest Practices Authority, Forest Practices Authority Scientific Report 8.
- Dennis, T.E., Detmar, S.A., Brooks, A.V. and Dennis, H.M. (2011). Distribution and status of White-bellied Sea-Eagle, *Haliaeetus leucogaster*, and Eastern Osprey, *Pandion cristatus*, populations in South Australia. *South Australian Ornithologist*, 37 (1).
- Cherriman, S.C., Foster, A., Debus, S.J.S. (2009). Supplementary Notes on the Breeding Behaviour of wedge-tailed eagles *Aquila audax*. *Australian Field Ornithology*, 26, pp. 142-147.

General bird surveys were conducted four times a day across the same four sites as the eagle observation surveys. During the eagle observations surveys any birds that were heard or seen were recorded during each of the observation shifts. Birds of conservation significance (e.g., threatened, migrant, vagrant or considered rare) that were flushed on arrival at a site or that were incidentally observed when moving between sites were also recorded.

All data were added to an excel spread sheet and analysed and summarised through pivot tables. The species data are summarised and reported by shift.

**Table 1. Shift order on each day corresponds to a turbine site number (i.e Site 1 – Turbine 1, Site 2 – Turbine 2, Site 3 – Turbines 3 and 4, Site 4 – turbine 5).**

Shift time	Day 1	Day 2	Day 3	Day 4
Early Morning	1	2	3	4
Late morning	2	3	4	1
Early afternoon	3	4	1	2
Late afternoon	4	1	2	3

#### 2.4.3 *Swift parrot habitat*

The swift parrot is a migratory species which breeds in Tasmania during the summer and then migrates to mainland Australia for the winter<sup>26</sup>. It is listed as Critically Endangered under the EPBCA.

The breeding range of the swift parrot is concentrated along the east and southeast coast of Tasmania and is strongly associated with the distribution of blue gum (*Eucalyptus globulus*), its primary feeding resource<sup>27</sup> (Figure 3). The swift parrot nests in hollows in large eucalypt trees, normally within 10 km of foraging habitat<sup>28</sup>. Suitable habitat includes any *E. globulus* or *E. ovata* trees that are old enough to produce significant flower or any large eucalypt trees that support suitable sized nesting hollows<sup>29</sup>.

A decline in the area of occupancy of the swift parrot can be inferred from the extent of habitat clearance that has occurred since European settlement. Recent population estimates for the species suggest less than 1000 individuals, with one source suggesting as few as 300 birds remaining<sup>30</sup>. Recovery actions for this species have been identified in accordance with a national recovery plan<sup>31</sup>. Key threats to this species are thought to include predation by sugar gliders, habitat loss/alteration, collision mortality, competition, disease and illegal wildlife capture/trading, although it is noted that these have not all been quantified to the same degree as threats<sup>32</sup>.

Swift parrots breed in tree hollows in mature eucalypts within foraging range of a flower source. Table 2 describes nesting habitat density classes for swift parrots. Foraging habitat includes and *E. globulus* or *E. ovata* tree > 40 cm Diameter at Breast Height (DBH). During the flora investigations any suitable

<sup>26</sup> Department of the Environment (2016) *Lathamus discolor* (Swift Parrot), Conservation Advice

<sup>27</sup> Department of the Environment (2016) *Lathamus discolor* (Swift Parrot), Conservation Advice

<sup>28</sup> Webb (2008)

<sup>29</sup> Forest Practices Authority (2014)

<sup>30</sup> Stojanovic (unpublished data)

<sup>31</sup> Saunders & Tzaros (2011)

<sup>32</sup> Department of the Environment (2016) *Lathamus discolor* (Swift Parrot), Conservation Advice

foraging or nesting habitat was recorded on a handheld GPS, as well as any sightings of swift parrots. Sightings or calls of swift parrots were also recorded during the bird surveys.

**Table 2. Potential nesting habitat density for ground-based assessment of swift parrots**

Potential nesting-habitat density class	Field-based assessment criteria <sup>33</sup>	
	Dry forest	Wet forest
High	At least 8 trees/ha are greater than 100 cm DBH.	At least 15 trees/ha are over 100 cm DBH or 8 trees /ha over 150 cm DBH
Medium	At least 8 trees/ha are greater than 70 cm DBH.	At least 8 trees/ha are greater than 100 cm DBH
Low	Trees over 70 cm DBH are present but comprise less than 8 trees/ha.	Trees over 100 cm DBH are present but comprise less than 8 trees/ha.

#### 2.4.4 *Tasmanian masked owl habitat*

Tasmanian masked owls are listed under the EPBCA as vulnerable and as endangered under Tasmania's TSPA. Loss of nesting habitat in the form of hollow-bearing trees is a major threat to the species along with secondary poisoning<sup>34</sup>. Masked owls are a nocturnal species that favour the edges of dry forests, utilising nearby hollows  $\geq 15$  cm in diameter for nesting. Their core foraging habitat includes mature native forests and woodlands typically below 600 m altitude as well as mosaics of both native vegetation and agricultural patches (Figure 2).

During the flora investigations any suitable hollows was recorded on a handheld GPS. Two automatic audio-recording devices (Song Meter Mini Recorders) were placed on site on the 20<sup>th</sup> of October 2021 (Figure 2). The devices were placed in a stand of dry forest (one in the north and one in the south) with mature habitat elements, which can be high quality potential habitat<sup>35</sup>, but in this case lacked suitable hollow-bearing trees for masked owls and was on the edge of a plantation. The audio-recording device was programmed to record from half an hour before sunset and continue for two and half hours after sunset, and then to record again for half an hour each side of sunrise<sup>36</sup> – i.e., a total of four hours of recording were completed each night.

The audio-recordings from the survey will be analysed using Kaleidoscope software using specific signal parameters. This process identifies sounds that correspond to the call signature of the Tasmanian masked owl.

<sup>33</sup> These are the mapping categories used to construct the Mature Habitat Availability Map ([www.fpa.tas.gov.au](http://www.fpa.tas.gov.au)). Both crown cover and senescence assessments are based on aerial photo interpretation of the forest canopy and are depicted in the PI-type and SenCode mapping layers respectively.

<sup>34</sup> Threatened Species Section (2019) *Tyto novaehollandiae castanops* Tasmanian Masked Owl

<sup>35</sup> FPA (2014)

<sup>36</sup> Todd (2012)

## 2.5 Limitations

Due to seasonal variations in detectability and accurate discrimination (*i.e.* identification of closely related species), there may be some herb, orchid and/or graminoid species present in the survey area that have been overlooked due to flowering at times of the year other than when the surveys were undertaken, or being absent at the time of surveys due to seasonality and/or the absence of requisite germination triggers.

To further mitigate survey limitations, field data from the present study were supplemented with data from the Tasmanian Natural Values Atlas<sup>37</sup> and the EPBCA Significant Matters database<sup>38</sup>. All threatened species known or with potential to occur in the local area (5 km radius of the project area) have thus been considered in terms of habitat suitability on site.

Locations of critical elements (e.g. specific survey points, weeds<sup>39</sup>, evidence of pathogens, threatened species habitat, *etc.*) were recorded with a handheld non-differential GPS with an average accuracy of 3-10 m.

The study area is quite large and thus has been surveyed at a scale considered adequate with respect to the proposal and the relative diversity of the landscape. It is possible that micro-siting surveys will be required for particular lifeforms following the finalisation of design elements.

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<sup>37</sup> NVA report\_nvr\_1\_03-Jun-2020 (DPIPWE) – with the database checked manually at later dates for new records

<sup>38</sup> EPBC Act Protected Matters report, (Commonwealth of Australia) – PMST\_ I63KLI

<sup>39</sup> Tasmanian Weed Management Act 1999



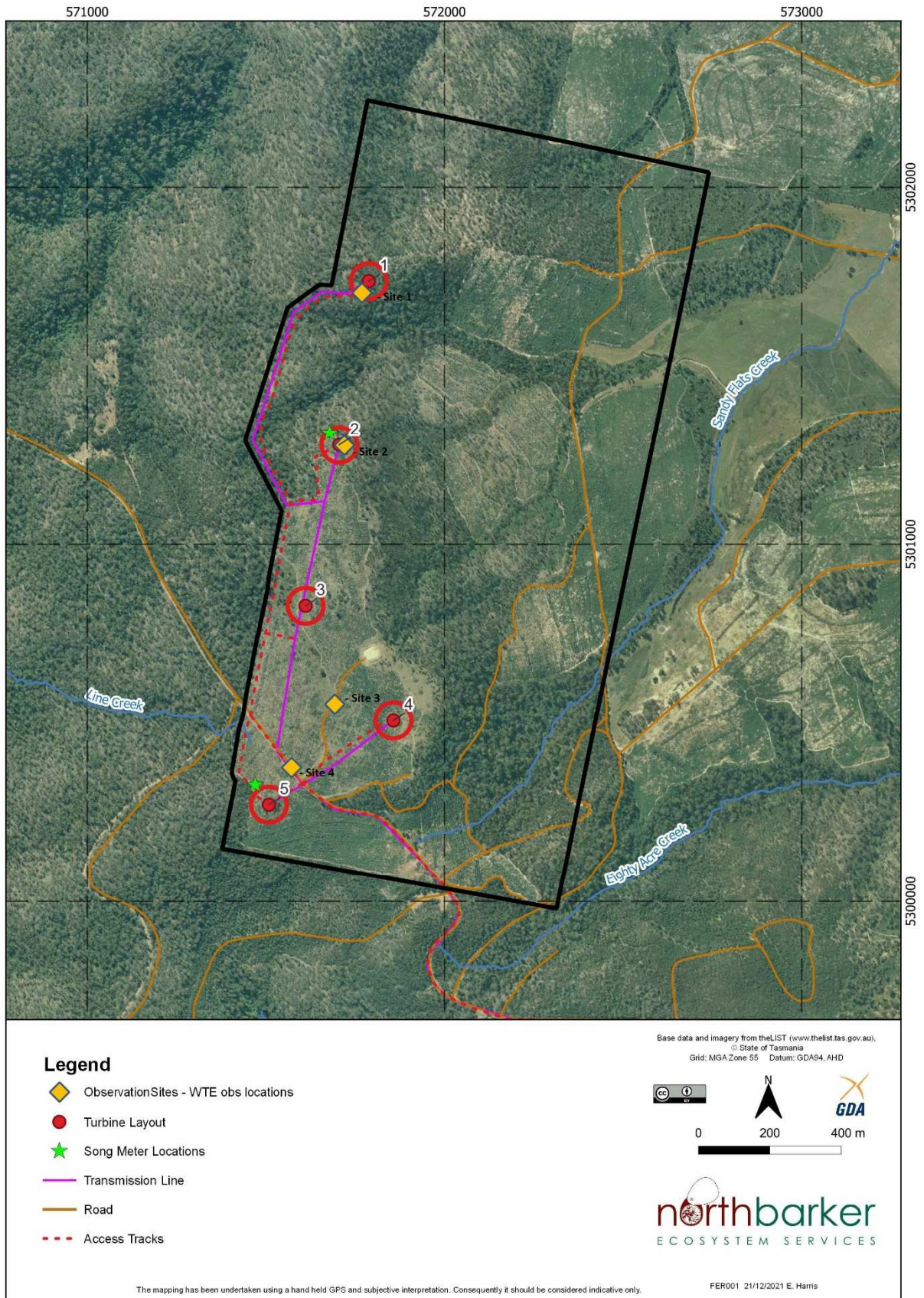


Figure 2. Survey locations for the eagle utilisation surveys and general avifauna surveys and two song meters, in relation to the turbine sites



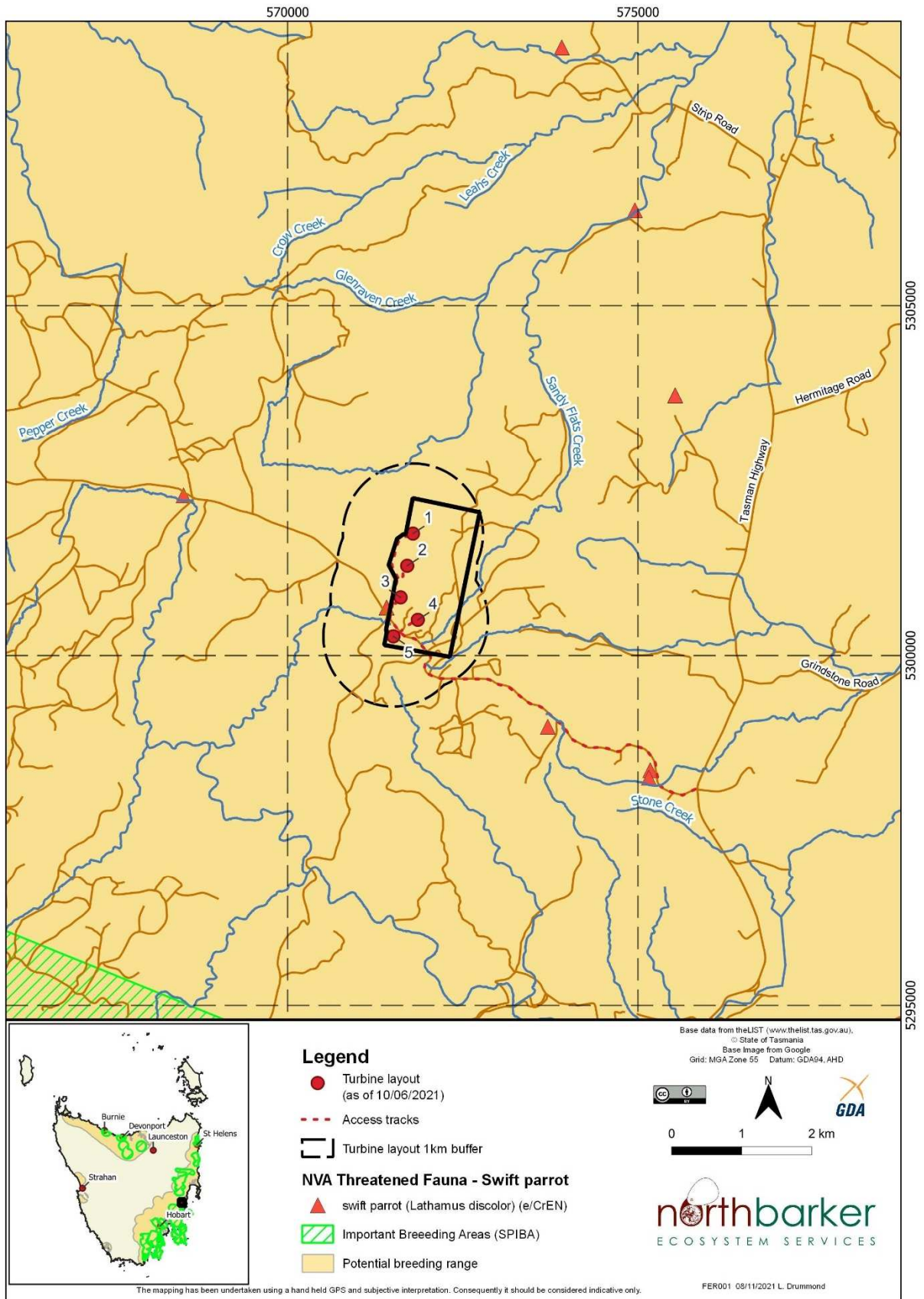


Figure 3. Swift parrot important breeding areas and NVA records in proximity to the site

### 3 EXISTING ENVIRONMENT - NATURAL VALUES

#### 3.1 Vegetation Communities

Vegetation within the study area is comprised of nine TASVEG mapping units (See Figure 4, Figure 5, Figure 6 and Figure 7):

- *Eucalyptus obliqua* dry forest (DOB)
- *Eucalyptus obliqua* forest with broad-leaf scrub (WOB)
- *Eucalyptus pulchella* forest and woodland (DPU)
- *Eucalyptus globulus* dry forest and woodland (DGL)
- Lowland grassy sedgeland (GSL)
- Agricultural land (FAG)
- Regenerating cleared land (FRG)
- Plantations for silviculture – hardwood (FPH)
- Improved pasture with native tree canopy (FAC)

DGL is listed as threatened under the NCA.

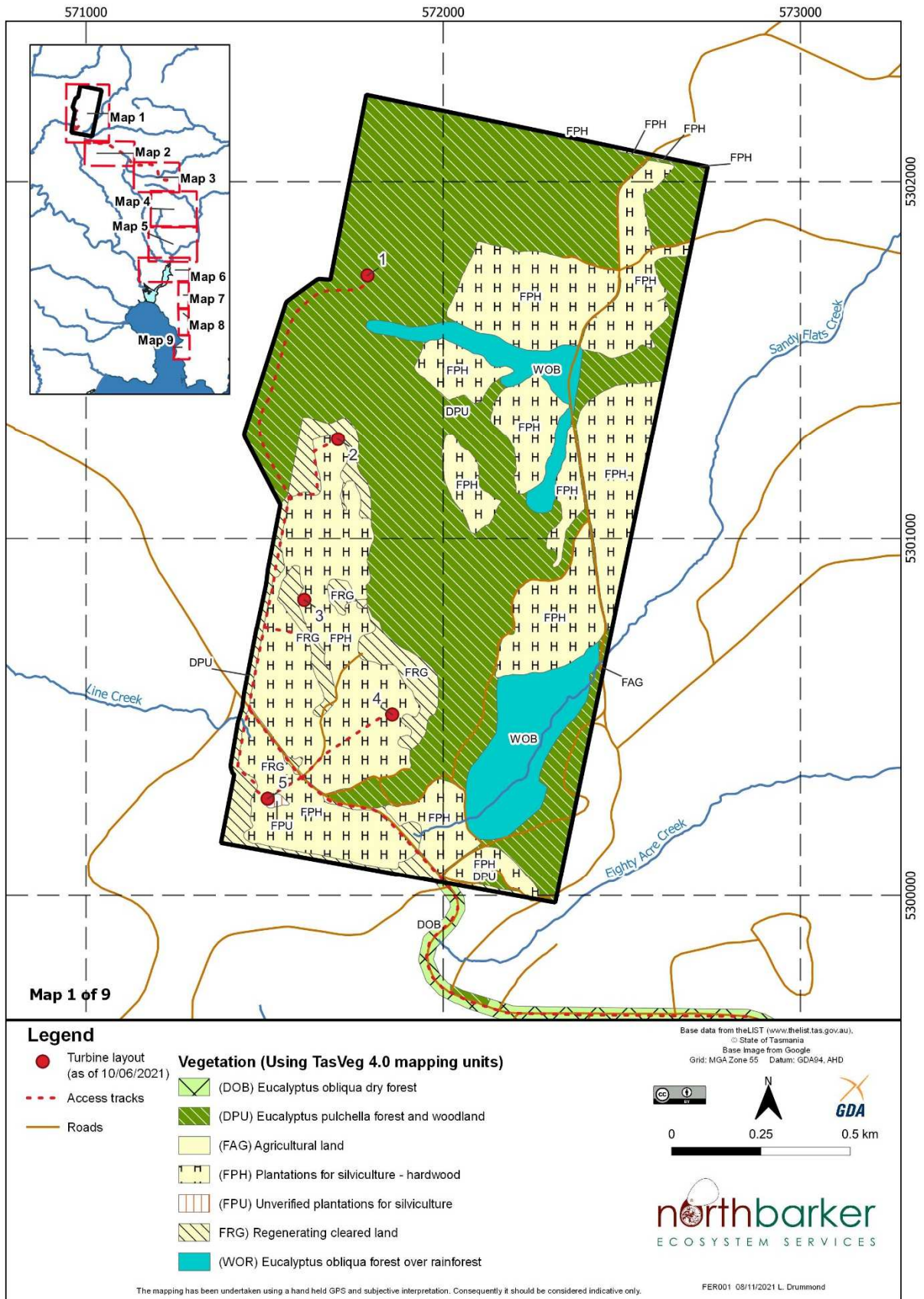


Figure 4. Vegetation communities on land title 209241/1 - Map 1 on 9



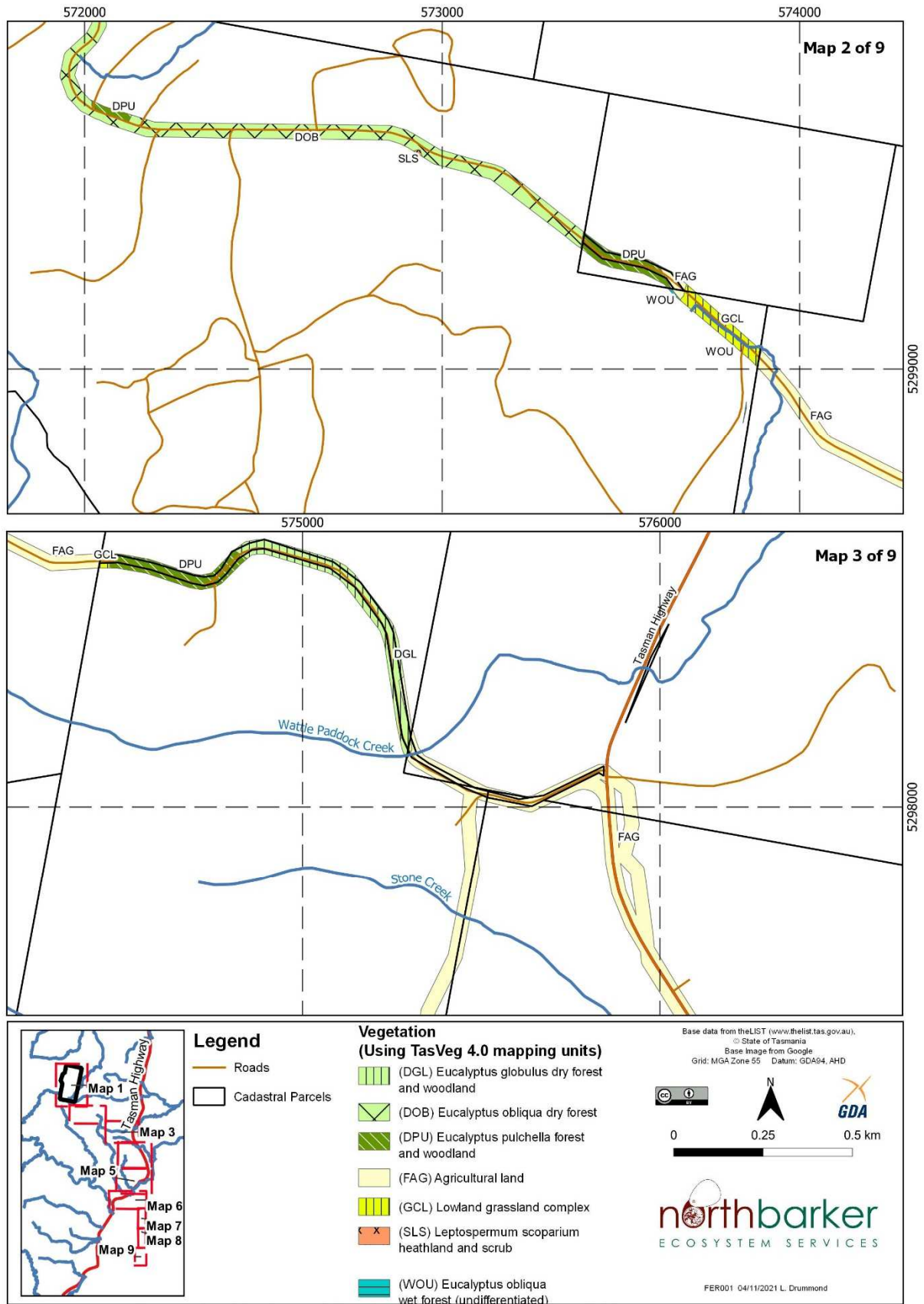


Figure 5. Vegetation communities along sections of the underground grid connection routes - Maps 2 and 3 of 9

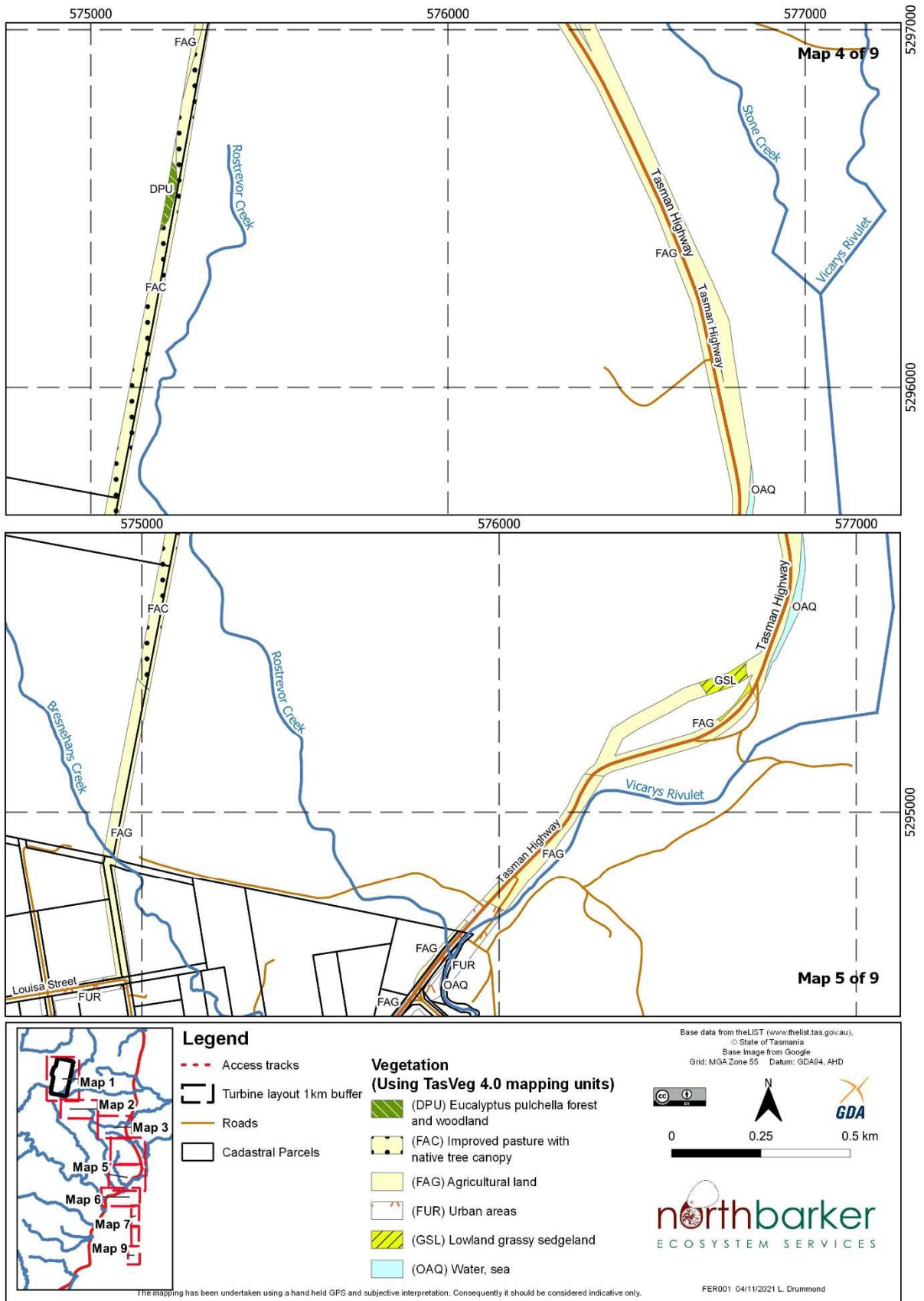


Figure 6. Vegetation communities along sections of the underground grid connection routes - Maps 4 and 5 of 9

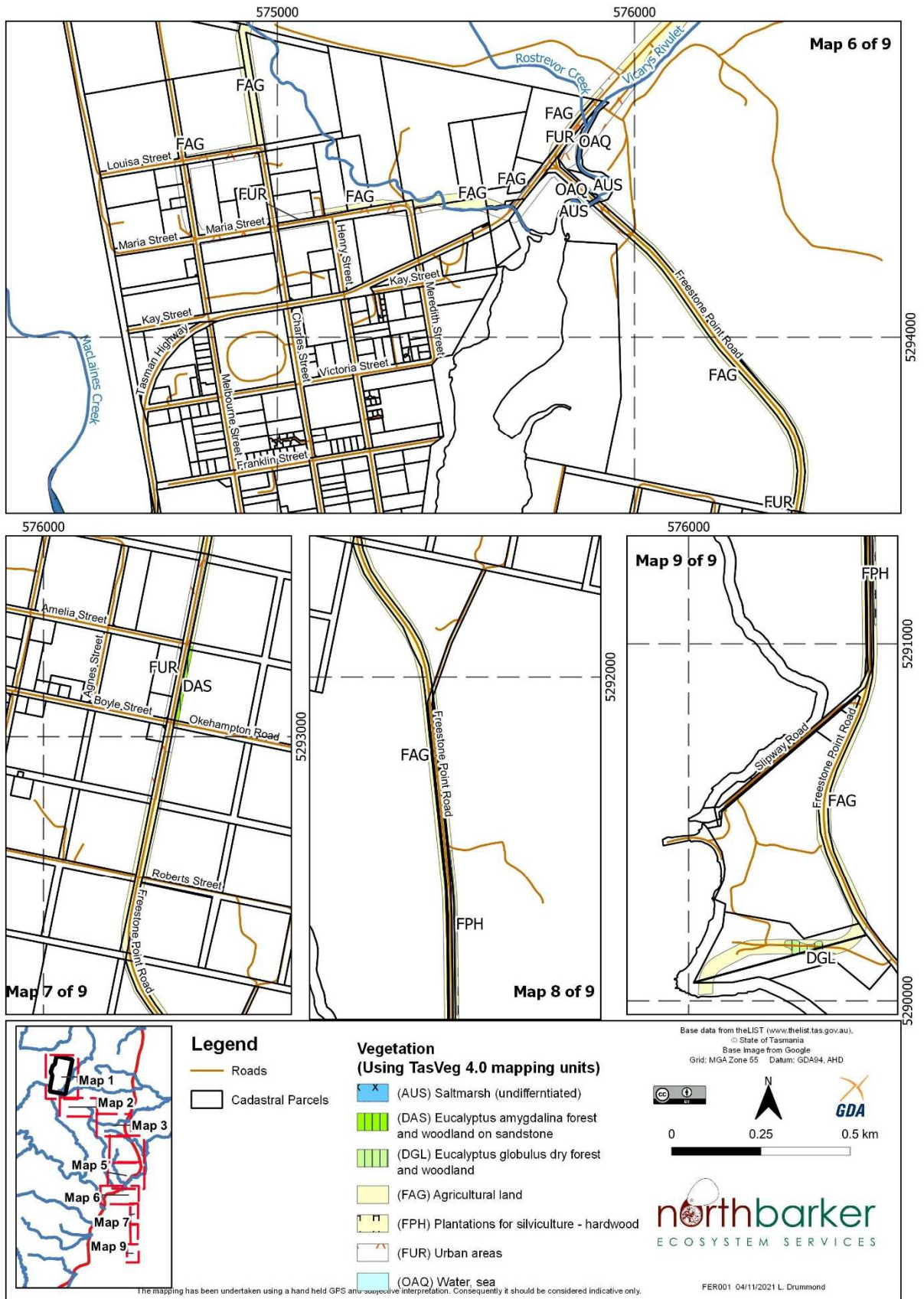


Figure 7. Vegetation communities along sections of the underground grid connection routes - Maps 6, 7, 8 and 9 of 9



### 3.1.1 *Eucalyptus obliqua* dry forest (DOB)

The DOB within the study area (including buffers) covers roughly 7.68 ha, has a typical height of 20-25m and is dominated by *Eucalyptus obliqua* with *E. pulchella* as a sub-dominant species and the occasional *E. tenuiramis* (Plate 1).

The ground layer is made up of graminoids and grasses such as *Carex apressa*, *Lomandra longifolia* and *Rytidosperma* species. *Pteridium esculentum* was quite widespread and dominant with some *Blechnum nudum* in the wetter spots.

*Eucalyptus obliqua* dry forest (DOB) is not listed as threatened under the Tasmanian NCA.



**Plate 1: DOB**



3.1.2 *Eucalyptus obliqua* forest with broad-leaf scrub (WOB)

WOB occupies 15.74 ha of the study area and occurs predominantly in the steeper gullies around the wind farm parcel.

The canopy is characterised by the dominance of *Eucalyptus obliqua* with occasional *E. globulus* also present, although not in great numbers. Trees are typically between 25-35 m tall with *Olearia lirata*, *Pomaderris apetala*, and *Bedfordia salicina* dominant in the understory (Plate 2).

The fern species *Dicksonia antarctica* and *Polystichum proliferum* are frequent within the lower layer, along with *Gahnia grandis* and *Lepidosperma* sp.

*Eucalyptus obliqua* forest with broad-leaf scrub (WOB) is not listed as threatened under the Tasmanian NCA.



Plate 2: WOB



### 3.1.3 *Eucalyptus pulchella* forest and woodland (DPU)

The study area includes 107.53 ha of this community and it is the dominant community within the wind farm parcel. In these higher rocky dolerite ridges the DPU occurs as open woodland facies.

At the higher elevations *Pultenaea juniperina* dominates the medium shrub layer, with some patches reaching a density of close to 90%. However, majority is fairly open with a low shrub layer consisting of predominantly *Lomatia tinctoria*, *Hibbertia riparia* and *Lissanthe strigose* (Plate 3 and Plate 4). The ground layer is comprised of mainly herbs and graminoids such as *Bossiaea prostrata*, *Dichondra repens*, *Viola hederacea* and *Lagenophora stipitata*.

Lower down in the communities which occur closer to the Tasman Highway, the understory is replaced with grassland. Dominant species here include *Themeda triandra*, *Rytidosperma* and *Austrostipa* species. Graminoids and herbs which are found in the higher altitudes are still in abundance.

*Eucalyptus pulchella* forest and woodland (DPU) is not listed as threatened under the Tasmanian NCA



**Plate 3: DPU – open woodland**





**Plate 4. DPU – Grassy forest**



3.1.4 *Eucalyptus globulus* dry forest and woodland (DGL)

DGL covers 3.93 ha of the lower part of study area where the underground grid connection are proposed to run. It is dominated by *E. globulus* with *E. pulchella* and *E. obliqua* as a sub dominant (Plate 5). There is a fairly open understory with *Acacia dealbata*, *Coprosma quadrifida* and *Olearia lirata* present. The ground layer is mainly *Lomandra longifolia*, *Poa labillardierei* and *Themeda triandra*.

DGL is listed as a threatened vegetation community under the NCA.



Plate 5. DGL



3.1.5 Plantations for silviculture – hardwood (FPH)

*Eucalyptus* Hardwood plantations cover 82.49 ha of the study area and contain numerous native species in the understory. The dominant native species within the plantations are *Pultenaea juniperina* and *Hibbertia riparia* (Plate 6).



Plate 6: FPH



3.1.6 *Regenerating cleared land (FRG)*

FRG occupies 12.82 ha within the wind farm parcel. These are areas which have been previously cleared of vegetation. They are dominated by *Acacia dealbata*, *Leptospermum scoparium*, *Pultenea juniperina*, *Pomaderris apetala* and a ground layer dominated by gramminoids and sedges such as *Gahnia grandis* and *Lomandra longifolia* (Plate 7).



Plate 7. FRG



3.1.7 Lowland grassy sedgeland (GSL)

A small section of GSL is located roughly 1.2km Northeast of the township of Triabunna just off the Tasman Highway. This area covers 0.62 ha is dominated by *Lomandra longifolia* with a high density of pasture grasses as it is surrounded by agricultural lands (Plate 8).



Plate 8. GSL



### 3.1.8 Modified lands (FAG, FAC, FUM)

The lower elevations of the underground grid connection study area were comprised mainly of modified lands, either agricultural lands or urban areas. These areas consist mostly of introduced species, either weeds or pasture grasses (Plate 9, 10 and 11).

There are some sections along the Tasman Highway which have rows of planted trees, either exotic such as *Cupressus macrocarpa* (Macrocarpa pine), or native *Eucalyptus* or *Acacia* species.



**Plate 9: Modified lands – Tasman Highway roadside**





**Plate 10. Planted *E. amygdalina* (Maria Street)**



**Plate 11. Tasman Highway roadside plantings**

### 3.2 Threatened flora

A full inventory of all vascular plant species recorded within the study area is included in Appendix 1. Separate plots were recorded in each discernible vegetation community, along with 'running' species list from incidental observation recorded elsewhere on the property.

A total of 108 vascular plant species were recorded during the survey, 28 of which are introduced species. One threatened species, *Eucalyptus morrysbii*, was recorded on private land (PID 3119103). The trees have been planted adjacent to a residential home therefore do not fall under the TSPA.

Table 4 shows the species within 5 km which have potential to occur on the site due to similar or suitable habitat. Those species which have no conceivable chance of occurring but have been recorded within 5 km are listed in Appendix 2.

### 3.3 Weeds

Surveys of the study area recorded 21 introduced plant species including seven weeds declared under the WMA (Table 3 and Figures 10 - Figure 13).

These species should be managed in a way which adopts the principles of DPIPWE's *Weed and Disease Planning and Hygiene Guidelines*<sup>40</sup>.

**Table 3. Declared and WONS species detected within the study area**

Species	Comment	WMA Zone in the Glamorgan Spring Bay Council	WoNs
<i>Foeniculum vulgare</i> fennel	Turning area at the end of Freestone road	<b>Zone A Eradication</b>	
<i>Cirsium arvense</i> Californian thistle	One location on Tasman Highway	<b>Zone A Eradication</b>	
<i>Echium vulgare</i> vipers bugloss	Population on Tasman highway near Bresnehans Creek and end of Freestone Road turning area.	<b>Zone A Eradication</b>	yes
<i>Erica lusitanica</i> Spanish heath	Roughly 2.5km from Tasman highway along proposed underground grid connection location	<b>Zone A Eradication</b>	
<i>Ulex europaeus</i> gorse	Tasman Highway just before turn off to Tassals.	<b>Zone B Control</b>	yes
<i>Rubus fruticosus</i> blackberry	Tasman highway numerous locations	<b>Zone B Control</b>	yes
<i>Lycium ferocissimum</i> African boxthorn	Tasman Highway near corner of Freestone Road.	<b>Zone B Control</b>	yes

<sup>40</sup> DPIPWE (2015). Weed and Disease Planning and Hygiene Guidelines

**Table 4. Verified threatened flora records attributed to within 5 km of the study area showing the listing status at both state and federal levels, preferred habitat, likelihood of impact and commentary on the species in relation to the study area. This table does not include marine or pelagic species**

Species	Status TSPA/EPBCA	Records within 500m/5km	Habitat	Impact likelihood	Commentary
<i>Acacia ulicifolia</i> juniper wattle	Rare / -	0/5	Sandy coastal heaths, open forests and woodlands.	Low	Unlikely to have been overlooked.
<i>Baumea gunnii</i> slender twigsedge	Rare / -	1/1	Wet moors, creeks, and riverbanks (often in rocky sections) throughout the State. It can extend to poorly drained sedgy/grassy forest and woodland dominated by <i>Eucalyptus ovata</i> or <i>E. rodwayi</i> .	Low	No suitable habitat, unlikely to have been overlooked.
<i>Caladenia filamentosa</i> daddy longlegs	Rare / -	3/4	Lowland heathy and sedgy eucalypt forest and woodland on sandy soils. Flowers Oct-November.	Low	Not observed during surveys
<i>Cyphanthera tasmanica</i> Tasmanian rayflower	Rare / -	1/1	Confined to gullies and on hillsides on the east coast of Tasmania, often associated with granite and dolerite slopes and ridges (extending to inland areas around Avoca) and dry forests on sandstone in the Buckland/Bluff River Gorge area.	Low	Not observed during surveys and unlikely to have been overlooked.
<i>Diuris palustris</i> swamp doubletail	- / ENDANGERED	1/1	Coastal areas in grassy open eucalypt forest, sedgy grassland and heathland with <i>Leptospermum</i> (tea tree) and <i>Melaleuca</i> (paperbark) on poorly- to moderately-drained sandy peat and loams, usually in sites that are wet in winter. Flowers September-November.	Low	No suitable habitat within study area.
<i>Eucalyptus barberi</i> Barbers gum	Rare / -	0/3	Dolerite-derived soils on the central east coast of Tasmania, with disjunct populations occurring in the Wielangta area. The species tends to occur on broad ridgelines, saddles and flats, often with high surface	Low	Not observed during survey.

Species	Status TSPA/EPBCA	Records within 500m/5km	Habitat	Impact likelihood	Commentary
			rock cover (including at the edge of dolerite rock plates). <i>Eucalyptus barberi</i> generally occurs in localised stands in heathy/grassy eucalypt forest and woodland, typically dominated by <i>E. pulchella</i> , with <i>E. viminalis</i> and <i>E. ovata</i> also present on some sites.		
<i>Lepidium hyssopifolium</i> soft peppergrass	Endangered/ ENDANGERED	0/22	Occurs in the growth suppression zone beneath large trees in grassy woodlands and grasslands (e.g. over-mature black wattles and isolated eucalypts in rough pasture). <i>Lepidium hyssopifolium</i> is now found primarily under large exotic trees on roadsides and home yards on farms. It occurs in the eastern part of Tasmania between sea-level to 500 metres above sea level in dry, warm and fertile areas on flat ground on weakly acid to alkaline soils derived from a range of rock types. It can also occur on frequently slashed grassy/weedy roadside verges where shade trees are absent.	Low	Not observed during survey.
<i>Lepilaena preissii</i> slender watermat	Rare / -	0/2	Fresh and brackish lagoons, and estuaries.	Low	No suitable habitat, unlikely to have been overlooked.
<i>Limonium australe</i> var. <i>baudinii</i> Tasmanian sea-lavender	Vulnerable/ VULNERABLE	20/64	Known only from the Triabunna and Saltwater River areas where it occurs in succulent or graminoid saltmarsh close to the high water mark, typically near small brackish streams.	Low	There are records within the vicinity of the study area however no plants were found,
<i>Melaleuca pustulata</i> warty paperbark	Rare / -	0/8	Occurs in a range of habitats including dry open woodland (often on dolerite in forests dominated by <i>Eucalyptus pulchella</i> ), grassland and scrub,	Low	Unlikely to have been overlooked.



Species	Status TSPA/EPBCA	Records within 500m/5km	Habitat	Impact likelihood	Commentary
			riparian zones and stable dunes in sparse coastal shrubbery.		
<i>Pterostylis squamata</i> ruddy greenhood	Vulnerable / -	1/1	Occurs in heathy and grassy open eucalypt forest, woodland and heathland on well-drained sandy and clay loams.	Low	Not observed during survey.
<i>Ruppia tuberosa</i> tuberous seatassel	Rare / -	4/4	Grows in holes and channels in saltmarshes.	Low	No suitable habitat.
<i>Scleranthus fasciculatus</i> spreading knawel	Vulnerable / -	-/10	Only recorded from a few locations in the Midlands and south-east. The vegetation at most of the sites is <i>Poa</i> grassland/grassy woodland. <i>Scleranthus fasciculatus</i> appears to need gaps between the tussock spaces for its survival and both fire and stock grazing maintain the openness it requires. Often found in areas protected from grazing such as fallen trees and branches.	Low	Not observed during survey.
<i>Senecio squarrosus</i> leafy fireweed	Rare / -	4/3	Occurs in a wide variety of habitats. One form occurs predominantly in lowland damp tussock grasslands. The more widespread and common form occurs mainly in dry forests (often grassy) but extends to wet forests and other vegetation types.	Low	Not observed during survey. Unlikely to have been overlooked.
<i>Stenanthemum pimeleoides</i> propeller plant	Vulnerable/ VULNERABLE	4/5	Restricted to Tasmania's central East Coast and the Northern Midlands, where it occurs in dry sclerophyll forest or woodland with an open heathy or shrubby understorey. The topography tends to be flat to gently sloping. The species occurs in the drier parts of the state with rainfall between 500-	Low	Not observed during survey. Unlikely to have been overlooked.

Species	Status TSPA/EPBCA	Records within 500m/5km	Habitat	Impact likelihood	Commentary
			800 mm per year, and usually at elevations below 100 m.		
<i>Vittadinia gracilis</i> woolly new-holland-daisy	Rare / -	1/1	Native grassland and grassy woodland	<b>Low</b>	Not observed during survey. Unlikely to have been overlooked.
<i>Vittadinia muelleri</i> narrowleaf new-holland-daisy	Rare / -	-/4	Native grassland and grassy woodland	<b>Low</b>	Not observed during survey. Unlikely to have been overlooked.

### 3.4 Threatened Fauna and Habitat

A total of 26 threatened fauna species have been recorded as either occurring or having the potential to occur within 5 km of the study site<sup>41</sup> (See Appendix 3). A number of species such as Tasmanian devil, eastern and spotted-tail quoll, the Tasmanian masked owl, wedge-tailed eagle, white-bellied sea eagle and swift parrot likely utilise the mature forest and open modified landscape on site for foraging, with limited foraging occurring in the plantations.

Of the 26 species known from the region, 13 have no likelihood of occurrence based on habitat requirements. The likelihood of occurrence based on habitat suitability is indicated in Table 8.

#### 3.4.1 Wedge-tailed and white-bellied sea eagles

##### Eagle nest search

Three eagle nests were found during the aerial eagle nest search (Table 5) and have been given a Raptor Nest Data (RND) number of #3109 (Plate 12), #3110 (Plate 13) and #3108 (Plate 14). Two turbines (turbine 1 and 2) are both within 1 km of #3108. Turbine 1 is approximately 775 m from #3108 and turbine 2 is approximately 991 m from #3108 (Figure 8a). Of these three nests, #3110 is derelict and falling apart whilst #3109 and #3108 are in good condition.

A number of eagle nests are known within 5 km of the turbine sites and proposed underground grid connections (Figure 8b). Only one nest, a white-bellied sea eagle nest, situated along the Tasman Highway opposite the Rostrevor Reservoir is known from within 500 m and 1 km of the proposed underground grid connection. This nest can easily be seen from the roadside with NBES ecologist confirming it as currently active with the presence of an adult on the nest.

Three other nests are known from within a 2 km radius of the study area (Figure 8a). The closest of these nests to the turbine site is nest #2172 which is 4 km to the southeast of the turbine sites. Two other nests, nests #303 and #828 are both roughly 6.5 km to the northeast (Figure 8).

The nests of wedge-tailed eagle breeding pairs tend to be clustered in a territory. A territory is the defended part of their home range and most territories have more than one nest. Nest clusters are generally 6-12 km apart in good-moderate habitat, potentially further in variable habitats with lower productivity, which depends on prey abundance and nesting opportunities<sup>42</sup>. Nests within a territory are usually within 1 km of each other and closest when habitat is continuous. Nests in separate territories have not been recorded closer than about 1.8 km<sup>43</sup>.

<sup>41</sup> Natural Values Report\_3\_18\_Oct-2021 - This number does not include marine or pelagic species as there is no chance of them occurring onsite.

<sup>42</sup> FPA (2013)

<sup>43</sup> Dr. James Pay Pers. Comm (2021)

**Table 5. Eagle nest search results including location and nest condition. Note: WTE = Wedge-tailed eagle.**

Date	Nest ID	Easting	Northing	Species	Condition	Comments
20/05/2022	3108	571074.9	5302042	WTE	Viable	Large brown nest with flat top, visible white-wash on adjacent trunks.
20/05/2022	3109	571075.2	5303533	WTE	Viable	Large brown nest in, 45 m high eucalyptus viminalis, nest roughly 30 m up the tree.
20/05/2022	3110	571537.3	5302833	WTE	Derelict	Sloping nest with lack of structure. Falling apart.

### Eagle utilisation survey

During eagle utilisation surveys 27 individual flights were recorded. All birds observed were adult wedge-tailed eagles, no white-bellied sea eagles or juvenile eagles were observed. Site 1 in the north experienced the highest number of flights (Table 6).

Site 1 is completely surrounded by native forest unlike the other three sites which are either in a plantation or on the edges of plantation. Site 1 is also on the edge of a gully, although site 2 is also on this same gully, the visibility at site 1 was greater than site 2. Had site 2 had similar visibility to site 1, a similar number of eagles would likely have been observed at site 2 compared to site 1. A pair of eagles and a single lone eagle were observed across the entire area. Whilst it is impossible without any distinguishing factors to determine if the pair and lone bird were the same birds seen each day, it is likely that the turbine site is within the territory of one or two breeding pair of eagles with the occasional 'floater' or sub-adult flying over the area based on the eagle nest search results.

The lowest eagle flight height was recorded at 15 m and the highest at 350 m. The range of candidate turbines have a lower tip height greater than 40 m and upper tip height of around 250 m. The closest eagle observed was spotted at 50 m from the observer with the furthest spotted at 600 m. With limited visibility across the site due to tall surrounding vegetation 600 m was at the limit of what an observer could see. Over the course of four days, eagles were observed flying within 600 m of the turbine sites for a total of 1 hour and 20 mins (Table 6).

**Table 6. Results from eagle utilisation surveys across the four sites**

Site	1	2	3	4
Number of flights	10	3	6	8
Duration of flights (mins)	33	19	13	15
Average height (m)	184	130	96	106
Average distance from observer (m)	384	250	57	259





**Plate 12. Nest #3109, this nest is in a good condition with new nesting material and is considered viable.**

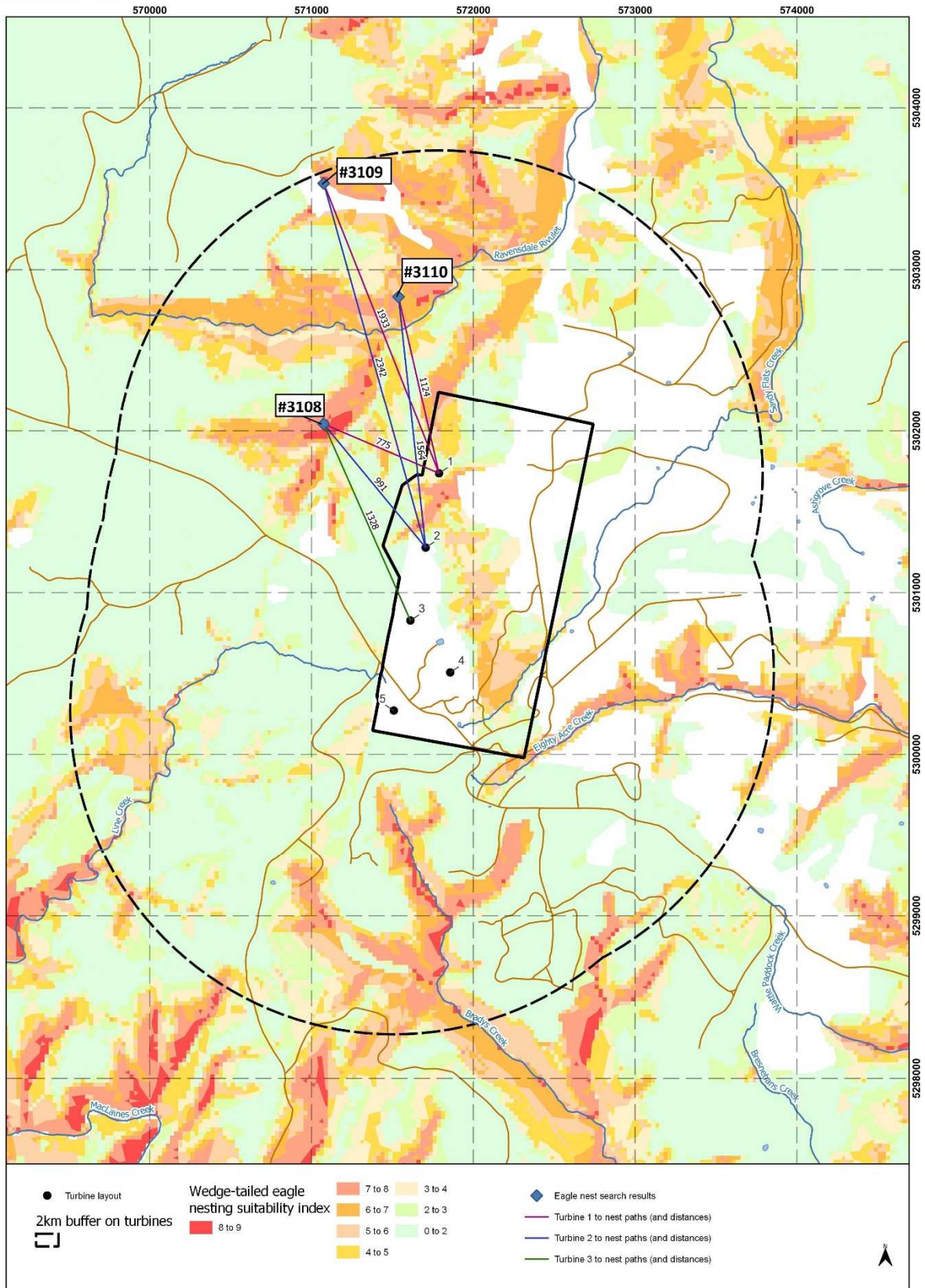


**Plate 13. Nest #3110, this nest has lost its structure and is falling apart, in its current form it is not viable, although renovation of this nest may occur in the future.**





**Plate 14. Nest #3108, this nest is in good condition and like #3109 has new nesting material and is viable.**



**Figure 8a. The three eagle nests found during the aerial eagle nest search and their distance from the 5 proposed turbines.**



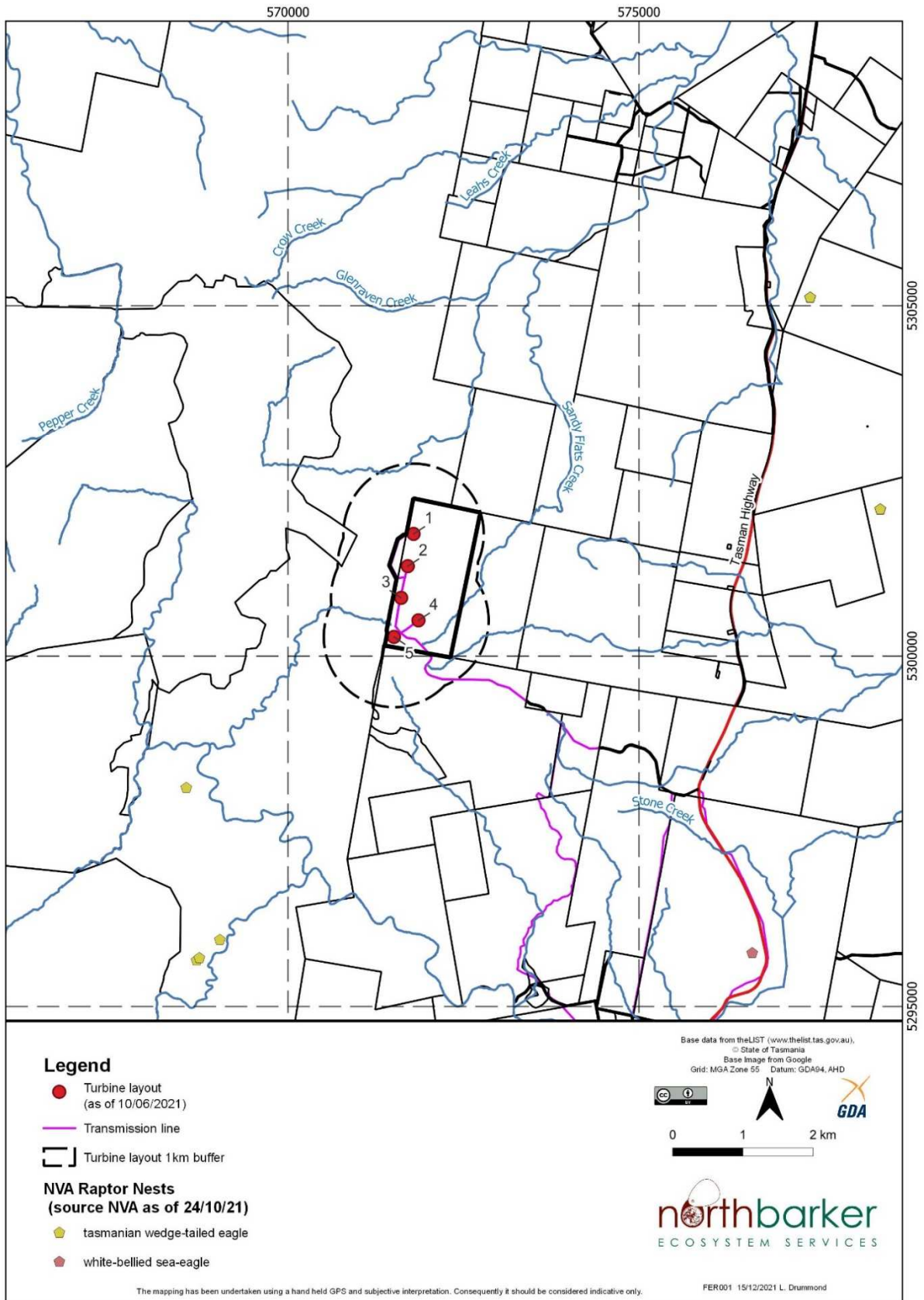


Figure 8b. Eagle nest locations within the greater vicinity of the site.



### 3.4.2 Swift parrot

The swift parrot has been recorded on 19 occasions within 5 km of the survey area on the Natural Values Atlas (Figure 3). The observer on site heard the call of a small group of swift parrots flying overhead at site 4 on the 22<sup>nd</sup>, however it was foggy on this particular morning and they were not observed.

The survey area is within the potential breeding range of swift parrots and is approximately 5 km north of 'important breeding range for this species (Figure 3). A number of large *E. globulus* with a DBH > 100 cm were recorded along the most western underground grid connection route (Figure 10-Figure 13). At the time of the survey the trees were flowering, and musk lorikeets were observed feeding at the time. Swift parrots often aggregate with musk lorikeets and it is likely swift parrots will use these trees to forage from time to time.

The threatened status is a result of population decline associated with the loss of foraging and nesting habitat, predation by sugar gliders (*Petaurus breviceps*) and collisions with man-made objects<sup>44</sup>. Any infrastructure can create a potential collision hazard to birds if it is not clearly visible and avoidable. In almost all scenarios, the risk that buildings pose to bird collisions relates to the design and location of windows and any other reflective surfaces, little is known about the risk of collision that wind farms produce.

Swift parrots generally fly within the height ranges of canopies when foraging between habitat patches or nesting sites. Thus, their risk of collision with a turbine rotor sweep is considered low. They also are not likely to fly near the turbines situated in plantations due to the lack of foraging and nesting habitat within these areas. Their greatest risk to swift parrots will come when they start or finish their migration and gain elevation within the range of the turbine's rotor sweep. It has been suggested by Smales (2005) that swift parrots likely have avoidance rates of turbines in the range between 95% -100%.

### 3.4.3 Tasmanian masked owl

One masked owl screech was recorded on the song meter placed at turbine 2 on November 8<sup>th</sup> 2021. Based on this call occurring only once between October 20<sup>th</sup> and December 17<sup>th</sup>, it is likely that this individual only used the site on one occasion, for foraging or a fly over. Fourteen observations of the masked owl have been recorded from within 5 km of the project area<sup>45</sup>. The survey area is within the core range for this species (Figure 9).

There are 23 trees across the site that have a DBH > 100 cm. A number have the potential to contain hollows of suitable size for masked owls. The transmission lines follow an existing road for most sections or is within paddocks with low tree density. Due to the proximity to the road and low tree density it is unlikely any hollows suitable for masked owls will be directly impacted. There is a change that masked owls utilising the site could be at risk of collision with a turbine.

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<sup>44</sup>Threatened Species Link – Swift Parrots (*Lathamus discolor*)

<sup>45</sup> Natural Values Atlas

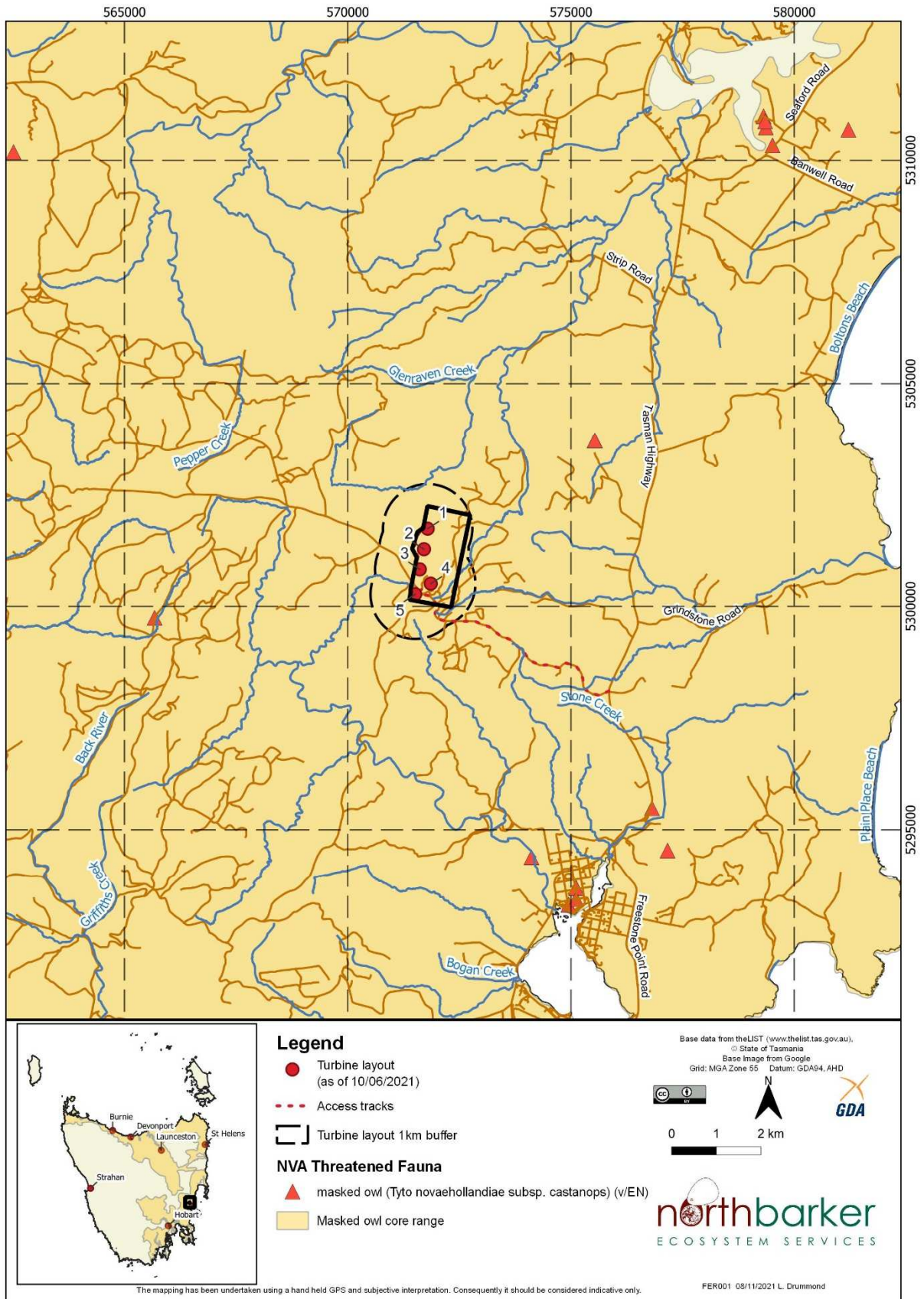


Figure 9. Masked owl records within the vicinity and masked owl core range

### 3.4.1 General and threatened avifauna

Over the course of 4 days, 32 different bird species (excluding the wedge-tailed eagle) were heard or observed (Table 7). Of these species 11 were recorded across all four sites, this includes the: black-headed honeyeater, fan-tailed cuckoo, green rosella, grey-shrike thrush, laughing kookaburra, New Holland honeyeater, forest raven, silvereye, spotted pardalote, yellow-throated honeyeater and the yellow wattlebird. Sites 1 and 2 had far more species richness compared to sites 3 and 4. This is likely due to site 1 and 2 being in the forest or on the edge of native forest, whereas sites 3 and 4 are both within plantations where there is less heterogeneity vegetation structure and species diversity.

There were twelve species that were not found within the plantation at all (Table 7), these were the: beautiful firetail, black-faced cuckoo shrike, brown thornbill, dusky woodswallow, eastern spinebill, flame robin, golden whistler, grey fan-tail, pallid cuckoo, shining bronze cuckoo, superb fairywren and the Tasmanian scrubwren. Birds that were frequently observed using the plantation for foraging or competitive interactions with other birds were: black currawong, grey currawong, black-headed honeyeater, green rosella, grey-shrike thrush, new holland honeyeater, spotted pardalote, yellow-throated honeyeater and yellow wattlebird. Other birds noted at sites 3 and 4 were either flyovers or heard on occasion in the distance and weren't noted regularly using the plantation.

Of the 32 different species observed, only the laughing kookaburra is an introduced species whilst the rest are native. Of the 31 natives species four are endemic to Tasmania (the yellow-throated honeyeater, black currawong, black-headed honeyeater and Tasmanian scrubwren). Of the species recorded, only the swift parrot is listed as a threatened species under both State and National legislation.

The Rostrevor Reservoir, where one of the proposed underground grid connection routes passes close by has suitable Australasian bittern and great crested grebe habitat, with four records of bitterns from this area recorded on the Natural Values Atlas. The Australasian bittern is listed as Endangered under the EPBCA and the great crested grebe is listed as vulnerable under the TSPA.

The native areas of the site have high species richness and diversity that is typical of the east coast of Tasmania with the non-native areas (the plantations) having low species richness and diversity. Impacts to these birds will be greatly reduced by placing turbines within the plantation forests rather than the native forests. Furthermore, due to the nature of many of these species being canopy and scrub foraging birds their risk of collision with a turbine is likely low.

**Table 7. Each number represented under each site is the number of times that species was recorded at that site over the four days**

Birds	Sites			
	1	2	3	4
<b>Common name – Scientific name</b>				
Beautiful firetail - <i>Stagonopleura bella</i>	1	0	0	0
Black currawong - <i>Strepera fuliginosa</i>	4	4	3	3
Black-faced cuckooshrike - <i>Coracina novaehollandiae</i>	3	1	0	1
Black-headed honeyeater - <i>Melithreptus affinis</i>	3	4	4	2
Brown thornbill - <i>Acanthiza pusilla</i>	4	2	0	0
Common bronzewing - <i>Phaps chalcoptera</i>	0	0	0	1

Birds	Sites			
	1	2	3	4
Common name – Scientific name				
Dusky woodswallow - <i>Artamus cyanopterus</i>	1	0	0	0
Eastern rosella - <i>Platycercus eximius</i>	2	1	0	1
Eastern spinebill - <i>Acanthorhynchus tenuirostris</i>	3	4	0	0
Fan-tailed cuckoo - <i>Cacomantis flabelliformis</i>	1	2	2	2
Flame robin - <i>Petroica phoenicea</i>	2	3	0	0
Forest raven – <i>Corvus tasmanicus</i>	4	2	3	3
Green rosella - <i>Platycercus caledonicus</i>	2	3	3	3
Grey currawong - <i>Strepera versicolor</i>	0	0	2	1
Grey fantail - <i>Rhipidura albiscapa</i>	4	4	0	0
Grey shrikethrush - <i>Colluricincla harmonica</i>	4	3	3	4
Laughing kookaburra - <i>Dacelo novaeguineae</i>	2	3	1	1
New Holland honeyeater - <i>Phylidonyris novaehollandiae</i>	1	2	4	4
Olive whistler - <i>Pachycephala olivacea</i>	2	1	1	0
Pallid cuckoo - <i>Cacomantis pallidus</i>	4	3	0	0
Shining bronze cuckoo - <i>Chrysococcyx lucidus</i>	3	2	0	0
Silvereye - <i>Zosterops lateralis</i>	2	2	1	1
Spotted pardalote - <i>Pardalotus punctatus</i>	3	3	4	1
Striated pardalote - <i>Pardalotus striatus</i>	4	4	0	2
Superb fairywren - <i>Malurus cyaneus</i>	3	2	0	0
Swift parrot - <i>Lathamus discolor</i>	0	0	0	1
Tasmanian scrubwren - <i>Sericornis humilis</i>	2	2	0	0
Tree martin - <i>Petrochelidon nigricans</i>	1	0	1	1
Welcome swallow - <i>Hirundo neoxena</i>	0	0	1	0
Yellow-throated honeyeater - <i>Lichenostomus flavicollis</i>	2	4	3	4
Yellow wattlebird - <i>Anthochaera paradoxa</i>	1	2	4	4

### 3.4.2 Tasmanian devil and quolls

Devils and quolls have been recorded on numerous occasions from within both 500 m and 5 km of the survey area<sup>46</sup>. There is sufficient interconnected habitat to support Tasmanian devils, and the project area is within their core range. A large number of devil scats were found along the roads. No evidence of dens or scats / latrines was found during the survey. As devils are wide ranging mammals, it is possible that they frequent the area to forage. The scale of habitat loss is not considered likely to have any meaningful impact upon the carrying capacity of the area for Tasmanian devils or quolls.

The survey area is within the core range for the eastern quoll, and potential range for the Tasmanian devil and spotted-tail quoll

### 3.4.3 Eastern barred bandicoot

This species is listed under the EPBCA but not listed as threatened in Tasmania due to a stable and widespread population. It is resilient to various types of human disturbance and can reach higher than natural densities in peri urban environments. Whilst the survey area is within the core range for this species, the development has little to no likelihood of resulting in significant impacts upon the eastern barred bandicoot. The modifications are unlikely to deter the species from utilising the site, as it is commonly found in non-native vegetation.

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<sup>46</sup> Natural Values Atlas



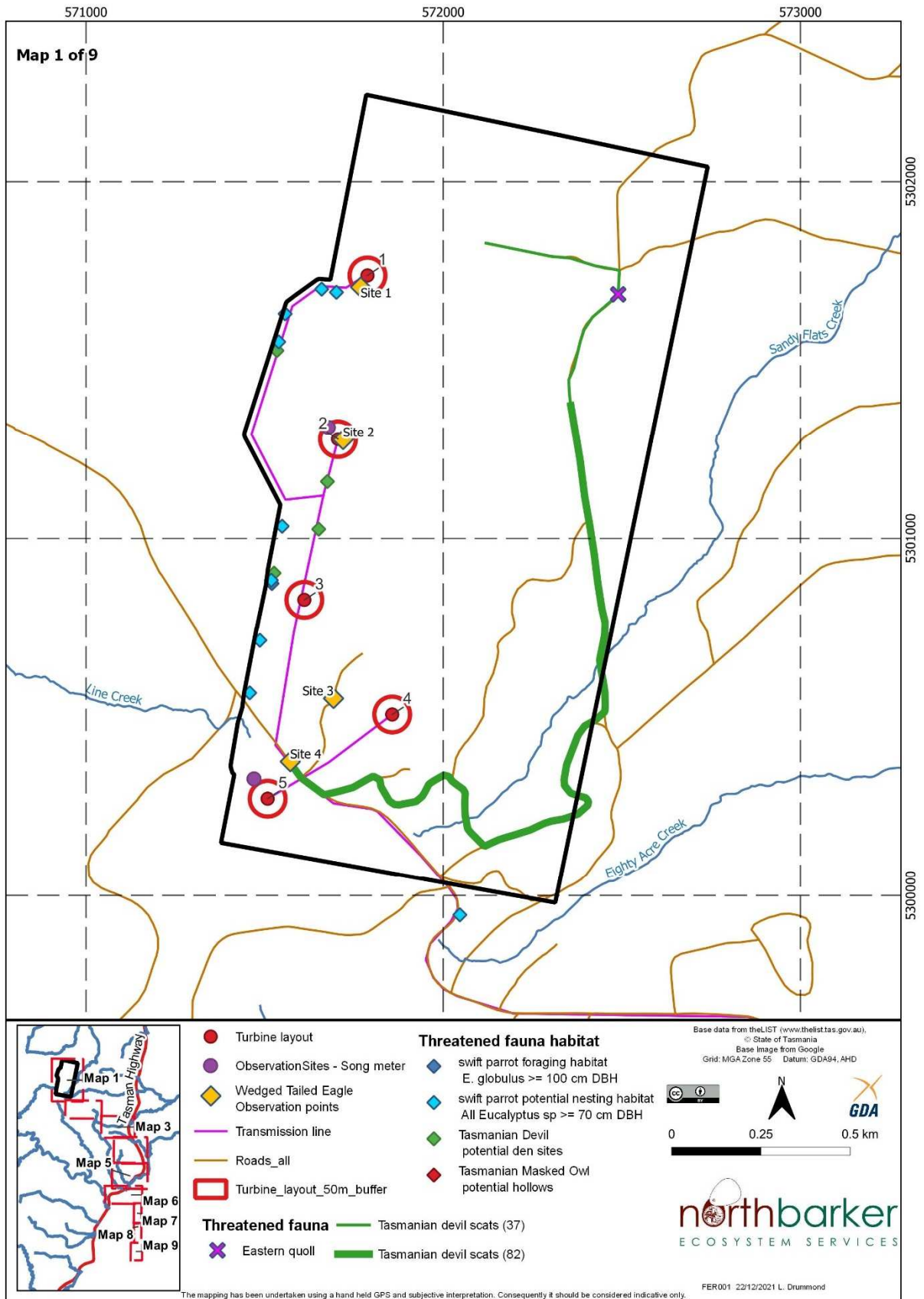


Figure 10. Threatened flora and fauna habitat and weeds across the study area - Map 1 of 9



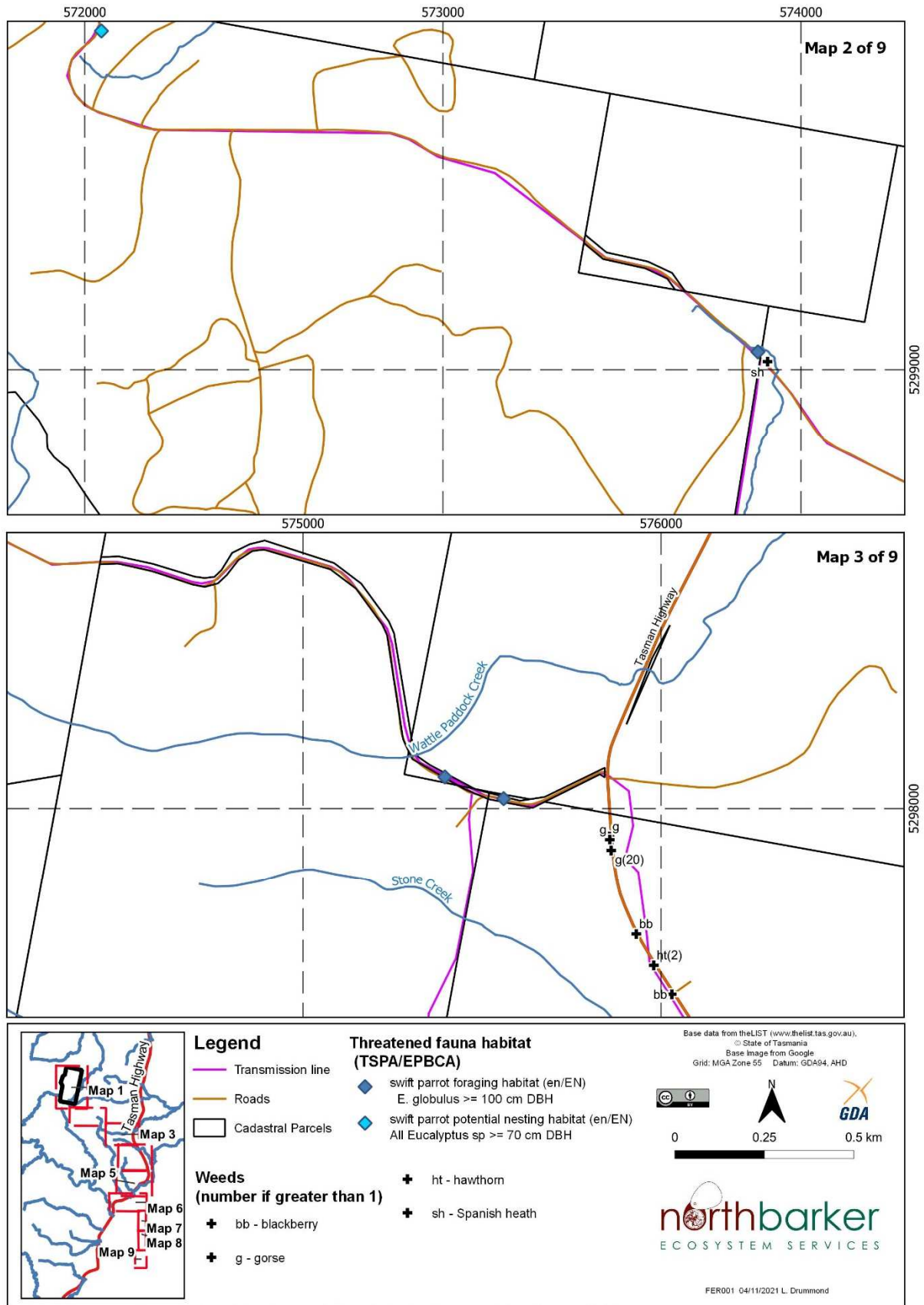


Figure 11. Threatened flora and fauna habitat and weeds across the study area - Map 2 and 3 of 9

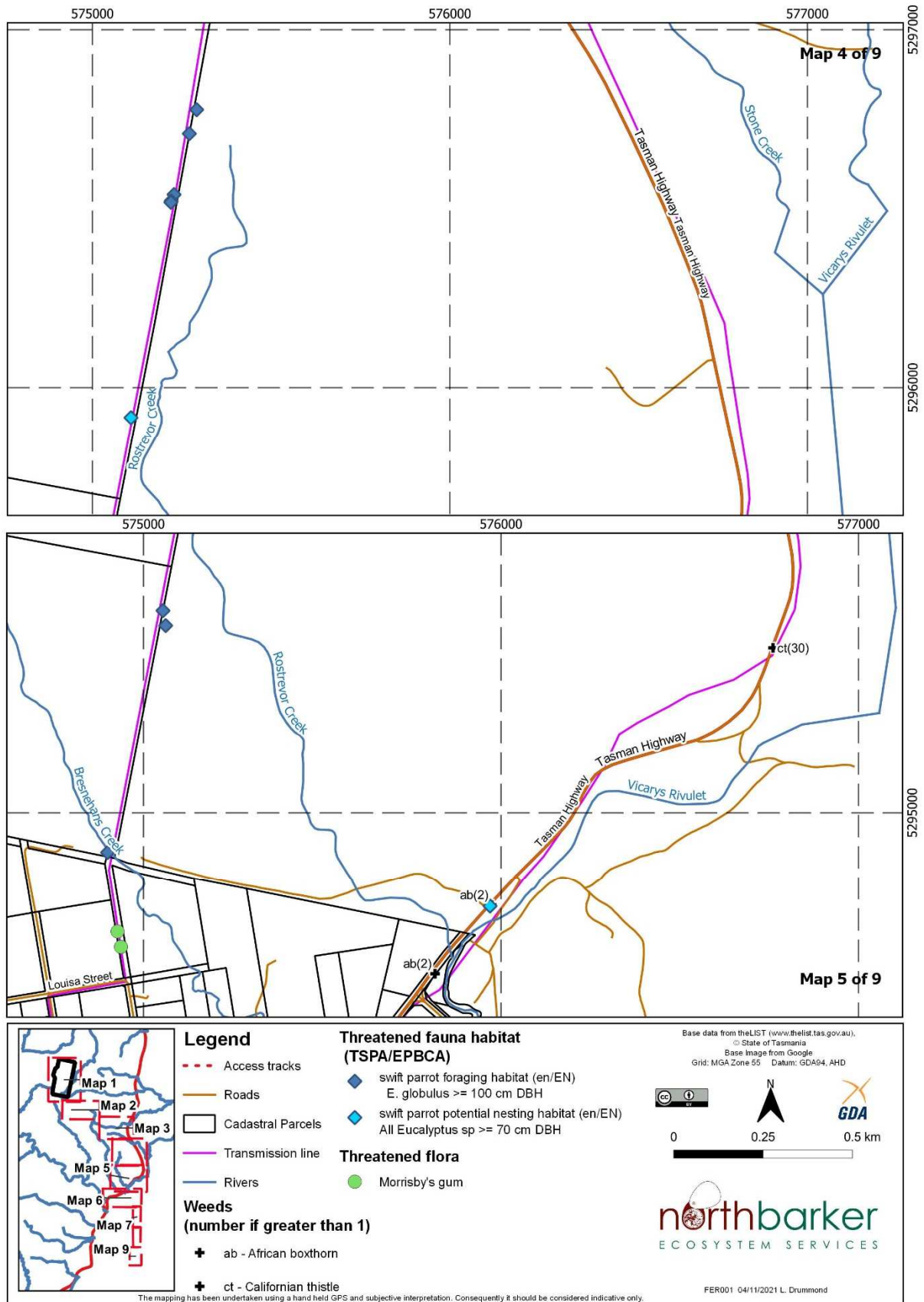


Figure 12. Threatened flora and fauna habitat and weeds across the study area - Map 4 and 5 of 9

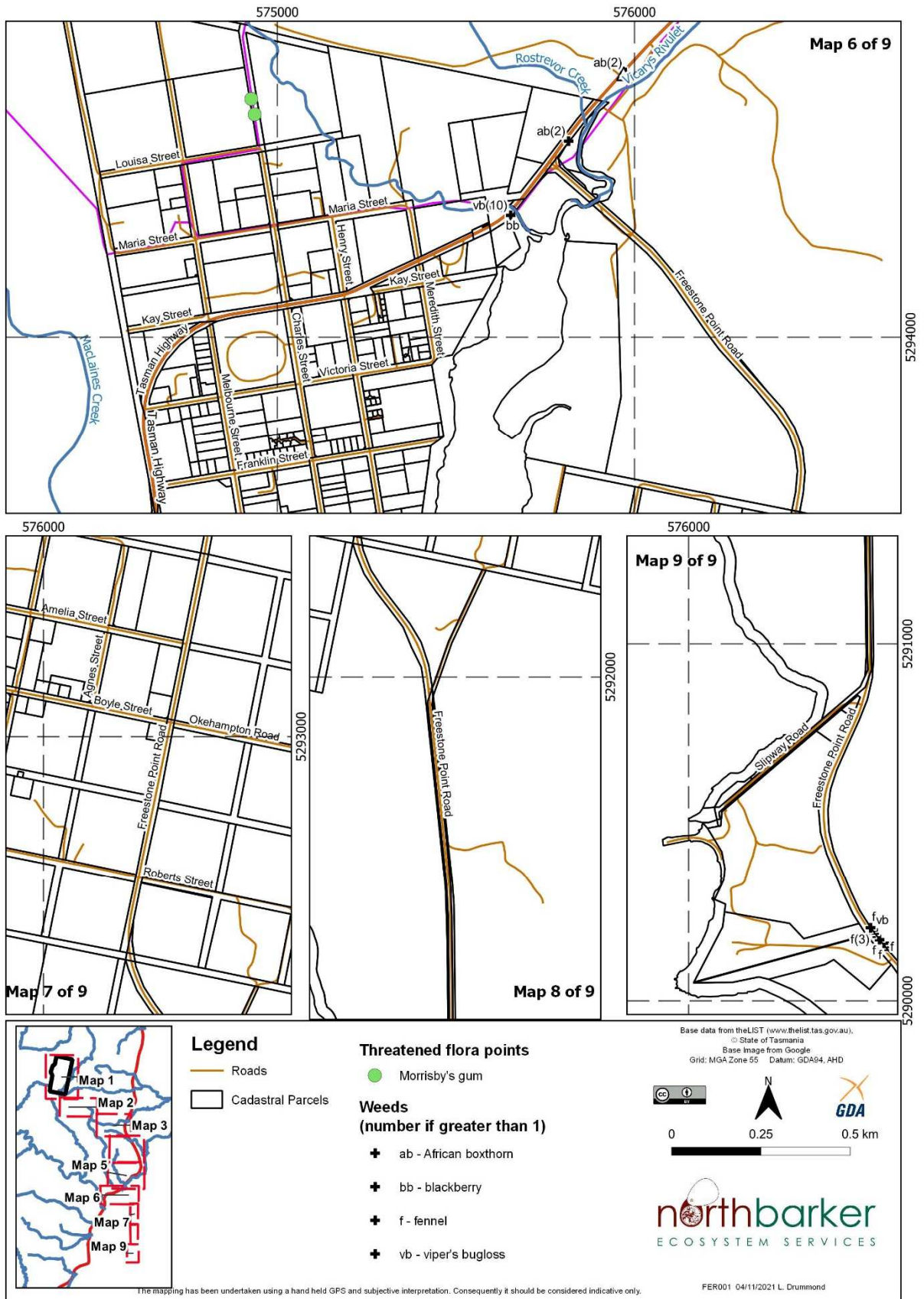


Figure 13. Threatened flora and fauna across the study area, including weeds - Map 6, 7, 8 and 9 of 9



**Table 8. Verified threatened fauna records within 5km of the study area showing the listing status at state and federal levels, records within 500 m and 5km, potential to occur and preferred habitat**

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Observations and Preferred Habitat
<b>MAMMALS</b>				
<i>Dasyurus maculatus</i> subsp. <i>maculatus</i> spotted-tailed quoll	Rare / VULNERABLE	0/5	Denning: low  Foraging: moderate	<p>This naturally rare forest-dweller most commonly inhabits wet forest but also occurs in dry forest. It forages and hunts on farmland and pasture, travelling up to 20 km at night, and shelters in logs, rocks, or thick vegetation.</p> <p>The native forest surrounding the northern most turbine along with sections of the underground grid connection contain habitat suitable for this species for both denning and foraging. Whilst no dens were found within the footprint, the greater area has suitable denning habitat.</p>
<i>Dasyurus viverrinus</i> eastern quoll	Endangered / ENDANGERED	1/9	Denning: moderate  Foraging: high	<p>Occurs in most parts of Tasmania but is recorded infrequently in the wetter western third of the state. This species' distribution is associated with areas of low rainfall and cold winter minimum temperatures. It is found in a range of vegetation types including open grassland (including farmland), tussock grassland, grassy woodland, dry eucalypt forest, coastal scrub, and alpine heathland, but is typically absent from large tracts of wet eucalypt forest and rainforest.</p> <p>This species is known from the area and is likely to utilise the entire project area for foraging. Whilst no dens were found within the footprint, the greater area has suitable denning habitat.</p>

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Observations and Preferred Habitat
<i>Perameles gunnii</i> eastern barred bandicoot	- / VULNERABLE	2/7	Moderate	<p>Inhabits grassy woodlands, native grasslands, and mosaics of pasture and shrubby ground cover favouring open grassy areas for foraging with thick vegetation cover for shelter and nesting. It has a widely dispersed range with concentrations in SE, NE and NW Tasmania and some areas of the State from where it is absent or in very low densities. It extends into the urban fringe where it can survive in large gardens and bushland reserves. It favours a mosaic of open grassy areas for foraging and thick vegetation cover for shelter and nesting.</p> <p>Native vegetation within the survey is suitable for this species to breed and forage. Direct impacts to individuals are considered to be extremely unlikely with this proposal due to the nature of the species to persist amongst developments.</p> <p>This species is capable of flushing rapidly from shelter and moving their litter to a new location in the event of disturbance, such as large machinery. In the unlikely scenario of disturbance of a natal nest, the species is so highly fecund that breeding is likely to be repeated in a nearby location shortly after disturbance</p>
<i>Sarcophilus harrisii</i> Tasmanian devil	Endangered / ENDANGERED	12/97	Denning: moderate  Foraging: high	<p>This species occupies a wide range of habitats across Tasmania and exploits landscapes with a mosaic of pasture and forest with elevated prey densities and is attracted to roadkill hotspots with concentrated scavenging resource. The protection of breeding</p>

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Observations and Preferred Habitat
				<p>opportunities is particularly important for the species due to the mortalities from demographic pressures.</p> <p>This species is known from the area and is likely to utilise the entire project area for foraging. Whilst no dens were found within the footprint, the greater area has suitable denning habitat.</p>
<b>BIRDS</b>				
<i>Aquila audax</i> subsp. <i>fleayi</i> wedge-tailed eagle	Endangered / ENDANGERED	6/53	<p>Nesting: low</p> <p>Foraging: moderate</p>	<p>This species nests in a range of old growth native forests and is dependent on forest for nesting. Territories can contain up to five alternate nests usually close to each other but may be up to 1 km apart where habitat is locally restricted. This eagle preys and scavenges on a wide variety of fauna including fish, reptiles, birds, and mammals.</p> <p>There are little to no nesting opportunities within the development footprint. However, a number of close surrounding gullies have suitable trees, aspect and shelter. A nest search outside the breeding season will determine whether any nests are known from within 1 km of the proposed development.</p> <p>This species has been observed utilising the airspace within the vicinity of the turbines and underground grid connections. Collision with either element could result in</p>



Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Observations and Preferred Habitat
				eagle deaths, although they generally have an avoidance rate of between 81 - 97 % <sup>47</sup> .
<i>Botaurus poiciloptilus</i> Australasian bittern	-/ENDANGERED	0/7	Nesting: none Foraging: none	Australasian bitterns are a highly cryptic species, utilising wetlands and lakes with a dense cover of vegetation. Whilst once common on Tasmania's north/east coasts, the numbers of Australasian bitterns in the state during the last two decades have declined significantly in both their range and numbers due to habitat loss and extended periods of dryness.  There is no suitable habitat for this species within the proposed impact area. Suitable habitat for this species can be found at Rostrevor Reservoir where one of the proposed underground grid connection routes passes close by.
<i>Haliaeetus leucogaster</i> white-bellied sea-eagle	Vulnerable / -	14/36	Nesting: low Foraging: moderate	In Tasmania, this species is restricted to nesting within 5 km of coastlines, major estuaries, and inland lakes. They typically build nests in large eucalypt trees, much like the Tasmanian wedge-tailed eagle ( <i>Aquila audax fleayi</i> ), although their specific nesting requirements aren't as strict, such that they often nest in relatively small and exposed coastal trees, and are also known to nest occasionally on sea cliffs or even piles of rocks at ground level on islands lacking ground predators (e.g. Ninth Island).  An active nest for this species occurs near the Tasman Highway opposite Rostrevor Reservoir. This species has

<sup>47</sup> Hull, C.L. and Muir, S.C. (2013) Behavior and Turbine Avoidance Rates of Eagles at Two Wind Farms in Tasmania, Australia

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Observations and Preferred Habitat
				been observed utilising the airspace within the vicinity of the underground grid connections. Collision with either element could result in eagle deaths, although they generally have an avoidance rate of between 81 - 97 % <sup>48</sup> . Mitigation measures would reduce this risk further. However the likely number of collisions has not been predicted.
<i>Hirundapus caudacutus</i> white-throated needletail	- / VULNERABLE	3/9	Nesting: none  Foraging: none	This migratory species breeds in central and north-eastern Asia in Siberia, Mongolia, northern-eastern China and northern Japan. It migrates south through eastern China, Korea and Japan spending its non-breeding season in eastern and south-eastern Australia including Tasmania. This species is almost exclusively aerial, occurring over most types of habitats with a preference to wooded areas, open forests, heathland and rainforests.  Due to the aerial nature of this species, no impact is anticipated.
<i>Lathamus discolor</i> swift parrot	Endangered / CRITICALLY ENDANGERED	6/19	Nesting: low  Foraging: moderate	This species spends its winter in south-eastern mainland Australian before migrating to Tasmania in late winter/early spring to breed. During the breeding season, nectar from Tasmanian blue gum ( <i>Eucalyptus globulus</i> ) and black gum ( <i>Eucalyptus ovata</i> ) flowers is the primary food source for the species. These eucalypts are patchily distributed, and their flowering patterns are erratic and unpredictable, often leading to only a small proportion of Swift Parrot habitat being available for

<sup>48</sup> Hull, C.L. and Muir, S.C. (2013) Behavior and Turbine Avoidance Rates of Eagles at Two Wind Farms in Tasmania, Australia

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Observations and Preferred Habitat
				<p>breeding in any one year. Swift Parrots breed in tree hollows in mature eucalypts within foraging range of a flower source.</p> <p>The site is likely to be used on occasion for foraging by this species although there will be little impact to foraging trees.</p> <p>The quality of habitat within the windfarm parcel is considered low (dry forest) as according to the FPA (2014) description (1-19% of the stems over 40 cm DBH in any one hectare patch are foraging trees) this is due to a lack of potential foraging-trees (<i>E. globulus</i> and/or <i>E. ovata</i> ≥40 cm DBH). The quality of habitat within the underground grid connection routes is also considered low (dry forest) or negligible overall except for two small patches of DGL Figure 5 and 6 which could be considered medium (20-49% of the stems over 40 cm DBH in any one hectare patch are foraging-trees). In total, 3.93 ha of DGL is within the underground grid connection buffers.</p>
<p><i>Podiceps cristatus</i> great crested grebe</p>	<p>Vulnerable/-</p>	<p>7/7</p>	<p>Nesting: none  Foraging: none</p>	<p>The Great Crested Grebe inhabits wetlands, deep lakes, rivers, and swamps and prefers a combination of open water and dense reedbeds. This species is relatively rare in Tasmania but can have minor irruptions and periods of regular sightings in some areas.</p> <p>The is no suitable habitat for this species within the proposed impact area. Suitable habitat for this species can be found at Rostrevor Reservoir where one of the</p>



Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Observations and Preferred Habitat
				proposed underground grid connection routes passes close by.
<i>Thinornis rubricollis</i> hooded plover	- / VULNERABLE	1/55	Nesting: none Foraging: none	Widely distributed in Tasmania. Inhabits sandy ocean beaches. Nests on or near beaches, with nests located on flat beaches above the high tide mark, on stony terraces adjacent to beaches, or on the sides of sparsely vegetated dunes.  The is no suitable habitat for this species within the proposed impact area.
<i>Tyto novaehollandiae castanops</i> Tasmanian masked owl	Endangered / -	7/14	Nesting: Low Foraging: Low	Found in a range of habitats which contain some mature hollow-bearing forest, usually below 600 m altitude. This includes native forests and woodlands as well as agricultural areas with a mosaic of native vegetation and pasture. Significant habitat is limited to large eucalypts within dry eucalypt forest in the core range.  The site is likely to be within a home range of a breeding pair and used for foraging on occasion.

## 4 LEGISLATIVE REQUIREMENTS

### 4.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The project is being referred to the Minister for assessment.

### 4.2 Tasmanian Threatened Species Protection Act 1995

Under the TSPA, a person cannot knowingly without a permit 'take' a listed species. With the definition of 'take' encompassing actions that kill, injure, catch, damage, destroy and/or collect threatened species or vegetation elements that support threatened species, e.g., nests and dens.

No threatened flora was recorded and no threatened fauna is proposed to be taken, therefore no constraint under this act is present based on current knowledge.

### 4.3 Tasmanian Nature Conservation Act 2002

Eucalyptus globulus dry forest and woodland (DGL) is listed under Schedule 3A on the NCA and has been identified within the study area. Disturbance of threatened vegetation is regulated under the Forest Practices Act and the Tasmanian Planning Scheme; which ever is relevant. In this case it is the Tasmanian Planning Scheme (Glamorgan Spring Bay) 2022.

### 4.4 Tasmanian Weed Management Act 1999

Fennel (*Foeniculum vulgare*), vipers bugloss (*Echium vulgare*), Californian thistle (*Cirsium arvense*) and Spanish heath (*Erica lusitanica*) are listed as Zone A species within the Glamorgan – Spring Bay Council<sup>49</sup>. According to the provisions of the *Weed Management Act 1999*, Zone A includes those Tasmanian municipalities for which eradication of a declared weed is the principal management objective. These municipalities are either free of the declared weed, host only small, isolated infestations, or host larger infestations which are deemed eradicable because a strategic management plan exists, and the resources required to implement it have been or are likely to be secured.

African boxthorn (*Lycium ferocissimum*), Blackberry (*Rubus fruticosus*) and gorse (*Ulex europeaus*) are listed as Zone B species within the Glamorgan – Spring Bay Council<sup>50</sup>. According to the provisions of the *Weed Management Act 1999* (WMA), Zone B municipalities are those that host infestations of the 'declared weed' that are not deemed eradicable because the feasibility of effective management is low at this time. Therefore, the objective is containment of infestations. The objective includes preventing spread of the 'declared weed' from the municipality and preventing spread to properties currently free of them. There is a requirement to prevent spread of the 'declared weeds' to properties containing sites for significant flora, fauna and vegetation communities.

### 4.5 Tasmanian Planning Scheme (Glamorgan Spring Bay) 2022

The turbine sites and underground grid connection are captured within the Rural Zone. Planning overlays pertaining to natural values that are within the project area include the Natural Assets Code which also protects waterways and coastal protection areas.

<sup>49</sup> Glamorgan Spring Bay- Weed Management Plan 2015-2020

<sup>50</sup> Glamorgan Spring Bay- Weed Management Plan 2015-2020

#### 4.5.1 Natural Assets Code C7.0

*The relevant purposes of the code is to:*

*C7.1.1 To minimise impacts on water quality, natural assets including native riparian vegetation, river condition and the natural ecological function of watercourses, wetlands and lakes.*

*C7.1.4 To minimise impacts on identified priority vegetation.*

*C7.1.5 To manage impacts on threatened fauna species by minimising clearance of significant habitat.*

The area affected by the 4 turbines is not covered by the Natural Assets Code.

The access road and underground grid connection passes through some areas of Priority vegetation. The total area of impact is uncertain at this stage because the connection may be placed under the road or in the road reserve that is already disturbed.

The road and underground grid connections will pass through waterway and coastal protection areas.

The proposed works will not meet the Acceptable Solutions A1 under the Development Standards C7.6, and thus the Performance Criteria P1.1 and P2.1 must be addressed. The relevant Performance Criteria are as follows: (Note that these are draft responses based on no detailed designs or Development Application).

#### **P1.1**

*Clearance and conversion within priority vegetation must be for:*

*(d) use or development that will result in significant long term social and economic benefits and there is no feasible alternative location or design;*

*(f) the clearance of native vegetation that is of limited scale relative to the extent of priority vegetation on the site.*

The proposed underground grid connection will impact predominantly upon vegetation that is located alongside an already existing access track. The underground grid connection is a requirement of the development and the impact to vegetation is relatively minor in the context of the broader area. There will be no impacts to potential habitat trees, burrows, or dens in the design area subject to this code.

#### **P1.2**

*Clearance of native vegetation within a priority vegetation area must minimise adverse impacts on priority vegetation, having regard to:*

*(a) the design and location of buildings and works and any constraints such as topography or land hazards;*

*(b) any particular requirements for the buildings and works;*

*(c) minimising impacts resulting from bushfire hazard management measures through siting and fire-resistant design of habitable buildings;*

*(d) any mitigation measures implemented to minimise the residual impacts on priority vegetation;*

*(e) any on-site biodiversity offsets; and*

*(f) any existing cleared areas on the site.*



Should any disturbance result in residual impacts then they will be offset by application of the relevant offsets policies including the above and the EPBC offsets Policy.

#### 4.5.2 Waterway and Coastal Protection Area

A small section of the project area may be subject to the standards applied to the Waterway and Coastal Protection areas. It is possible that the final design may avoid these area, however as the design has not yet been finalised, it is addressed below, assuming that it will be impacted.

The objective is that buildings and works within a waterway and coastal protection area or future coastal refugia area will not have an unnecessary or unacceptable impact on natural assets. The proposal doesn't meet the Acceptable solutions and so the Performance criteria must be relied upon.

##### P1.1

Buildings and works within a waterway and coastal protection area must avoid or minimise adverse impacts on natural assets, having regard to:

- (a) *impacts caused by erosion, siltation, sedimentation and runoff;*
- (b) *impacts on riparian or littoral vegetation;*
- (c) *maintaining natural streambank and streambed condition, where it exists;*
- (d) *impacts on in-stream natural habitat, such as fallen logs, bank overhangs, rocks and trailing vegetation;*
- (e) *the need to avoid significantly impeding natural flow and drainage;*
- (f) *the need to maintain fish passage, where known to exist;*
- (g) *the need to avoid land filling of wetlands;*
- (h) *the need to group new facilities with existing facilities, where reasonably practical;*
- (i) *minimising cut and fill;*
- (j) *building design that responds to the particular size, shape, contours or slope of the land;*
- (k) *minimising impacts on coastal processes, including sand movement and wave action;*
- (l) *minimising the need for future works for the protection of natural assets, infrastructure and property;*
- (m) *the environmental best practice guidelines in the Wetlands and Waterways Works Manual; and*
- (n) *the guidelines in the Tasmanian Coastal Works Manual.*

The works area (Figure 4 to Figure 7) includes drainage line and buffers between 10 and 30 m each side that are potentially affected by the underground grid connection routes.

## 5 CONCLUSIONS AND RECOMMENDATIONS

The proposal to construct a wind farm consisting of 4 turbines and underground grid connections is unlikely to cause any significant impacts to Matters of National Environmental Significance. However, the quantification of the potential impact to the wedge-tailed eagle is not known. The small scale may constrain the viability of completing sufficient flight sampling to construct a collision risk model. Nevertheless, the frequency of collisions is highly likely to be very low based on the low numbers predicted for other windfarms with 40 or more turbines.

The following natural values were recorded within the design footprint.

### 5.1 Vegetation Communities

Eucalyptus globulus dry forest and woodland (DGL) is listed under Schedule 3A on the NCA and has been identified within the study area.

The impacts to DGL will be minimal as it is located along existing tracks. There is also a small section (0.3 ha) of DGL located on a small ridge approximately 800m south of Tassals (Figure 7) which could be impacted. Impacts could be avoided by careful placement of infrastructure.

### 5.2 Threatened flora

One threatened species, *Eucalyptus morrysbii*, was recorded on private land (PID 3119103). The trees have been planted adjacent to a residential home therefore do not fall under the TSPA.

### 5.3 Threatened Fauna and Habitat

#### Wedge-tailed eagles and white-bellied sea eagles

Eagle mortalities are recognised as the most significant natural values impact associated with Tasmanian wind farms. The mitigation of collision risk has proven to be an extremely complex challenge where the wind farm's mitigation actions have to demonstrate tangible positive outcomes. Mitigation will be considered further following any provision of assessment guidelines by the assessment authority.

#### Swift Parrots

It is recommended to coordinate tree removal to take place outside the bird nesting season. Follow best practice management when felling trees ensuring all operations are conducted in accordance with the Department of State Growth Tree Felling Protocol.

#### Tasmanian devils and quolls

No suspected threatened fauna dens are likely to be impacted by the proposal. Nonetheless, if potential dens for species such as the Tasmanian devil, the eastern quoll and/or the spotted-tailed quoll are identified within 50 m of the impact area during works, appropriate advice will be sought on a course of action from NRE and/or consultant ecologists. In this scenario, an appropriate course of action is likely to involve an activity assessment of the potential den, camera monitoring, and potentially decommissioning if the den was confirmed to be vacant.

### 5.4 Weeds

There are seven declared weeds located in the study area.

Prepare a *Weed Management Plan* to control 'declared' weeds throughout the works area and environmental weeds within patches of native vegetation. Specifically:

- a. contain the spread of Zone B species and eradicate Zone A species.
- b. plan for targeted pre-works control to reduce propagule pressure during works;
- c. ensure excavated soil from weed affected areas is not spread to weed free areas and preferably is buried beneath 500 mm of fill;
- d. include prescriptions for hygiene measures during work;
- e. clean all machinery upon entering and exiting the site. In addition, the following should be followed for best practice prescriptions:
  - *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania* (DPIPWE, Stewart and Askey-Doran, 2015): and
- f. allow for targeted weed treatment on completion of works and during follow-up. This should include annual weed control on the site for up to five years following completion, to specifically target weeds that have exploited the disturbances associated with earthworks

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## APPENDIX 1: VASCULAR PLANT SPECIES LIST

## Species list - project: FER001

## Status codes:

ORIGIN	NATIONAL SCHEDULE	STATE SCHEDULE
i - introduced	EPBC Act 1999	TSP Act 1995
d - declared weed WM Act	CR - critically endangered	e - endangered
en - endemic to Tasmania	EN - endangered	v - vulnerable
t - within Australia, occurs only in Tas.	VU - vulnerable	r - rare

## Sites:

1	Turbine 1 with buffer - E571763, N5360703	19/10/2021	Fiona Walsh
2	DPU - E571700, N5301690	19/10/2021	Fiona Walsh
3	Turbine 2 with buffer - E571696, N5301295	19/10/2021	Fiona Walsh
4	Turbine 3 with buffer - E571606, N5300859	19/10/2021	Fiona Walsh
5	Construction laydown area - FPH - E571519, N5300430	19/10/2021	Fiona Walsh
6	Turbine site 4 with buffer - FPH - E571857, N5300511	19/10/2021	Fiona Walsh
7	Turbine 5 with buffer - E571508, N5300275	19/10/2021	Fiona Walsh
8	FAG - E573927, N5298990	19/10/2021	Fiona Walsh
9	FRG - E571929, N5300610	20/10/2021	Fiona Walsh
10	WOB - E572108, N5300511	20/10/2021	Fiona Walsh
11	DGL - E575184, N5298553	20/10/2021	Fiona Walsh
12	DOB - E572577, N5299666	20/10/2021	Fiona Walsh

Site	Name	Common name	Status
	<b>DICOTYLEDONAE</b>		
	<b>APIACEAE</b>		
8	<i>Foeniculum vulgare</i>	fennel	d
1 2 4 5 6	<i>Hydrocotyle hirta</i>	hairy pennywort	
7 10 12			
	<b>ASTERACEAE</b>		
10	<i>Bedfordia salicina</i>	tasmanian blanketleaf	en
8 9	<i>Cassinia aculeata subsp. aculeata</i>	dollybush	
8	<i>Cirsium arvense var. arvense</i>	Californian thistle	d
6 8	<i>Cirsium vulgare</i>	spear thistle	i
9	<i>Cotula australis</i>	southern buttons	
4 6 7 8 9	<i>Euchiton sp.</i>	cudweed	
11 12			
2 4 5 6 8	<i>Hypochaeris radicata</i>	rough catsear	i
12			
1 2 3 6 7	<i>Lagenophora stipitata</i>	blue bottledaisy	
8 9 11 12			
5 8 10 11	<i>Olearia lirata</i>	forest daisybush	
12			
12	<i>Senecio sp.</i>	groundsel	
8	<i>Taraxacum officinale</i>	common dandelion	i
	<b>BORAGINACEAE</b>		
8	<i>Echium vulgare</i>	vipers bugloss	d
	<b>CARYOPHYLLACEAE</b>		
8	<i>Scleranthus biflorus</i>	twinflower knawel	
	<b>CONVOLVULACEAE</b>		

1 2 3 4 5	<i>Dichondra repens</i>	kidneyweed	
8 9 12			
	<b>CRASSULACEAE</b>		
4	<i>Crassula decumbens</i> var. <i>decumbens</i>	spreading stonecrop	
	<b>CUNONIACEAE</b>		
4 9	<i>Bauera rubioides</i>	wiry bauera	
	<b>DILLENACEAE</b>		
2 3 5 7 8	<i>Hibbertia riparia</i>	erect guineaflower	
1 2 6	<i>Hibbertia sericea</i> var. <i>sericea</i>	silky guineaflower	
	<b>ERICACEAE</b>		
1 2 3 5 6	<i>Cyathodes glauca</i>	purple cheeseberry	en
7 8 10			
1 2 5	<i>Epacris impressa</i>	common heath	
5 8	<i>Epacris tasmanica</i>	eastern heath	en
8	<i>Erica lusitanica</i>	spanish heath	d
1 2 3 8	<i>Lissanthe strigosa</i> subsp. <i>subulata</i>	peachberry heath	
3 5 8 11	<i>Styphelia humifusa</i>	native cranberry	
	<b>EUPHORBIACEAE</b>		
10	<i>Beyeria viscosa</i>	pinkwood	
1 2	<i>Poranthera microphylla</i>	small poranthera	
	<b>FABACEAE</b>		
1 2 3 9 10	<i>Acacia dealbata</i> subsp. <i>dealbata</i>	silver wattle	
11	<i>Acacia mearnsii</i>	black wattle	
5 8	<i>Acacia melanoxylon</i>	blackwood	
8 12	<i>Acacia mucronata</i>	variable sallow wattle	
1 2 4 5 8	<i>Acacia verticillata</i> subsp. <i>verticillata</i>	prickly moses	
12			
1 2 3 8	<i>Bossiaea prostrata</i>	creeping bossiaea	
1 2	<i>Hovea heterophylla</i>	winter purplepea	
1 2 5 6 7	<i>Pultenaea juniperina</i>	prickly beauty	
8 9			
8	<i>Trifolium dubium</i>	suckling clover	i
8	<i>Trifolium repens</i>	white clover	i
8	<i>Ulex europaeus</i>	gorse	d
	<b>GENTIANACEAE</b>		
1 2 8	<i>Centaurium erythraea</i>	common centaury	i
	<b>GERANIACEAE</b>		
5 8	<i>Erodium</i> sp.	storksbill	
8	<i>Geranium molle</i>	soft cranesbill	i
1 2 3 6	<i>Geranium potentilloides</i> var.	mountain cranesbill	
1 2	<i>Pelargonium australe</i>	southern storksbill	
	<b>GOODENIACEAE</b>		
2	<i>Goodenia lanata</i>	trailing native-primrose	
7	<i>Goodenia ovata</i>	hop native-primrose	
	<b>HALORAGACEAE</b>		
1 2	<i>Gonocarpus tetragynus</i>	common raspwort	

<b>MYRTACEAE</b>			
8	<i>Eucalyptus amygdalina</i>	black peppermint	en
2 4 5 6 7	<i>Eucalyptus globulus subsp. globulus</i>	tasmanian blue gum	
9 10 11			
8	<i>Eucalyptus morrisbyi</i>	morrisbys gum	en EN e
2 7 10 11	<i>Eucalyptus obliqua</i>	stringybark	
12			
1 2 3 11	<i>Eucalyptus pulchella</i>	white peppermint	en
12			
12	<i>Eucalyptus tenuiramis</i>	silver peppermint	en
1 2 3	<i>Eucalyptus viminalis subsp. viminalis</i>	white gum	
1 2 3 4 5	<i>Leptospermum scoparium</i>	common tea-tree	
6 8 9 12			
<b>OXALIDACEAE</b>			
8 12	<i>Oxalis sp.</i>	woodsorrel	
<b>PITTOSPORACEAE</b>			
1 2 8 11	<i>Bursaria spinosa subsp. spinosa</i>	prickly box	
<b>PLANTAGINACEAE</b>			
8 11	<i>Plantago coronopus</i>	buckshorn plantain	i
8	<i>Plantago lanceolata</i>	ribwort plantain	i
8	<i>Plantago major</i>	great plantain	i
7	<i>Veronica calycina</i>	hairy speedwell	
<b>POLYGALACEAE</b>			
1 2 3 5	<i>Comesperma volubile</i>	blue lovecreeper	
<b>POLYGONACEAE</b>			
8	<i>Acetosella vulgaris</i>	sheep sorrel	i
8	<i>Rumex crispus</i>	curled dock	i
<b>PRIMULACEAE</b>			
11	<i>Lysimachia arvensis</i>	scarlet pimpernel	i
<b>PROTEACEAE</b>			
1 2 5 7 12	<i>Banksia marginata</i>	silver banksia	
1 2 3 5	<i>Lomatia tinctoria</i>	guitarplant	en
<b>RANUNCULACEAE</b>			
8 11	<i>Ranunculus sp.</i>	buttercup	
<b>RHAMNACEAE</b>			
9 10	<i>Pomaderris apetala</i>	common dogwood	
<b>ROSACEAE</b>			
1 2 3 4 5	<i>Acaena novae-zelandiae</i>	common buzzy	
6 7 8 12			
8	<i>Crataegus monogyna</i>	hawthorn	i
8	<i>Rubus fruticosus</i>	blackberry	d
<b>RUBIACEAE</b>			
1 2 3 8 11	<i>Coprosma quadrifida</i>	native currant	
12			



	<b>RUTACEAE</b>		
2	<i>Zieria arborescens</i>	stinkwood	
	<b>SANTALACEAE</b>		
12	<i>Exocarpos cupressiformis</i>	common native-cherry	
12	<i>Leptomeria drupacea</i>	erect currantbush	
2	<i>Leptomeria glomerata</i>	creeping currantbush	en
	<b>SCROPHULARIACEAE</b>		
8	<i>Verbascum thapsus</i>	great mullein	i
	<b>SOLANACEAE</b>		
8	<i>Lycium ferocissimum</i>	african boxthorn	d
	<b>STYLIDIACEAE</b>		
1 2	<i>Stylidium graminifolium</i>	narrowleaf triggerplant	
	<b>THYMELAEACEAE</b>		
3	<i>Pimelea humilis</i>	dwarf riceflower	
	<b>VIOLACEAE</b>		
1 2 3 12	<i>Viola hederacea</i>	ivyleaf violet	
	<b>GYMNOSPERMAE</b>		
	<b>CUPRESSACEAE</b>		
8	<i>Cupressus macrocarpa</i>	monterey cypress	i
	<b>MONOCOTYLEDONAE</b>		
	<b>ASPARAGACEAE</b>		
1 2 3 4 5 6 7 8 9 11 12	<i>Lomandra longifolia</i>	sagg	
	<b>CYPERACEAE</b>		
12	<i>Carex appressa</i>	tall sedge	
4	<i>Ficinia nodosa</i>	knobby clubsedge	
3 4 7 9 10	<i>Gahnia grandis</i>	cutting grass	
1 2 11	<i>Lepidosperma inops</i>	fan sedge	en
1 8 10	<i>Lepidosperma sp.</i>	sword sedge	
1 2 3 5 7 8 9 11 12	<i>Schoenus apogon</i>	common bogsedge	
	<b>IRIDACEAE</b>		
2 8 11	<i>Diplarrena moraea</i>	white flag-iris	
	<b>JUNCACEAE</b>		
1 2	<i>Luzula sp.</i>	luzula	
	<b>ORCHIDACEAE</b>		
2	<i>Thelymitra sp.</i>	sun-orchid	
	<b>POACEAE</b>		
8	<i>Agrostis stolonifera</i>	creeping bent	i
8	<i>Aira sp.</i>	hair grass	i
2 11	<i>Austrostipa sp.</i>	speargrass	
8	<i>Dactylis glomerata</i>	cocksfoot	i
8	<i>Holcus lanatus</i>	yorkshire fog	i
8 9 12	<i>Poa annua</i>	winter grass	i
11	<i>Poa labillardierei</i>	silver tussockgrass	
3 8	<i>Poa sp.</i>	poa	
1 2 3 5 6	<i>Rytidosperma sp.</i>	wallabygrass	

8 9 11 12

2 8 11 *Themeda triandra* kangaroo grass

**PTERIDOPHYTA**

**ASPIDIACEAE**

4 5 9 10 *Polystichum proliferum* mother shieldfern

**BLECHNACEAE**

4 12 *Blechnum nudum* fishbone waterfern

**DENNSTAEDTIACEAE**

1 2 5 6 8 *Pteridium esculentum subsp. esculentum* bracken

10 12

**DICKSONIACEAE**

4 10 *Dicksonia antarctica* soft treefern

**APPENDIX 2: THREATENED FLORA WITHIN 5 KM OF THE STUDY AREA**

Species listed here are all those records which occur within 5km of the study area. This list includes those which have been addressed in this report and also those which are highly unlikely to occur due to no conceivable suitable habitat being present.

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
<i>Acacia ulicifolia</i>	juniper wattle	r		n	5	10-Apr-2018
<i>Baumea gunnii</i>	slender twigsedge	r		n	1	09-Sep-1951
<i>Caladenia filamentosa</i>	daddy longlegs	r		n	4	08-Oct-1993
<i>Cyphanthera tasmanica</i>	tasmanian rayflower	r		e	1	01-Sep-1896
<i>Diuris palustris</i>	swamp doubletail	e		n	1	18-Oct-2002
<i>Eucalyptus barberi</i>	barbers gum	r		e	3	01-Jan-1990
<i>Lepidium hyssopifolium</i>	soft peppergrass	e	EN	n	22	07-Dec-2016
<i>Lepilaena preissii</i>	slender watermat	r		n	2	01-Oct-1978
<i>Limonium australe</i> var. <i>baudinii</i>	tasmanian sea-lavender	v	VU	e	64	10-Mar-2018
<i>Melaleuca pustulata</i>	warty paperbark	r		e	8	15-Oct-2019
<i>Pterostylis squamata</i>	ruddy greenhood	v		n	1	22-Jan-1969
<i>Ruppia tuberosa</i>	tuberous seatassel	r		n	4	15-Oct-2018
<i>Scleranthus fasciculatus</i>	spreading knawel	v		n	10	24-Apr-2019
<i>Senecio squarrosus</i>	leafy fireweed	r		n	3	10-Oct-2014
<i>Stenanthemum pimeleoides</i>	propeller plant	v	VU	e	5	10-Mar-1999
<i>Vittadinia gracilis</i>	woolly new-holland-daisy	r		n	1	15-Jan-1929
<i>Vittadinia muelleri</i>	narrowleaf new-holland-daisy	r		n	4	03-Apr-2018

**APPENDIX 3: THREATENED FAUNA WITHIN 5 KM OF THE STUDY AREA**

Species listed here are all those records which occur within 5km of the study area. This list includes those which have been addressed in this report and also those which are highly unlikely to occur due to no conceivable suitable habitat being present.

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
<i>Aquila audax</i>	wedge-tailed eagle	pe	PEN	n	9	07-Jan-2018
<i>Aquila audax</i> subsp. <i>fleayi</i>	tasmanian wedge-tailed eagle	e	EN	e	44	19-Dec-2018
<i>Botaurus poiciloptilus</i>	australasian bittern		EN	n	7	21-Feb-2005
<i>Dasyurus maculatus</i>	spotted-tail quoll	r	VU	n	1	29-Mar-1979
<i>Dasyurus maculatus</i> subsp. <i>maculatus</i>	spotted-tail quoll	r	VU	n	4	27-Jun-2017
<i>Dasyurus viverrinus</i>	eastern quoll		EN	n	9	19-Jul-1992
<i>Diomedea cauta</i> subsp. <i>cauta</i>	shy albatross	pv	PVU		1	31-Aug-1979
<i>Eubalaena australis</i>	southern right whale	e	EN	m	12	08-Jul-2017
<i>Gazameda gunnii</i>	Gunn's screw shell	v		ae	4	30-Apr-2019
<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	v		n	36	10-May-2019
<i>Hirundapus caudacutus</i>	white-throated needletail		VU	n	9	07-Mar-2015
<i>Lathamus discolor</i>	swift parrot	e	CR	mbe	19	01-Jan-2000
<i>Megaptera novaeangliae</i>	humpback whale	e	VU	m	4	13-Oct-2007
<i>Mirounga leonina</i>	southern elephant seal	e	VU	n	1	02-Jun-2013
<i>Mirounga leonina</i> subsp. <i>macquariensis</i>	southern elephant seal	pe	PVU	n	2	16-May-2008
<i>Perameles gunnii</i>	eastern barred bandicoot		VU	n	7	11-Sep-1992
<i>Podiceps cristatus</i>	great crested grebe	v		n	7	07-Jan-2018
<i>Sarcophilus harrisii</i>	tasmanian devil	e	EN	e	97	21-Jul-2021
<i>Sterna nereis</i> subsp. <i>nereis</i>	fairy tern	pv	PVU		1	31-Aug-1980
<i>Sternula nereis</i> subsp. <i>nereis</i>	fairy tern	v	VU	n	3	17-Nov-2015
<i>Thinornis cucullatus</i>	hooded plover		PVU	n	20	02-Dec-2015
<i>Thinornis rubricollis</i>	hooded plover		VU	n	35	21-Aug-2006
<i>Tyto novaehollandiae</i>	masked owl	pe	PVU	n	14	27-Jun-1996