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ECOSYSTEM SERVICES

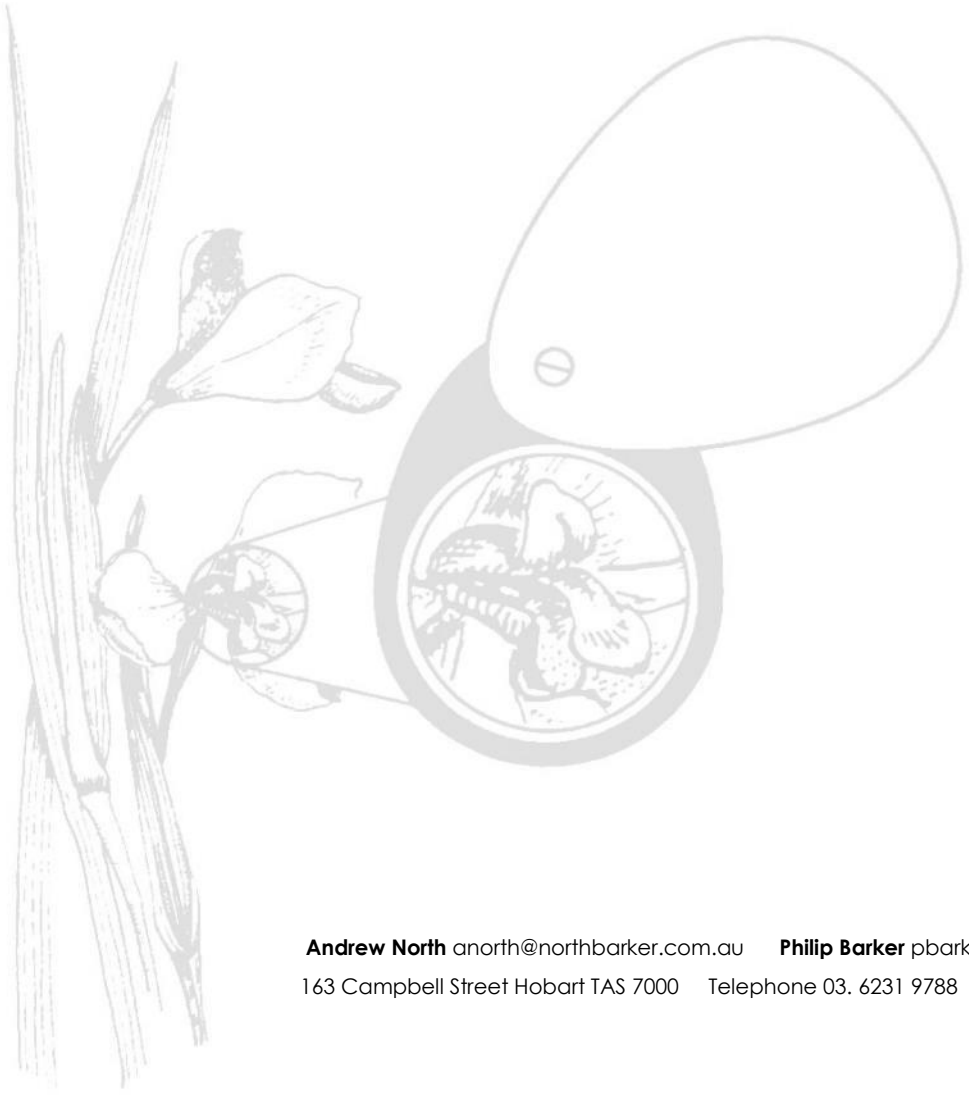
Mt Wellington Cableway

**Mt Wellington / kunanyi**

# NATURAL VALUES IMPACTS ASSESSMENT

12 May 2021

For Mt Wellington Cableway Company (MWC001)



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# SUMMARY

This report provides an assessment of the likely impacts to natural values associated with the Mt Wellington Cableway project.

In summary:

- It is unlikely that the project will have a significant impact upon matters of national environmental significance that would trigger the Commonwealth *Environment Protection and Biodiversity Conservation Act 2002* (EPBCA).
- Impacts to flora and fauna listed under the *Threatened Species Protection Act 1995* (TSPA) are unlikely to be significant or to require major amendment to the design.
- The project will impact on threatened vegetation listed under the Tasmanian *Nature Conservation Act 2002,* in establishing an access road link from McRobie's Road.
- Likely and unavoidable impacts to threatened vegetation, significant vegetation and potential habitat for threatened fauna species require aspects of the project to be assessed against the Performance Criteria of the Biodiversity Code of the Hobart Interim Planning Scheme 2015 as 'high' and 'medium' priority values.
- Development within Wellington Park will include impacts to significant vegetation, threatened flora and threatened fauna habitat. These impacts are assessed through Standards for Use and Development outlined in the Wellington Park Management Plan 2013.

**Site Values**

The Project has been subdivided into separate sections – Access Road, Base Station including Towers 1 & 2, Temporary Installation Net site and Pinnacle Centre and Tower 3.

The Access Road section supports potentially suitable habitat for two listed orchid species, *Corunastylis nudiscapa* and *C. nuda,* although neither have been located in repeated searches conducted during the flowering period in 2019 and 2020. The dry open forest on mudstone supports threatened vegetation which is also represented at numerous other sites on the foothills of Mt Wellington elsewhere in Hobart. The operation of the road introduces a new threat of roadkill.

The Base Station is predominantly sited in cleared land requiring some localised vegetation clearance for the upper car park and part of the main building. The bushfire hazard management area requires vegetation removal downslope of the Base Station. This area and the lower tower sites are in forest supporting large trees which have potential habitat for hollow nesting birds. Footprints of towers are small and opportunity to microsite towers may avoid need to impact on large trees assuming dangerous trees in vicinity do not need to be removed for safety reasons. The operational impacts will result in ongoing disturbance which will reduce the suitability of nearby trees for nesting. It is possible the bushfire hazard management requirements can be met with selective retention of conservation significant trees.

The Temporary Installation Net site is only temporary and localised. Its placement may disturb rocky terrain that supports habitat for the rare silky snail although impact is considered very localised and not significant.

The Pinnacle Centre and Tower 3 are located in subalpine scrub that characterises the uppermost crest of Mt Wellington. This vegetation is diverse and sensitive to disturbance due to the extreme weather conditions at this altitude. Mt Wellington is an outlier from other alpine areas in Tasmania and as such is notable for its distinctive alpine flora. Outside of the footprint of disturbance the impacts will be largely

dependent on the method of construction. The vicinity is however not pristine and has been impacted by numerous other activities in the Pinnacle area. The footprint of the developments equates to approximately 25-30 % of the total footprint of developments already on site. Some potential, albeit insignificant impact to silky snail and some impact to montane violet is also not likely to be significant.

**Vegetation**

Nine TASVEG vegetation units are known to within the study areas:

- DCO – *Eucalyptus coccifera* forest and woodland
- DGL – *Eucalyptus globulus* dry forest and woodland
- DOB – *Eucalyptus obliqua* dry forest
- DTO – *Eucalyptus tenuiramis* forest and woodland on sediments
- FPE – Permanent easements
- FUM – Extra-urban miscellaneous
- HHE – Eastern alpine heathland
- WGL – *Eucalyptus globulus* wet forest
- WOB – *Eucalyptus obliqua* forest with broad-leaf shrubs

Two of these vegetation communities (DGL and DTO) correspond to communities listed as threatened under the Tasmanian *Nature Conservation Act 2002*. Both are confined to the Access Road section of the project.

No threatened ecological communities under the EPBCA will be impacted.

Two impacted communities within Wellington Park (WGL and HHE) are considered significant vegetation under the Wellington Park Management Plan 2013.

**Threatened Flora**

At least two threatened flora species occur within the project area and there is potential for at least three others, albeit low. It is of low likelihood that any impacts to threatened flora will be of such significance as to require amendments to the layout.

Three species listed under the Tasmanian *Threatened Species Protection Act 1995* (TSPA) have been identified as potentially occurring at various locations:

- *Corunastylis nuda* tiny midge orchid – rare. Moderate probability of being impacted in the Access Road section.
- *Corunastylis nudiscapa* dense midge orchid – endangered. Low probability of being impacted in the Access Road section.
- *Viola curtisiae* montane violet - rare. Confirmed as present in the footprint of the Pinnacle Centre and close to Tower 3.

No nationally listed threatened flora (EPBCA) are likely to be impacted.

**Threatened Fauna**

Impacts to threatened fauna habitat are of moderate significance. The operation of the cable car is unlikely to adversely impact on threatened fauna directly. The risk of any direct impacts to threatened fauna during the construction phase can be minimised through appropriate procedures prior and during this period.

Habitat for several threatened fauna species is present in the vicinity of the project area.

- Tasmanian devil *Sarcophilus harrisii*
- spotted tailed quoll *Dasyurus maculatus*
- eastern quoll *Dasyurus viverrinus*

All three of the listed marsupial carnivores are wide ranging species that may have home ranges that extend into the project area. Tasmanian devils and eastern quolls were observed during camera trap surveys in the vicinity of the Access Road. The footprint of the development is unlikely to adversely impact on the carrying capacity of the habitat for these species which is currently at moderately low levels based on quality of habitat, scarcity of observation records, and evidence of scats or latrines.

Potential risks could arise from an increase in the incidences of roadkill. This risk can be mitigated through the development of a Roadkill Mitigation Plan.

- Tasmanian masked owl *Tyto novaehollandiae castanops*

The lower sections (Access Road and Base Station) occur in suitable habitat and support trees of such stature to potentially carry hollows that could be utilised for nesting. A detailed tree survey and subsequent assessment by an arborist quantified potential habitat trees that will be impacted.

The study area is outside core range although masked owls are known to utilise areas such as these and are recorded periodically on the fringes of the city, so it is still possible that they may use the surrounding areas.

- Swift parrot *Lathamus discolor*

Hollow bearing trees provide nesting habitat. These are notable in the vicinity of the Base Station and especially the lower two tower sites. They also occur on parts of the Access Road. Blue gums (*Eucalyptus globulus*) provide the primary native foraging resource. These occur in the vicinity of the Base Station and at the start of the Access Road.

A detailed tree survey supported by an arborist assessment was used to determine potential impacts to potential habitat trees, which includes 91 nesting trees and 37 foraging, of which 24 are both nesting and foraging habitat. Pruning to some trees is also anticipated at the departure corridor of the cable car.

A Bird Collision Risk Assessment concludes that the risk of collision is low.

- Tasmanian wedge-tailed eagle *Aquila audax* ssp. *fleayi*

There are no known nests in the vicinity that are likely to be disturbed. Potential nesting habitat is present in the upper catchment of McRobie's Gully. However, the existing levels of disturbance are likely to make this area unattractive for nesting purposes. The entire project area is likely to be within a foraging territory of at least one pair. The risk of collision with the cables is uncertain although the dimension and conformation of cable car cables suggest they would be significantly more visible than transmission line wires which already traverse many of the foothills of Mt Wellington including a site immediately adjacent to the Base Station.

A Bird Collision Risk Assessment identified a moderate level of collision risk in the vicinity of the Organ Pipes and low elsewhere on the project.

- Silky snail *Exquisitiropa agnewi*

The temporary installation net required during the construction phase of the project will be located close to high quality potential habitat. The Pinnacle Station and Tower Site 3 are also located within potential habitat. The extent of disturbance is small relative to the scale of habitat available. However, any direct impacts cannot be discounted. Significance of any possible impact is considered to be very low.

**Recommendations**

The proposed development meets the requirements of the Hobart Interim Planning scheme 2015 and the Wellington Park Management Plan 2013. Any approval should include conditions to ensure the natural values are mitigated and offset through the inclusion and / or implementation of:

- Weed and plant pathogen management plan;
- Fauna management protocols throughout the construction phase;
- Oversight from Arborist to ensure impacts to trees in close proximity are minimised
- Tree hollow reuse and replacement plan;
- Roadkill mitigation plan;
- Bird collision risk mitigation measures

A permit to take under the Tasmanian *Threatened Species Protection Act 1995* (TSPA) will be required for impacts to:

  - Montane violet
  - Silky snail

## ACKNOWLEDGMENTS

**Project management:** Andrew North, NBES.

**Field survey Wellington Park,** September, October and December 2018, April 2019, Feb-March 2020. **Hobart City Council Land,** Feb-April 2019, March 2020: Andrew North and staff of NBES.

**Report:** Andrew North, Karen Ziegler and various staff at NBES.

**Photographs:** Andrew North and Karen Ziegler.

**Client contact:** Adrian Bold, Mt Wellington Cableway Company

**Consultation:**

Mark Wapstra, Ecological Consulting Options Tasmania – *Corunastylis* species

Axel von Krusenstierna, Manager, Wellington Park Management Trust

**File Control**

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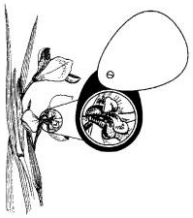

## List of Acronyms and abbreviations (excluding measurement units and abbreviations defined within figures or tables)

asl – Above sea level

BPA – Biodiversity Protection Area

DBH – Diameter ant Breast Height. Measurement of trunk diameter taken at 1.4m above the ground on the uphill side

DEWHA – Department of the Environment, Water, Heritage and the Arts

DFTD - Devil Facial Tumour Disease

DPIPWE – Department of Primary Industries, Parks, Water and the Environment, Tasmania

EPBCA – *Environment Protection and Biodiversity Conservation Act 1999*

FPA – Forest Practices Authority, Department of State Growth, Tasmania

HIPS – Hobart Interim Planning Scheme 2015

LUPAA – Land Use Planning and Approvals Act 1993

MNES – Matters of National Environmental Significance

MWC – Mount Wellington Cableway Company

NBES – North Barker Ecosystem Services

NCA – Tasmanian *Nature Conservation Act 2002*

NVA – Natural Values Atlas database (DPIPWE, Tasmania)

PCAB – Policy and Conservation Advice Branch, DPIPWE

PC – *Phytophthora cinnamomi*

RFA – *Tasmanian Regional Forest Agreement 1997*

SAP – Specific Area Plan

TASVEG – An integrated vegetation map for Tasmania

- DCO – *Eucalyptus coccifera* forest and woodland (TASVEG unit)
- DGL – *Eucalyptus globulus* dry forest (TASVEG unit)
- DOB – *Eucalyptus obliqua* dry forest (TASVEG unit)
- DTO – *Eucalyptus tenuiramis* dry forest on sediments (TASVEG unit)
- FPE – Permanent easements (TASVEG unit)
- FUM – extra-urban miscellaneous (TASVEG unit)
- HHE – Eastern alpine heathland TASVEG unit)
- WGL – *Eucalyptus globulus* wet forest (TASVEG unit)
- WOB – *Eucalyptus obliqua* forest with broad-leaf shrubs (TASVEG unit)

TSPA – Tasmanian *Threatened Species Protection Act 1995*

WMA – Tasmanian *Weed Management Act 1999*

WPMP – Wellington Park Management Plan 2013

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# 1 INTRODUCTION

## 1.1 Background

The Mt Wellington Cableway Company have developed a proposal to construct an aerial tramway to the summit of Mt Wellington, near Hobart in southeast Tasmania. The development will include the construction of a base station, carpark and a Pinnacle development set into the landscape with three levels including café, bar, amenities, indoor and outdoor viewing platforms. There will be two towers near the lower end of the proposed cable car development and one at the Pinnacle end. There will also be a temporary net located approximately mid-level on the mountain to ensure that the cable does not come into contact during construction with an existing powerline that services the top of the mountain. This will then be removed. The proposal is planned so that construction of the towers for the cable car will not require temporary roading as it is planned to fly in the towers by helicopter. Subsequent construction of the pinnacle development is planned to use the cable car to deliver materials and construction personnel.

An Access Road is proposed to be constructed from McRobie's Road in South Hobart to the Base Station located on an existing fire trail east of the end of Old Farm Road.

The proponents have engaged North Barker Ecosystem Services (NBES) to undertake botanical field surveys and fauna habitat assessments of the project area, and to make recommendations to minimise impacts to threatened natural values. The current study presents results from field surveys undertaken in early to mid-spring 2018 and late summer 2019, supplemented with further targeted surveys in the summer and autumn of 2020. Previous data and surveys have been referred to when applicable for context.

## 1.2 Study Area and Existing Environment

### 1.2.1 Survey/study area

The footprint of disturbance on the ground study area can be divided into discrete sections:

1. Access Road – from McRobie's Road, South Hobart to the boundary of Wellington Park at the Main Fire Trail – 2.2 km, 5.8 ha
2. Base Station, car park and lower towers (Towers 1 & 2) site – 1.2 ha
3. Temporary Installation Net - temporary 100 sqm
4. Pinnacle Centre including boardwalk access from existing Pinnacle carpark, temporary access ramp and upper tower (Tower 3) - 0.4 ha

The entire project spans over 1100m in altitude from start of the Access Road at 100m asl to the Pinnacle which is over 1200m asl.

Mean rainfall for the area varies considerably from 760 mm in South Hobart[1] to over 1350 mm at The Springs but down to 900 mm at the Summit.

[1] Bureau meteorology data. Hillborough Road, South Hobart (2008-present), the Springs (1891-present) and The Pinnacle (1961-present)

### 1.2.2 Location characteristics

| Location | Altitude | Aspect | Geology |
|---|---|---|---|
| Access Rd | 100-300 m | North east and north | Permian mudstone<br>(Triassic sandstone first 50m) |
| Base Station and Towers 1 & 2 | 300-330 m | East southeast | Permian mudstone |
| Temporary Installation Net | 890-900 m | East southeast | Jurassic dolerite |
| Pinnacle Centre and Tower 3 | 1200-1230 m | East southeast | Jurassic dolerite |

*Plate 1: View from the upper tower site looking directly towards the base station*

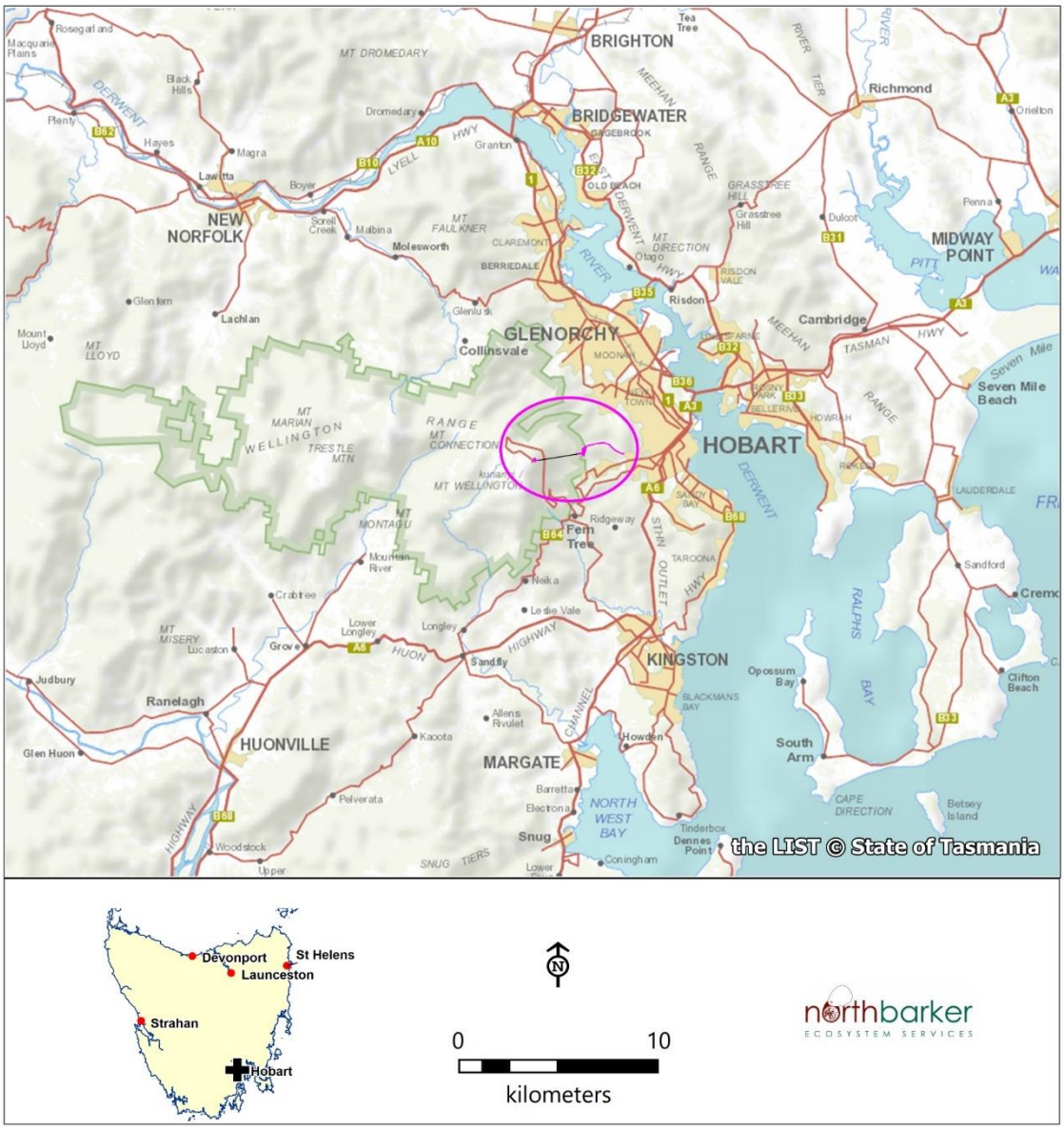



*Figure 1: Location of the Mt Wellington Cableway Project*

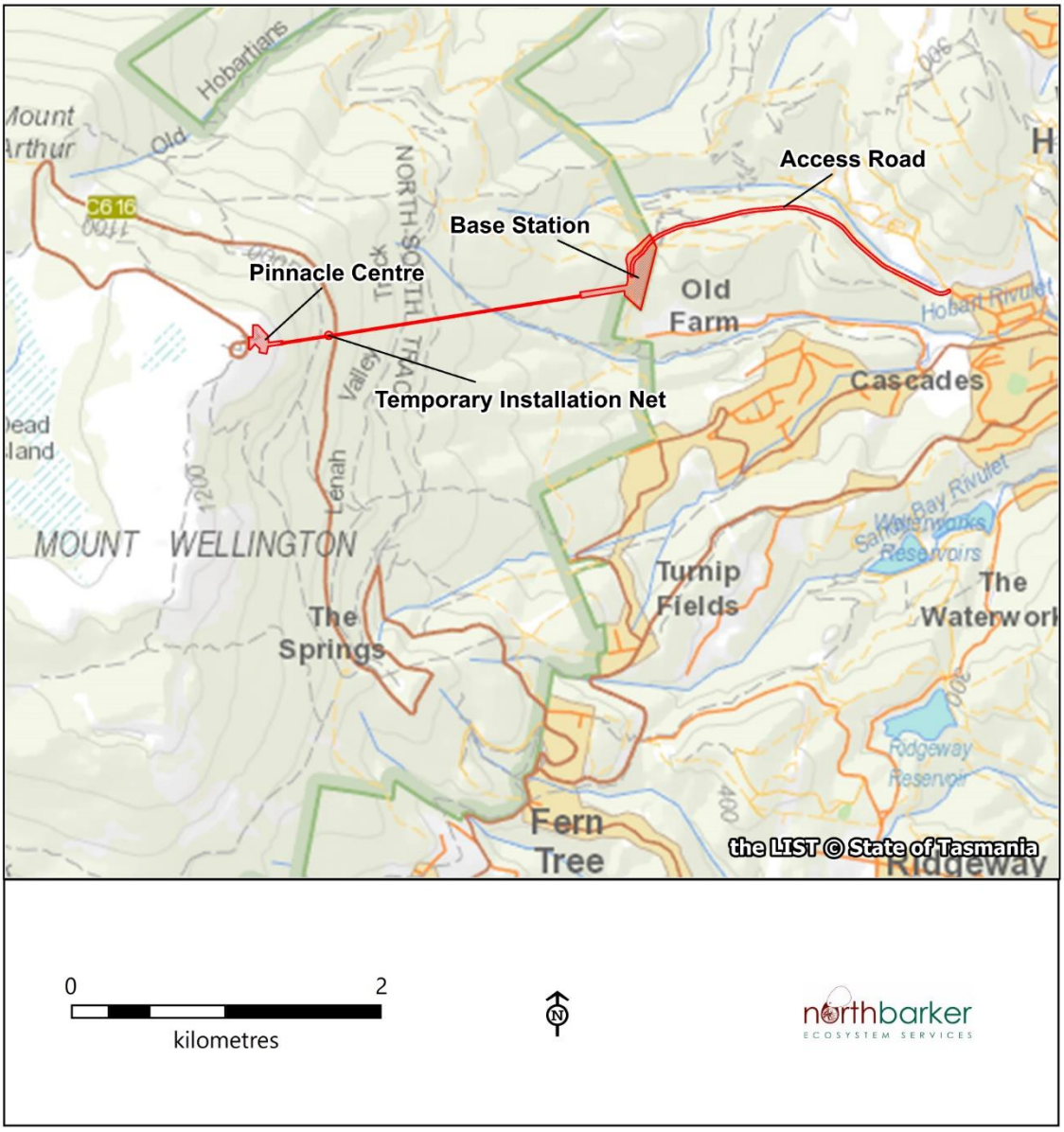



*Figure 2: Location of project sections*

## 1.3 Background information

Mt Wellington has one of Tasmania's driest alpine environments and lacks some alpine species common on other, wetter Tasmanian dolerite mountain tops. The Park supports more than 500 species (30%) of Tasmania's native vascular plant flora, with two local endemics not found elsewhere. The Park supports a range of fauna, including 55 species of birds, and an estimated 5000 – 6000 invertebrate species. There has been much research investigating the natural values of Wellington Park including plant ecology[2], fire ecology[3], animal ecology[4], avifauna[5], geomorphology[6], bryology[7], lichenology[8],

[2] Gilfedder (1988), Martin (1940), Pyrke and Kirkpatrick (1994)
[3] Ratkowsky (1976b), Ratkowsky (1982b), Kirkpatrick and Dickinson (1984)
[4] Melville (1999)
[5] Ratkowsky (1976a)
[6] Whinham and Kirkpatrick (1985)

mycology[9] and more. These provide a strong basis to our understanding of the natural values of the region.

The Park hosts a range of vegetation considered to be of conservation significance[10]. These include the rare Tasmanian endemic shrub *Centropappus brunonis* where it is localised in communities dominated by *Eucalyptus urnigera* or *E. delegatensis,* communities with localised distributions in the Park (e.g. *Gleichenia alpina – Empodisma minus* fernland occurring in the Fools Tarn area), as well as alpine peatlands, wetlands, and waterbodies, which are given significance by their fragile nature. It also supports four vegetation communities listed as threatened under schedule 3A of the *Nature Conservation Act 2002*.

A large proportion of the summit area of Mt Wellington is a listed geoconservation site due to its representativeness of an alpine area of Tasmania that has been largely unaffected by glaciation. This means it provides a location in which periglacial landforms can be studied and observed without the need to separate periglacial and glacial effects[11]. The Wellington Park Management Plan 2013[12] says of the geodiversity of the park:

*"The landforms and geomorphic processes which have shaped Wellington Range are well expressed, accessible and representative examples of landform systems which occur widely in eastern and central Tasmania. This representative geomorphology has geomorphological value and provides a foundation for the Park's ecosystem."*

Inappropriate fire regimes are one of the greatest risks to the flora and fauna of Wellington Park[13]. Severe fires are known to have occurred within parts of the Wellington Range in 1898, 1914, 1939, 1947, 1967 and 1983. Some of these, including 1967, burnt over most of the plateau[14].

[7] Ratkowsky (1982a)
[8] Kantvilas, James and Jarman (1985)
[9] Gates and Ratkowsky (2004)
[10] Wellington Park Management Trust (1996)
[11] Wellington Park Management Trust (1996)
[12] Wellington Park Management Trust (2015)
[13] Wellington Park Management Trust (2015)
[14] Wellington Park Management Trust (1996)

# 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[15] – 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)[16] – this Department of Primary Industries, Parks, Water and the Environment, Tasmania (DPIPWE) database includes biological records.
- TASVEG 3.0 digital data.
- Mt Wellington Cableway Preliminary Ecological Assessment 2016[17]
- Previous assessments on natural values McRobie's Gully[18]

## 2.2 Vegetation Field Methods

The study area has been subject to a significant number of separate surveys and studies to best capture all potential values.

The Pinnacle Area was first surveyed by ecologists for GHD in 2016. Surveys were undertaken on foot by ecologists from NBES in September 2018 and April 2019. Tasks included vegetation mapping, floristic surveys (including threatened species searches), targeted fauna surveys (direct and indirect), and fauna habitat assessment. Targeted survey was undertaken in December 2018 specifically for the rare *Viola curtisiae* during the flowering period with a follow up survey in February 2020. The extent of these surveys is indicated graphically in Appendix G.

The Access Road area was surveyed between February and April 2019 to target threatened *Corunastylis* species and habitats for threatened flora and fauna. A follow up survey for *Corunastylis* species was conducted in March 2020 to capture the footprint of the amended road alignment but also to ensure the full corridor was searched to coincide with the known flowering of target species nearby in Hobart.

### 2.2.1 Vegetation mapping

In Tasmania the distribution of vegetation is accessed via TASVEG 3.0[19] (TASVEG) – the state-wide 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[20]. 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[21]. Furthermore, vegetation mapping at any scale can be an exercise in

[15] EPBC Act Protected Matters report, (Commonwealth of Australia) – PMST_G3H7H0
[16] NVA reports_ nvr_08-Oct-2018 (DPIPWE)
[17] This was for a previous option but shared study area with current project at Tower Sections 2 & 3 and Pinnacle Zone GHD 2016
[18] McRobies Gully – Andrew North for Hobart City Council 1997
[19] DPIPWE (2013)
[20] Harris and Kitchener (2005)
[21] Kitchener and Harris (2013)

judgement, with an inherent potential for errors in interpretation. Subsequently, it is standard practice to truth TASVEG data using recent imagery and ground sampling[22].

Ground sampling was undertaken over the specified dates. On each occasion ground sampling involved either one or two ecologists traversing the study area on foot in a stratified fashion that ensured ground sampling of the complete range of image signatures. 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[23]. 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.

This combination of image interpretation followed by stratified ground sampling and interpolation is consistent with the DPIPWE guidelines for natural values assessments (section 7, DPIPWE 2015[24]).

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).

### 2.2.2 Floristic survey

To support the determination of TASVEG units in accordance with survey guidelines[25] and provide general floristic data within each native community, a full vascular plant species list was taken of each section with representative ¼ ha plots using a form of the Timed Meander Search Procedure[26]. Outside the ¼ ha plots, additional plant species were noted as encountered, with the survey effort applied disproportionately within locations considered likely to contain threatened species habitat or simply contain species not noted earlier.

Declared[27] and environmental weeds, as well as symptomatic evidence of plant pathogens, were recorded across the site during the ground survey.

Botanical nomenclature follows the current census of Tasmanian plants[28].

## 2.3 Fauna Field Methods

Observations of habitat suitability for fauna were made concurrently with the flora ground surveys across the entire site, with particular reference to suitability of habitat for dens (including natal dens) of the Tasmanian devil (*Sarcophilus harrisii*) and nesting habitat for hollow requiring species such as the Tasmanian masked owl (*Tyto novaehollandiae castanops*) and swift parrot (*Lathamus discolor*). Evidence of the presence of threatened fauna was sought and included scats, bones, feathers and diggings.

Targeted surveys of the potential habitat in the Access Road and Base Station was conducted with a 50 m buffer of the impact area and achieved coverage well in excess of the 30 % visual survey coverage specified in DPIPWE guidelines[29].

[22] TVMMP (2013)
[23] Kitchener and Harris (2013)
[24] DPIPWE (2015)
[25] DPIPWE (2015)
[26] Goff *et al.* (1982)
[27] Tasmanian *Weed Management Act 1999*
[28] de Salas & Baker (2018)

Habitat features including large trees, potential dens and hollows were plotted by land survey providing sub-metre accuracy.

## 2.4 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 on the site that have been overlooked due to flowering at times of the year other than when the surveys were undertaken or being seasonally absent at the time of survey. The potential for this limitation to have impacted the detection probability of threatened species in particular has been considered in the interpretation of results.

To compensate for survey limitations to some degree, field data from the present study were supplemented with data from the Tasmanian Natural Values Atlas (Reports_08 &09-Oct-2018, DPIPWE, 2018) and the EPBCA Significant Matters database. All threatened species known from or with potential to occur in the local area (5 km) have thus been considered in terms of habitat suitability on site.

Locations of critical elements (e.g. specific survey points, weeds[30], threatened species habitat, *etc.*) were recorded with a handheld non-differential GPS with an average accuracy of 3-10 m.

[29] *Survey Guidelines and Management Advice for Development Proposals that may Impact on the Tasmanian Devil (Sarcophilus harrisii): A supplement to the Guidelines for Natural Values Surveys - Terrestrial Development Proposals*"
[30] Tasmanian *Weed Management Act 1999*

# 3 BIOLOGICAL VALUES

## 3.1 Vegetation

Nine TASVEG vegetation mapping units occur within the study area:

- DCO – *Eucalyptus coccifera* forest and woodland
- DGL – *Eucalyptus globulus* dry forest and woodland
- DOB – *Eucalyptus obliqua* dry forest
- DTO – *Eucalyptus tenuiramis* forest and woodland on sediments
- WGL – *Eucalyptus globulus* wet forest
- WOB – *Eucalyptus obliqua* forest with broad-leaf shrubs
- HHE – Eastern alpine heathland
- FPE – Permanent easements
- FUM – Extra-urban miscellaneous

The TASVEG 3.0 mapping is of varying reliability.

- The Access Road section is consistent with our findings with one exception. The small patch of DPU identified close to the start of the road is incorrect and has been reallocated to DGL.
- The Base Station site is incorrect. The DPU identified for the forest below the main fire trail is wet forest WOB. Upslope of the fire trail it is mapped as DOB although much of this is WOB and WGL.
- The location for the Temporary Location Net is correctly mapped as DCO.
- The vicinity of the Pinnacle Centre and Tower 3 is correctly mapped as HHE with DCO occurring close by.

None of these vegetation communities correspond to ecological communities listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 2002* (EPBCA). Two communities (DTO and DGL) are listed as threatened under the Tasmanian *Nature Conservation Act 2002*.

The native vegetation types are described below within groupings derived from similarities in floristics and structure. Vascular plant species lists from sampling points are given in Appendix A.

The distribution of TASVEG units recorded within the study area is illustrated in Figure 3, Figure 5, Figure 7 and Figure 8.

*Table 1: Distribution of vegetation communities*

| Community | Location | Extent |
|---|---|---|
| Threatened - *Nature Conservation Act 2002* | | |
| DGL | Access Rd | Localised near McRobie's Road |
| DTO | Access Rd | Widespread intergrading with DOB |
| Non-Threatened vegetation | | |
| DOB | Access Rd | Widespread intergrading with DTO |
| | Base Station | Vicinity of Access Road |

| | | |
|---|---|---|
| DOC | Temporary Installation Net | Also, in close proximity to Pinnacle Centre |
| WOB | Base station | Nearby forest extending to Tower 2 and downslope of the Base Station site |
| WGL | Base station | Vicinity of Tower 1 |
| HHE | Pinnacle Centre | Extensive across Pinnacle area above tree line |
| FPE | Access Rd | Within section of DTO |
| FUM | Access Rd | Start |
| | Base Station | Firetrail - main area of infrastructure |

### 3.1.1 Dry Eucalypt Forest

- DGL – *Eucalyptus globulus* dry forest and woodland

There is a localised area of this community at the start of the proposed Access Road on steep northeast facing slope visible from McRobie's Road; Plate 2.

*E. viminalis* and *E. obliqua* are subdominant. A tall shrub layer includes *Exocarpos cupressiformis, Acacia dealbata* and *Bursaria spinosa*. Low shrubs include *Astroloma humifusum*. The ground layer is dominated by *Lomandra longifolia* with various native grass species present in low numbers.

DGL is a listed threatened community under the NCA.

*Plate 2: Grassy* **E. globulus** *forest DGL at start of Access Road near McRobie's Road*

- DOB – *Eucalyptus obliqua* dry forest

*Eucalyptus obliqua* is present as a community with both *E. tenuiramis* and *E. viminalis* as co-dominant and sub-dominant trees. DOB is prominent on the slopes above McRobie's Gully extending to the saddle where the high voltage powerlines intersect with the Fire Trial; Plate 3.

This occurs over Permian mudstone from 120m to just above 300m. This area at the saddle, close to the Wellington Park boundary has been burnt within the last year, presumably for fire management purposes. Prominent species recorded from within the DOB include *Exocarpos cupressiformis, Daviesia ulicifolia, Pultenaea gunnii, and Pultenaea juniperina.* Due to the recent nature of the fire on this drier slope there is evidence of various species of orchid including *Caladenia sp., Chiloglottis sp., Pterostylis melagramma, Pterostylis parviflora and Thelymitra sp.*

DOB is not a listed threatened community.

- DTO – *Eucalyptus tenuiramis* forest and woodland on sediments

This community occurs relatively extensively within the study area on the section of proposed Access Road; Plate 4.

This community is comprised of a dominant canopy layer of *Eucalyptus tenuiramis* intergraded with DOB, with sections presenting co-dominance between the two eucalypts. Understorey tends to be consistent with the DOB community. Occasional tall shrubs include *Exocarpos cupressiformis, Acacia terminalis, Allocasuarina monilifera* and *Allocasuarina littoralis.* The ground layer is sparse with plenty of exposed open rocky terrain. A dense low shrub layer is dominated by *Pultenaea juniperina* with *Daviesia ulicifolia, Acacia myrtifolia, Pultenaea gunnii,* and *Tetratheca labillardierei* all prominent. Grasses and sedges are sparse.

As with the DOB the orchid flora is potentially diverse, with recent fires likely to have stimulated flowering peaks. Orchid species found during the current surveys include Chiloglottis reflexa and *Caladenia* sp.

DTO is a listed threatened community under the NCA.

There is a clearly defined transmission line easement that runs north to south that is crossed by the alignment of the Access Road. Although correctly mapped as FPE – Permanent Easement the impact of the management will have impacted little on the character of the community except for the periodic removal of trees and taller shrubs. Its ecological and thus conservation values are in line with the adjacent forest community - in this case DTO.

- DCO – *Eucalyptus coccifera* forest and woodland

DCO occurs in the area below the Organ Pipes extending to just above road in the vicinity of the Temporary Installation Net, upslope of Pinnacle Road. Plate 5

The site has Jurassic dolerite scree and is just above 900 m above sea level. The forest is approximately 50 years old, post 1967 bushfires. The site is moderately moist with an easterly aspect and shaded from the late afternoon sun. *Eucalyptus coccifera* is codominant with *E. urnigera.* Other prominent species are diverse and include *Nothofagus cunninghamii, Oxylobium ellipticum, Pittosporum bicolor, Telopea truncata, Aristotelia peduncularis, Coprosma nitida, Cyathodes glauca, Hakea lissosperma, Leptecophylla parvifolia, Lomatia polymorpha, Olearia phlogopappa, Olearia tasmanica, Ozothamnus antennaria, Ozothamnus ledifolius, Pimelea cinerea, Richea dracophylla, Tasmannia lanceolata* and *Veronica formosa.*

DCO is not a listed threatened community.

*Plate 3: Typical* E. obliqua *forest DOB on HCC Access Road section*

*Plate 4:* E. tenuiramis *forest DTO on Access Road section*


*Plate 5: DCO within study area in the vicinity of the Temporary Installation Net*

### 3.1.2 Wet eucalypt forests

- WGL – *Eucalyptus globulus* wet forest

Wet *Eucalyptus globulus* forest (Plate 6) occupies the slopes immediate adjacent to the fire trail concentrated around a shallow gully swale close to the alignment of the cableway route as it departs from the Base Station. It extends just past the location for the Tower 1.

*Eucalyptus globulus* is the dominant eucalypt with *Eucalyptus obliqua* also present. The vegetation is characterised by mature and overmature eucalypts with massive trunks up to 1.5m in diameter. All trees are in senescent stage with evident decay, fire scars and most trees support hollows of various dimensions.

Many of the trees appear stressed which is possibly due to the combined histories of fire damage and drought. The eucalypt canopy is open in form.

There is a continuous tall shrub layer including *Acacia dealbata, Bedfordia salicina, Beyeria viscosa, Olearia argophylla* and *Pomaderris apetala*. The understorey is relatively open with scattered *Coprosma quadrifida*. Ground herbs are infrequent but include *Hydrocotyle hirta* plus a few orchids typical of these habitats including *Corybas sp., Pterostylis pedunculata* and other *Pterostylis* spp.

WGL is not listed under the NCA or the EPBCA.

- WOB – *Eucalyptus obliqua* forest over broad-leaf shrubs

WOB is present and widespread on the lower slopes of Mt Wellington on Permian sediments with an easterly aspect. There is a gradual change in understorey from the lowest point to slightly drier facies upslope.

In the vicinity of the Base Station *Eucalyptus globulus* is present as a sub-dominant canopy tree and characterises many of the larger trees although *E. obliqua* dominate. *E. regnans* and *E. viminalis* are also occasional with prominent small trees and shrubs including *Acacia dealbata* subsp. *dealbata, Asterotrichion discolor, Bedfordia salicina, Exocarpos cupressiformis, Nematolepis squamea, Olearia argophylla, Beyeria viscosa, Pittosporum bicolor* and *Bursaria spinosa*. The ground layer is sparse with very few ferns and herbs. This is reflective of the fire history and density of regrowth stems. The site has a moderate number of large eucalypt logs on the ground. There are patches of rocks outcropping. While most trees show some fire damage, little useful hollow development was seen. There is a 20cm depth of litter over most areas of the ground. The forest community offers a variety of habitat niches.

Further upslope in the vicinity of the Tower 2 *Eucalyptus obliqua* is the sole dominant eucalypt with *Acacia leprosa* var. *graveolens, Pomaderris apetala, Zieria arborescens Bedfordia salicina* and *Pittosporum bicolor* as the dominant tall shrubs. The understorey is generally open with a sparse lower shrub layer. The cover of litter is generally high, though there are patches that have been burnt recently. There is a massive fallen tree close by (Plate 7).

The forest is generally free of weeds, apart from the corridor along the high voltage power line. Spanish heath and gorse are abundant here and pose a risk as a seed source.

WOB is not listed under the NCA or the EPBCA.


*Plate 6:* Eucalyptus globulus *wet forest near site for Tower 1*


*Plate 7:* Eucalyptus obliqua *wet forest over broad-leaf shrubs at near Tower 2*

*Plate 8:* **Eucalyptus obliqua** *wet forest below Base Station*

### 3.1.3 Alpine Heathlands

- HHE – Eastern alpine heathland

This community is the most widespread within the study area. HHE dominates the Pinnacle area of Mt Wellington on dolerite within the footprint of the proposed walkways, Pinnacle Centre (Plate 9) and Tower 3 (Plate 10). *Eucalyptus coccifera* is present as a minor component only as small wind pruned plants to 1 m. Downslope the vegetation transitions into true subalpine *E. coccifera* woodland (DCO). Boulders including some massive structures are a prominent component and create protected niches and sites where snow cover is able to persist. The shrubs are varied and diverse and include *Telopea truncata, Baeckea gunniana, Coprosma nitida, Epacris serpyllifolia, Exocarpos humifusus, Gaultheria hispida, Leptospermum rupestre, Monotoca empetrifolia, Olearia ledifolia, Olearia pinifolia, Orites acicularis, Orites revolutus, Ozothamnus ledifolius, Pimelea sericea, Planocarpa petiolaris, Richea scoparia, Richea sprengelioides, Tasmannia lanceolata* and *Trochocarpa thymifolia*. There are small patches of fjaeldmark-like bare ground subject to frost heave. Around Tower 3 pineapple grass *Astelia alpina* forms a prominent component of the ground cover.

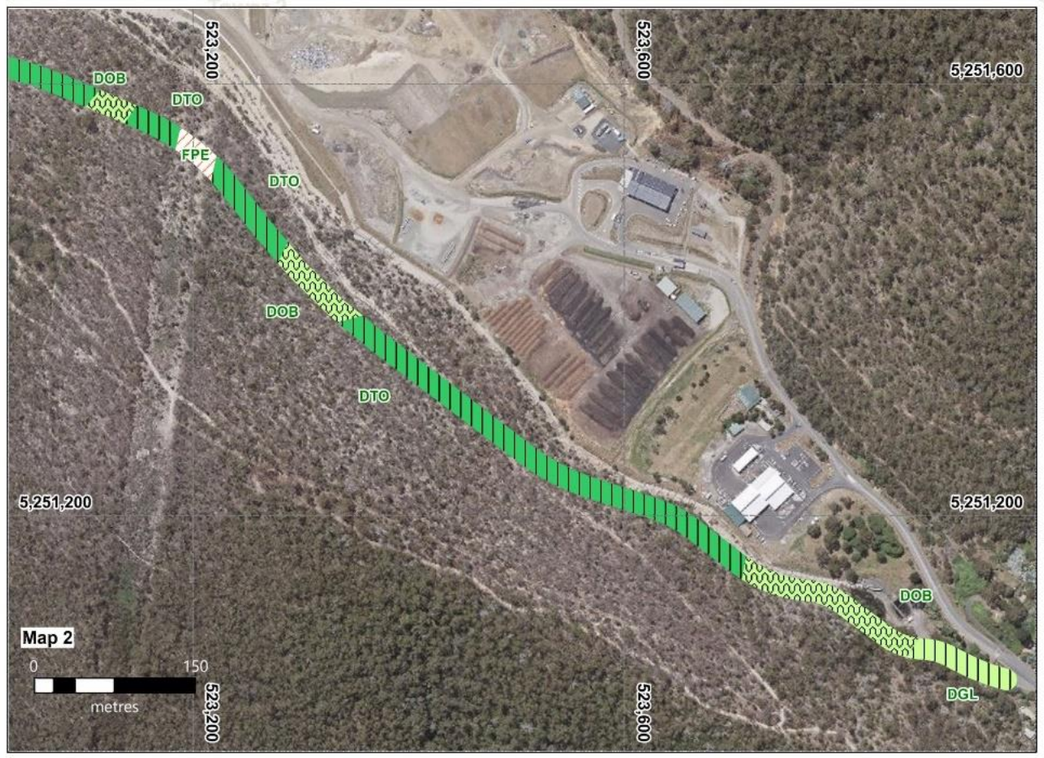
HHE is not listed under the NCA or the EPBCA.

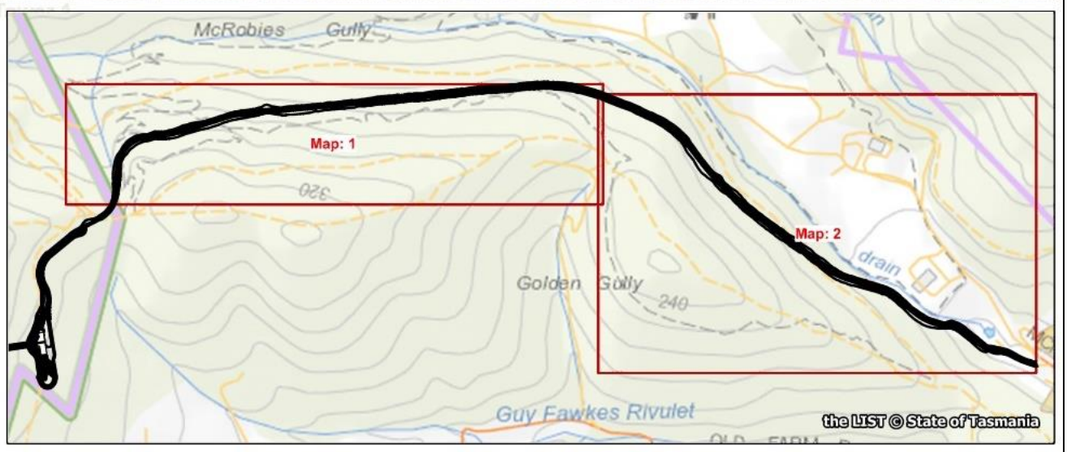
This vegetation is sensitive to disturbance and diverse due to the extreme weather conditions at this altitude. Mt Wellington is an outlier from other alpine areas in Tasmania and as such is notable for its distinctive alpine flora. Outside of the footprint of disturbance the impacts will be largely dependent on the method of construction. The vicinity is however not pristine and has been impacted by numerous other activities in the Pinnacle area. The footprint of the development includes 0.3 ha for the Pinnacle Centre and walkways plus 0.1 ha modification for bushfire (1m) and temporary

disturbance (2m) during construction (total 0.4 ha). This equates to approximately <25% of the total footprint (1.7 ha) of developments already on site.


*Plate 9: HHE within Pinnacle Centre development area*

*Plate 10: HHE within Tower 3 platform site*


Vegetation
(Tasveg 3.0 mapping units)

- (DTO) Eucalyptus tenuiramis forest and woodland on sediments
- (DOB) Eucalyptus obliqua dry forest
- (DGL) Eucalyptus globulus dry forest and woodland
- (FPE) Permanent easements
- (WOB) Eucalyptus obliqua forest with broad-leaf shrubs

Design
*(source: Gandy Roberts received 10/05/2019)*

Base data from theLIST (www.thelist.tas.gov.au), © State of Tasmania
Base image by TASMAP, © State of Tasmania
Datum: GDA94, AHD Grid: MGA Zone 55

northbarker ECOSYSTEM SERVICES

MWC00114/05/2019

*The point data in this map was collected using a survey-grade GPS and is accurate to 10 cm*

*Figure 3: Vegetation within the Access Road section*

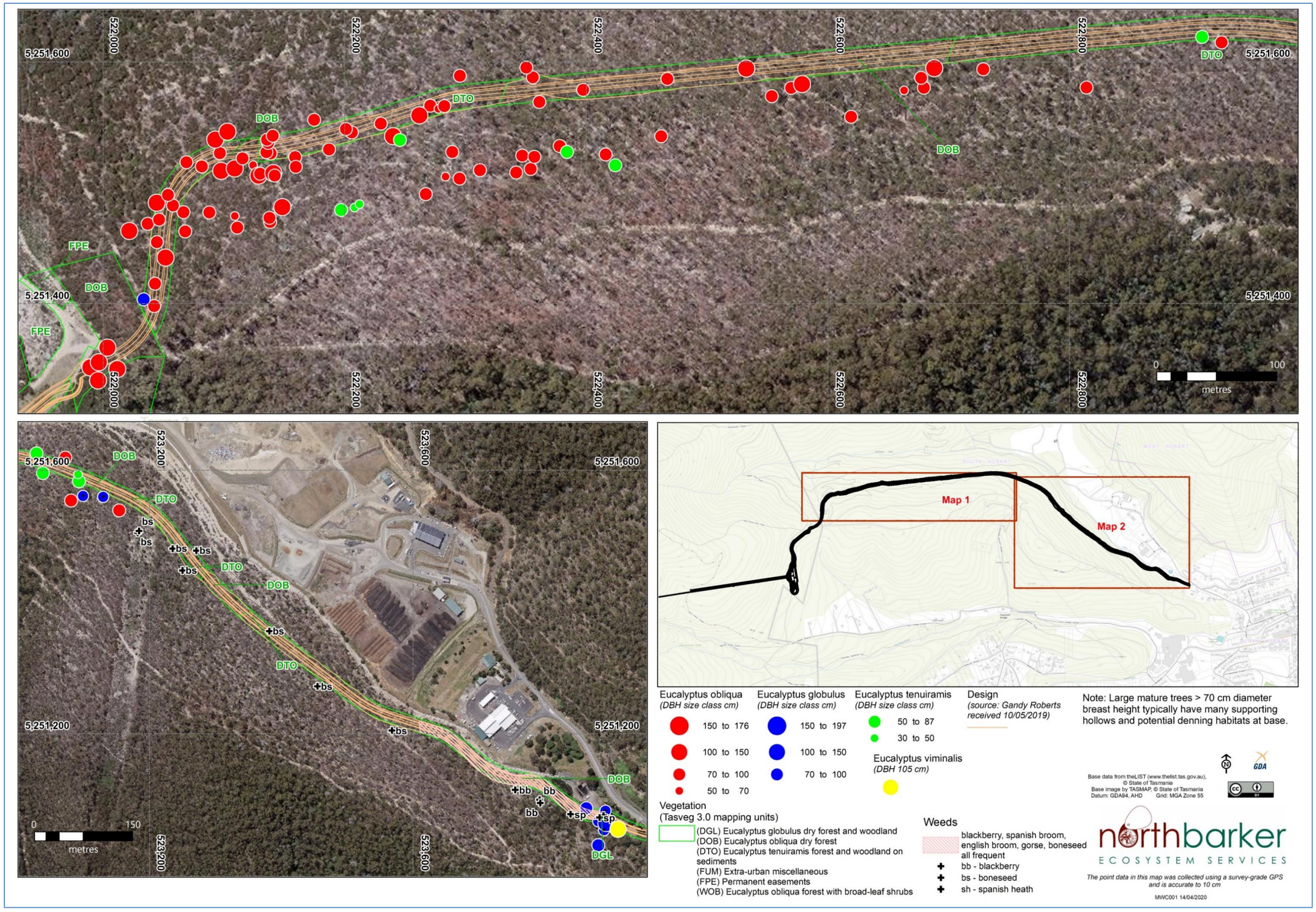



*Figure 4: Access road detail*

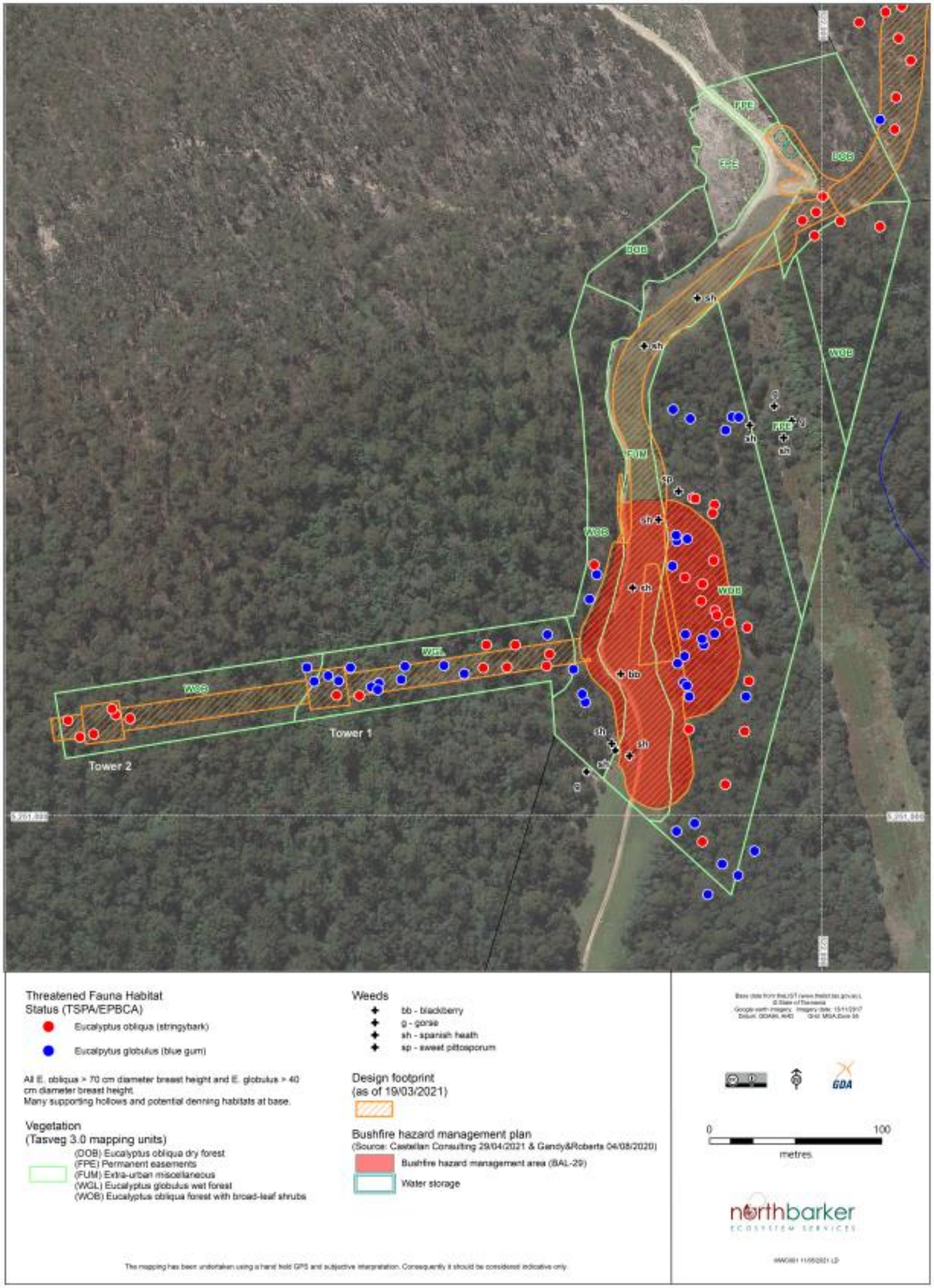



*Figure 5: Base Station, Tower 1 and Tower 2 sites - Natural Values*

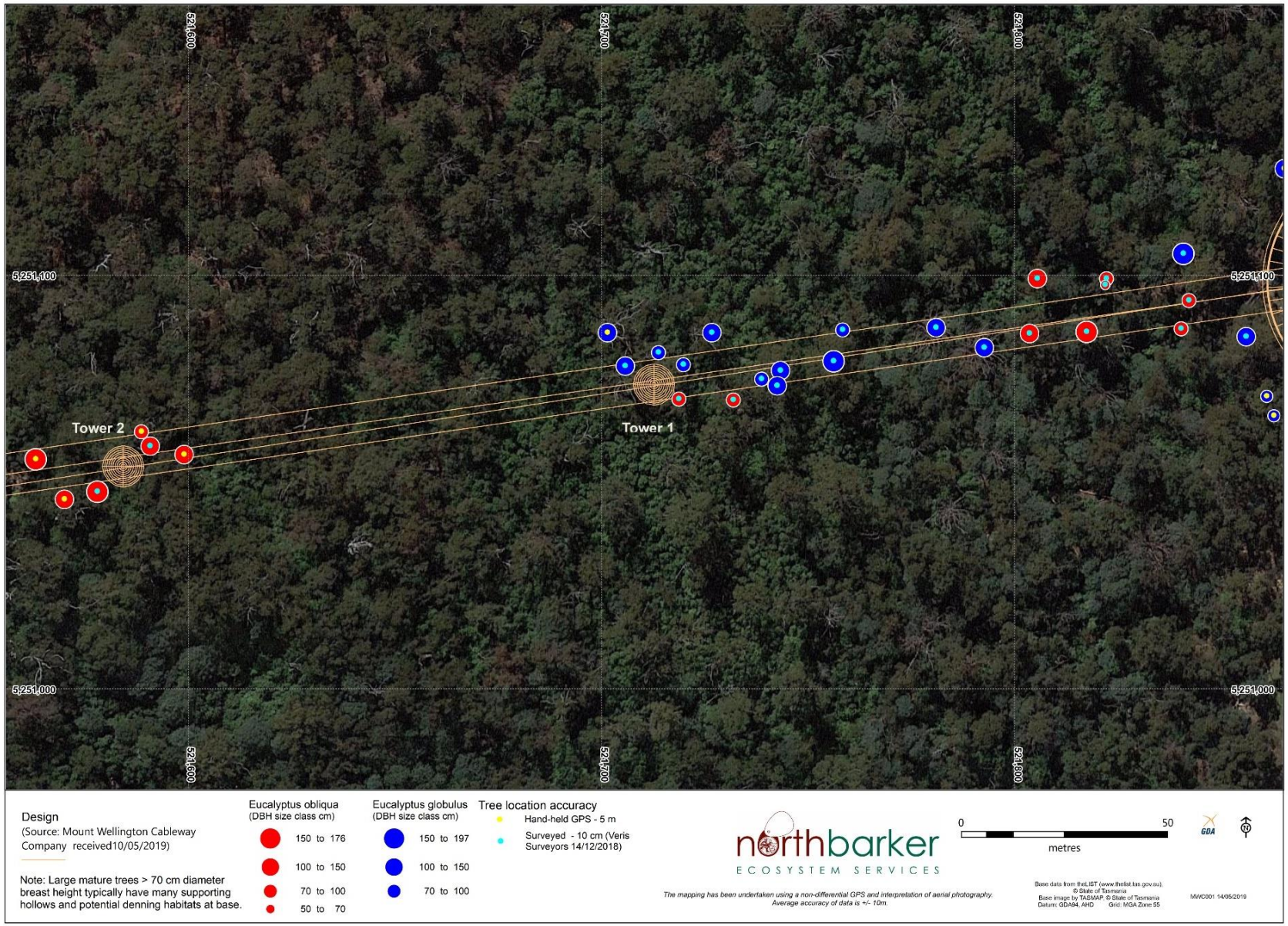



*Figure 6: Tower 1 and Tower 2 sites – Detail*

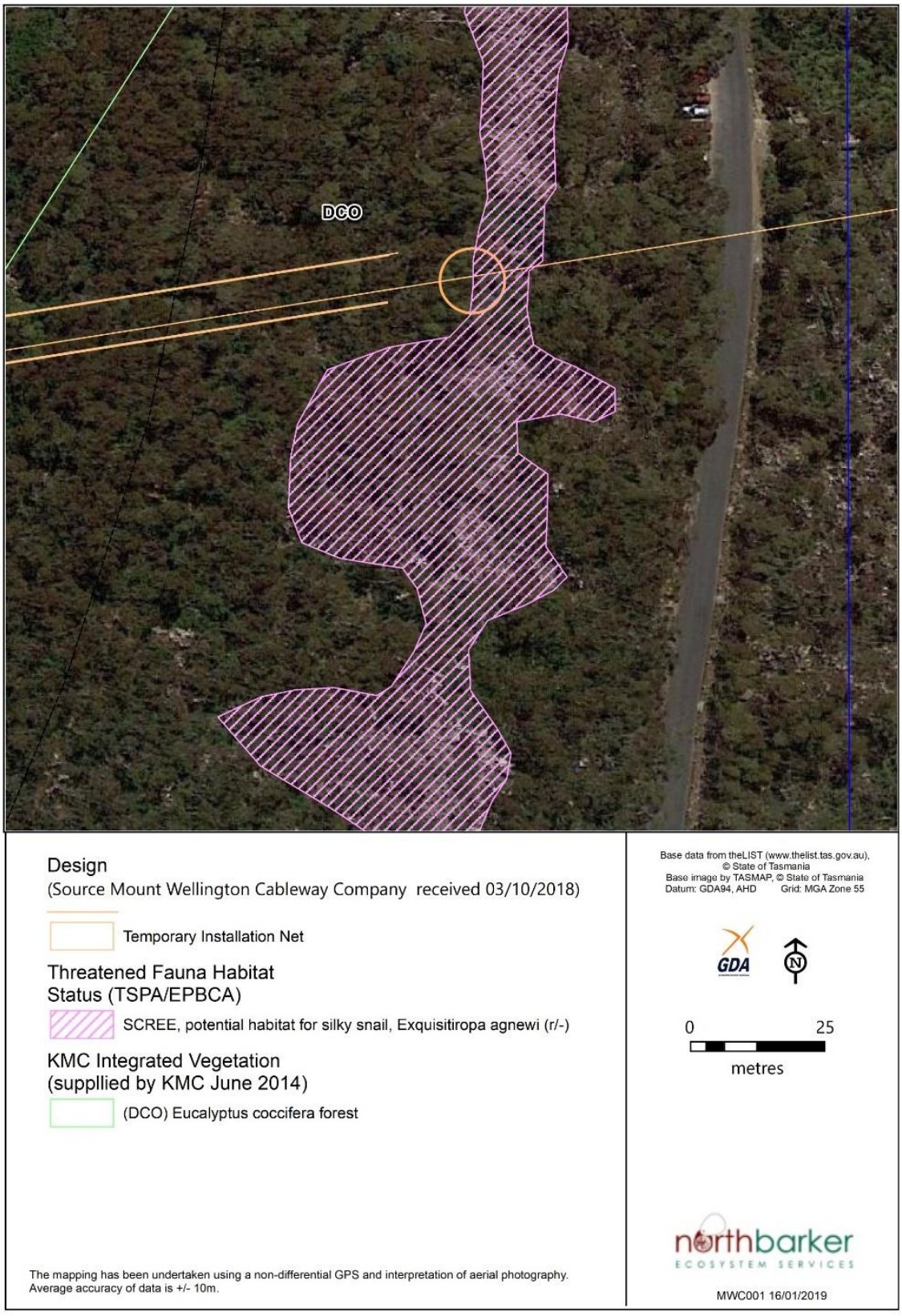



*Figure 7: Temporary Installation Net – Natural Values*

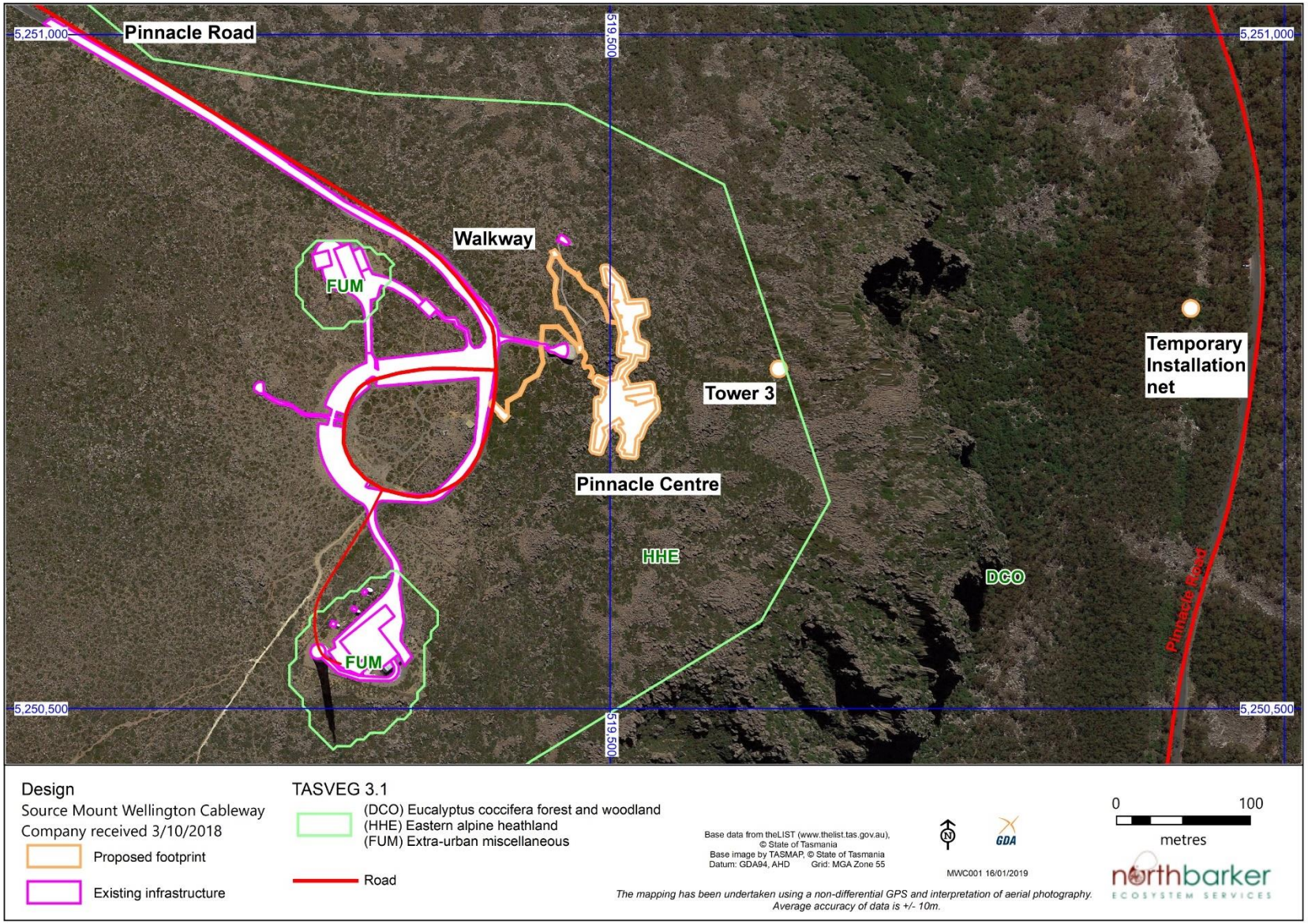



*Figure 8: Vegetation at the Pinnacle Centre and Tower 3*

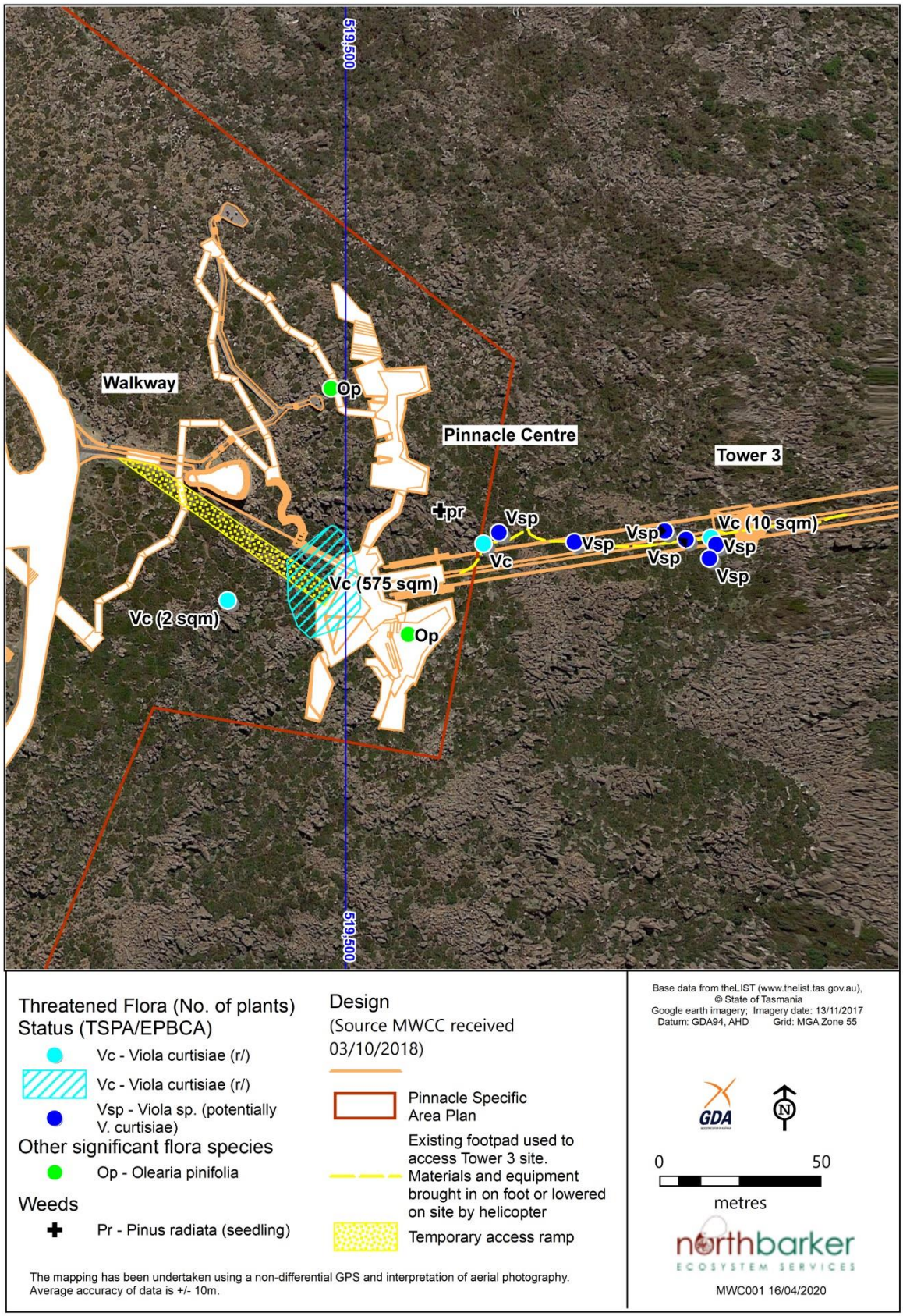



*Figure 9: Pinnacle Centre and Upper Tower - Natural Values*

## 3.2 Flora of Conservation Significance

The collective surveys include 213 native species within the study area (Appendix A). Further survey at targeted times would be expected to document additional ephemeral species including orchids, grasses, and other herbs. Surveys conducted in 2016[31] failed to locate any threatened flora species from the Pinnacle Zone or Tower Sections 2 and 3.

Table 2: Threatened flora species lists threatened species recorded within a 5 km radius of the study area and discusses potential occurrence within the study area based on habitat and the context of known records.

*Viola curtisiae* has been confirmed present at the Pinnacle Centre and close to Tower Site 3.

Several herbs are considered to have moderate to low potential of occurring in habitats corresponding to particular sections of the development footprint.

[31] GHD 2016

*Table 2: Threatened flora species*

**Verified observations (Tasmanian Natural Values Atlas) or predicted habitat (EPBCA Protected Matters database) from within a 5 km radius of the site [32]**

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| **Known from study area or within 500 m** | | | |
| *Australina pusilla* subsp. *muelleri* Shade nettle | Rare/ | None | From within 5 km there exists only a single historical record of very low spatial accuracy. Known from southern flanks of Mount Wellington in deeply-shaded gullies within wet eucalypt forest, and from King Island where it grows in association with *Australina pusilla* subsp. *pusilla* along stream flats in blackwood swamp forest. No suitably wet gullies are found on site. |
| *Centropappus (Brachyglottis) brunonis* Tasmanian daisytree | Rare/ - | Very Low | Known from scattered colonies on the Wellington Range and Mt Dromedary. It grows in shrubby woodland/forest dominated by *Eucalyptus delegatensis* (at mid altitudes) and by *E. coccifera* and *E. urnigera* (at higher altitudes). It typically occurs on dolerite talus but also occurs on poorly-drained sandstone shelves. Only known from a small number of locations closer to the peak of Mount Wellington, such as the Organ Pipes track, therefore it has potential to occur in the vicinity of the temporary Mid Tower site. However, it is unlikely to be overlooked as it is a large and distinctive shrub. |
| *Carex gunniana* Mountain sedge | Rare/ - | Very Low | Widespread records from a range of altitudes and habitats although generally in wetter locations than any of the study area.<br>The habitat of *Carex gunniana* is poorly understood and highly variable. It includes wet eucalypt forest, sandy heathlands, margins of streams, littoral sands, shingle with seepage, damp grasslands within dry forest and rough pasture.<br>Not likely to have been overlooked. |
| *Carex longebrachiata* Drooping sedge | Rare/ - | None | Associated with riverbanks, in rough grassland and pastures, in damp drainage depressions and on moist slopes amongst forest, often dominated by *Eucalyptus viminalis, E. ovata or E. rodwayi*.<br>Known from one historic record in vicinity. No suitable habitat is present. |
| *Corunastylis nuda* Tiny midge-orchid | Rare/ - | Moderate | Occurs in a wide range of habitats from near sea level to 1,000 m above sea level, on a range of different soil types and geologies. Vegetation types include scrub, subalpine grassland, open rock plates, heathy open forest, shrubby dry sclerophyll forest and wet sclerophyll forest.<br>Multiple records from a concentrated area on north facing slope on mudstone south of Old Farm Road. The habitat is analogous with some of the Access Road alignment in McRobie's Gully (500 m distant). |

[32] Natural Values Reports # 8 & 9 Oct-2018, DPIPWE, 2018; EPBC Act Protected Matters report PMST_WQTRMC
[33] Tasmanian *Threatened Species Protection Act 1995,* Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
[34] Threatened Species Section (2018)

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| | | | This is a tiny ephemeral species almost impossible to identify when not in flower. Confirmation of its occurrence requires a targeted survey during the flowering period. Peak flowering is given as the second half of January and all of February[35].<br>No plants were observed during two surveys conducted in 2019 and 2020, during the peak flowering period. There is an anecdotal report[36] of the species occurring in the vicinity of the mountain bike tracks that pass through the proposed road site, though no accurate spatial data is available.<br>Given the listing of this species as rare any occurrence that may occur in the footprint would not be significant for the species. |
| *Corunastylis nudiscapa*<br>Bare midge-orchid | Endangered/<br>- | Low | Restricted to a few sites in the area between Hobart and Kettering. It has been recorded from open forests and woodlands on mudstone, dominated by *Eucalyptus tenuiramis*, and occasionally *E. obliqua* or *E. amygdalina*, with a heathy or grassy ground layer of varying density.<br>Occupies dry open eucalypt forest on mudstone-derived soils. Known from 49 records from within 500 m from a concentrated area on north facing slope on mudstone south of Old Farm Road. There is a total of 145 from 5km from the proposed Access Road route, these others coming from similar habitats on slopes adjacent to Strickland Avenue and Huon Road. The habitat is analogous with some of the Access Road alignment in McRobie's Gully.<br>Peak flowering is given as the second half of February through to the first half of April[37], although refer note below.<br>No individuals were observed during the 2019 survey despite targeted searches. Targeted searches by orchid enthusiasts of this area in previous years failed to locate any plants[38]. Observations at known sites in South Hobart in the summer of 2018-19 were unseasonal being late December and early January, well outside the identified peak flowering period. Flowering in summer 2020 was more typical with observations at two known sites in South Hobart in mid-March. A resurvey of the entire road corridor conducted in mid-March also failed to locate any plants. |
| *Diuris palustris*<br>Swamp doubletail | Endangered/<br>- | None | Occurs in coastal areas in grassy open eucalypt forest, sedgy grassland and heathland with *Leptospermum* (teatree) and *Melaleuca* (paperbark) on poorly- to moderately-drained sandy peat and loams.<br>Known from single historical records from the area only. May be extinct in the Hobart area. No suitable habitat is present on site. |

[35] Wapstra, M. (2018). *Flowering Times of Tasmanian Orchids: A Practical Guide for Field Botanists. 4th edition* July 2018
[36] Mark Wapstra pers com.
[37] Wapstra (2018)
[38] Mark Wapstra pers com.

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| *Euphrasia gibbsiae* subsp. *wellingtonensis* Mt Wellington eyebright | Rare/ - | Very Low | Occurs in a variety of vegetation types on Mount Wellington, including sphagnum bogs, bolster heath and open montane shrubbery. The records from close proximity to the Pinnacle are of low accuracy and are historic.<br>Targeted surveys conducted by the TPT in 2015 added a further 225 observations all from a distinct microhabitat associated with margins of soaks and sites subject to periodic waterlogging.<br>The Pinnacle development site is consistently well drained. Two *Euphrasia* spp. are widespread throughout the footprint of both the walkways and the Pinnacle Centre site and in the vicinity of the Temporary Access Net site. These are the common and widespread alpine eyebrights, *E. striata* and *E. collina* subsp. *diemenica*. |
| *Isolepis habra* Wispy clubsedge | Rare/ - | Very Low | The habitat is poorly understood and variable as it occurs from lowland to highland sites in forest and non-forest habitats. Wet sclerophyll and riparian habitats may be preferred.<br>Not recorded from within 5 km of the study area since the 1970s. |
| *Ranunculus pumilio* var. *pumilio* Ferny buttercup | Rare/ - | None | Occurs mostly in wet places (e.g. broad floodplains of permanent creeks, "wet pastures") from sea level to altitudes of 800-900 m above sea level.<br>Known from only one record within 500m dating from the 1980's. Typically occurs in wetter habitats than those found on site. |
| *Viola curtisiae* Montane ivyleaf violet | Rare/ - | Present | Montane species that had long been thought to be confined to sub-alpine habitats on Mt Field where it is typically associated with *Eucalyptus coccifera* woodland. The underlying substrate is Jurassic dolerite, and the altitude range of known occurrences 1050 to 1200 metres above sea level. Recently published data has confirmed it from other sites including a record collected from a site near the Bend on Mt Wellington, 2km from the Pinnacle.<br>Surveys conducted by Threatened Plants Tasmania in Dec 2018 have shown it to be widespread in the Wellington Range.<br>Targeted surveys conducted for this project in Dec 2018 and Feb 2020 confirmed its presence at the Pinnacle Centre and close to Tower 3. |
| **Known within 5 km** | | | |
| *Allocasuarina duncanii* Conical sheoak | Rare/ - | None | A species known primarily from dolerite mountain-tops and outcrops. May have a wider distribution than presently documented, but is nonetheless unlikely to occur on site, nor likely to have been overlooked. |
| *Anogramma leptophylla* Annual fern | Vulnerable/ - | None | Only 2 records within 5 km, the last in 1985. Not recorded during survey. Fronds only present in late winter and early spring which corresponds to survey time. Occurs in dry to damp areas of cliff or rocky areas often just within a drip line. Known from altitudes varying from about 50 to 350 m on a |

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| | | | variety of rock substrates. Study area generally too dry at these preferred altitudinal range |
| *Asperula scoparia var. scoparia* Prickly woodruff | Rare/ - | Very Low | Occurs in grassy forest usually on moist sites. Known from 18 sites from within 5 km of the study area. Habitat is marginal, and the species is conspicuous and unlikely to have been overlooked. |
| *Atriplex suberecta* Sprawling saltbush | Vulnerable/ - | None | This is a species of coastal areas and is known only from 1 historical record. No suitable habitat is present on site. |
| *Austrostipa bigeniculata* Doublejointed speargrass | Rare/ - | Very Low | 57 records for this species within 5 km. Occurs in grassy habitats on fertile soils in low rainfall areas. A conspicuous species unlikely to have been overlooked, although at the time of survey spear grasses on site had not developed fertile material necessary for identification. Habitat not suitable. |
| *Austrostipa blackii* crested speargrass | Rare/ - | Very Low | A single record for this species within 5 km. Occurs in grassy habitats on fertile soils in low rainfall areas. Habitat not suitable. |
| *Bolboschoenus caldwellii* Sea clubsedge | Rare/ - | None | Occurs in shallow, standing, sometimes brackish water, rooted in heavy black mud. No suitable habitat occurs on site. |
| *Brachyscome perpusilla* Tiny daisy | Rare/ - | None | Found on rock plates in grassy woodland. It was recently recorded in a grassy herbfield on very shallow dolerite soils in the Midlands.<br>From within 5 km there exists only a single historical record of low spatial accuracy. |
| *Brachyscome radicata* Spreading daisy | Rare/ - | Very low | The habitat and distribution of *Brachyscome radicata* is poorly understood. It has been recorded from the foothills of Mt Wellington and from montane grassland near Cradle Mountain and the Central Plateau. Its habitat also extends to shrubby forest and wet sclerophyll forest in the east.<br>Three historic records of very low spatial accuracy are known from within 5 km of the study area. A conspicuous species unlikely to have been overlooked. |
| *Caladenia caudata* Tailed spider orchid | Rare / VULNERABLE | None | Varied range and habitat, in the central north: *Eucalyptus obliqua* heathy forest on low undulating hills; the north-east: *E. globulus* grassy/heathy coastal forest, *E. amygdalina* heathy woodland and forest, *Allocasuarina* woodland; and the south-east: *E. amygdalina* forest and woodland on sandstone, coastal *E. viminalis* forest on deep sands. Substrates vary from dolerite to sandstone to granite, with soils ranging from deep windblown sands, sands derived from sandstone and well-developed clay loams developed from dolerite. A high degree of insolation is typical of many sites.<br>Known from 8 records within 5km of the proposed impact area, but none from Hobart. Nearest confirmed populations are in Kingston, Waverley and Rosetta.<br>Very low likelihood of occurrence. |

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| *Caladenia filamentosa* Daddy longlegs | Rare/ - | Very Low | Occurs in heathy and sedgy open lowland forest. Highly fire responsive, most commonly seen in the two seasons following a fire. The most likely area to support this species is the Access Road section on mudstones. *Caladenia* recorded on site, by evidence of leaves, were not flowering during the time of our surveys.<br>Only a single recent record for the species within 5 km. |
| *Caladenia sylvicola* Forest fingers | Endangered/ CRITICALLY ENDANGERED | Very Low | Only recorded in dry forest adjacent to Huon Road, near Hobart. One site is on a highly insolated hillside on well-drained gravelly loam overlying mudstone in heathy/shrubby *Eucalyptus tenuiramis* forest at about 240 m above sea level. A second site is at slightly lower elevation (160 m asl) on a moist, sheltered slope (on a similar substrate), growing among leaf litter and dense shrubs in *E. obliqua* dry sclerophyll forest.<br>No plants have been confirmed in recent years from either site despite regular reinspections at the flowering period by orchid enthusiasts.<br>Occupies dry open eucalypt forest on mudstone-derived soils. 7 records within the 5km all derived from the two known locations. The Access Road may include habitat that corresponds to that favoured by this species but given the scarcity of the species the likelihood is considered to be remote. |
| *Comesperma defoliatum* leafless milkwort | rare/ - | None | Habitat includes wet heathland/sedgeland, buttongrass moorland, coastal low scrub and on the crests of dunes. It has also been recorded from flat alkaline pans. The predominant substrates include peat, quartzite and sand. There is a single historic record for this species.<br>The study area does not contain suitable habitat. |
| *Dianella amoena* Grassland flaxlily | Rare / ENDANGERED | None | Occurs in grasslands mainly on fertile soils in low rainfall areas. No suitable habitat is present. |
| *Epacris virgata* (Kettering) Pretty heath | Vulnerable/ ENDANGERED | None | Occurs among foothills in south-eastern Tasmania in dry sclerophyll forest on hilly terrain at elevations of 10-300 m above sea level, mainly on dolerite, though sometimes close to the geological boundary of dolerite and Permian mudstone. It is generally associated with grassy/heathy *Eucalyptus ovata* woodland and forest but is also occasionally found in grassy/heathy *E. pulchella* woodland and forest.<br>No suitable habitat is present on site and unlikely to have been overlooked. |
| *Eryngium ovinum* Blue Devil | Vulnerable/ - | None | 224 records within 5 km. Not recorded during survey. Known from grasslands and open grassy woodlands often with heavy clay soils.<br>Study area is unlikely to contain suitable habitat. |
| *Eucalyptus risdonii* | Rare/ | None | Restricted to the greater Hobart area (particularly the Meehan Range), with an outlying population |

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| Risdon peppermint | - | | at Mangalore and on South Arm. It occurs on mudstone, with an altitudinal range from near sea level to 150 m above sea level. It can occur as a dominant in low open forest with a sparse understorey on dry, insolated ridgelines and slopes (e.g. with a north-west aspect), and individuals can extend into other forest types typically dominated by *E. tenuiramis* or *E. amygdalina* (but occasionally by other species) on less exposed sites.<br>Although the section above McRobie's Gully is similar habitat to known sites there are no records from the Hobart side of the River Derwent. No plants were recorded in this habitat. This is a distinctive species unlikely to be overlooked.<br>A single specimen of *E. risdonii* is present close to the McRobie's Road entrance to the Access Road end of the site in an area where various native and non-native trees of planted origin occur. This tree is not of natural origin and has been planted. |
| *Euphrasia scabra* Yellow eyebright | Endangered/ - | Very Low | Occurs in moist herb/sedge communities in grassy leads in marshes and in drier open grassy areas at the headwaters of creeks. Its habitat is associated with gaps created by grazing, flooding or other disturbance. It has been recorded from scattered sites throughout lowland areas of Tasmania, including the north-west coast, central north, Midlands, Eastern Tiers and around Hobart. However, it is considered to be extinct from many of these sites, and populations are low and transient in areas (Eastern Tiers and Hobart) with the greatest probability of still supporting the species.<br>Previously recorded from the Waterworks Reserve and from the Ridgeway area but now thought to be locally extinct at those sites. A total of 12 records within 5 km the most recent from 2009. The present survey was undertaken prior to the flowering period for this species and none were observed. |
| *Goodenia geniculata* Bent native-primrose | Endangered/ - | None | No local records since 1805. Presumed extinct. |
| *Hovea tasmanica* Rockfield purplepea | Rare/ - | None | Found on dry rock slopes of predominantly dolerite origin. It is unlikely to be overlooked when flowering which corresponds with the survey time.<br>No suitable habitat in study area |
| *Hyalosperma demissum* Moss sunray | Endangered/ - | None | A species of rock plates in grasslands and grassy woodlands on fertile soils.<br>No local records since 1898. Presumed extinct. |
| *Hydrocotyle laxiflora* Stinking pennywort | Endangered/ - | None | Historical records only from the area. Now thought to be restricted to sheoak woodlands on the Queen's Domain. |

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| *Isoetopsis graminifolia* Grass cushion | Vulnerable/ - | None | A species of fertile grasslands. Extinct in the local area. |
| *Juncus vaginatus* Clustered rush | Rare/ - | Very low | Typically occurs in marshes and wetlands. Occasional moist depressions within the study area would provide suboptimal habitat only. |
| *Lachnagrostis punicea* subsp. *filifolia* Narrowleaf blowngrass | Rare/ - | None | Associated with coastal environments and not recorded from within the local area since 1929. |
| *Lepidium hyssopifolium* Soft peppercress | Endangered/ ENDANGERED | Very Low | Occurs on fertile soils in dry habitats within the growth suppression zone of shade-bearing trees. Not recorded during the survey. A conspicuous species unlikely to have been overlooked. |
| *Olearia hookeri* Hooker's Daisy Bush | Rare/ - | Very Low | Not found during survey. Found on dry rocky slopes. The study area only provides marginal habitat. |
| *Pellaea calidirupium* Hotrock fern | Rare/ - | None | Known from a single record. Found in relatively arid environments in rock crevices, predominantly in the Midlands and eastern Tasmanian and on dry screes on the edge of the Central Plateau |
| *Pimelea flava* subsp. *flava* Yellow riceflower | Rare/ - | Very Low | A conspicuous shrub that is unlikely to have been overlooked. Most local records are associated with dry forests and woodlands on dolerite derived soils which differ from habitats at the preferred altitude which overly mudstone. |
| *Prasophyllum amoenum* Dainty leek-orchid | Endangered/ ENDANGERED | Very Low | Known from the Snug Tiers and the western summit of Mt Wellington. A high number of records occur on the west of Mt Wellington summit in and near cushion plants in alpine moorland. The rocky habitats associated with the Pinnacle development site are distinct from the cushion moorland and are unsuited to this species. There are no records from the immediate vicinity. |
| *Prasophyllum apoxychilum* Tapered leek-orchid | Endangered/ ENDANGERED | None | In the Hobart area this species is restricted to the Knocklofty Reserve in West Hobart in grassy and scrubby open forest on sandy and clay loams. No comparable habitat in study area. |
| *Prasophyllum castaneum* Chestnut leek-orchid | Endangered/ CRITICALLY ENDANGERED | None | Only known extant populations are on Bruny Island and the Tasman Peninsula. The known sites have highly variable site conditions, so it is difficult to extrapolate on the likely habitat requirements. |

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| *Prasophyllum perangustum* Knocklofty leek-orchid | Endangered/ CRITICALLY ENDANGERED | None | Restricted to the Knocklofty Reserve in West Hobart. The Mount Wellington area, including the Waterworks Reserve, has been extensively searched by orchid enthusiasts for further populations, but to no avail. |
| *Pterostylis squamata* Ruddy greenhood | Rare/ - | Very low | 3 records with low spatial accuracy exists within 5 km of the proposed impact zone. The Mount Wellington area is regularly searched by orchid enthusiasts, meaning that the lack of records in the immediate vicinity of the proposed route can be taken as a reliable indicator of its absence. |
| *Rhodanthe anthemoides* Chamomile sunray | Rare/ - | None | The only regional record for this species on the Tasmanian NVA is from 1898 and with a very low spatial accuracy.<br>Typically, the species occurs in montane grasslands and heathy habitats. Marginal habitat is present on the pinnacle site; however, such as showy species is unlikely to be overlooked in such a visited area. |
| *Rumex bidens* Mud dock | Vulnerable/ - | None | The only regional record for this species on the Tasmanian NVA is from 1891 and with a very low spatial accuracy.<br>It is a semi -aquatic / wetlands species. No suitable habitat occurs within the study area |
| *Scleranthus fasciculatus* Spreading knawel | Vulnerable/ - | Very Low | Only recorded from a few locations in the Midlands and south-east. The vegetation at most of the sites is *Poa* grassland/grassy woodland although in the Hobart area it occurs in lawns and other modified grassy habitats close to the city.<br>Very little suitable habitat within the study area with the most likely being associated with the fire trail area. |
| *Senecio squarrosus* Leafy fireweed | Rare/ - | Very Low | Occupies dry forest habitats and germinates in particularly large numbers in post-fire periods. Previously recorded 84 times within 5 km. A disturbance coloniser and can persist for many years as soil stored seed.<br>Habitat in vicinity typically associated with grassy fertile grasslands and grassy woodlands. Lower altitude habitats are too infertile and unlikely to be suitable. |
| *Thelymitra bracteata* Leafy sun-orchid | Endangered/ - | Very Low | Occurs in open grassy and heathy forest/woodland on mudstone and sandstone. At Rosny Hill site, *Thelymitra bracteata* is most abundant on the top of the hill on open ground with dense exotic grasses and sparse in a remnant patch of native grass close to *Allocasuarina verticillata* woodland. At Conningham, the species occurs in a canopy gap created by a rough track amongst heathy *Eucalyptus amygdalina* forest on Triassic sandstone.<br>A single record only from within 5 km from the 1970's. Typically occurs on sedimentary substrates. Some marginal habitat along the Access Road although skeletal mudstone derived soils not likely to be suited. |

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| *Thelymitra inflata* Inflated sun-orchid | Rare/ - | Very low | The species grows in areas of slightly impeded drainage in open forest and woodland on clay loam soils. The populations are of very restricted nature in the vicinity of Ridgeway. Despite survey at peak flowering during December no further populations have been found. |
| *Velleia paradoxa* Spur velleia | Vulnerable/ - | Very low | Occurs in stony grassland typically on fertile sites in low rainfall zones typically in *E. viminalis* woodland. In Hobart it is known form Mt Stuart. Lower altitude sites are on mudstone and considered sub optimal for the species. |
| *Veronica notabilis* Forest speedwell | X(Endangered) / - | None | The only regional record for this species on the Tasmanian NVA is from 1892 and with a very low spatial accuracy. This was recently rediscovered on the slopes of Mt Arthur in northern Tasmania at 900m altitude in *E. delegatensis* forest.<br>The most likely suitable habitat is at the mid tower site although unlikely to have been overlooked. |
| *Vittadinia burbidgeae* Smooth New Holland daisy | Rare/ - | Very Low | The species typically occurs on dry and fertile grassy sites. Unlikely to have been overlooked. The lower sections provide the most likely habitat although the mudstone soils are not typical habitat. |
| *Vittadinia cuneata* var. *cuneata* Fuzzy New Holland daisy | Rare/ - | None | From the region this species exists as two historic records from the Queens Domain. The species typically occurs on dry and fertile grassy sites. Unlikely to have been overlooked. The lower sections provide the most likely habitat although the mudstone soils are not typical habitat. |
| *Vittadinia gracilis* Woolly New Holland daisy | Rare/ - | Very Low | The species typically occurs on dry and fertile grassy sites. Unlikely to have been overlooked. The lower sections provide the most likely habitat although the mudstone soils are not typical habitat. |
| *Vittadinia muelleri* Narrowleaf New Holland daisy | Rare/ - | Very Low | The species typically occurs on dry and fertile grassy sites. Unlikely to have been overlooked. The lower sections provide the most likely habitat although the mudstone soils are not typical habitat. |
| *Westringia angustifolia* Narrowleaf westringia | Rare/ - | None | Occurs mainly in mid elevations, always on dolerite (but can be close to dolerite-sediment contact zones), in dry to wet sclerophyll forest on broad ridges, slopes and dense riparian shrubberies.<br>A distinctive species unlikely to have been overlooked. More likely to occur in riparian habitats. |
| **Additional species included in the EPBC Protected Matters Search Tool but not on the NVA 5km buffer** | | | |
| *Colobanthus curtisiae* Curtis's colobanth | Rare/ VULNERABLE | None | When first described, *Colobanthus curtisiae* was understood to occur in native grassland and grassy woodland (the type location is a grassy *E. pauciflora* woodland on a small basalt hill) but also extending to subalpine low vegetation (Ben Lomond area). This species is now known to occur in |

| Species | Status[33] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[34] |
|---|---|---|---|
| | | | lowland grasslands and grassy woodlands but is also prevalent on rocky outcrops and margins of forest on dolerite on the Central Highlands (including disturbed sites such as log landings and snig tracks).<br>There are no records form the Wellington Range which is 40 km south of the southern extent of the species range.<br>The status at the State level is inconsistent with the national listing. |
| *Glycine latrobeana* Clover glycine | Vulnerable/ VULNERABLE | None | Occurs in a range of habitats, geologies and vegetation types. Soils are usually fertile but can be sandy when adjacent to or overlaying fertile soils. The species mainly occurs on flats and undulating terrain over a wide geographical range, including near-coastal environments, the Midlands, and the Central Plateau. It mainly occurs in grassy/heathy forests and woodlands and native grasslands.<br>Subalpine records are few and there are none from the Wellington Range. The nearest confirmed record is more than 10 km to the northwest. |
| *Xerochrysum palustre* Swamp everlasting | Vulnerable/ VULNERABLE | None | Has a scattered distribution with populations in the north-east, east coast, Central Highlands and Midlands, all below about 700 m elevation. It occurs in wetlands, grassy to sedgy wet heathlands and extends to associated heathy Eucalyptus ovata woodlands. Sites are usually inundated for part of the year. This is distinct from Victoria where it also extends into subalpine areas.<br>There is no suitable habitat in the project area. The nearest known population is near the Hobart Airport more than 20 km to the east. |

### 3.2.1 Threatened species recorded on site

The present survey has recorded one species of threatened flora in the footprint.

*Viola curtisiae* montane ivyleaf violet – rare TSPA

A recent review of this species[39] has revealed that it is not, as had for long been understood, confined to the subalpine woodlands of Mt Field but also occurs in similar habitats on Mt Wellington and Mt Baw Baw in Victoria. In Tasmania it grows in subalpine *Eucalyptus coccifera* woodland on Jurassic dolerite, with an altitude range of known occurrences from 1050 to 1200 metres above sea level. It is reported from the Big Bend and The Lectern on Mt Wellington, approximately 2km north of the Pinnacle.

*Viola curtisiae* is distinguished from other *Viola* taxa in Tasmania by the following combination of characters: stoloniferous, anterior petal not spurred, petals emarginate to shortly bilobed, petals glabrous. *Viola hederacea* has flower scapes that are typically longer than the leaves, a markedly discolorous corolla (pale with darker violet blotches), and lateral petals that are entire and bearded. A third alpine species, *Viola fuscoviolacea*, generally has smaller leaves but is most easily distinguished by the tiny dark purple flowers. The three cannot be separated on leaf characters alone.

Leaves of *Viola* sp. were observed in suitable habitat for *V. curtisiae* on the Pinnacle site in the October survey. Follow up targeted survey conducted in December 2018 and February 2020 confirmed the presence of *V. curtisiae*. In open areas plants form dense mats occupying several square metres. Under shrubs plants are more dispersed and rarely in flower. Surveys conducted by Threatened Plants Tasmania in 2018 have confirmed the species to be widespread across a range of habitats on the Wellington Range including Collins Cap, Tom Thumb, Ice House Track, and Thark Ridge. In some instances, the species was coexisting with *Viola hederacea* and *V. fuscoviolacea*.

It is possible that more than one species occurs at the Pinnacle Centre site although only *V. curtisiae* has been confirmed.


*Plate 11: montane ivyleaf violet Viola curtisiae*

[39] Thiele et al 2018


*Plate 12: Habitat of Viola curtisiae*

### 3.2.2 Other threatened and significant species recorded from the area

Existing records indicate that the lowland dry eucalypt forest between McRobie's Road and the Main Fire Trail support some potential for two threatened orchid species. Neither of these species are listed nationally (EPBCA).

*Corunastylis nuda,* tiny midge-orchid – rare TSPA

This is a tiny ephemeral orchid that is only able to be identified during the summer flowering period, mid Jan-end Feb. There are records within 500 m of Access Road on forest slopes above Old Farm Road. There is also anecdotal report of it being recorded on the slopes above McRobie's Gully[40] and so is considered a moderate likelihood of occurring. Two surveys in consecutive seasons have been conducted for this project with no evidence of its occurrence.

*Corunastylis nudiscapa,* dense midge-orchid – endangered TSPA

This species has been subject to extensive searches since being rediscovered in 2008 after many years of absence. It is now well known from three locations in the South Hobart area, the nearest being 500m south of the Access Road on the south side of Old Farm Road in similar habitat. There are no records from the slopes above McRobie's Gully even though there have been repeated attempts searching for it during the flowering period Feb-April[41]. Two surveys in consecutive seasons have been conducted for this project with no evidence of its occurrence.

Several mature pine daisy bush *Olearia pinifolia* occur in sheltered locations amongst boulders in the vicinity of the Pinnacle Centre (Plate 13). These appear to have survived

[40] M Wapstra pers comm.
[41] M Wapstra pers comm.

fires and may be many decades old. This species is not listed as threatened but is only represented in Wellington Park by occasional individuals sheltered from the impacts of wildfire amongst boulders close to the Pinnacle area, near the Big Bend and from The Lectern. It is widespread in various other alpine environments in Tasmania. Five plants occur close to the edge of the Pinnacle Centre that may be impacted.

*Plate 13: Pine daisybush Olearia pinifolia*

*Table 3: Potential threatened species and risk of occurrence by section*

| **Location** | **Potential species** | **Risk of occurrence** |
|---|---|---|
| Access Road | *Corunastylis nuda*<br>*Corunastylis nudiscapa* | Moderate potential<br>Low potential |
| Base Station and Towers 1 & 2. | None | |
| Temporary Installation Net | None | |
| Summit Centre and Tower 3 | *Viola curtisiae* | Present |

## 3.3 Introduced Plants and Plant Pathogens

### 3.3.1 Weeds

Intact native vegetation in Wellington Park is predominantly weed-free.

A single pine seedling close to the Pinnacle is a notable exception. It was observed growing in a fissure amongst rocks but not expected to be capable of maturing into a tree at that altitude.

In total 39 non-native species were recorded throughout the various surveys, including 7 species of weeds declared under the *Tasmanian Weed Management Act 1999*. All declared species are located within the footprint of the Main Fire Trail in the vicinity of the Base Station or on the Access Road through McRobie's Gully. It is apparent that there is an active weed control program in this Base Station area as all the recorded plants were small and or seedlings.

The declared weeds observed in the Base Station section are mapped Figure 5:

- Blackberry *Rubus fruticosus,*
- Gorse *Ulex europaeus*, and
- Spanish heath *Erica lusitanica.*

Five declared weeds were observed in the road corridor Figure 4:

Boneseed (*Chrysanthemoides monilifera*), Montpellier broom (*Genista monspessulana*), English broom (*Cytisus scoparius*), gorse (*Ulex europaeus*), and blackberry (*Rubus fruticosus*). All sightings of declared weeds were restricted to the eastern 1 km of the proposed road that runs closest to the McRobie's Gully Waste Management Centre and McRobie's Road.

*Plate 14: Spanish heath seedling common on the Main Fire Trail clearing*

### 3.3.2 Cinnamon root-rot fungus (*Phytophthora cinnamomi*)

Commonly referred to as dieback or root rot fungus, *Phytophthora cinnamomi* (*PC*) is a soil-borne fungus exotic to Tasmania. The fungus is pathogenic, requiring plant tissue as a food source. High degrees of susceptibility to *PC* are known to occur within members of the Ericaceae and Proteaceae[42]. When infected susceptible species display a characteristic progression of morphological traits, beginning with leaf yellowing, progressing to substantive dieback (browning), and ending in death. Other potentially fatal processes, such as drought, can cause similar visual symptoms to *PC*, but the impact of drought at a given location tends to vary less within and between species. Thus, a mosaic of symptomatic and healthy plants can be a good indicator of the presence of *PC*, in particular if symptoms are concentrated in susceptible species and in moist locations. *PC* requires warm moist soils if it is to reproduce and spread. This limits its distribution in Tasmania to areas that are generally below approximately 700 m in altitude. These characteristics means that the susceptibility of the vegetation communities in the study area is generally low.

No signs of *Phytophthora* have been observed during the field surveys.

## 3.4 Fauna of Conservation Significance

### 3.4.1 Habitat assessment

Habitat quality in the survey area varies in relation to potential use by threatened species.

- The Pinnacle area includes massive boulder fields with numerous caves and shelters. Likely to be utilised by smaller vertebrates but as the location is exposed to extreme weather and unlikely to be used for larger vertebrate fauna for much of the year although Bennett's wallaby *Macropus rufogriseus* is resident in warmer months.
- The rock scree at the site for the Temporary Installation Net provides habitat features that are suited to a range of smaller vertebrates and invertebrates.
- The wet forests which retain mature and overmature eucalypts, e.g. upslope of the Base Station, support a diversity of hollow features and large fallen logs. There are obvious den-like hollows at the base of some of the largest trees. Collectively these are a rich resource for hollow nesting birds and mammals, denning animals and a diversity of invertebrates.
- The McRobie's Gully slopes support rocky outcrops (Plate 15) with evident fauna activity and several obvious hollows and small den like caves. There are multiple large trees near the upper sections any of these large enough to carry hollows in the upper branches. Some obvious trunk hollows can be seen from ground-based inspections. Collectively, these provide potentially significant habitat for vertebrates.
- No carnivore scats were located other than those of domestic dogs suggesting that if present they are in low densities.
- Camera traps confirmed the presence of a Tasmanian devil *Sarcophilus harrisii* and an eastern quoll *Dasyurus viverrinus* inspecting a small cave entrance in rocky outcrops in McRobie's Gully. This same entrance was also recorded being utilised by an owlet nightjar *Aegotheles chrisoptus*. An eastern quoll was also captured on a second camera close by. All observations are detailed in Appendix C – Targeted Fauna Survey.

[42] Podger and Brown (1989); Barker and Wardlaw (1995)

- Targeted song meter recording for masked owls *Tyto novaehollandiae castanops* (Appendix C) in the vicinity of the saddle at the top of the Access Road failed to provide any evidence.

### 3.4.2 Nearby records and habitat mapping

Several threatened and/or migratory fauna are identified as having the potential to occur in the study area based on broad scale habitat mapping presented within the EPBC Protected Matters database or have verified observations within 5 km according to the Tasmanian Natural Values Atlas. Table 4 provides a description of the preferred habitat of these species and an assessment of the likelihood of their occurrence[43].

*Plate 15: Rocky outcrops on upper slopes of McRobie's Gully*

[43] Note, obligate marine species are also excluded, as the proposal will have no conceivable impacts on such species.

*Plate 16: Likely tree hollows in* E. obliqua *McRobie's Gully section*

*Table 4: Fauna species of conservation significance known within a 5 km radius of the survey area, or with the potential to occur based on EPBC habitat mapping* [44]

| Species | Status[45] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[46] |
|---|---|---|---|
| **AMPHIBIANS** | | | |
| green and gold frog *Litoria raniformis* | Vulnerable/ VULNERABLE | None | In Tasmania, the species occurs in lowland areas in the south-east and north, breeding in permanent freshwater or slightly brackish habitats, generally with emergent vegetation. It has declined significantly (over 20 %) in range and abundance over the last 10 years, having disappeared from much of the southern range. The nearest confirmed records to Hobart are from Richmond.<br>The study areas are not within 5 km of any previous records of this species nor within 5 km of any core habitat patches according to the NVA. No suitable habitat was observed. |
| **BIRDS**<br>NB Coastal species included in EPBC Protected Matters Search are not considered due to absence of habitat | | | |
| Tasmanian masked owl *Tyto novaehollandiae castanops* | Endangered/ VULNERABLE | Moderate | Requires a mosaic of forest and open areas for foraging and large old-growth hollow-bearing trees for nests. Core range covers all habitat below 600 m a.s.l, but significant habitat is dry forest with mature habitat elements within that range[47].<br>There are two records on NVA of birds observed within 500m of the lower development area. There are old-growth trees with the potential of supporting nesting hollows in the vicinity of the Base Station, Towers 1 and 2 and along sections of the Access Road. |
| Tasmanian azure kingfisher *Ceyx azureus* subsp. *diemenensis* | Endangered/ ENDANGERED | None | A single record only from within 5 km. Species primarily utilises riverine environments, particularly in western Tasmania.<br>No suitable habitat on site. |

[44] NVA reports_ 8 & 9-Oct-2018 (DPIPWE), DPIPWE, 2018. EPBC Act Protected Matters Report, Commonwealth of Australia, 29/10/2018.
[45] Tasmanian *Threatened Species Protection Act 1995,* Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
[46] Threatened Species Section (2018)
[47] FPA (2014)

| Species | Status[45] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[46] |
|---|---|---|---|
| Swift parrot *Lathamus discolor* | Endangered/ ENDANGERED | Foraging: Moderate<br>Nesting: Moderate | The site is located within the core breeding and foraging range of the species. 2 records from within 500 m, but numerous records from within 5 km. Nesting habitat requires tree hollows, foraging habitat includes flowering blue gums (*Eucalyptus globulus*) and/or black gums (*E. ovata*).<br>Localised patch of foraging/nesting habitat at start of Access Road near McRobie's Rd. Large hollow bearing trees along the upper section of the Access Road, near the Base Station and Towers 1 and 2 provide both potential foraging (blue gums) and nesting habitat. |
| Forty-spotted pardalote *Pardalotus quadragintus* | Endangered/ ENDANGERED | Very Low | No records from within 500 m, 10 records within 5 km. Primarily restricted to 5 locations along the east coast: Flinders Island, Maria Island, Bruny Island, Howden and Tinderbox. Species occurs in dry grassy forest containing mature white gum (*E. viminalis*).<br>No likelihood of breeding colonies on site, White gums are occasional in forest along the route of the Access Road. These may provide foraging habitat for non-breeding birds. |
| grey goshawk *Accipiter novaehollandiae* | Endangered/ - | Foraging: Low<br>Nesting: Low | In Tasmania, the grey goshawk is a large, pure white raptor. The species nests in mature wet forest, usually near a watercourse. Non-breeding birds can utilise open woodland and urban fringes for foraging. Most nests are in the north and west of the State, but smaller breeding populations also occur in the south-east including the North West Bay catchment of Wellington Park and potentially elsewhere.<br>Marginally suitable foraging habitat, nearest potentially suitable nesting habitat is in Myrtle Gully approx. 500 m SW of the Base Station below the route of the cableway. |
| Tasmanian wedge-tailed eagle *Aquila audax* ssp. *fleayi* | Endangered/ ENDANGERED | Foraging: Moderate<br>Nesting: Very Low | Pairs of the wedge-tailed eagle defend a large territory, nesting in patches of mature forests with sheltered aspects throughout Tasmania. The total adult population has been estimated at less than 1000 birds. While individual responses vary, disturbance occurring even many hundreds of metres away can cause breeding birds to temporarily leave eggs or chicks at risk, or even to desert their nest site for years. Disturbances involving helicopters can be particularly serious. Disturbances involving people tend to be more serious when the disturbance is atypical.<br>No nest for this species is known from the vicinity with the nearest nests on the north side of the Wellington Range.<br>Viable nesting habitat occurs in the wet eucalypt forest north of the Base Station area in the |

| Species | Status[45] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[46] |
|---|---|---|---|
| | | | upper catchment of McRobie's Gully on steep easterly facing slopes supporting large trees. The proximity of this habitat to the landfill site, recreational bike riders and walkers is likely to make the area unattractive to breeding birds. |
| white-bellied sea eagle<br>*Haliaeetus leucogaster* | Vulnerable/ | Very Low | A species largely of coastal environments or large inland waterbodies.<br>No nest for this species is known from the vicinity.<br>As for the previous species likelihood of nesting is area is very low. |
| Australasian bittern<br>*Botaurus poiciloptilus* | - / ENDANGERED | None | The Australasian bittern occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.<br>No suitable habitat occurs within the study area. |
| **INVERTEBRATES** | | | |
| *Antipodia chaostola leucophaea*<br>Tasmanian chaostola skipper | Endangered/ ENDANGERED | None | No record from within 500 m of the proposal and 3 from within 5 km. It has been recorded from Knocklofty Reserve to the north of McRobie's gully. Key habitat is associated with the larval food plant, the thatch saw sedge *Gahnia radula* which grows in heathy woodland and open forest.<br>Only potential habitat for this species is in the Access Road section although no observations were made of the *Gahnia radula*. |
| *Discocharopa vigens*<br>Ammonite snail | Endangered/ CRITICALLY ENDANGERED | None | This is a tiny land snail that has been recorded from just seven locations around Hobart, of which it has only been confirmed in recent years from two despite numerous targeted surveys. It is typically located beneath dolerite rocks. The nearest known populations are close to the Access Road at Hillgrove and near Sandy Bay rivulet south of Huon Rd.<br>The rock type along the corridor of the Access Road is sedimentary and so not consistent with known habitat for this species. Dolerite is only present at higher elevations in the project area well outside the altitudinal range for the species. |
| *Lissotes menalcas*<br>Mount Mangana stag beetle | Vulnerable/ - | Low-moderate | A species associated with decaying logs in wet forests. There is one record within 500m from 1910 and 3 within 5 km. Suitable habitat is present on site within WOB and WGL near the lower towers in the form of large rotting logs. |

| Species | Status[45] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[46] |
|---|---|---|---|
| | | | It is possible that the quality of the habitat has been compromised due to 2 severe bushfires in the time since the last nearby record. |
| *Exquisitiropa agnewi* Silky snail | Rare/ - | Moderate-High at the Temporary Installation Net. Low-moderate Pinnacle Centre | This species is endemic to Mt Wellington where it has been collected in amongst leaf litter especially under dolerite scree. The NVA lists 6 records from within 500 m and 30 within 5 km. Restricted to dolerite talus on Mount Wellington between 550-1200 m.<br>The site for the Temporary Installation Net has suitable habitat with dolerite scree being common and known records nearby. The Pinnacle Centre may also occur within suitable habitat considering recent records from the vicinity (Bonham 2018). |
| **FISH** | | | |
| Australian grayling *Prototroctes maraena* | Vulnerable/ VULNERABLE | None | A diadromous species (*i.e.* one that has both marine and freshwater stages of its lifecycle) that occurs in major rivers and unpolluted streams with large pools, particularly in low and mid-catchment areas where there are no barriers to the sea. Adults spawn in streams over gravel beds and the young migrate to sea for a period before moving back into rivers.<br>No suitable breeding habitat occurs within the study area. The impact area is in the catchment of the Cascade Rivulet however urban development and channelization downstream has reduced water quality and structure of the waterway. |
| **MAMMALS** | | | |
| spotted-tailed quoll *Dasyurus maculatus* subsp. *maculatus* | Rare/ VULNERABLE | Foraging: low Denning: very low | This naturally rare forest-dweller occurs widely in Tasmania and most commonly inhabits rainforest, wet forest and blackwood swamp forest. It forages and hunts on farmland and pasture, travelling up to 20 km at night, and shelters in logs, rocks or thick vegetation.<br>One observation on NVA is attributed to within 500 m of the of the proposal and a further 12 within 5 km.<br>Parts of the study area may occur within the home range of resident spotted-tailed quolls; however, the location is outside the core range. No evidence of scats was observed.<br>Denning habitat can include rocky outcrops, large logs and underground hollows. Potential denning habitat is widespread across the slopes of Mt Wellington including sections within the lower tower sites. |

| Species | Status[45] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[46] |
|---|---|---|---|
| eastern quoll<br>*Dasyurus viverrinus* | /<br>ENDANGERED | Foraging: Present<br>Denning: Moderate | The eastern quoll is widespread in Tasmania and was previously widespread in mainland south-eastern Australia but has been effectively extinct there since 1963 (some reintroductions have occurred). Not currently listed as threatened species within Tasmania under the TSPA.<br>The species' distribution is associated with areas of lower 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. This species will often be observed around dwellings in peri-urban locations. The lower section of the proposal is within core habitat for the species.<br>The species has 16 observation record attributed to within 500m and 66 within 5 km of the survey area, including very recent sightings.<br>Potential den sites are widespread in the area and may extend into the vicinity of the Base Station and Access Road. Activity near Access Road was recorded. |
| eastern-barred bandicoot<br>*Perameles gunnii gunnii* | -/<br>VULNERABLE | Moderate | This species occurs in agricultural areas in the state's southeast, northeast and northwest. It favours a mosaic of open grassy areas for foraging and thick vegetation cover for shelter and nesting. Removal of plant cover in agricultural areas is seen as one of the main threats to the species.<br>A single observation records of this species is known within 500 m of the lower section of the proposed development from 2014. Core range habitat is present within the lower portion of the proposed development area. The most likely areas to support this species are the properties with pasture and gardens with forest interface. Bandicoots may forage in the grassy habitats of the Main Fire Trail near the Base Station site. |
| Tasmanian devil<br>*Sarcophilus harrisii* | Endangered/<br>ENDANGERED | Foraging: Present<br>Denning:<br>Low – restricted to fallen logs | The Tasmanian devil 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 hotpots with concentrated scavenging resource. Populations have declined substantially since the first observations of the infectious cancer Devil Facial Tumour Disease (DFTD). DFTD has now spread across much of Tasmania. The reduced population is also likely to be more sensitive to additional threats such as death by roadkill, competition with cats and foxes, and loss or disturbance of areas surrounding traditional dens where young are raised. The protection of breeding opportunities is particularly important for the species due |

| Species | Status[45] TSPA / EPBCA | Potential to occur | Observations and preferred habitat[46] |
|---|---|---|---|
| | | | to the mortalities from demographic pressures.<br>There are no records on NVA within 500m of the proposed development area, however there are 49 within 5 km. No potential den locations were observed during ground searches.<br>Denning habitat can include rocky outcrops, large logs and underground hollows. Potential denning habitat is widespread across the slopes of Mt Wellington including sites in the vicinity of much of the project area. Activity near Access Road was recorded |
| **REPTILES** | | | |
| Tussock skink<br>*Pseudemoia pagenstecheri* | Vulnerable/<br>- | None | Occurs in *Poa* tussock grassland and *Themeda* grassland without trees. No suitable habitat is present within survey area. Nearest record from Queens Domain. |

# 4 ASSESSMENT OF IMPACT AND MITIGATION

## 4.1 The Impact

All vegetation clearance will be confined to the development footprint. The Construction Methods report included with the DA (VOS dated 2 Nov 2018) articulates how operations will be conducted. The following statements draw heavily from that document supplemented with verbal advice from the author (Mark Millhouse, VOS) over a number of specific matters.

### 4.1.1 Access Road

Figure 4 presents the footprint in relation to the ecological survey results.

The road design was used to inform the survey area and was buffered by 5m. This defines the 'disturbance footprint'. No disturbances outside this corridor are anticipated.

### 4.1.2 Base station

Figure 5 presents the footprint in relation to the ecological survey results.

All laydown areas and site offices will be located in the area of the future car park. Access will utilise the proposed access road. All of the disturbances are anticipated to fall within the footprint of the investigation area. Construction access will be via the newly constructed access road. Laydown and site office will utilise the newly constructed car park.

Disturbance (other than requirements for bushfire hazard management) will be confined to less than 4m buffer around the edge of the building design. This defines the 'disturbance footprint'.

The bushfire hazard management area[48] is defined separately as it will not result in conversion to impervious surfacing, but it will require the removal of trees and other woody vegetation within the requisite zone of management (Figure 5).

### 4.1.3 Towers 1 and 2

Figure 6 present the 'disturbance footprint' in relation to the ecological survey results.

Preliminary geotechnical investigations will utilise a small drilling rig that will be helicoptered in onto a temporary treated pine platform (2.4m x 2.4m). Materials for the platform will be carried in by hand or lowered in by helicopter.

The tower footprints are less than 10m x 10m, inside the survey area. No machinery access tracks are proposed to either tower. A walking track for maintenance purposes will be built by hand and will connect the Base Station to the tower sites (300m). This will follow a course beneath the cableway which has been included in the ecological surveys. This foot track can be used for personal access for construction work and for future maintenance. A small excavator and tower material will be lowered in by helicopter directly to the tower site footprints.

[48] Castellan Consulting 2021

Concrete for footings will be pumped from trucks parked in the newly constructed car park. The pipes will be laid along the foot track extending for 300m.

The proponents[49] indicate that the extent of clearance for the cableway is minimal with a 9m corridor of foliage needing to be cleared between the Base Station and Tower 1 as the cable car ascends through the canopy. From Tower 2 the route is understood to be well clear of the canopy for the remainder of the journey. The risk of tree fall threatening the stability of towers may need to be determined to understand whether surrounding trees would be considered a hazard. If this were the case, then the scale of impact could be significantly larger.

### 4.1.4 Tower 3

Figure 9 presents the development in relation to the ecological survey results.

Preliminary geotechnical investigations will utilise a small drilling rig that will be helicoptered in onto a temporary treated pine platform (2.4m x 2.4m). Materials for the platform will be carried in by hand or lowered in by helicopter. Route for foot traffic must be clearly defined and locations of sensitive vegetation identified to ensure their protection.

Access is via the Pinnacle Centre site. Access by foot can be achieved utilising an existing foot pad created by rock climbers. The extent of disturbance has been contained within the area surveyed.

Concrete footings will be pumped using a pipe combining rigid 3.6m sections of solid pipework. Flexible rubber houses can also be utilised if necessary. These will be laid over the vegetation. Where practical the foot pad can be followed. Considering the low-lying vegetation and exposed rocks this can be achieved with minimal impact to vegetation.

For all construction work a Helicopter Use Plan will be developed which specifies routes and includes procedures to minimise risk of interactions with wedge tailed eagles.

### 4.1.5 Pinnacle Centre

Figure 9 presents the Pinnacle centre design in relation to the ecological survey results. The 'disturbance footprint' for the Pinnacle Centre includes the new walkway, the Pinnacle Centre buffered by 2m and the area of the temporary ramp.

Preliminary geotechnical investigations will utilise a small drilling rig that will be helicoptered in onto a temporary treated pine platform (2.4m x 2.4m). The drill rig is a purpose built for remote area exploration drilling and is lightweight and able to be transported by helicopter (Appendix E). Materials for the platform will be carried in by hand or lowered by helicopter. Any sensitive habitats such as the patch of montane violet (*Viola curtisiae*) will be marked by an ecologist to avoid inadvertent impacts.

Laydown and Site Office will utilise the existing Pinnacle car park. Impacts to routine car parking are not known but should be managed to avoid overflow impacts.

[49] A Bold pers com

Disturbance outside the building will mostly be in the form of compaction arising from construction activities. The bushfire hazard management area is confined to 1m from the building edge [50]. Plate 1 in Appendix F shows the Maydena Eagles Eyrie main building in relation to surrounding vegetation. This is a comparable structure in a comparable mountain top location.

Access to the site of the main structure will be achieved using a temporary ramp that will extend on the south side of the existing viewing structure. A 4m by 75m ramp will be bolted to rocks. No excavations are required for the construction of this ramp. Plates 2 and 3 Appendix F identify a similar structure at Maydena. This will be in place for 14-15 months and removed at completion of construction. No lasting impact to vegetation is anticipated. However, short term impacts will be very much dependent on the height and gap above existing vegetation to allow space for light and moisture to maintain the flora. All site office, laydown etc will be contained within the existing car park.

## 4.2 Native Vegetation Communities

Table 5 summarises the anticipated extent of clearance associated with each aspect of the project.

- Disturbance along the Access Road is limited to the design corridor which includes the full extent of cuttings and embankments, plus a nominal buffer of 5m.
- The Base Station is largely confined to the existing fire trail. There appears to be some minor vegetation clearance required for the upper car park (Figure 5). Additional vegetation clearance for bushfire hazard management will involve clearance of WOB vegetation and conservation significant trees (Figure 5).
- The tower sites are limited to a 12 m diameter footprint – all infrastructure to be lowered in by helicopter.
- There will be no clearance associated with the cable infrastructure other than the section between the Base Station and first tower where canopy removal is anticipated.
- Vegetation disturbance for the summit infrastructure will not extend more than 2m from the design plan footprint.
- The new boardwalk will not disturb any more than the its own surface area cover.

The 'disturbance footprint' of the development on the Pinnacle has been identified as 4330 sqm (2120 sqm for the Pinnacle Centre, 1140 for the 2m buffer for BHM and construction impacts, 270 sqm for the temporary access ramp, 690 sqm for the boardwalk and access steps and 110sqm for the Tower site) (Figure 10). Note the existing walkway will be removed allowing the full recovery of HHE over 210 sqm. Following this and the removal of the temporary access ramp the Permanent footprint of impact will be able to be reduced to 3850 sqm.

[50] Castellan Consulting 2021

*Table 5: Vegetation impacts by section*

| Location | Vegetation Community | Area of impact | Comment |
|---|---|---|---|
| Access Rd (outside Wellington Park) | DOB<br>DTO<br>DGL | 2.29 ha<br>3.16 ha<br>0.20 ha | Footprint includes earthworks +5m disturbance buffer |
| Base Station incl Towers 1 and 2, car park, firefighting access and road in Wellington Park | WOB<br>WGL<br>DOB | 0.29 ha<br>0.15 ha<br>0.09 ha | Footprint includes design +2m disturbance buffer |
| Base Station Bushfire Hazard Management Area | WOB | 0.37 ha | Effective clearance of the vegetation |
| Temporary Installation Net | DCO | 0.01 ha | Temporary disturbance |
| Tower 3 | HHE | 0.01 ha | Localised disturbance |
| Summit infrastructure incl boardwalk, temporary access ramp | HHE | 0.42 ha | Footprint includes design +2m disturbance buffer Some vegetation will persist/recover beneath the boardwalk and around the boundaries of the summit station |

### 4.2.1 Impact to threatened vegetation

The project area does not contain any nationally threatened ecological communities listed under the EPBCA. It includes two communities listed as threatened on the Tasmanian NCA.

- DGL – *E. globulus* forest – 0.20 ha
- DTO – *E. tenuiramis* forest on sediments – 3.16 ha

The remaining communities are well reserved at the State level. One other community, HHE qualifies as rare at the Bioregional level due to there being approximately 300 ha present.

- HHE – Eastern alpine heathland – 0.43 ha

To further minimise net losses, revegetation could provide mitigation in areas where clearance of native vegetation is not required to be a permanent loss (e.g. construction disturbance footprints)[51]. Suitable revegetation can be selected from the species lists in Appendices A and B.

[51] This will be contingent upon detailed project specifics unavailable at this time

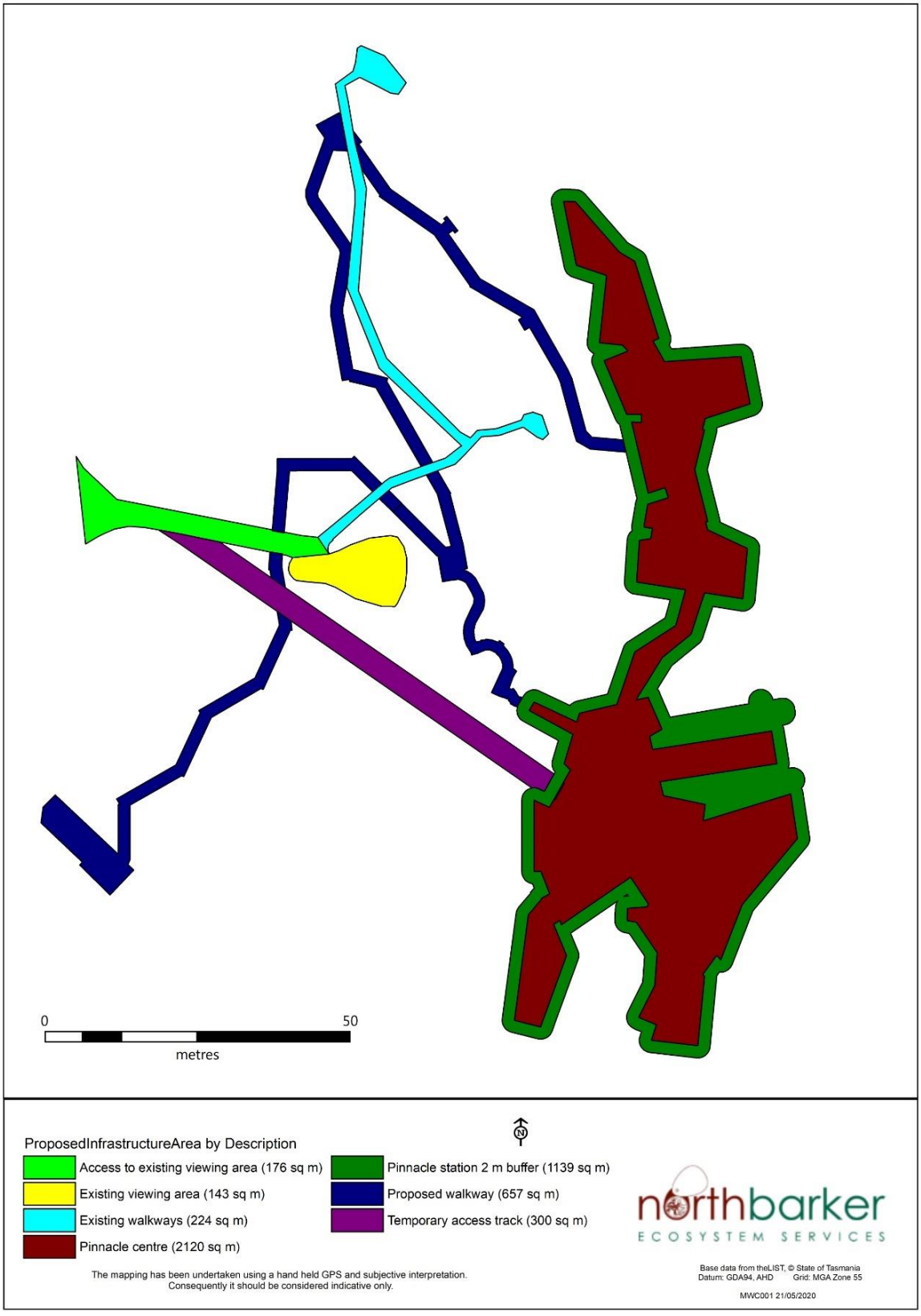



*Figure 10: Summit Infrastructure footprints*

## 4.3 Threatened and Conservation Significant Flora

Section 3.2.1 describes one threatened flora species (*Viola curtisiae*) as being impacted and identifies two others as having varying likelihood of being impacted.

No nationally listed (EPBCA) flora are at risk of being impacted.

*Viola curtisiae* is a tiny herb only recently confirmed from Mt Wellington, being previously thought to be confined to Mt Field. Recent surveys have shown it to be widespread across several widely dispersed locations across the Wellington Range. One patch plus scattered smaller patches are intersected by the Pinnacle Centre. It is likely that targeted surveys in the vicinity would identify many more patches in the Pinnacle area. The scale of impact is not significant in terms of the conservation of the species.

The provision of a Pinnacle Centre rooftop garden may create translocation opportunities for these plants. It is acknowledged however that the chances of success in such an endeavour are unknown.

A significant impact to a threatened flora would occur if a population of the endangered *Corunastylis nudiscapa* were confirmed within the corridor of the proposed Access Road. It is worth noting that previous targeted surveys for this species in the vicinity as well as surveys over two successive years for this project have not been successful, so the likelihood is low. A second less significant midge orchid, *Corunastylis nuda,* listed as rare*,* has been reported from the McRobie's Gully area although no data exists for the record on the Natural Values Atlas.

## 4.4 Threatened Fauna

### 4.4.1 Tasmanian devil, spotted-tailed quoll and eastern quoll

These species are wide-ranging carnivores, with foraging locations largely driven by prey occurrences rather than habitat types or conditions (more so for the devil than the quolls). Due to the more specific and critical nature of breeding sites (natal dens), these are treated with priority in impact assessments and mitigation measures.

No high-quality denning habitat for Tasmanian devils has been identified in the study area. Dens within the project area include small hollows and shelters. Rocky outcrops occur in the McRobie's Gully section of the Access road which may be utilised by eastern quolls. Rock shelters in the subalpine areas are unlikely to be suitable for denning purposes although they may act as temporary holdups.

Each of the species may use habitat in the vicinity of the Base Station. A Tasmanian devil and eastern quoll have both been observed during camera surveys of the Access Road, however no devil dens were located during extension surveys.

Denning sites of each species, especially natal dens, are located in well concealed locations to provide protection from predators. Habitats in the vicinity of the Base Station support the most favourable sites for these purposes.

Operational impacts arising from the project include the risk of roadkill to animals foraging in the McRobie's Gully area especially after dark. This also extends to prey mortalities resulting in scavenging within the road with consequent roadkill hazard to devils and quolls. Such risks can be mitigated by placing traffic calming devices on the road. Roadkill mitigation strategies for the Access Road are considered in detail in Section 4.6.

Incentives to encourage evening visitors to the Pinnacle Centre to use the cableway will help to offset risk of increased roadkill threat on the Pinnacle Road. Modelling suggests that traffic volume will be reduced on Pinnacle Road[52]. This should result in concomitant reduction in incidences of roadkill on Pinnacle Road itself.

[52] Midson 2018

### 4.4.2 Tasmanian masked owl

Potential habitat for the masked owl is defined as all areas that have trees with large hollows (≥ 15 cm entrance diameter); with trees over 100 cm DBH (diameter at breast height) having a higher probability of containing such hollows. Significant habitat includes native dry forest areas that contain trees with large hollows (≥ 15 cm entrance diameter). Remnants and paddock trees in agricultural areas may also constitute significant habitat if they include large old hollow-bearing trees. Threats to the masked owl include habitat clearing and fragmentation, loss of nesting habitat through tree dieback, competition for tree hollows, secondary poisoning and collision mortality.

Along the alignment of the Access Road there are a number of mature and larger sized trees including some blue gums close to McRobie's Road and stringybarks along the upper section. The placement in dry forest is potentially suitable for masked owls. Tree hollows are not easily discerned from the ground.

The Base Station area is surrounded by large hollow-bearing trees, many with trunk diameters (DBH) > 100 cm. It is likely that some hollows would be suitable for masked owls. These extend to the vicinity of both lower tower sites. This is wet forest which is suboptimal with drier habitats being preferred. No masked owls were recorded during a 3-week period of monitoring using a song meter placed at the saddle at the top of the Access Road which was considered the most likely habitat.

The project is unlikely to change prey densities (including introduced species) resulting in a change to foraging behaviour other than through a heightened risk of roadkill which could attract scavenging animals such as Tasmanian devils. The provision of traffic calming to reduce this risk is discussed in Section 4.6.

Nest trees in close proximity to the Access Road, Base Station and Towers 1 and 2 may be disrupted by the changes in activity resulting from the operations of the cableway.

The extent of likely impacts to potential nesting trees are included in Table 6. These include 24 in Wellington Park and 12 on the Access Road. A subset of these are likely to support hollows of required dimensions.

### 4.4.3 Swift parrot

Swift parrots are annual summer migrants to Tasmania. From August to March they feed primarily on the nectar of the Tasmanian blue gum (*Eucalyptus globulus*) and black gum (*E. ovata*). Breeding occurs in tree hollows in areas adjacent to abundant flowering.

The sections of WGL and WOB forest contain mature blue gums. Due to the stressed condition of the majority of these trees (historic fire damage, small crowns, low crown density and negligible flower capsules) they only constitute low quality swift parrot foraging habitat being unlikely to flower prolifically. A smaller patch of DGL closer to McRobie's Road does support trees that are likely to provide foraging habitat in mast years. Three blue gums were recorded along the remainder of the corridor of the Access Road. Blue gums are also located just upslope of the car park at the Base Station.

Nesting habitat is present in the slopes in the vicinity of the Base Station and may also occur in the vicinity of the Access Road. Nest trees in close proximity to the Access Road, Base Station and Towers 1 and 2 may be disrupted by the changes in activity resulting from the operations of the cableway.

There are blue gums downslope of the fire trail adjacent to the Base Station that may bring birds closer to ground level should they be foraging out of those trees. Any infrastructure provides a potential collision hazard should it be unseen by the birds. Of greatest risk are open fencing, wires and buildings with reflective glass or see through

corners. There are standard building design features to minimise bird collision[53]. These should be incorporated into the building design.

Swift parrots are less likely occur at higher altitudes such as the Pinnacle Centre.

Habitat trees accord to accepted standards[54]. Potential foraging trees are *E. globulus* or *E. ovata* with DBH > 40cm. Nesting habitat trees are considered most typically associated with trees with DBH of 70 cm and above recognising that larger diameter trees have a greater potential for hollows. High quality mature habitat trees are those with a DBH > 150 cm in wet forest and >100 cm in dry forest, medium quality mature habitat is defined as trees with a DBH of 70-100 cm in dry forest and 100-150 cm in wet forest.

The extent of impacts to foraging and potential nesting trees are provided in Table 6.

Total numbers of impacted trees include:

- 37 potential foraging trees (*Eucalyptus globulus* with DBH > 40cm); 30 of which are in Wellington Park.
- 18 high quality nesting habitat trees; 6 in Wellington Park and 12 in HCC Access Road.
- 45 medium quality nesting trees; 9 in Wellington Park and 36 in HCC Access Road.
- 11 trees < 70cm but potentially hollow bearing in HCC Access Road.
- Total impact to potential habitat trees includes 91 nesting trees and 37 foraging of which 24 are both nesting and foraging habitat.

Confirmation of nesting habitat presence requires, in most instances, climbing of the tree to provide a high level of confidence, although even then not all hollows can be accessed e.g. spouts at ends of long branches. Some hollows are not observed from the ground and those that are apparent can often be determined to be inadequate on closer inspection. Quantification of tree hollow impacts for offset could be determined by inspecting trees after they have been felled.

### 4.4.4 Wedge-tailed eagle

Wedge-tailed eagles require large trees capable of supporting the massive nests, usually eucalypts, in sheltered aspects typically high in a gully. The upper catchment of McRobie's Gully provides the necessary attributes suitable for nesting. However, the proximity to the noises and activities of the landfill site and periodic disturbances from cyclist and walkers in the fire trail suggest the area is unlikely to be favoured for establishing a nest. There is no record of nesting on the city side of Mt Wellington. The likelihood of disturbance to breeding is therefore considered to be remote.

The risk of flying into cableway infrastructure warrants consideration. Wedge-tailed eagles suffer mortality from electrocution by colliding with high voltage powerlines. They may also suffer broken wings by such impacts. The cableway cables will extend high above the ground, potentially within flight paths. Cableway cables diameters are significantly larger than transmission line wires and are bundled together. As such they are likely to be more easily seen and avoided. The utilisation of airspace by eagles on the upper slopes of Mt Wellington in front of the Organ Pipes is not known.

Collision risk is considered further in Section 4.5.

[53] Pfennigwerth 2008
[54] Forest Practices Authority 2014

### 4.4.5 Silky snail

The silky snail habitat is typically associated with dolerite talus with recent records coming from "sparsely vegetated dolerite boulder fields, rocky subalpine woodlands and wet scrub, and rocky areas in alpine scrub and heathland"[55]. The Pinnacle Centre site and temporary tower include habitat for the silky snail.

The size of the footprint in the context of the extent of habitat (Figure 11) suggest impact to the species would be insignificant. A recent review of the silky snail notes that "land clearance within the species' habitat (for instance the proposed building of cable car infrastructure and a tower near the summit) is likely to eradicate the species from areas cleared or built over but will not necessarily affect it beyond that".

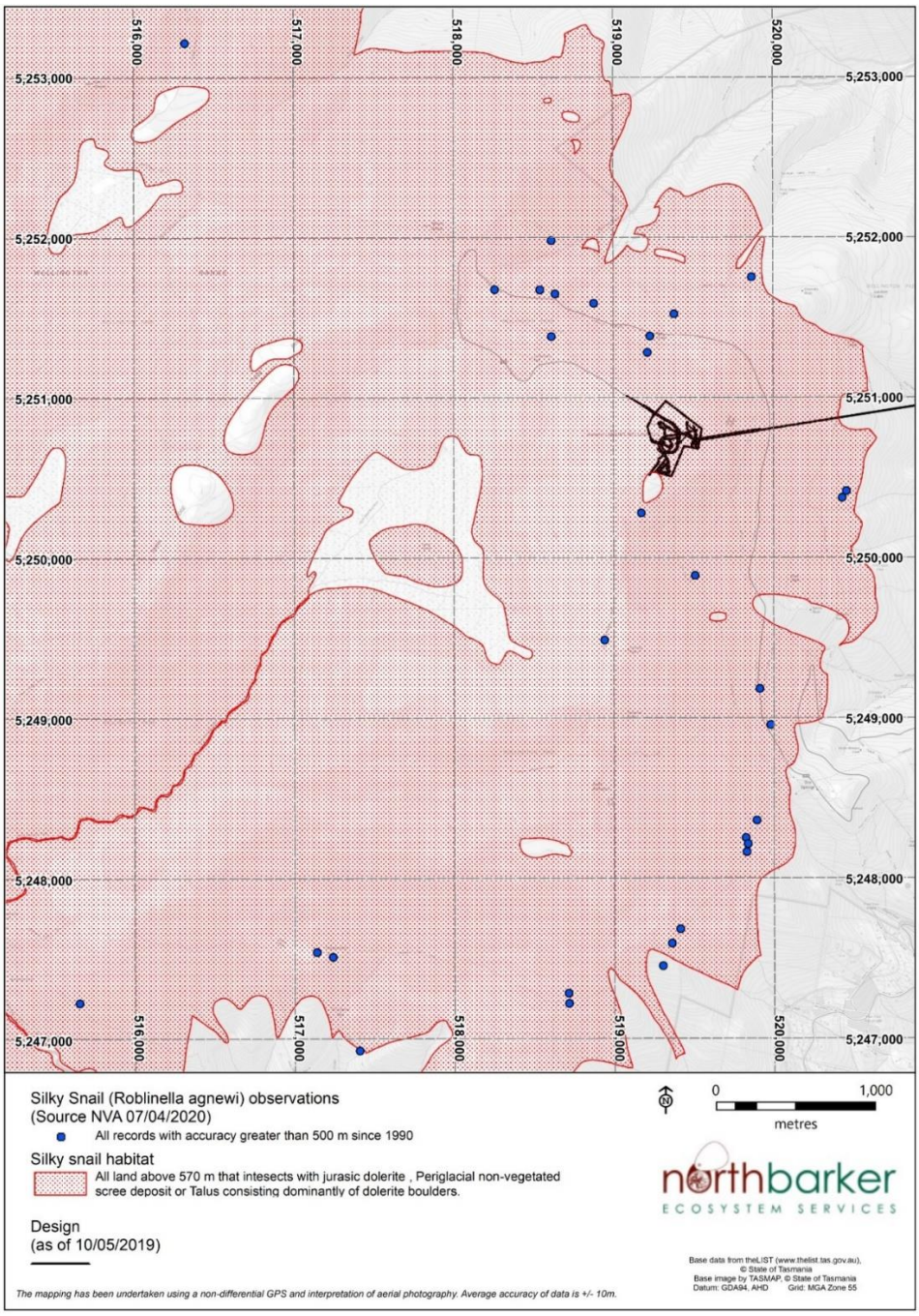



*Figure 11: Silky snail distribution and habitat*

[55] Bonham 2018

### 4.4.6 Habitat Trees

All potentially significant hollow bearing trees, have been surveyed and mapped (Appendix D – Fauna Habitat Tree Assessment). The total expected impact is summarised in Table 6. Trees with an impact >50% to their Tree Protection Zones (TPZ) are treated as being fatally impacted as the tree itself falls inside the footprint of the development. Trees with impact from 10-50% suffer potentially significant encroachment. An impact of <10% is not considered significant in accordance with the Australian standard.

*Table 6: Total predicted impact to habitat trees*

***Large trees (DBH > 70 cm) or ones carrying obvious hollows or hollow-bearing potential if <70cm***

***HCC = Hobart City Council, WPMT = Wellington Park Management Trust***

| **Tenure** | **HCC** | | | **HCC Total** | **WPMT** | | | **WPMT Total** | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| **Impacted** | **<70** | **70 - 100** | **>100** | | **<70** | **70-100** | **>100** | | |
| *Eucalyptus globulus* | 0 | 2 | 1 | 3 | 0 | 0 | 10 | 10 | 13 |
| *Eucalyptus obliqua* | 16 | 34 | 11 | 61 | 0 | 0 | 14 | 14 | 75 |
| *Eucalyptus tenuiramis* | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| **Total** | 16 | 39 | 12 | **67** | 0 | 0 | 24 | **24** | **91** |

An Arborist Assessment was conducted in July 2019 by Element Tree Services (Appendix H). This quantified the number of high conservation trees that could be impacted as **74**.

There may be opportunity to reuse tree hollow structures. Sections of branches and even trunks can be relocated and strapped onto nearby trees[56]. The provision of artificial nest boxes can also supplement any losses. This is discussed further in Section 5.5.2 Habitat Enhancement.

*Access Road (HCC & WPMT)*

**36** trees in the road corridor are expected to be critically damaged. It was noted that engineering solutions may be able to reduce this number. In particular, at the stage of detailed design for the road there will be opportunity to investigate further opportunities to reduce the total number of trees impacted, mainly through locally steepening of cuts and fills.

*Base Station and Towers 1 and 2 (WPMP)*

An additional **38** trees will be critically damaged (/removed) around the base station, towers and cable alignment. The major requirement for these losses are the conditions around compliant bushfire hazard management.

Additional trees that may require pruning were determined by the arborist to be unlikely to suffer any major health impacts.

[56] Central Coast Council 2016

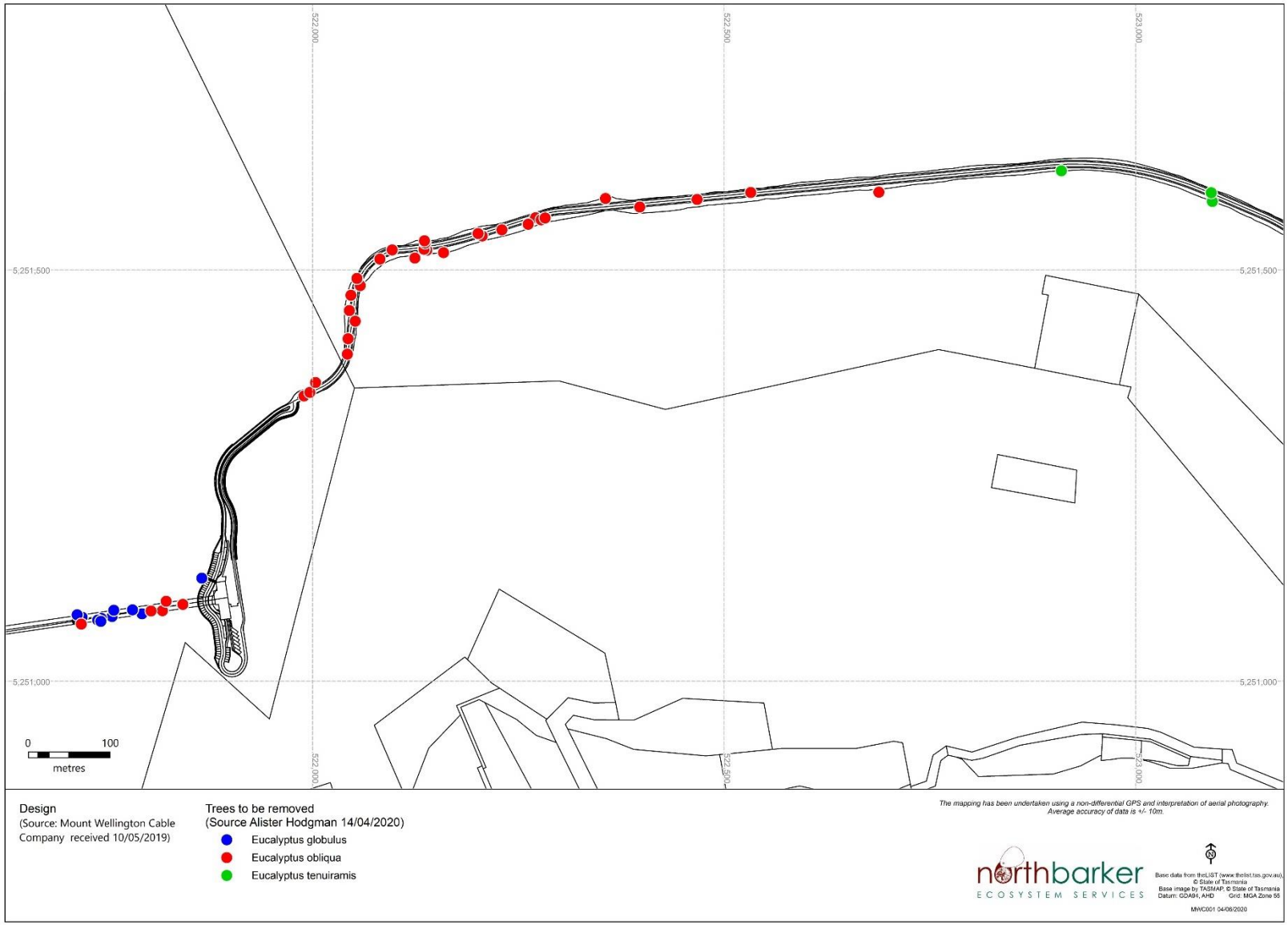



*Figure 12: Impacted Habitat Trees*

## 4.5 Bird collision risk

***Note since writing this section a separate stand-alone Collision Risk Report has been prepared in response to Council RFI[57]. Please refer to that.***

There is very little scientific literature relating to the effects of overhead lines on bird mortality in Australia, however some broad lessons can be extracted from existing international research. The rates of bird collision with overhead lines are generally thought to be influenced by several factors associated with engineering aspects of the infrastructure[58]. These include:

- Wire diameter
- Line placement
- Line configuration (vertical or horizontal, number of lines)
- Lighting
- Structure type

The risks associated with each factor are addressed below.

*Wire diameter*

There is a general lack of understanding of the relationship between bird mortalities and overhead line diameter because of the challenge of accurately estimating mortality. This is partially due to the difficulties of locating carcasses of birds that strike lines then survive for a short period ("crippling bias"[59]).

The majority of studies on bird collisions with lines focus specifically on power cables due to their abundance in the landscape. It is generally understood that shield/earth wires (1-1.3 cm) cause the majority of collisions, with the phase conductors (2.5 to 5 cm) posing less risk. Though this may be a combination of the fact that shield/earth wires are generally located above phase conductor lines (*i.e.* collisions occurring when trying to avoid the more obvious and larger lines) and are less visible. The current cableway cable design specifies two sets of a bundle of three (2 x 55 mm and 1 x 40 mm). This far exceeds above parameters. The presence of the cable cars may pose a risk of sudden disturbance to birds in the canopy, causing panic and flush, a contributing factor to incidences of cable collision[60].

It is worth noting that high voltage electricity transmission lines are already present in the vicinity.

*Line placement*

Lines placed in proximity to bird take-off and landing areas can pose a greater than normal risk to birds, in the case of the cableway line the vast majority of take-off and landing areas would be the forest canopy.

*Line configuration*

Line configuration is broadly focused on minimizing the vertical spread of lines, vertical placement of lines, as well as clustering lines that share the same right-of-way in order to increase their visibility. Where lines are placed level with, or below the canopy, there has been shown to be reduced risk of bird mortality[61]. Although it is not feasible in this instance to retain the cabling below the canopy the clustering of the cables in groups of three will increase their visibility.

[57] North Barker Ecosystem Services (2020a)
[58] Avian Power Line Interaction Committee (APLIC) (2012), Bernadino *et al* (2018)
[59] Bech *et al.* (2012)
[60] Avian Power Line Interaction Committee (APLIC) (2012)
[61] Avian Power Line Interaction Committee (APLIC) (2012)

*Lighting*

This refers to towers for lines that have white or red lights to increase visibility. They have been shown (particularly steady-burning lights) to disorientate migrating birds, especially in inclement weather[62], as well as cause birds to circle towers, causing exhaustion, injury, or death. The degree of risk is closely linked to the type and intensity of lights[63]. The extent of permanent lighting is not known but Is not anticipated to be significant in these terms.

*Structure type*

This generally applies to types of towers used and their structural effect on rates of mortality. The structural principles would also apply to any permanent structures aside from the cableway itself. The risk of bird collisions with buildings are closely related to the reflections and transparency of the windows. Glass can reflect the natural environment around it, and this effect increases when glass is viewed from an oblique angle. Birds cannot understand reflection, and they also cannot perceive the difference between clear glass and unobstructed airspace. This is a particularly prominent risk in glass lobbies, balconies, aligned windows, or windows and glass walls that meet at a corner. All these design factors need to be considered when assessing bird collision risk. The elevations in the architectural plans suggest the Pinnacle Centre is set low in the landscape wrapping around the contour. Windows are set back in rather than being proud with many tilted downwards which assists with limiting reflectivity of sky which is known to create the greatest risk of collision hazard.

## 4.6 Roadkill mitigation

***Note since writing this section a stand-alone Roadkill Risk Report and Draft Mitigation Plan has been prepared in response to Council RFI[64]. Please refer to that.***

Several measures can be used to reduce wildlife roadkill. These can be incorporated into a Roadkill Mitigation Plan (before construction. The following methods are considered for the McRobie's Gully access road.

### 4.6.1 Traffic calming

The camera survey confirmed the presence of threatened fauna but did not identify specific areas of increased usage. Speed bumps or chicanes be implemented on the road. The McRobie's Gully Waste Management Centre will attract wildlife as well as the rocky outcrops identified as potential fauna habitat (Appendix C – Targeted Fauna Survey). These areas should be priorities for traffic calming measures, however as a precaution they ought to be spread throughout the full extent of the road.

### 4.6.2 Wildlife signage

Wildlife signs portraying the risk to wildlife and human safety/provide a useful way of alerting drivers to the hazards. As most of the Tasmanian wildlife are nocturnal these signs can also include a regulatory or advisory speed limit from dusk to dawn. A sign can be placed at the start of the Access Road at the halfway point, and at the Base Station for returning visitors. Any signs should follow recommendations for wildlife signs in *Reducing the Incidence of Wildlife Roadkill: Improving the Visitor Experience in Tasmania*[65].

[62] Manville 2009, Gehring et al 2009
[63] Avian Power Line Interaction Committee (APLIC) (2012
[64] North Barker Ecosystem Services (2020b)
[65] Z. Magnus, L.K. Kriwoken, N. Mooney, & M. Jones. *Reducing the Incidence of Wildlife Roadkill: Improving the Visitor Experience in Tasmania, pp. 8-9.*

### 4.6.3 Table drain management

Wildlife can be attracted to the road by water in roadside drains and/or herbaceous vegetation growing by the roadside as a result of run-off from roads. Reducing these resources could reduce the amount of wildlife attracted to the road. To reduce vegetation growth of herbaceous vegetation on the roadside, the affected areas could be sprayed regularly with a biodegradable herbicide. Herbaceous roadside vegetation should not be slashed or mown, as this creates new growth which is attractive to herbivores. To reduce water, drains could be lined with concrete so that the water could drain away quickly rather than pooling in the drains or fill the drains with boulders to prevent access to water while allowing water to flow.

### 4.6.4 Virtual fencing

Given that the camera survey showed devils and quolls using the site, virtual fencing may be effective as an additional roadkill mitigation method. Virtual fencing devices are mounted on a pole and are solar powered. The device is activated by approaching headlights, which cause it to emit sound and light stimuli which alerts, startles and prevents animals from entering the road.

A virtual fence was tested at a site in Arthur River, on Tasmania's north west coast. Devices were installed on both sides of the road, but staggered, so that there was a 50m distance between devices on the same side of the road, and a 25m distance between devices on the opposite side of the road. This creates a virtual fence of noise and light when the devices are triggered by the car headlights. The results of this study showed a reduction in total roadkill, and that of the common species (pademelons and Bennett's wallabies), by 50 percent[66]. As well as reducing direct deaths of animals hit by vehicles, there was a reduction in Tasmanian devils killed while scavenging on roadkill.

### 4.6.5 Underpasses

Underpasses such as a 300-450 mm diameter culvert, could be installed to facilitate wildlife safely crossing the road. They are more likely to be useful for the smaller Tasmanian mammals and those that use burrows (Tasmanian devils, quolls, bandicoots, wombats etc). Likely locations could include a site near the McRobie's Gully Waste Management Centre and adjacent to the potential denning habitat on the upper slopes.

### 4.6.6 Canopy crossings

Canopy crossings are used to ensure that roads do not restrict movement of animals and to reduce roadkill. They have been used in Queensland and at a site in Tasmania for ringtail possums. No ringtail possums were detected during our camera survey of the McRobie's access road and no ringtail possum scats were observed whilst conducting the ground survey, therefore the ecological benefit of installing a canopy crossing is not guaranteed. However, where there are large trees near to the road, some crossings may be pertinent to provide an opportunistic crossing mechanism should any arboreal animals use the area. It is suggested that brushtail possums are more likely to cross at ground level.

### 4.6.7 Escape routes

Banks, cuttings and fences that trap animals on the road are associated with roadkill. In order to increase the likelihood of escape from the road, escape routes could be constructed along the access road. If deep gutters and steep embankments occur along the access road, a ramp connecting the road verge to the top of the

[66] S. Fox, J.M. Potts, D. Pemberton, & D. Crosswell. (2018) *Roadkill mitigation: trialling virtual fence devices on the west coast of Tasmania.* Australian Mammalogy.

embankment could be installed. A drainage pipe incorporated under the ramp will provide temporarily shelter right next to the road. Example designs for effective escape routes for wildlife are detailed in *Reducing the Incidence of Wildlife Roadkill: Improving the Visitor Experience in Tasmania*[67].

## 4.7 Weeds

Earthworks associated with clearance and infrastructure construction present a risk of spreading weeds, both onsite and offsite. Development activities for this proposal may result in the spread of the seven declared weeds present at the lower section of the Access Road and in the vicinity of the Base Station.

The major area of weed infestation is confined to the first section of the Access Road adjacent to McRobie's Road. Any works in this area will risk spreading weed propagules elsewhere along the Access Road. Earthworks in this area will stimulate further weed growth.

Three declared weeds recorded in the fire trail close to the Base Station are mostly localised although spanish heath seedlings are common. Disturbances will stimulate germination of soil borne seed.

The risk of introducing or spreading weeds near the summit is low.

Control of declared and environmental weeds during and following construction will minimise the risk of their spread and the introduction of new weeds. Weed control should include preliminary weed removal prior to civil works and be supplemented by follow-up measures to target any regenerating plants post-construction. During construction, weed management should include wash-down of earth-moving machinery before leaving the site in order to prevent the transport of fertile material[68]. These methods can assist in significantly reducing the chance of weeds being spread on and off site. Project specific measures can be incorporated into a weed and hygiene protocol under a Construction Environmental Management Plan.

The ongoing risk of future introductions will be a consequence of a new Access Road. Management of this threat will necessitate ongoing monitoring and response during the operational phase of the project.

## 4.8 Phytophthora cinnamomi

The movement of soil and machinery during the earthworks process poses a risk of introducing and/or spreading *Phytophthora cinnamomi* (PC). However, given the habitats the risks are confined to the section between McRobie's Road and the Base Station.

Best practice hygiene measures[69] during construction will minimise the risk of introducing and spreading PC.

[67] Z. Magnus, L.K. Kriwoken, N. Mooney, & M. Jones. *Reducing the Incidence of Wildlife Roadkill: Improving the Visitor Experience in Tasmania, pp. 14-15.*
[68] DPIPWE (2015b)
[69] DPIPWE (2015b)

# 5 LEGISLATIVE IMPLICATIONS

## 5.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBCA)

The project will require consideration of the potential for significant impacts on any Matters of National Environmental Significance (MNES), which could trigger the need for assessment as a controlled action under this legislation. The proponent will undertake this with a referral to the federal Department of Agriculture, Water and the Environment, which will include the context of our survey results and discussion.

## 5.2 Tasmanian Threatened Species Protection Act 1995 (TSPA)

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.

A permit to take a threatened species (*Viola curtisiae*) will likely be required where the project cannot directly avoid known (or future discovered) occurrences of threatened flora.

## 5.3 Tasmanian Nature Conservation Act 1995 (NCA)

Under Wildlife (General) Regulations 2010 Tasmania a permit to take wildlife or product of wildlife will be required for this project if during works any unanticipated discoveries of dens or nests need to be decommissioned or individual threatened fauna are to be impacted or captured.

## 5.4 Tasmanian Weed Management Act 1999 (WMA)

Seven species of declared weeds have been observed in the survey area. The relevant statutory weed management plans define the Hobart City Council as a Zone B municipality for gorse, blackberry, English broom, Montpelier broom, boneseed, Spanish heath and willow.

According to the provisions of the *Weed Management Act 1999*, Zone B municipalities are those which host moderate or large 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. This includes preventing spread of the declared weed from the municipality or into properties currently free of the weed or which have developed or are implementing a locally integrated weed management plan for that species. As well there is a requirement to prevent spread of the weeds to properties containing sites with significant flora, fauna and vegetation communities.

Management of declared weeds is being undertaken in Wellington Park. Weed management will need to be followed to ensure the objectives of the Weed Management Act are met.

## 5.5 Tasmanian Land Use Planning and Approvals Act 1993 (LUPAA)

LUPAA states that 'in determining an application for a permit, a planning authority must (amongst other things) seek out the objectives set out in Schedule 1'[70].

Schedule 1 includes 'The objectives of the Resource Management and Planning System of Tasmania' which are (amongst other things):

[70] Section 51(2)(b) – Part 4 Enforcement of Planning Control – Division 2 Development Control (*LUPPA 1993*)

'To promote sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity'.

Sustainable development includes 'avoiding, remedying or mitigating any adverse effects of activities on the environment'[71].

The intent of LUPAA is addressed through relevant provisions in the Hobart Interim Planning Scheme 2015 and the Wellington Park Management Plan 2013.

## 5.6 Hobart Interim Planning Scheme 2015 (HIPS)

The first 900m of the Access Road is within the Utilities Zone (D28), the rest is within the Environmental Management Zone (D29); Figure 13. The Biodiversity Protection Area overlay accords with the Environmental Management Zone and does not extend into the Utilities Zone. The Biodiversity Code (E10) applies to the part of the project within the overlay.

The Pinnacle Centre is located within the Pinnacle Specific Area and as such planning assessment for this area follows the Pinnacle Specific Area Plan (refer Section 5.7.3), although still needs to be assessed under the Environmental Management Zone (5.6.2).

### 5.6.1 Utilities Zone (D29)

There are no provisions relating to the regulation of vegetation clearance. The Development Standards for Buildings and Works (D28.4 do not include any provisions applicable to the access road other than potentially landscaping 28.4.3. The most effective visual break from land in the residential zone would be achieved by retaining as many canopy trees as possible. Some planting around the intersection with McRobies Road would contribute to fulfilling the Performance Criteria P1

### 5.6.2 Environmental Management Zone (D29)

29.1.1 Zone Purpose Statements

1. To provide for the protection, conservation and management of areas with significant ecological, scientific, cultural or aesthetic value, or with a significant likelihood of risk from a natural hazard.
2. To only allow for complementary use or development where consistent with any strategies for protection and management.
3. To facilitate passive recreational opportunities which are consistent with the protection of natural values in bushland and foreshore areas.
4. To recognise and protect highly significant natural values on private land.
5. To protect natural values in un-developed areas of the coast.

Clauses 1 and 2 are relevant to this project and need to be met with appropriate controls on development and mitigation. The development area includes some significant ecological values (notably the alpine habitats near the summit of Mt Wellington, threatened vegetation, and threatened species habitat). Opinions on what constitutes significant aesthetic value is outside the scope of a natural values assessment but is broadly acknowledged as being pertinent to the summit area and slopes of Mt Wellington visible from many parts of Greater Hobart.

[71] page 56 – *LUPPA 1993*

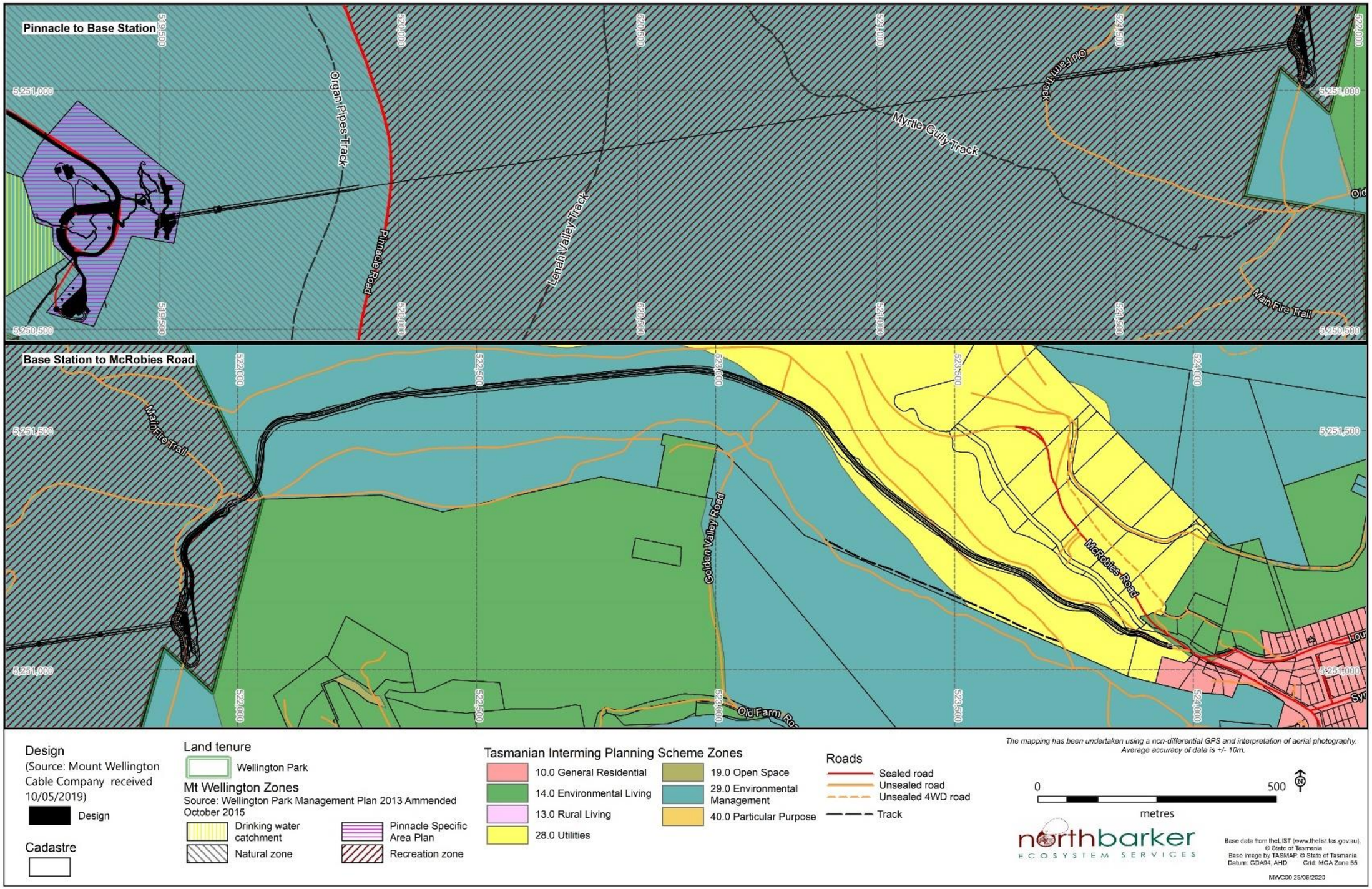



*Figure 13: Planning Zones*

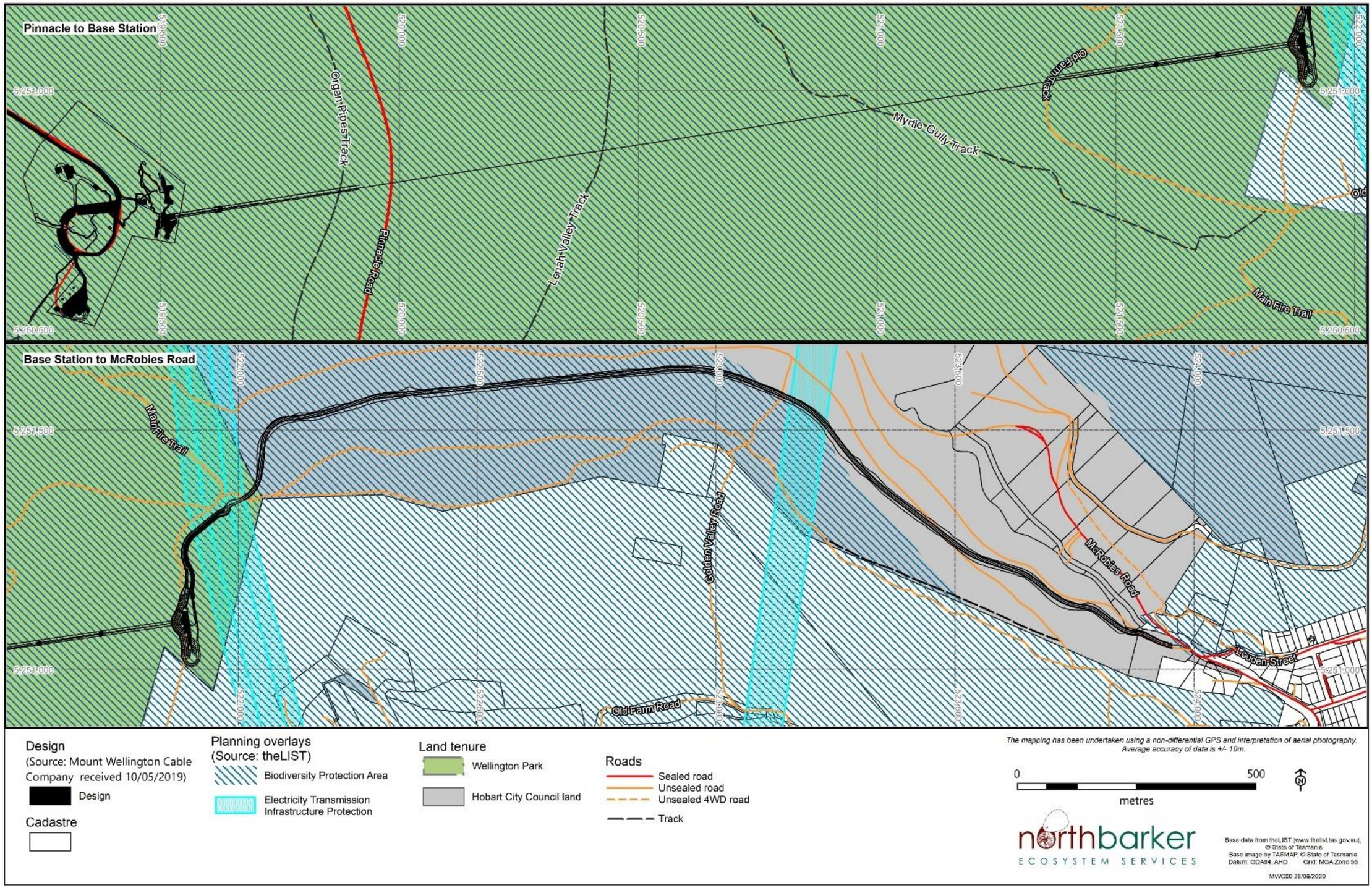



*Figure 14: Planning Overlays*

29.4 Development standards for Building and works.

29.4.1 (Building height) and 29.4.2 (Setback) are not considered here but it is understood that the cableway and associated infrastructure development is a permitted use as it is included in the Wellington Park Management Plan 2013.

29.4.3 Design may need to be assessed against Performance criteria P1

The location of buildings and works must satisfy all of the following:

(a) be located in an area requiring the clearing of native vegetation only if:

(i) there are no sites clear of native vegetation and clear of other significant site constraints such as access difficulties or excessive slope;

(ii) the extent of clearing is the minimum necessary to provide for buildings, associated works and associated bushfire protection measures;

(iii) the location of clearing has the least environmental impact;

Each of the elements of the project are considered against these criteria below:

| Location | 29.4.3 | Comment |
|---|---|---|
| Access Road | (i) | No alternative option that avoids vegetation is available. |
| | (ii) | This can be achieved for the access road by incorporating the need to minimise vegetation loss into the final design. |
| | (iii) | No alternative alignment linking start and end can avoid the high priority vegetation.<br>The Access Road alignment has been modified to avoid direct impact to rocky habitat features that support potential threatened fauna habitat (devils and quolls).<br>Constraints for maintaining adequate road grade limits the opportunity to avoid all large habitat trees. However, their locations have been accurately surveyed so that, where possible local steepening of cuts and fills will limit impacts to nearby trees. |
| Base Station | (i) | The existing fire break is used for the access road section through Wellington Park as much as is practical. Opportunity has been taken to utilise a cleared corridor for the Base Station limiting the need for tree clearance. |
| | (ii) | Repeated consultation with the Tasmanian Fire Service over requirements for bushfire hazard management has resulted in a requirement to modify the specified amount of vegetation around the base station, with the subsequent losses of wet forest habitat and constituent habitat trees discussed in our assessment and the arborist report. Nonetheless the proposal still meets this criteria on the basis that the clearing is the minimum necessary to have a compliant hazard management plan and accommodate the necessary infrastructure components. |
| | (iii) | Clearing likely to avoid high conservation values. |
| Towers 1 and 2 | (i) | Impossible to avoid some impact, especially between Base Station and Tower 1. Actual extent of clearance subject to detailed design. |
| | (ii) | Towers to be lowered in by helicopter minimising the extent of clearance. |
| | (iii) | Minor adjustment to Tower 2 placement may ensure largest habitat tree (2m DBH blue gum) can be retained. |

| | | |
|---|---|---|
| Temporary Installation Net | (i) (ii) (iii) | Unlikely to require any vegetation clearing. |
| Tower 3 | (i) | Impossible to avoid some impact. |
| | (ii) | Tower to be lowered in by helicopter minimising the extent of clearance. |
| | (iii) | Use of alternate location that is practicable to the project would not reduce impact. |
| Pinnacle Centre | (i) | Impossible to avoid some impact. |
| | (ii) | Building to be lowered in by helicopter in sections. Access to utilise cableway limiting need to disturb surrounding vegetation in construction. |
| | (iii) | No alternate locations assessed. Limited scope of adjusting placement of infrastructure. Use of existing walkway would limit need for further impacts. |

### 5.6.3 Biodiversity Code (E10)

Figure 14 present the Biodiversity Protection Area overlay. The Biodiversity Code applies 'to development involving clearance and conversion or disturbance of native vegetation within a Biodiversity Protection Area (E10.2.1)". E10.7.1 Buildings and Works Acceptable Solution cannot be met as clearance is not confined to low priority biodiversity values (c i) and the clearance will exceed 1000m$^2$ (cii). The total area of vegetation within the BPA outside Wellington Park is 3.08 ha. The development therefore needs to be considered against Performance Criteria (P1). These build on the priority status of vegetation proposed for clearance and conversion as follows:

| **Performance Criteria** | **Priority value** |
|---|---|
| (i) development is designed and located to minimise impacts, having regard to constraints such as topography or land hazard and the particular requirements of the development; | High, moderate, low |
| (ii) impacts resulting from bushfire hazard management measures are minimised as far as reasonably practicable through siting and fire-resistant design of habitable buildings; | High, moderate, low |
| (iii) remaining high priority biodiversity values on the site are retained and improved through implementation of current best practice mitigation strategies and ongoing management measures designed to protect the integrity of these values; | High, moderate |
| (iv) special circumstances exist; | High |

The priority values identified for each section are listed below:

| **Location** | **Priority value** | **Comment** |
|---|---|---|
| Access Road (outside Wellington Park) | High | Sections of DTO - 1.60 ha<br>Potential denning habitat eastern quoll.<br>Potential threatened fauna habitat trees. |
| Base Station | High | Native vegetation WOB<br>Potential threatened fauna habitat trees. |
| Towers 1 & 2 | Moderate | WGL – Tower 1 |

| | | |
|---|---|---|
| | | Potential nesting habitat for swift parrot – both Tower 1 and 2 |
| Temporary Installation Net | Low | Native vegetation DCO |
| Pinnacle Centre | Low | Native vegetation HHE |

DGL, a threatened vegetation community, is not included in the Priority table as its only occurrence in the project area is located outside the Biodiversity Protection Area overlay and so is excluded from the provisions of the Biodiversity Code.

Other fauna habitats may exist, but these are unlikely to be 'highly significant' as defined in the E10.1A for rare species and so will not apply to the Pinnacle Centre or Temporary Installation Net.

Each portion of the development is considered against the Performance Criteria (E10.7.1 P1) in line with the priority value being impacted.

| **Location** | **E10.7.1 P1** | **Comment** |
|---|---|---|
| Access Road<br>(High) | (i) | Road alignment has been modified to avoid denning habitat and to avoid large trees wherever possible. Local steepening of cuts and fills will limit impacts to nearby trees. |
| | (ii) | No fire hazard management is required through this section as the development is a road only. |
| | (iii) | A detailed Construction Environmental Management Plan can include specific measures to ensure any impacts are contained within the immediate footprint. Opportunities can be sought to improve the current standard of management to tackle existing threats such as weeds which will potentially improve the condition of retained vegetation. Further details of Mitigation Strategy are provided below. |
| | (iv) | *Special circumstances are considered to exist if one or more of the following*<br>*(a) the use or development will result in significant long term social or economic community benefits and there is no feasible alternate location*. – Not considered as outside the remit of this report.<br>*(b) ongoing management cannot ensure the survival of the high priority biodiversity values on the site and there is little potential for recruitment or for long term persistence*. – No. We take this to mean that even with dedicated management the priority biodiversity values are not viable and will not survive in the long term and so their presence should not preclude development. This clause would typically apply to small and highly degraded patches of priority vegetation.<br>*(c) the development is located on an existing lot within the Low Density Residential, Rural Living or Environmental Living Zone and is for a single dwelling and/or associated residential outbuildings or works*. – No. |
| Base Station<br>(High) | (i) | The placement of the Base Station is largely within an existing fire break thus minimising impact. Minor clearance for a road on the east side of the Base Station; the upper car park and bushfire hazard minimisation requirements extend into low priority vegetation but potential habitat trees for threatened fauna will be required to be removed. |

| Location | E10.7.1 P1 | Comment |
|---|---|---|
| | (ii) | Building standard has minimised extent of vegetation clearing necessary for fire hazard management[72]. Requisite clearance impacts low priority vegetation only in terms of the community, but includes high priority values in the form of potential habitat trees for threatened fauna. |
| | (iii) | A detailed Construction Environmental Management Plan can include specific measures to ensure any impacts are contained within the requisite direct impact footprint (including the BHMA). Mitigation options have been proposed to offset the loss of potential foraging habitat trees with replacement plantings, and loss of potential nesting cavities with artificial replacement. |
| | (iv) | *Special circumstances are considered to exist if one or more of the following*<br><br>*(a) the use or development will result in significant long term social or economic community benefits and there is no feasible alternate location*. – Not considered as outside the remit of this report.<br><br>*(b) ongoing management cannot ensure the survival of the high priority biodiversity values on the site and there is little potential for recruitment or for long term persistence*. – No. We take this to mean that even with dedicated management the priority biodiversity values are not viable and will not survive in the long term and so their presence should not preclude development. This clause would typically apply to small and highly degraded patches of priority vegetation.<br><br>*(c) the development is located on an existing lot within the Low Density Residential, Rural Living or Environmental Living Zone and is for a single dwelling and/or associated residential outbuildings or works*. – No. |
| Towers 1 and 2<br><br>(Moderate) | (i) | Impossible to avoid some impact, especially between Base Station and Tower 1. The use of two towers ensures cable car rises more steeply from Base Station so reducing the extent of canopy clearance. Towers to be lowered in by helicopter minimising the extent of clearance. Minor adjustment to Tower 2 may ensure largest habitat tree (*E. obliqua* with 2m DBH) can be retained. |
| | (ii) | No fire management required here. |
| | (iii) | All vegetation outside the site of impact can be retained. Opportunity to improve through ongoing site management. |
| Temporary Installation Net<br><br>(Low) | (i) (ii) | Not applicable as unlikely to require any vegetation clearing. |
| Pinnacle Centre Tower 3<br><br>(Low) | (i) | Impossible to avoid some impact. Tower to be lowered in by helicopter minimising the extent of clearance. Opportunity to utilise existing boardwalk rather than constructing a new walkway would potentially reduce footprint further although relative to main footprint benefit is proportionately low. |

[72] Castellan Consulting 2021

| Location | E10.7.1 P1 | Comment |
|---|---|---|
| | (ii) | The Bushfire report[73] provides for 1m vegetation to be cleared around perimeter of building. |

Outside Wellington Park

The Access Road is predominantly outside Wellington Park. *The Guidelines for the Use of Biodiversity Offsets in the local planning approvals process* [74] discuss mitigation and the relationship to offsets.

> "The Biodiversity offsets refer to measures that compensate for the residual impact of an action on a biodiversity value(s), such as clearance of native vegetation. Offsets provide environmental benefits to counterbalance the impacts that remain after avoidance and mitigation measures are exhausted" pg15

Offsets are considered "the final component of a mitigation hierarchy".

Mitigation hierarchy (Principle 1 from STCA 2013)

1. Avoid – Not possible
2. Minimise impact – Realignment of the road has avoided localised rocky outcrop fauna habitat. Tightening of batters reduces the footprint size.
3. Rehabilitate. The new batters will be subject to revegetation works incorporating methods such as: use of slashed material for the cleared vegetation, which will help stabilise the ground and capture organic material and locally sourced seed; replanting at the junction with McRobie's Road; and landscaping throughout the road corridor to restore ground cover plants.
4. Offset the residual impacts – the key component of this will be the Habitat Enhancement which will offset any tree hollow impacts. There is also opportunity to consider the contribution towards an offsite offset for loss of vegetation community through existing conservation programs such as the Private Land Conservation Program (PLCP) overseen by the Tasmanian Land Conservancy obo DPIPWE. However, with appropriate mitigation the extent of residual impact does not justify an offsite offset.

Habitat Enhancement

Tree hollows that are lost to vegetation clearance can be replaced with artificial structures such as nest boxes and constructed hollows. The re-use of natural hollows however has been shown to have a higher level of utilisation. This seems particularly the case with large birds such as owls and cockatoos [75]. Methods that have been successfully applied include the reuse of hollow sections and even entire trunk sections.

Hollow augmentation can be achieved through the removal of rotten branch base in the hollow and by fixing an artificial floor in the hollow. Cavities can be cut into upright branches and trunks that are then covered with a faceplate with a bored-out entrance. Branch stubs can be bored to create hollows and left open for large entrances or covered with a face plate and then new access drilled. Applying these techniques, it is

[73] Castellan Consulting 2021
[74] Southern Tasmanian Councils Authority 2013
[75] Guidelines for the Relocation of Large Tree Hollows, NSW Central Coast Council, Wyong, 2016

possible to replace any lost hollows (with any offset multiplier) to effectively create an increased hollow availability in the vicinity.

Once the extent of tree removal is finalised, then the affected trees can be assessed, and material from the trees repurposed for the project. Some trees that are deemed at risk from the works can be effectively retained in situ by pruning of main trunk and branches to reduce wind drag such that they are no longer are at risk of blowing over. Multiple hollows can be created within these trees. These techniques are explained further in *Pruning for Habitat* [76]. Graphic examples of practical habitat enhancement techniques to create artificial hollows are provided in Appendix J.

## 5.7 Wellington Park Management Plan 2013

The ***Wellington Park Act 1993*** provides authority to the Wellington Trust to take legislative responsibility for determining the nature of development in accordance with the *Wellington Park Management Plan 2013*. This is articulated in Section 8.2 – *Objectives for Assessing and Managing, Use and Development;* relevant to the subject of this report involves "protecting the Park's natural, cultural and use values by requiring environmentally sustainable development, behaviour and practices".

The Park is divided into Management Zones, several of which are relevant to this proposal.

| Location | Wellington Park Management Zone | Comment |
|---|---|---|
| Access Road | n/a | Outside Wellington Park |
| Base Station | Recreation Zone | Including Towers 1 & 2 |
| Temporary Installation Net | Natural Zone | |
| Tower 3 | Natural Zone | |
| Pinnacle Centre | Recreation Zone | Pinnacle Specific Area |

One of the management objectives of the Natural Zone is to "protect plant and animal species and communities" Impacts to the Tower Site 3 should therefore be undertaken with considerable care to minimise the extent of any such impacts.

### 5.7.1 Recreation Zone – Base Station only

Standards for Use and Development pertaining to flora and fauna for the Recreation Zone (Base Station). Pinnacle Centre is assessed against the Pinnacle Specific Area Plan in 5.7.3.

A2.1 Native Vegetation

(a) WGL, WOB, DOB are the impacted vegetation communities. None of these are listed as threatened under the NCA. "Significant vegetation" is not defined in the WPMP although the plan refers to significance being contributed to by "poorly reserved' plant communities (p 21). WGL is a poorly reserved community[77]. This

[76] Victorian Tree Industry Organisation 2010
[77] Adequate reservation levels for non-threatened vegetation are broadly recognised as less than 15% of pre-European extent (Commonwealth of Australia 1997). Although the pre-1750 extent of WGL has not been assessed, TASVEG 3 (DPIPWE 2014) identifies there to be 1700 ha in reserves, 26 % of a total area of 6800 ha mapped state-wide. The loss of WGL is likely to exceed 50 % qualifying this community as being poorly reserved.

occupies the corridor between the Base Station and Tower 1 where some vegetation clearing will be required. There are no Trust endorsed scientific assessments that deal with flora and fauna[78].

(b) Vegetation along the corridor between the Base Station and Tower 2 includes some large hollow bearing trees that may provide nesting habitat for threatened fauna such as swift parrot and (less likely) masked owl. The footprint of the development (within Wellington Park) is expected to result in the loss of 30 potential foraging trees for the swift parrot and 24 trees with hollow-bearing potential.

P2.1. Native Vegetation

Native vegetation supporting WGL, WOB, DOB TASVEG forest communities will be impacted through localised clearance. WOB and DOB communities are widespread and abundant in the area, and the proportionate loss is small. WGL is not uncommon (but considerably less extensive in area than WOB and DOB - although it is potentially under-mapped due to limitations on discriminating between wet forest units where aerial imagery is relied on) and the proportionate impact is low given there is more than 94 ha mapped in Wellington Park. The clearance footprint is the minimum required to complete the development and achieve compliance with matters such as bushfire hazard management. Measures to protect retained vegetation from inadvertent damage during construction will minimise long term impacts beyond the necessary footprint.

The design and construction techniques have utilised opportunities to minimise the scale of disturbance through placement of main building and access road in an already cleared area. The tower construction will incorporate techniques obviating the need to build construction tracks, instead relying on the assembly on site with major infrastructure being lowered in by helicopter (refer to the Construction Methods - VOS Nov 2018).

P2.2 Threatened Species

No threatened flora species have been recorded and the likelihood of any occurring is considered low.

Impacts to threatened fauna habitat, particularly potential habitat trees for swift parrot and potentially masked owl, cannot be avoided.

Remedying Adverse Impacts

The risk of any impact to vegetation outside the development footprint will be minimised through strict exclusion areas being defined in the works contract. These will be translated into the use of temporary exclusion fencing to define the limitation to any operations on site.

The provision of best practice stormwater runoff control through sediment fencing inside the footprint of development will be provided. All of the above can be developed in a Construction Environmental Management Plan which should be approved prior to the commencement of any works.

Approximately 1000 sqm of already cleared land located upslope of the Access Road (Figure 15) can be replanted with eucalypts, ultimately replacing the losses of potential swift parrot foraging trees in particular. There is scope to plant 50 trees at 5m spacing, which would provide an offset of approximately 1.7:1 for potential foraging trees if *Eucalyptus globulus* are planted.

[78] A von Krusenstierna pers com

A habitat replacement plan is outlined in section 5.6.3 which provides a mechanism to offset loses of hollows through provision of artificial structures.

Although there will be a net loss of vegetation and mature habitat trees in the short term, the recommended measures will ensure these impacts are avoided in the long term.

**Issue 2: Flora and Fauna Conservation, Geoconservation and Natural Processes**

**Objective:** To conserve flora, fauna, geological and geomorphological values, and to protect natural processes.

| Acceptable Solutions | Performance Criteria |
|---|---|
| **A2.1** Native vegetation<br>The proposal does not impact upon terrestrial or aquatic native vegetation which:<br>(a) is listed as significant in this Management Plan or any planning strategy or Trust endorsed scientific assessment, prepared in accordance with this Management Plan; or is a Threatened Vegetation Community under the *Nature Conservation Act 2002.*<br>(b) supports, or forms habitat for any species of fauna listed in the *Threatened Species Protection Act 1995* or the *Environment Protection and Biodiversity Conservation Act 1999.* | **P2.1** Native vegetation<br>Any adverse affects on terrestrial or aquatic native vegetation or habitat values must be avoided, or remedied to ensure no long term impact on vegetation values. |
| **A2.2** Threatened Species<br>The proposal does not impact upon any threatened species listed under the *Threatened Species Protection Act 1995* or the *Environment Protection and Biodiversity Conservation Act 1999.* | **P2.2** Threatened Species<br>Any adverse affects on nationally or State listed rare, threatened or endangered species, communities or habitats must be avoided or remedied to ensure no long term impact on vegetation values. |

### 5.7.2 Natural Zone

The Standards for Use and Development pertaining to flora and fauna are the same in the Natural Zone (Temporary Installation Net and Tower 3) as they are for the Recreation Zone (5.7.1).

A2.1 Native Vegetation

(a) HHE is the impacted vegetation community (Tower site 3). This is not listed as significant in the Management Plan and there are no Trust endorsed scientific assessments that deal with flora and fauna. HHE is not listed as threatened under the NCA. The term "significant vegetation" is not defined in the WPMP although the plan makes reference to sensitive vegetation in the alpine area. The Park Activity Assessment form (Appendix 3C of the WPMP) makes reference to "natural values" including "vegetation that is known to have a slow recovery rate after disturbance". HHE being an alpine community would fall into this category.
(b) Rocky habitats at both the Temporary Installation Net and Tower 3 provide potential habitat for the silky snail (rare TSPA).

P2.1. Native Vegetation

A small footprint (100sqm) of native vegetation supporting Eastern Alpine Heathland (HHE) TASVEG community will be cleared for the concrete base for the Tower. This community is widespread with nearly 350 ha mapped in Wellington Park, so the proportionate loss is insignificant even taking not account the 0.4 ha impacted in the Pinnacle Zone. Management of the surrounding vegetation outside the immediate footprint should be controlled and prescribed in any approval conditions to ensure that there will be no peripheral impacts.

A2.2 Threatened Species

One threatened flora species, montane ivy leaf violet *Viola curtisiae,* is present close to the tower site and one threatened fauna, the silky snail, may be impacted at least at the habitat level.

P2.2 Threatened Species

The adverse impact on montane ivy leaf violet *Viola curtisiae* (listed rare in TSPA) may be avoided with careful sighting of the tower infrastructure. Any loss will not have an adverse long-term impact upon the species which has recently been found to be widespread across the Wellington Range. Reanalysis of the novel data may justify a case for having the species delisted as threatened from the TSPA. The species is also likely to be easy to propagate and cultivate in ornamental plantings on site, including roof-top gardens.

Impact to the silky snail is not known in relation to the presence of the species within the available habitat. The localised potential impacts however when considered against the extensive habitat availability suggest that potential losses would be negligible.


*Figure 15: Replanting Area*

### 5.7.3 The Pinnacle Specific Area Plan

Relevant to the biological values the purpose of the Pinnacle Specific Area Plan (SAP) is to maintain and enhance: "the environmental values associated with natural vegetation, habitats, avian, aquatic and terrestrial fauna" S2.1.2 and to "facilitate environmentally and economically sustainable development at the Pinnacle in the following ways" (specific to biological values) (S2.1.3):

- Recognise the special environmental status and fragile nature of the Pinnacle while providing for development and use that does not adversely impact upon the site's natural, biological and physical processes.
- Ensure that there is no adverse effect on geoheritage, and native flora and fauna habitat values.

The Standards for Use and Development pertaining to flora and fauna are the same in the Pinnacle SAP as they are for the Recreation Zone (5.7.1).

A2.1 Native Vegetation

(a) HHE is the impacted community. HHE is not listed as significant in the Management Plan and there are no Trust endorsed scientific assessments that deal with flora and fauna. HHE is not listed as threatened under the NCA. The term "significant vegetation" is not defined in the WPMP although the plan makes reference to sensitive vegetation in the alpine area. The Park Activity Assessment form (Appendix 3C of the WPMP) makes reference to "natural values" including "vegetation that is known to have a slow recovery rate after disturbance". HHE being an alpine community would fall into this category.
(b) Rocky habitats within the Pinnacle Centre may provide potential habitat for the silky snail (rare TSPA).

P2.1. Native Vegetation

Some native vegetation supporting Eastern Alpine Heathland (HHE) TASVEG community will be impacted by the development. 0.43 ha of HHE will be impacted, 6.5 % of the full extent in the SAP. Other than a tiny patch of DCO (0.05 ha) The SAP is dominated by 6.6 ha of HHE, the rest of the SAP (1.7 ha, 18 %) is existing infrastructure (roads, carparks, transmission towers etc); Figure 16. This community is widespread with nearly 350 ha mapped in Wellington Park, so the proportionate loss is small. Given the SAP covers this area of heath and is specifically in place to regulate vegetation clearance for developments, the intent of the SAP is not to preclude any loss of vegetation with its boundaries but to ensure there is "no long-term impact on vegetation values". Management of the surrounding vegetation outside the immediate footprint should be controlled and prescribed in any approval conditions to ensure that there will be no peripheral impacts through runoff or construction damage. The Fire Management Plan requires bushfire hazard management area of 1m around the building[79].

[79] Castellan Consulting 2021

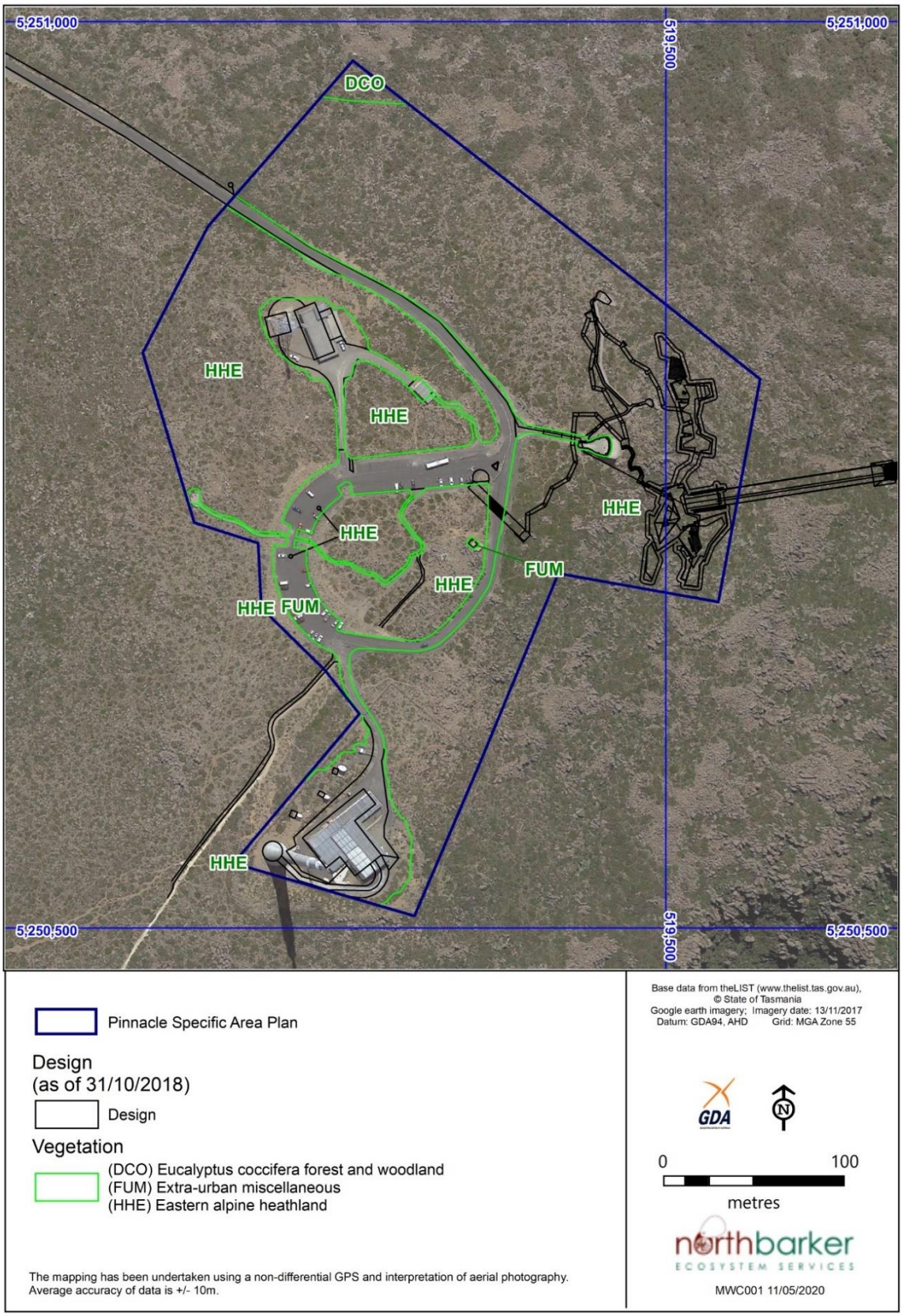



*Figure 16: Vegetation in the Pinnacle Specific Area*

## A2.2 Threatened Species

One threatened flora species, montane ivy leaf violet *Viola curtisiae,* is present close to the Tower Site and one threatened fauna, the silky snail, may be impacted upon.

P2.2 Threatened Species

The adverse impact on montane ivy leaf violet *Viola curtisiae* (listed rare in TSPA) cannot be entirely avoided with the current nominated location of the Pinnacle Centre. However, the loss will not have an adverse long-term impact upon the species. This is because the species has recently been found to be widespread across the Wellington Range. Reanalysis of the novel data may justify a case for having the species delisted as threatened from the TSPA.

Impact to the silky snail is not known. The localised impacts when considered against the extensive habitat availability suggest that it would not be significant.

Remedying Adverse Impacts

The risk of any impact to vegetation outside the development footprint will be minimised through strict exclusion areas being defined in the works contract. These will be translated into the use of temporary exclusion fencing to define the limitation to any operations on site.

The provision of best practice stormwater runoff control through sediment fencing inside the footprint of development will be provided. All of the above can be developed in a Construction Environmental Management Plan which should be approved prior to the commencement of any works.

Approximately 50% of the walkway will be an elevated boardwalk. These will shade low vegetation to some degree but are not expected to be a detrimental impact resulting in vegetation loss. It is clearly apparent that vegetation persists beneath the existing boardwalk, probably due to ample light reaching the plants due to the angle of the sun in this location and the height of the boardwalk (Plate 17). It is also possible some of the plants benefit from a degree of shading during the heat of the day and the boardwalk to some degree buffers some plants from extremes of the weather. Ultimately the area beneath the boardwalk will remain vegetated and so can be excluded from any area impact calculations. The existing boardwalk will be removed along with the associated viewing platforms. Any non-elevated sections or sites where the vegetation cover is compromised will be subject to rehabilitation to regenerate native vegetation comparable to the adjacent habitats.

The architectural plans for the Pinnacle Centre include rooftop gardens (Plate 18). Material can be sourced from the footprint of the site as a growing medium. Plant material can also be salvaged capturing a range of some of the smaller and longer-lived ground covers. There could also be opportunity to propagate the listed rare montane violet *Viola curtisiae*. These could then be included in the rooftop plantings. This could ensure any losses are offset and so better securing its conservation.

Successful outcome with the rooftop garden will be dependent on the standard of the work. This has a high likelihood of success if it is directed by a well-considered revegetation plan that considers adequate soil depth and quality, watering, wind protection and plant selection. Substantial lead times (preferably >12 months) are required for the plant material that needs to be collected and propagated offsite by a specialist horticulturist. Planting densities need to be high to counter expected mortalities and the need to establish cover in a reasonable timeframe.

The architectural design allows much of the roof areas to be visible from elsewhere in the building providing opportunity for this showcased and included in interpretation.


*Plate 17: Vegetation growing under existing raised boardwalk*

*Plate 18: Rooftop gardens*

*Table 7 - Natural Values Impact Summary*

The following table lists the impacts by section as they are addressed through the planning process

| Value | Significance Status NCA/TSPA | Impact | Context (Area Reserved in HCC) | % Impact | Comment Impact and Mitigation |
|---|---|---|---|---|---|
| **Access Road (outside Wellington Park)** | | | | | |
| DTO *Eucalyptus tenuiramis* dry forest on sediments | Threatened | 3.16 ha<br>(1.60 within BPA overlay) | 141 ha | 2.2% | Not possible to bypass threatened vegetation.<br>Include measures to minimise width of corridor including steepening batter, especially around large trees close to embankments, controls to limit runoff during construction and to restrict construction machinery.<br>Include a weed control and revegetation plan. |
| DGL *Eucalyptus globulus* dry forest | Threatened | 0.20 ha<br>(Entirely outside BPA overlay) | 64 ha | <0.01% | |
| DOB *Eucalyptus obliqua* dry forest | - | 2.29 ha<br>(1.46 within BPA overlay) | 342 ha | <0.01% | |
| tiny midge orchid *Corunastylis nuda* | Rare | Potential habitat | 11 records in 500m, 29 in 5km | Unlikely but <10% at worst | Anecdotal records from vicinity in previous years. Not located in targeted surveys in flowering period 2019 and 2020.<br>If located nearby in close vicinity, then plants will be actively protected during construction.<br>If impacted, then consultation with PCAB to determine appropriate response. Unlikely to be a significant impact. |
| dense midge orchid *Corunastylis nudiscapa* | Endangered | Potential habitat | 48 records in 500m, 145 in 5km | Unlikely but <10% at worst | Only known from South Hobart in recent times. Likelihood of occurrence considered low.<br>If located nearby in close vicinity, then plants will be actively protected during construction. |

| Value | Significance Status NCA/TSPA | Impact | Context (Area Reserved in HCC) | % Impact | Comment Impact and Mitigation |
|---|---|---|---|---|---|
| **Access Road (outside Wellington Park)** | | | | | |
| | | | | | If impacted, then consultation with PCAB to determine appropriate response. |
| Tasmanian devil *Sarcophilus harrisii*<br><br>spotted-tail quoll *Dasyurus maculatus* | Endangered<br><br>Rare | Loss of 5.7 ha potential foraging habitat<br><br>Potential disturbance to 50m buffer<br><br>Roadkill risk | Significant areas of breeding habitat throughout Park | <0.1% | Footprint (including 50 m buffer) supports suboptimal denning habitat. No obvious features identified.<br><br>Prior to any disturbance, apply den management protocol to mitigate potential for disturbance of denning activities of devils or quolls.<br><br>Implement traffic calming measures to minimise risk of roadkill. |
| swift parrot *Lathamus discolor* | Endangered | Loss of 7 potential foraging trees<br><br>Loss of 67 potential nesting trees.<br><br>Estimate of 2 ha direct habitat loss. Potential disturbance to 13 ha nesting [80] | 286 ha foraging habitat[81] in Hobart<br><br>725 ha nesting habitat[82] in Hobart | <1% foraging<br><br><1% nesting habitat loss<br><br>1-2% disturbance | No scope to avoid all large trees of which some may support nesting habitat.<br><br>Undertake arboriculture assessment to inform measures to retain as many trees as is practical.<br><br>Design measures to minimise width of corridor including steepening batter, especially around large trees close to embankments.<br><br>Include controls to restrict construction machinery.<br><br>Include replacement plan for tree hollow losses.<br><br>Develop revegetation plan that identifies replacement of |

[80] Assuming noise disturbance from road 50m on either side
[81] Habitat based on mapped WGL, DGL, DOV and additional areas shown on GlobMap layer.
[82] Habitat based on high availability of mature habitat (FPA Fauna Technical Note 1.2 (2012)

| Value | Significance Status NCA/TSPA | Impact | Context (Area Reserved in HCC) | % Impact | Comment Impact and Mitigation |
|---|---|---|---|---|---|
| **Access Road (outside Wellington Park)** | | | | | |
| | | | | | losses. |
| Tasmanian masked owl *Tyto novaehollandiae castanops* | Endangered | Loss of 12 potential nesting trees (DBH>100cm)<br><br>Estimate of 2 ha direct habitat loss. Potential disturbance to 13 ha nesting [83] | 725 ha habitat[84] in Hobart | <1% direct impact<br><br>1-2% disturbance | Many hollow bearing trees, although no obvious large hollows >15cm observed from ground surveys.<br><br>Some direct loss of potential current and future nesting habitat.<br><br>Undertake arboriculture assessment to inform measures to retain as many trees as is practical.<br><br>Include replacement plan for tree hollow losses. |

[83] Assuming noise disturbance from road 50m on either side
[84] Habitat based on high availability of mature habitat (FPA Fauna Technical Note 1.2 (2012)

| Value | Significance Status NCA/TSPA | Impact | Context (Area Reserved in HCC) | % Impact | Comment Impact and Mitigation |
|---|---|---|---|---|---|
| **Base Station including top end of Access Road and Towers 1 & 2 (inside Wellington Park)** | | | | | |
| WOB *Eucalyptus obliqua* forest with broad-leaf shrubs | - | 0.29 ha direct conversion and 0.17 ha modified to meet bushfire hazard management) | 121 ha | <0.01% | Minimal impact on threatened vegetation.<br><br>Ensure high priority vegetation is identified during construction to limit extent of clearance.<br><br>Prescribe management for bushfire hazard management to ensure method of control is controlled by hand tools such as brushcutters to limit disturbance to native vegetation.<br><br>Design measures to minimise width of corridor including steepening batter, especially around large trees close to embankments, controls to limit runoff during construction and to restrict construction machinery. Weed control and revegetation plan. |
| WGL *Eucalyptus globulus* wet forest | poorly reserved (significant in WPMP) | 0.15 ha | 94 ha | 0.01% | |
| DOB *Eucalyptus obliqua* dry forest | - | 0.09 ha | 1330 ha | <0.01% | |
| Tasmanian devil *Sarcophilus harrisii*<br><br>spotted-tail quoll *Dasyurus maculatus* | Endangered<br><br>Rare | Loss of 0.51 ha foraging habitat<br><br>Potential disturbance to 50m buffer (5 ha) during construction.<br><br>Roadkill risk. | Significant areas of breeding habitat throughout Park | <0.1% | Footprint (including 50 m buffer) may contain burrows with undetermined occupancy/activity status. Prior to any disturbance, apply den management protocol to mitigate potential for disturbance of denning activities of devils or quolls.<br><br>Implement traffic calming measures to minimise risk of roadkill. |

| Value | Significance Status NCA/TSPA | Impact | Context (Area Reserved in HCC) | % Impact | Comment Impact and Mitigation |
|---|---|---|---|---|---|
| **Base Station including top end of Access Road and Towers 1 & 2 (inside Wellington Park)** | | | | | |
| swift parrot *Lathamus discolor* | Endangered | Foraging trees *Eucalyptus globulus* Estimated 10 trees may require pruning of branches [85] 18 trees within footprint (TPZ>10%) and 12 in BHMA.<br><br>Potential nesting trees DBH>70cm Loss of 20 trees in the footprint (TPZ>10%), 4 in BHMA Direct loss to <1 ha habitat. Potential disturbance to 7 ha[86] | 172 ha foraging habitat[87] in Wellington Park<br><br>1455 ha habitat[88] in Wellington Park | foraging habitat <1%<br><br>nesting habitat <0.1% direct, 0.5% disturbance | Large habitat trees present between Base Station, Tower 1 and Tower 2.<br><br>All recorded habitat trees within the BHMA on lower side of Base Station are required to be removed, including potential foraging trees and trees potentially suitable for nesting.<br><br>Undertake arboricultural assessment to inform measures to retain as many trees as is practical.<br><br>Micro-siting of Tower to ensure sufficient longitudinal (up or down slope) distance from trees.<br><br>Include *E. globulus* in any landscape planting of car park and within potential offset planting. Implement hollow-replacement program for loss of potential nesting habitat trees. |
| Tasmanian masked owl *Tyto novaehollandiae castanops* | Endangered | Loss of 20 trees in the footprint (TPZ>10%), 4 in BHMA Potential disturbance to 7 ha<br><br>Potential noise | 1455 ha habitat in Wellington Park | <0.1%habitat loss, 0.5% disturbance | Potential disturbance through construction and operation should trees be used in local area.<br><br>All recorded habitat trees within the BHMA on lower side of Base Station are required to be removed, including trees of sufficient size to potentially support viable nesting hollows. |

[85] Proponents have advised that no trees will require removal along the corridor between the base station and Tower 2
[86] Assuming noise disturbance from road 50m on either side
[87] Habitat based on mapped WGL, DGL, DOV and additional areas shown on GlobMap layer.
[88] Habitat based on High availability of mature habitat (FPA Fauna Technical Note 1.2 (2012)

| Value | Significance Status NCA/TSPA | Impact | Context (Area Reserved in HCC) | % Impact | Comment Impact and Mitigation |
|---|---|---|---|---|---|
| | | disturbance to 5 ha habitat | | | Undertake arboricultural assessment to inform measures to retain as many trees as is practical.<br>Implement hollow-replacement program for loss of potential nesting habitat trees. |
| **Pinnacle Centre** | | | | | |
| HHE<br>Eastern alpine heathland | - | 0.42 ha | 350 ha | 0.001% | Localised impact.<br>Use of exclusion fencing to ensure no disturbance outside footprint of development |
| montane violet<br>*Viola curtisiae* | Rare | 370 sqm<br>Of a patch totalling 570sqm | Multiple sites | <10% | Multiple populations identified in 2018 throughout alpine areas in Wellington Park, suggesting the species has previously been under-surveyed and the loss associated with this development is insignificant.<br>Fence off area of population (200 sqm) outside footprint for duration of works.<br>Investigate potential to incorporate species in rooftop garden. |
| Silky snail<br>*Exquisitiropa agnewi* | Rare | Estimate <0.1 ha | 100s ha | <0.01% | Potential habitat amongst boulders. Habitat loss is insignificant in context of extent of habitat throughout Wellington Park. |
| **Tower 3** | | | | | |
| HHE<br>Eastern alpine | - | 0.01 ha | 350 ha | <0.0001% | Localised impact. |

| Value | Significance Status NCA/TSPA | Impact | Context (Area Reserved in HCC) | % Impact | Comment Impact and Mitigation |
|---|---|---|---|---|---|
| heathland | | | | | Use of exclusion fencing to ensure no disturbance outside footprint of development |
| montane violet *Viola curtisiae* | Rare | 0 | Multiple sites | <1% | Plants in close vicinity of Tower site able to be avoided with care.<br>Multiple populations identified in 2018 throughout alpine areas in Wellington Park.<br>Fence off plants in vicinity of site for duration of works.<br>Investigate potential to incorporate species in rooftop garden. |
| Silky snail *Exquisitiropa agnewi* | Rare | 0.01ha | 100s ha | <0.01% | Potential habitat amongst boulders. Habitat loss is insignificant in context of extent of habitat throughout Wellington Park.<br>Use of exclusion fencing to ensure no disturbance outside footprint of development. |
| **Temporary Installation Net** | | | | | |
| DCO *Eucalyptus coccifera* forest and woodland | - | 0.01 ha | 3957 ha | <0.001% | No or very minimal impact.<br>Use of exclusion fencing to ensure no disturbance outside footprint of development. |
| Silky snail *Exquisitiropa agnewi* | Rare | 0.01ha | 100s ha | <0.01% | Potential habitat amongst boulders. No habitat loss anticipated with structure to be bolted to rocks without them being disturbed.<br>Use of exclusion fencing to ensure no disturbance outside footprint of development. |

# 6 CONCLUSION AND RECOMMENDATIONS

No impacts are anticipated to ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). Some impacts are likely to threatened vegetation communities listed under the Tasmanian *Nature Conservation Act 2002*. These include two communities present along the proposed Access Road alignment:

- *Eucalyptus globulus* dry forest – DGL
- *Eucalyptus tenuiramis* forest on sediments - DTO

The development will impact on two vegetation communities within Wellington Park that could be considered to be significant vegetation according to the Wellington Park Management Plan 2013:

- *Eucalyptus globulus* wet forest – WGL – Base Station-Tower Site 2
- Eastern alpine heathland - HHE – Tower site 3 and Pinnacle Centre

At least two threatened flora species occur within the project area and there is potential for at least three others, albeit low. It is of low likelihood that any impacts to threatened flora are of such significance as to require amendments to the proposal.

Impacts to threatened fauna habitat are of moderate significance. Redesign of the Access Road alignment has avoided direct impact to localised rocky habitat supporting small hollows and dens. There are some unavoidable losses of large habitat trees which will affect the availability of nesting habitat for hollow dependent species.

The risk of any direct impacts to threatened fauna during the construction phase can be minimised through appropriate procedures prior and during this period. Replacement of any unavoidable losses of tree hollows through reuse of hollow structures and provision of nest boxes can mitigate any losses. Tree losses in Wellington Park can be offset through new plantings.

A Roadkill Risk Report and Roadkill Mitigation Plan have been prepared. A suite of monitoring and mitigation measures are proposed for the new Access Road. In contrast, the roadkill risk on Pinnacle Road is not expected to significantly increase based on an expectation of less than a 10% change to traffic volumes. Recommended measures for that road are focussed on monitoring, with scope for future mitigation in the event of increases in levels of roadkill. Future mitigation to Pinnacle Road (independent of traffic monitoring results) provides an alternate offset to any residual roadkill impacts occurring along the access road following recommended mitigation for that road.

A Bird Collision Risk Assessment identified elevated risk in the vicinity of the Organ Pipes for wedge-tailed eagles and the vicinity of Base Station to Tower 2 for the swift parrot. This concludes that the risk is low to moderate overall and proposes a suite of mitigation measures to reduce this risk to acceptable levels.

**Recommendations**

The proposed development meets the requirements of the Hobart Interim Planning scheme 2015 and the Wellington Park Management Plan 2013. Any approval should include conditions to ensure the natural values are mitigated and offset through the inclusion and / or implementation of

- Weed and plant pathogen management plan;
- Fauna management protocols throughout the construction phase; and
- Oversight from Arborist to ensure impacts to trees in close proximity are minimised
- Tree hollow reuse and replacement plan;
- Roadkill mitigation plan;

- Bird collision risk mitigation measures

A permit to take under the Tasmanian *Threatened Species Protection Act 1995* (TSPA) will be required for impacts to

  - Montane violet
  - Silky snail

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# APPENDIX A – VASCULAR PLANT SPECIES LISTS WITHIN PLANT COMMUNITIES (TASVEG) AND PROJECT SITES

## HHE - Pinnacle Centre

| | |
|---|---|
| Grid Reference: | 519520E, 5250740N |
| Accuracy: | GPS (within 10 metres) |
| Recorder: | Andrew J. North |
| Date of Survey: | 27 Sep 2018 |
| Trees: | *Eucalyptus coccifera* |
| Tall Shrubs: | *Telopea truncata* |
| Shrubs: | *Baeckea gunniana, Coprosma nitida, Epacris serpyllifolia, Exocarpos humifusus, Gaultheria hispida, Leptospermum rupestre, Monotoca empetrifolia, Olearia ledifolia, Olearia pinifolia, Orites acicularis, Orites revolutus, Ozothamnus ledifolius, Pimelea sericea, Planocarpa petiolaris, Richea scoparia, Richea sprengelioides, Tasmannia lanceolata, Trochocarpa thymifolia* |
| Low Shrubs: | *Acrothamnus* sp., *Bellendena montana* |
| Herbs: | *Astelia alpina var. alpina, Brachyscome spathulata, Celmisia asteliifolia, Colobanthus apetalus var. apetalus, Cotula alpina, Gonocarpus montanus, Viola* sp. *Helichrysum luteoalbum, Oreomyrrhis sp., Pappochroma bellidioides, Pappochroma tasmanicum, Rubus gunnianus, Schizacme montana* |
| Grasses: | *Deyeuxia monticola, Hierochloe fraseri, Poa gunnii, Rytidosperma sp.* |
| Ferns: | *Lycopodium fastigiatum, Lycopodium scariosum* |
| Weeds: | *Euphrasia* sp., *Holcus lanatus, Leontodon saxatilis, Pinus radiata* |

## HHE - Tower 3

| | |
|---|---|
| Grid Reference: | 519625E, 5250750N |
| Accuracy: | GPS (within 10 metres) |
| Recorder: | Andrew J. North |
| Date of Survey: | 27 Sep 2018 |
| Trees: | *Eucalyptus coccifera* |
| Tall Shrubs: | *Leptospermum lanigerum, Telopea truncata* |
| Shrubs: | *Coprosma nitida, Epacris serpyllifolia, Exocarpos humifusus, Gaultheria hispida, Monotoca empetrifolia, Olearia ledifolia, Orites acicularis, Orites revolutus, Ozothamnus ledifolius, Pimelea sericea, Richea scoparia, Richea sprengelioides, Tasmannia lanceolata* |
| Low Shrubs: | *Acrothamnus* sp. |
| Herbs: | *Acaena sp., Astelia alpina var. alpina, Brachyscome spathulata, Celmisia asteliifolia, Cotula australis, Geranium brevicaule, Gonocarpus montanus, Gonocarpus teucrioides, Helichrysum luteoalbum, Ranunculus scapiger, Senecio gunnii, Viola hederacea* |
| Graminoids: | *Gahnia grandis, Luzula sp.* |
| Grasses: | *Deyeuxia monticola, Poa gunnii, Rytidosperma sp.* |
| Ferns: | *Huperzia australiana, Lycopodium scariosum, Polystichum proliferum* |
| Weeds: | *Euphrasia* sp. |

## DCO - Temporary Installation Net

| | |
|---|---|
| Grid Reference: | 519935E, 5250795N |
| Accuracy: | GPS (within 10 metres) |
| Recorder: | Karen Ziegler |
| Date of Survey: | 1 Oct 2018 |
| Trees: | *Eucalyptus coccifera, Eucalyptus urnigera, Nothofagus cunninghamii* |
| Tall Shrubs: | *Oxylobium ellipticum, Pittosporum bicolor, Telopea truncata* |
| Shrubs: | *Aristotelia peduncularis, Coprosma nitida, Cyathodes glauca, Hakea lissosperma, Leptecophylla parvifolia, Lomatia polymorpha, Olearia phlogopappa, Olearia tasmanica,* |

| | |
|---|---|
| | *Ozothamnus antennaria, Ozothamnus ledifolius, Pimelea cinerea, Richea dracophylla, Tasmannia lanceolata, Veronica formosa* |
| Herbs: | *Acaena sp., Cardamine sp., Correa lawrenceana var. lawrenceana, Galium australe, Geranium potentilloides var. potentilloides, Gonocarpus tetragynus, Gonocarpus teucrioides, Hydrocotyle hirta, Oxalis sp., Poranthera microphylla, Pterostylis sp., Ranunculus sp., Senecio gunnii, Senecio pectinatus var. pectinatus* |
| Graminoids: | *Luzula sp., Uncinia sp.* |
| Grasses: | *Poa sp.* |
| Ferns: | *Asplenium flabellifolium, Blechnum wattsii, Dicksonia antarctica, Polystichum proliferum* |
| Weeds: | *Euphorbia sp.* |

### HHE - Pinnacle walkways

| | |
|---|---|
| Grid Reference: | 519498E, 5250742N |
| Accuracy: | within 50 metres |
| Recorder: | Karen Ziegler |
| Date of Survey: | 1 Oct 2018 |
| Trees: | *Eucalyptus coccifera* |
| Shrubs: | *Epacris serpyllifolia, Exocarpos humifusus, Leptospermum rupestre, Monotoca empetrifolia, Olearia ledifolia, Olearia pinifolia, Orites acicularis, Orites revolutus, Ozothamnus ledifolius, Pimelea sericea, Planocarpa petiolaris, Richea scoparia, Richea sprengelioides, Tasmannia lanceolata, Trochocarpa thymifolia* |
| Low Shrubs: | *Acrothamnus* sp., *Bellendena montana* |
| Herbs: | *Acaena montana, Astelia alpina var. alpina, Brachyscome spathulata, Celmisia asteliifolia, Colobanthus apetalus var. apetalus, Cotula alpina, Geranium potentilloides var. potentilloides, Gonocarpus montanus, Helichrysum luteoalbum, Oreomyrrhis sp., Pappochroma bellidioides, Pappochroma tasmanicum, Ranunculus scapiger, Senecio gunnii, Viola hederacea* |
| Graminoids: | *Luzula sp.* |
| Grasses: | *Poa gunnii, Rytidosperma sp.* |
| Ferns: | *Lycopodium scariosum, Polystichum proliferum* |
| Weeds: | *Cerastium vulgare, Euphrasia* sp. |

### FUM – Main Fire Trail

| | |
|---|---|
| Grid Reference: | 521890E, 5251090N |
| Accuracy: | within 100 metres |
| Recorder: | Karen Ziegler |
| Date of Survey: | 4 Oct 2018 |
| Trees: | *Eucalyptus globulus subsp. globulus, Eucalyptus obliqua, Eucalyptus viminalis subsp. viminalis* |
| Tall Shrubs: | *Leptospermum scoparium* |
| Shrubs: | *Cassinia aculeata subsp. aculeata, Coprosma quadrifida* |
| Herbs: | *Acaena novae-zelandiae, Cardamine sp., Drosera peltata, Drosera pygmaea, Euchiton japonicus, Galium australe, Geranium potentilloides var. potentilloides, Oxalis sp., Poranthera microphylla, Senecio linearifolius var. linearifolius, Thelymitra sp., Urtica incisa, Wahlenbergia sp.* |
| Graminoids: | *Carex appressa, Gahnia grandis, Juncus sp.* |
| Grasses: | *Ehrharta sp., Rytidosperma sp.* |
| Ferns: | *Blechnum nudum, Dicksonia antarctica, Histiopteris incisa, Hypolepis rugosula, Pteridium esculentum subsp. esculentum* |
| Weeds: | *Cirsium vulgare, Erica lusitanica, Linum catharticum, Plantago lanceolata, Rubus fruticosus, Ulex europaeus* |

### WOB – Vicinity of Base Station

| | |
|---|---|
| Grid Reference: | 521917E, 5251997N |
| Accuracy: | within 50 metres |
| Recorder: | Karen Ziegler |
| Date of Survey: | 4 Oct 2018 |
| Trees: | *Eucalyptus globulus subsp. globulus, Eucalyptus obliqua* |

| | |
|---|---|
| Tall Shrubs: | *Acacia dealbata subsp. dealbata, Asterotrichion discolor, Bedfordia salicina, Beyeria viscosa, Exocarpos cupressiformis, Olearia argophylla, Pittosporum bicolor, Pittosporum bicolor X Pittosporum undulatum* |
| Shrubs: | *Cassinia aculeata subsp. aculeata, Coprosma quadrifida, Pimelea drupacea* |
| Herbs: | *Acaena sp., Galium australe, Geranium potentilloides var. potentilloides, Hydrocotyle hirta, Pterostylis pedunculata* |
| Grasses: | *Ehrharta sp.* |
| Ferns: | *Blechnum wattsii, Dicksonia antarctica, Polystichum proliferum, Pteridium esculentum subsp. esculentum* |
| Climbers: | *Clematis aristata* |
| Weeds: | *Erica lusitanica* |

### FUM- -Main Fire Trail

| | |
|---|---|
| Grid Reference: | 521927E, 5251294N |
| Accuracy: | within 50 metres |
| Recorder: | Karen Ziegler |
| Date of Survey: | 4 Oct 2018 |
| Tall Shrubs: | *Acacia leprosa var. graveolens* |
| Shrubs: | *Coprosma quadrifida, Pultenaea juniperina* |
| Herbs: | *Acaena sp., Caladenia sp., Chiloglottis triceratops, Coronidium scorpioides, Dianella tasmanica, Geranium potentilloides var. potentilloides, Helichrysum luteoalbum, Hydrocotyle hirta, Oxalis sp., Poranthera microphylla, Thelymitra sp.* |
| Graminoids: | *Juncus sp., Luzula sp.* |
| Grasses: | *Ehrharta sp., Rytidosperma sp.* |
| Ferns: | *Blechnum nudum, Blechnum wattsii, Dicksonia antarctica, Polystichum proliferum, Pteridium esculentum subsp. esculentum* |
| Climbers: | *Clematis aristata* |
| Weeds: | *Anthoxanthum odoratum, Cirsium vulgare, Erica lusitanica, Hypochaeris radicata, Linum catharticum, Prunella vulgaris* |

### DOB – Vicinity of Main Fire Trail near ridge

| | |
|---|---|
| Grid Reference: | 522011E, 5251375N |
| Accuracy: | GPS (within 10 metres) |
| Recorder: | Karen Ziegler |
| Date of Survey: | 4 Oct 2018 |
| Trees: | *Eucalyptus obliqua, Eucalyptus tenuiramis, Eucalyptus viminalis subsp. viminalis* |
| Tall Shrubs: | *Exocarpos cupressiformis, Ozothamnus thyrsoideus* |
| Shrubs: | *Daviesia ulicifolia, Pultenaea gunnii, Pultenaea juniperina* |
| Herbs: | *Caladenia sp., Chiloglottis sp., Drosera peltata, Poranthera microphylla, Pterostylis melagramma, Pterostylis parviflora, Thelymitra sp.* |
| Grasses: | *Ehrharta sp.* |

### WGL – Tower 1

| | |
|---|---|
| Grid Reference: | 521697E, 5251078N |
| Accuracy: | GPS (within 10 metres) |
| Recorder: | Karen Ziegler |
| Date of Survey: | 4 Oct 2018 |
| Trees: | *Eucalyptus globulus subsp. globulus, Eucalyptus obliqua* |
| Tall Shrubs: | *Acacia dealbata subsp. dealbata, Bedfordia salicina, Beyeria viscosa, Olearia argophylla, Pomaderris apetala* |
| Shrubs: | *Coprosma quadrifida* |
| Herbs: | *Corybas sp., Hydrocotyle hirta, Pterostylis pedunculata, Pterostylis sp.* |
| Graminoids: | *Luzula sp.* |
| Climbers: | *Clematis aristata* |

### WOB - Tower 2

| | |
|---|---|
| Grid Reference: | 521587E, 5251055N |
| Accuracy: | GPS (within 10 metres) |

| | |
|---|---|
| Recorder: | Karen Ziegler |
| Date of Survey: | 4 Oct 2018 |
| Trees: | *Eucalyptus obliqua* |
| Tall Shrubs: | *Acacia leprosa var. graveolens, Bedfordia salicina, Nematolepis squamea, Olearia argophylla, Pittosporum bicolor, Pomaderris apetala, Zieria arborescens* |
| Shrubs: | *Coprosma quadrifida, Cyathodes glauca, Pimelea cinerea* |
| Herbs: | *Cardamine sp., Chiloglottis sp., Dianella tasmanica, Drymophila cyanocarpa, Geranium potentilloides var. potentilloides, Pterostylis melagramma* |
| Ferns: | *Notogrammitis billardierei, Polystichum proliferum, Pteridium esculentum subsp. esculentum* |

## DTO - E. tenuiramis forest and woodland on sediments – Access Road HCC land

| | |
|---|---|
| Grid Reference: | 522949E, 5251599N |
| Accuracy: | within 50 metres |
| Recorder: | Andrew J. North |
| Date of Survey: | 21 Feb 2019 |
| Trees: | *Bursaria spinosa subsp. spinosa, Eucalyptus pulchella, Eucalyptus tenuiramis, Eucalyptus viminalis subsp. viminalis* |
| Tall Shrubs: | *Allocasuarina monilifera, Exocarpos cupressiformis, Leptospermum scoparium* |
| Shrubs: | *Daviesia ulicifolia, Epacris impressa, Leptomeria drupacea, Ozothamnus obcordatus, Pomaderris pilifera, Pultenaea gunnii subsp. gunnii, Pultenaea juniperina* |
| Low Shrubs: | *Acacia myrtifolia, Pultenaea pedunculata, Tetratheca pilosa* |
| Herbs: | *Gonocarpus tetragynus, Opercularia ovata, Senecio prenanthoides* |
| Graminoids: | *Diplarrena moraea, Juncus pallidus, Lepidosperma laterale* |
| Grasses: | *Deyeuxia densa, Deyeuxia monticola, Microlaena stipoides, Poa labillardierei, Rytidosperma indutum, Rytidosperma setaceum* |
| Weeds: | *Chrysanthemoides monilifera subsp. monilifera, Conium maculatum* |

## DOB – E. obliqua dry forest – Access Road

| | |
|---|---|
| Grid Reference: | 522343E, 5251502N |
| Accuracy: | within 50 metres |
| Recorder: | Andrew J. North |
| Date of Survey: | 21 Feb 2019 |
| Trees: | *Eucalyptus globulus subsp. globulus, Eucalyptus obliqua, Eucalyptus tenuiramis, Eucalyptus viminalis subsp. viminalis* |
| Tall Shrubs: | *Acacia dealbata subsp. dealbata, Bedfordia salicina, Dodonaea viscosa subsp. spatulata, Exocarpos cupressiformis, Leptospermum scoparium, Pultenaea daphnoides* |
| Shrubs: | *Amperea xiphoclada var. xiphoclada, Coprosma quadrifida, Daviesia ulicifolia, Epacris impressa, Exocarpos strictus, Leptomeria drupacea, Lomatia tinctoria, Olearia stellulata, Olearia viscosa, Pomaderris pilifera, Pultenaea gunnii subsp. gunnii, Pultenaea juniperina* |
| Low Shrubs: | *Acacia myrtifolia, Astroloma humifusum, Lissanthe strigosa subsp. subulata, Tetratheca labillardierei* |
| Herbs: | *Caladenia sp., Coronidium scorpioides, Gonocarpus tetragynus, Hypericum gramineum, Opercularia ovata, Poranthera microphylla, Senecio linearifolius var. linearifolius, Senecio minimus, Wahlenbergia sp.* |
| Graminoids: | *Juncus sarophorus, Lomandra longifolia* |
| Grasses: | *Anthosachne scabra, Austrostipa pubinodis, Deyeuxia monticola, Dichelachne rara, Microlaena stipoides, Poa gunnii, Poa labillardierei, Rytidosperma racemosum var. racemosum* |
| Ferns: | *Pteridium esculentum subsp. esculentum* |
| Climbers: | *Cassytha pubescens* |
| Weeds: | *Centaurium erythraea, Chrysanthemoides monilifera subsp. monilifera, Rubus fruticosus* |

# APPENDIX B – VASCULAR PLANT SPECIES LIST

**Status codes:**

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

**Sites:**

| | | | |
|---|---|---|---|
| 1 | SHS - Pinnacle Centre - E519520, N5250740 | 27/09/2018 | Andrew J. North |
| 2 | SHS - Tower C3 - E519625, N5250750 | 27/09/2018 | Andrew J. North |
| 3 | DCO - Temporary tower mid slope - E519935, N5250795 | 1/10/2018 | Karen Ziegler |
| 4 | SHS - Pinnacle walkways - E519498, N5250742 | 1/10/2018 | Karen Ziegler |
| 5 | FUM - Base Station - E521890, N5251090 | 4/10/2018 | Karen Ziegler |
| 6 | WOB – Near base station - E521917, N5251997 | 4/10/2018 | Karen Ziegler |
| 7 | FUM – Base Station Access Rd - E521927, N5251294 | 4/10/2018 | Karen Ziegler |
| 8 | DOB – Access Rd Wellington Park section E522011, N5251375 | 4/10/2018 | Karen Ziegler |
| 9 | WGL – Tower 1 - E521697, N5251078 | 4/10/2018 | Karen Ziegler |
| 10 | WOB – Tower2 - E521587, N5251055 | 4/10/2018 | Karen Ziegler |
| 11 | FUM – Access Point off McRobie's Rd E523916, N5251082 | 18/10/2018 | Karen Ziegler |
| 12 | DGL - Access Rd Degraded E. globulus forest - E523873, N5251061 | 18/10/2018 | Andrew J. North |
| 13 | DGL - Access Rd Grassy E. globulus forest - E523800, N5251050 | 23/01/1997 | Andrew J. North |
| 14 | DOB - Access Rd Eucalyptus obliqua dry forest - E523670, N5251130 | 23/01/1997 | Andrew J. North |
| 15 | DTO - Access Rd Heathy E. tenuiramis forest - E523460, N5251220 | 23/01/1997 | Andrew J. North |
| 16 | DOB - Access Rd Dry shrubby E. obliqua forest - E522110, N5251500 | 23/01/1997 | Andrew J. North |
| 17 | DTO – Access Rd Dry shrubby E. tenuiramis forest - E522949, N5251599 | 21/02/2019 | Andrew J. North |
| 18 | DOB - Access Rd Dry shrubby E. obliqua forest - E522343, N5251502 | 21/02/2019 | Andrew J. North |
| 19 | Pinnacle centre - summer ephemerals - E519500, N5250750 | 6/02/2020 | Andrew J. North |
| 20 | WOB – FMBZ near Base Station - E521950, N5251050 | 14/03/2020 | Karen Ziegler |
| 21 | Access Road - additional species - E522050, N5251382 | 13/03/2020 | Karen Ziegler |

| Site | Name | Common name | Status |
|---|---|---|---|
| | DICOTYLEDONAE | | |
| | **APIACEAE** | | |
| 11 12 17 | *Conium maculatum* | hemlock | i |
| 3 6 7 9 12 | *Hydrocotyle hirta* | hairy pennywort | |
| 19 | *Oreomyrrhis eriopoda* | australian caraway | |
| 1 4 | *Oreomyrrhis sp.* | carraway | |
| | **APOCYNACEAE** | | |
| 11 | *Vinca major* | blue periwinkle | i |
| | **ASTERACEAE** | | |
| 6 9 10 18 20 | *Bedfordia salicina* | tasmanian blanketleaf | en |
| 1 2 4 19 | *Brachyscome spathulata* | spoonleaf daisy | |
| 5 6 20 | *Cassinia aculeata subsp. aculeata* | dollybush | |
| 1 2 4 | *Celmisia asteliifolia* | silver snowdaisy | en |
| 17 18 | *Chrysanthemoides monilifera subsp. monilifera* | boneseed | d |
| 5 7 12 19 20 | *Cirsium vulgare* | spear thistle | i |
| 7 14 18 | *Coronidium scorpioides* | curling everlasting | |
| 1 4 19 | *Cotula alpina* | alpine buttons | |
| 2 | *Cotula australis* | southern buttons | |
| 5 19 | *Euchiton japonicus* | common cottonleaf | |
| 1 2 4 7 | *Helichrysum luteoalbum* | jersey cudweed | |
| 7 19 | *Hypochaeris radicata* | rough catsear | i |
| 1 19 | *Leontodon saxatilis* | hairy hawkbit | i |
| 6 9 10 20 | *Olearia argophylla* | musk daisybush | |
| 1 2 4 | *Olearia ledifolia* | rock daisybush | en |
| 3 16 | *Olearia phlogopappa* | dusty daisy bush | |
| 1 4 | *Olearia pinifolia* | prickly daisybush | en |
| 13 | *Olearia ramulosa* | twiggy daisybush | |
| 16 18 | *Olearia stellulata* | sawleaf daisybush | |
| 3 | *Olearia tasmanica* | tasmanian daisybush | en |
| 18 | *Olearia viscosa* | viscid daisybush | |
| 3 | *Ozothamnus antennaria* | sticky everlastingbush | en |

| | | | |
|---|---|---|---|
| 1 2 3 4 | *Ozothamnus ledifolius* | mountain everlastingbush | en |
| 15 17 | *Ozothamnus obcordatus* | yellow everlastingbush | |
| 8 | *Ozothamnus thyrsoideus* | arching everlastingbush | |
| 1 4 | *Pappochroma bellidioides* | hairy mountaindaisy | |
| 1 4 | *Pappochroma tasmanicum* | tasmanian mountaindaisy | |
| 2 3 4 | *Senecio gunnii* | mountain fireweed | |
| 5 18 | *Senecio linearifolius var. linearifolius* | common fireweed groundsel | |
| 18 | *Senecio minimus* | shrubby fireweed | |
| 3 | *Senecio pectinatus var. pectinatus* | yellow alpine groundsel | |
| 17 | *Senecio prenanthoides* | common fireweed | |
| 13 | *Senecio quadridentatus* | cotton fireweed | |
| 12 15 | *Senecio sp.* | groundsel | |
| 19 | *Taraxacum officinale* | common dandelion | i |
| | **BORAGINACEAE** | | |
| 11 | *Echium candicans* | pride of madeira | i |
| 12 | *Myosotis arvensis* | field forgetmenot | i |
| 19 | *Myosotis australis* | southern forgetmenot | |
| | **BRASSICACEAE** | | |
| 11 12 | *Cardamine hirsuta* | hairy bittercress | i |
| 19 | *Cardamine lilacina* | lilac bittercress | |
| 3 5 10 | *Cardamine sp.* | bittercress | |
| | **CAMPANULACEAE** | | |
| 19 | *Wahlenbergia saxicola* | mountain bluebell | en |
| 5 12 18 20 | *Wahlenbergia sp.* | bluebell | |
| | **CARYOPHYLLACEAE** | | |
| 4 | *Cerastium vulgare* | common mouse-ear | i |
| 1 4 | *Colobanthus apetalus var. apetalus* | coast cupflower | |
| | **CASUARINACEAE** | | |
| 15 | *Allocasuarina littoralis* | black sheoak | |
| 15 17 | *Allocasuarina monilifera* | necklace sheoak | en |
| | **CLUSIACEAE** | | |
| 18 20 | *Hypericum gramineum* | small st johns-wort | |
| | **CONVOLVULACEAE** | | |
| 14 | *Dichondra repens* | kidneyweed | |
| | **CRASSULACEAE** | | |
| 12 | *Crassula sieberiana* | stone-crop | |
| | **DROSERACEAE** | | |
| 16 | *Drosera auriculata* | tall sundew | |
| 5 8 | *Drosera peltata* | pale sundew | |
| 5 | *Drosera pygmaea* | dwarf sundew | |
| | **ELAEOCARPACEAE** | | |
| 3 | *Aristotelia peduncularis* | heartberry | en |
| | **ERICACEAE** | | |
| 1 2 4 | *Acrothamnus hookeri* | mountain beardheath | |
| 12 13 18 | *Astroloma humifusum* | native cranberry | |
| 3 10 20 | *Cyathodes glauca* | purple cheeseberry | en |
| 14 16 17 18 | *Epacris impressa* | common heath | |
| 1 2 4 | *Epacris serpyllifolia* | alpine heath | en |
| 5 6 7 20 | *Erica lusitanica* | spanish heath | d |
| 1 2 | *Gaultheria hispida* | copperleaf snowberry | en |
| 3 | *Leptecophylla parvifolia* | mountain pinkberry | en |
| 14 18 | *Lissanthe strigosa subsp. subulata* | peachberry heath | |
| 1 2 4 | *Monotoca empetrifolia* | mat broomheath | en |
| 1 4 | *Planocarpa petiolaris* | alpine cheeseberry | en |
| 3 | *Richea dracophylla* | pineapple candleheath | en |
| 1 2 4 | *Richea scoparia* | scoparia | en |

| | | | |
|---|---|---|---|
| 1 2 4 | *Richea sprengelioides* | rigid candleheath | en |
| 1 4 | *Trochocarpa thymifolia* | thymeleaf purpleberry | en |
| | **EUPHORBIACEAE** | | |
| 15 18 | *Amperea xiphoclada var. xiphoclada* | broom spurge | |
| 6 9 20 | *Beyeria viscosa* | pinkwood | |
| 1 2 3 4 | *Euphorbia sp.* | spurge | i |
| 3 5 7 8 18 | *Poranthera microphylla* | small poranthera | |
| | **FABACEAE** | | |
| 6 9 12 13 14 18 20 | *Acacia dealbata subsp. dealbata* | silver wattle | |
| 7 10 14 | *Acacia leprosa var. graveolens* | varnish wattle | |
| 12 | *Acacia longifolia subsp. longifolia* | sydney coast wattle | i |
| 12 | *Acacia melanoxylon* | blackwood | |
| 14 15 1718 | *Acacia myrtifolia* | redstem wattle | |
| 11 | *Acacia pravissima* | oven's wattle | i |
| 16 | *Acacia terminalis* | sunshine wattle | |
| 12 | *Bossiaea prostrata* | creeping bossiaea | |
| 12 | *Cytisus scoparius* | english broom | d |
| 8 12 14 15 16 17 18 20 | *Daviesia ulicifolia* | spiky bitterpea | |
| 11 12 | *Genista monspessulana* | canary broom | d |
| 12 | *Indigofera australis subsp. australis* | native indigo | |
| 3 | *Oxylobium ellipticum* | golden shaggypea | |
| 12 14 18 20 | *Pultenaea daphnoides* | heartleaf bushpea | |
| 8 15 16 17 18 | *Pultenaea gunnii subsp. gunnii* | delicate golden bushpea | en |
| 7 8 14 15 16 17 18 | *Pultenaea juniperina* | prickly beauty | |
| 14 15 17 | *Pultenaea pedunculata* | matted bushpea | |
| 5 12 20 | *Ulex europaeus* | gorse | d |
| | **FAGACEAE** | | |
| 3 | *Nothofagus cunninghamii* | myrtle beech | |
| | **FUMARIACEAE** | | |
| 12 | *Fumaria sp.* | fumitory | i |
| | **GENTIANACEAE** | | |
| 13 18 20 | *Centaurium erythraea* | common centaury | i |
| | **GERANIACEAE** | | |
| 2 | *Geranium brevicaule* | alpine cranesbill | |
| 3 4 5 6 7 10 12 19 20 | *Geranium potentilloides var. potentilloides* | mountain cranesbill | |
| | **GOODENIACEAE** | | |
| 12 15 | *Goodenia lanata* | trailing native-primrose | |
| 20 | *Goodenia ovata* | hop native-primrose | |
| | **HALORAGACEAE** | | |
| 1 2 4 | *Gonocarpus montanus* | mountain raspwort | |
| 3 12 13 14 15 17 18 | *Gonocarpus tetragynus* | common raspwort | |
| 2 3 | *Gonocarpus teucrioides* | forest raspwort | |
| | **LAMIACEAE** | | |
| 7 | *Prunella vulgaris* | selfheal | i |
| | **LAURACEAE** | | |
| 15 16 18 | *Cassytha pubescens* | downy dodderlaurel | |
| | **LINACEAE** | | |
| 5 7 | *Linum catharticum* | white flax | i |
| | **LOGANIACEAE** | | |
| 1 | *Schizacme montana* | mountain mitrewort | |

| | | | |
|---|---|---|---|
| | **MALVACEAE** | | |
| 6 20 | *Asterotrichion discolor* | tasmanian currajong | en |
| | **MYRTACEAE** | | |
| 1 | *Baeckea gunniana* | alpine heathmyrtle | |
| 13 | *Eucalyptus amygdalina* | black peppermint | en |
| 1 2 3 4 | *Eucalyptus coccifera* | snow peppermint | en |
| 5 6 9 12 13 18 20 | *Eucalyptus globulus subsp. globulus* | tasmanian blue gum | |
| 5 6 8 9 10 12 13 14 15 16 18 20 | *Eucalyptus obliqua* | stringybark | |
| 17 | *Eucalyptus pulchella* | white peppermint | en |
| 20 | *Eucalyptus regnans* | giant ash | |
| 11 | *Eucalyptus risdonii* | risdon peppermint | planted |
| 8 14 15 16 17 18 | *Eucalyptus tenuiramis* | silver peppermint | en |
| 3 | *Eucalyptus urnigera* | urn gum | en |
| 5 8 12 13 14 17 18 20 | *Eucalyptus viminalis subsp. viminalis* | white gum | |
| 2 20 | *Leptospermum lanigerum* | woolly teatree | |
| 1 4 | *Leptospermum rupestre* | mountain teatree | en |
| 5 14 17 18 | *Leptospermum scoparium* | common tea-tree | |
| | **ONAGRACEAE** | | |
| 19 | *Epilobium sp.* | willowherb | |
| | **OROBANCHACEAE** | | |
| 19 | *Euphrasia collina subsp. diemenica* | plain tufted-eyebright | en |
| 19 | *Euphrasia striata* | shiny striped eyebright | en |
| | **OXALIDACEAE** | | |
| 13 | *Oxalis perennans* | grassland woodsorrel | |
| 3 5 7 12 20 | *Oxalis sp.* | woodsorrel | |
| | **PITTOSPORACEAE** | | |
| 12 13 14 17 20 | *Bursaria spinosa subsp. spinosa* | prickly box | |
| 3 6 10 20 | *Pittosporum bicolor* | cheesewood | |
| 6 | *Pittosporum bicolor X Pittosporum undulatum* | hybrid pittosporum | |
| 12 20 | *Pittosporum undulatum* | sweet pittosporum | i |
| 15 | *Rhytidosporum procumbens* | starry appleberry | |
| | **PLANTAGINACEAE** | | |
| 5 | *Plantago lanceolata* | ribwort plantain | i |
| 19 | *Plantago tasmanica* | tasman plantain | en |
| 3 | *Veronica formosa* | common speedwellbush | en |
| | **PROTEACEAE** | | |
| 1 4 | *Bellendena montana* | mountain rocket | en |
| 12 | *Grevillea rosmarinifolia* | grevillea | i |
| 3 | *Hakea lissosperma* | mountain needlebush | |
| 3 | *Lomatia polymorpha* | mountain guitarplant | en |
| 18 | *Lomatia tinctoria* | guitarplant | en |
| 1 2 4 | *Orites acicularis* | yellow orites | en |
| 1 2 4 | *Orites revolutus* | revolute orites | en |
| 1 2 3 | *Telopea truncata* | tasmanian waratah | en |
| | **RANUNCULACEAE** | | |
| 6 7 9 | *Clematis aristata* | mountain clematis | |
| 20 | *Clematis sp.* | clematis | |
| 2 4 19 | *Ranunculus scapiger* | gully buttercup | |
| 3 | *Ranunculus sp.* | buttercup | |
| | **RESEDACEAE** | | |
| 12 | *Reseda lutea* | cutleaf mignonette | i |

| | | | |
|---|---|---|---|
| | **RHAMNACEAE** | | |
| 9 10 20 | *Pomaderris apetala* | common dogwood | |
| 17 18 | *Pomaderris pilifera* | hairy dogwood | |
| | **ROSACEAE** | | |
| 4 | *Acaena montana* | mountain buzzy | en |
| 5 | *Acaena novae-zelandiae* | common buzzy | |
| 2 3 6 7 20 | *Acaena sp.* | sheep's burr | |
| 11 | *Cotoneaster glaucophyllus var. serotinus* | largeleaf cotoneaster | i |
| 11 | *Cotoneaster pannosus* | velvet cotoneaster | i |
| 11 | *Prunus sp.* | | i |
| 5 11 12 18 | *Rubus fruticosus* | blackberry | d |
| 1 | *Rubus gunnianus* | alpine raspberry | en |
| | **RUBIACEAE** | | |
| 1 2 3 | *Coprosma nitida* | mountain currant | |
| 5 6 7 9 10 18 20 | *Coprosma quadrifida* | native currant | |
| 11 12 | *Galium aparine* | cleavers | i |
| 3 5 6 20 | *Galium australe* | tangled bedstraw | |
| 17 18 | *Opercularia ovata* | broadleaf stinkweed | |
| 16 | *Opercularia varia* | variable stinkweed | |
| | **RUTACEAE** | | |
| 3 | *Correa lawrenceana var. lawrenceana* | mountain correa | en |
| 10 | *Nematolepis squamea* | satinwood | |
| 10 | *Zieria arborescens* | stinkwood | |
| | **SALICACEAE** | | |
| 11 | *Populus nigra* | lombardy poplar, italica | i |
| 11 | *Salix sp.* | willow | d |
| | **SANTALACEAE** | | |
| 6 8 12 13 14 15 16 17 18 20 | *Exocarpos cupressiformis* | common native-cherry | |
| 1 2 4 19 | *Exocarpos humifusus* | mountain native-cherry | en |
| 18 | *Exocarpos strictus* | pearly native-cherry | |
| 15 16 17 18 | *Leptomeria drupacea* | erect currantbush | |
| | **SAPINDACEAE** | | |
| 12 18 | *Dodonaea viscosa subsp. spatulata* | broadleaf hopbush | |
| | **SOLANACEAE** | | |
| 12 | *Solanum laciniatum* | kangaroo apple | |
| | **THYMELAEACEAE** | | |
| 3 10 | *Pimelea cinerea* | grey riceflower | en |
| 6 20 | *Pimelea drupacea* | cherry riceflower | |
| 12 | *Pimelea humilis* | dwarf riceflower | |
| 1 2 4 | *Pimelea sericea* | mountain riceflower | en |
| | **TREMANDRACEAE** | | |
| 15 18 | *Tetratheca labillardierei* | glandular pinkbells | |
| 17 | *Tetratheca pilosa* | hairy pinkbells | |
| | **URTICACEAE** | | |
| 5 | *Urtica incisa* | scrub nettle | |
| | **VIOLACEAE** | | |
| 19 | *Viola curtisiae* | Curtis's violet | r |
| 2 4 | *Viola hederacea* | ivyleaf violet | |
| | **WINTERACEAE** | | |
| 1 2 3 4 | *Tasmannia lanceolata* | mountain pepper | |

## GYMNOSPERMAE

### PINACEAE

| | | | |
|---|---|---|---|
| 1 20 | *Pinus radiata* | radiata pine | i |

## MONOCOTYLEDONAE

### AGAPANTHACEAE

| | | | |
|---|---|---|---|
| 11 12 | *Agapanthus sp.* | agapanthus | i |

### ASPARAGACEAE

| | | | |
|---|---|---|---|
| 12 13 15 18 | *Lomandra longifolia* | sagg | |

### ASTELIACEAE

| | | | |
|---|---|---|---|
| 1 2 4 | *Astelia alpina var. alpina* | pineapple grass | en |

### CYPERACEAE

| | | | |
|---|---|---|---|
| 5 | *Carex appressa* | tall sedge | |
| 2 5 | *Gahnia grandis* | cutting grass | |
| 12 | *Lepidosperma elatius* | tall swordsedge | |
| 17 | *Lepidosperma laterale* | variable swordsedge | |
| 19 | *Uncinia flaccida* | mountain hooksedge | |
| 3 | *Uncinia sp.* | hooksedge | en |

### HEMEROCALLIDACEAE

| | | | |
|---|---|---|---|
| 12 13 14 15 | *Dianella revoluta* | spreading flaxlily | |
| 7 10 20 | *Dianella tasmanica* | forest flaxlily | |

### IRIDACEAE

| | | | |
|---|---|---|---|
| 17 | *Diplarrena moraea* | white flag-iris | |

### JUNCACEAE

| | | | |
|---|---|---|---|
| 12 17 | *Juncus pallidus* | pale rush | |
| 18 | *Juncus sarophorus* | broom rush | |
| 5 7 | *Juncus sp.* | Rush | |
| 19 | *Luzula australasica subsp. australasica* | australian woodrush | en |
| 2 3 4 7 9 | *Luzula sp.* | luzula | |

### LUZURIAGACEAE

| | | | |
|---|---|---|---|
| 10 | *Drymophila cyanocarpa* | turquoise berry | |

### ORCHIDACEAE

| | | | |
|---|---|---|---|
| 7 8 18 | *Caladenia sp.* | spider-orchid | |
| 21 | *Chiloglottis reflexa* | autumn bird-orchid | |
| 8 10 | *Chiloglottis sp.* | bird orchid | |
| 7 | *Chiloglottis triceratops* | threehorned bird-orchid | |
| 9 | *Corybas sp.* | helmet orchid | |
| 13 | *Microtis sp.* | onion orchid | |
| 8 10 | *Pterostylis melagramma* | blackstripe greenhood | |
| 8 | *Pterostylis parviflora* | tiny greenhood | |
| 6 9 | *Pterostylis pedunculata* | maroonhood | |
| 3 9 19 | *Pterostylis sp.* | greenhood | |
| 5 7 8 | *Thelymitra sp.* | sun-orchid | |

### POACEAE

| | | | |
|---|---|---|---|
| 19 | *Agrostis venusta* | graceful bent | |
| 13 | *Aira caryophyllea* | silvery hairgrass | i |
| 13 14 18 | *Anthosachne scabra* | rough wheatgrass | |
| 7 | *Anthoxanthum odoratum* | sweet vernalgrass | i |
| 18 | *Austrostipa pubinodis* | tall speargrass | |
| 13 | *Austrostipa rudis subsp. australis* | southern speargrass | |
| 17 | *Deyeuxia densa* | heath bentgrass | |
| 1 2 14 15 16 17 18 19 | *Deyeuxia monticola* | mountain bentgrass | |
| 15 16 18 | *Dichelachne rara* | common plumegrass | |
| 12 | *Ehrharta erecta* | panic veldtgrass | i |
| 5 6 7 8 20 | *Ehrharta sp.* | ricegrass | |
| 19 | *Festuca plebeia* | tasmanian fescue | en |

| | | | |
|---|---|---|---|
| 1 19 | *Hierochloe fraseri* | alpine holygrass | en |
| 19 | *Hierochloe redolens* | sweet holygrass | |
| 1 | *Holcus lanatus* | yorkshire fog | i |
| 14 17 18 | *Microlaena stipoides* | weeping grass | |
| 1 2 4 18 | *Poa gunnii* | gunns snowgrass | en |
| 12 17 18 | *Poa labillardierei* | silver tussockgrass | |
| 3 | *Poa sp.* | poa | |
| 19 | *Rytidosperma fortunae-hibernae* | luck-of-the-irish wallabygrass | en |
| 14 17 | *Rytidosperma indutum* | tall wallabygrass | r |
| 13 | *Rytidosperma pilosum* | velvet wallabygrass | |
| 18 | *Rytidosperma racemosum var.* | stiped wallabygrass | |
| 13 14 15 17 | *Rytidosperma setaceum* | bristly wallabygrass | |
| 1 2 4 5 7 12 | *Rytidosperma sp.* | wallabygrass | |
| 19 | *Saxipoa saxicola* | rock snowgrass | |

## PTERIDOPHYTA

### ASPIDIACEAE

| | | |
|---|---|---|
| 2 3 4 6 7 10 20 | *Polystichum proliferum* | mother shieldfern |
| 20 | *Rumohra adiantiformis* | leathery shieldfern |

### ASPLENIACEAE

| | | |
|---|---|---|
| 3 | *Asplenium flabellifolium* | necklace fern |

### BLECHNACEAE

| | | |
|---|---|---|
| 5 7 | *Blechnum nudum* | fishbone waterfern |
| 3 6 7 | *Blechnum wattsii* | hard waterfern |

### DENNSTAEDTIACEAE

| | | |
|---|---|---|
| 5 20 | *Histiopteris incisa* | batswing fern |
| 5 | *Hypolepis rugosula* | ruddy groundfern |
| 5 6 7 10 12 14 18 20 | *Pteridium esculentum subsp. esculentum* | bracken |

### DICKSONIACEAE

| | | |
|---|---|---|
| 3 5 6 7 20 | *Dicksonia antarctica* | soft treefern |

### GRAMMITIDACEAE

| | | |
|---|---|---|
| 10 | *Notogrammitis billardierei* | common fingerfern |

### LYCOPODIACEAE

| | | |
|---|---|---|
| 2 | *Huperzia australiana* | mother clubmoss |
| 1 | *Lycopodium fastigiatum* | mountain clubmoss |
| 1 2 4 | *Lycopodium scariosum* | spreading clubmoss |

# APPENDIX C – TARGETED FAUNA SURVEY

Five motion response cameras were installed on the 7th of March around rocky outcrops that were deemed as potentially significant denning habitat and left for 3 weeks, as well as a song meter near a concentration of potential masked owl habitat adjacent to the top of the Access Road over the same period (Figure A). Results from camera trap survey confirmed the use of the area by threatened fauna.

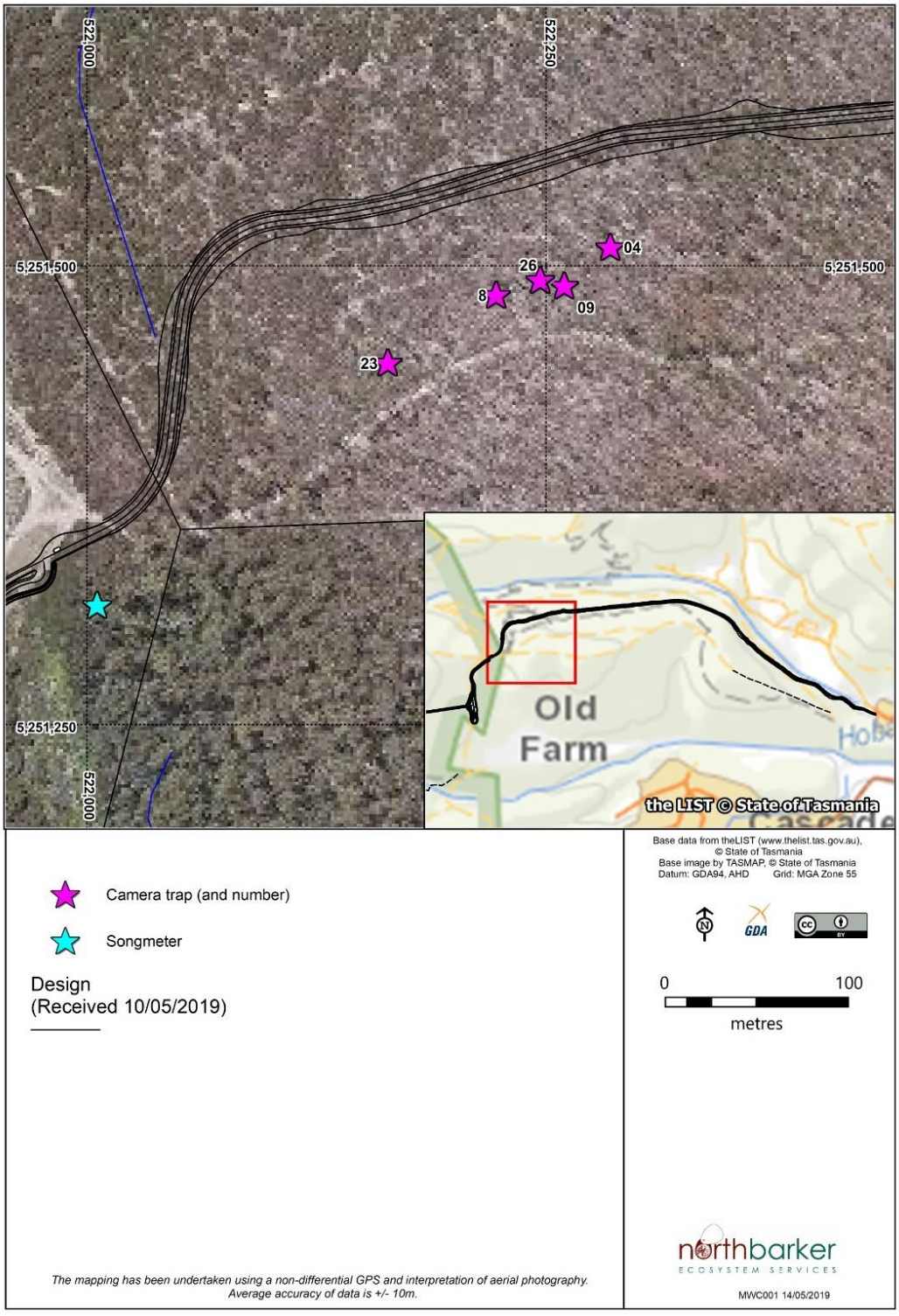


**Figure A: Location of the Access Road cameras and song meter**

## Methods

*Tasmanian masked owl Tyto novaehollandiae castanops*

Survey guidelines have been developed for Australia's threatened birds listed under the EPBCA[89]. Although the Tasmanian masked owl is not included in these guidelines, its Species Profile and Threats Database (SPRAT) profile[90] suggests that the recommendations for the northern Australian subspecies, *T. n. kimberli*, may be relevant. Guidelines for the northern subspecies suggest that broadcast (playback) surveys are effective in suitable habitat, especially in the lead up to breeding season. Detection occurs with solicited responses. Area and transect searches are unlikely to be useful due to the nocturnal habits and cryptic nature of the species[91].

Whilst the Department of the Environment, Water, Heritage and the Arts (DEWHA) guidelines suggest that playback surveys are most likely to be effective in the lead up to the breeding season[92], in Tasmania there is no peak survey period recommended[93], with the entire year considered viable for surveying[94]. This is supported by the complete lack of seasonality in the effectiveness of the playback method in Tasmania[95], which is consistent with the limited effect of season on owl calling or response to playback noted in other Australian large forest owls, including other subspecies of *T. novaehollandiae*[96]. The limited breeding records for the Tasmanian masked owl are concentrated between spring and early summer[97]. However, observations of chicks at other times[98] have led to the understanding that breeding may be broadly seasonal but possible at any time of the year, with opportunistic events most likely relating to spikes in prey density, consistent with closely related species elsewhere[99].

The DEWHA survey effort guide for the northern subspecies recommends eight hours of surveys over four days[100]. However, the Threatened Species Section of DPIPWE[101] acknowledges that extensive survey effort may be required to obtain clear results (from broadcasts) and that it is common for broadcasts to go unanswered in locations where owls are known to be present some of the time, leading to very low rates of detection. In our experience this is further exacerbated in western Tasmania where population density of this species is lower[102]. The broadcast method also suffers in relation to impact assessments as it may attract non-resident birds onto a site. As such, our primary survey method for this species was automated audio-recording, which is passive (non-attractant) and highly efficient in relation to required physical survey effort.

For the audio survey, an automatic audio-recording device (a Song Meter SM3 Bioacoustics Recorder) was placed on site for almost three weeks (20 nights). The device was placed in a stand of dry forest with mature habitat elements, which is n be high quality potential habitat[103]. The audio-recording device was programmed to record from half an hour before

[89] DEWHA (2010)
[90] Department of the Environment (2018)
[91] DEWHA (2010)
[92] DEWHA (2010)
[93] Threatened Species Section (2018)
[94] Threatened Species Section (2018)
[95] Todd (2012)
[96] Kavanagh and Peake (1993); Debus (1995); Kavanagh (1997)
[97] Mooney (1997)
[98] e.g. Bell (2008) cited in Threatened Species Scientific Committee (2010)
[99] Lenton (1984); Taylor (1994)
[100] DEWHA (2010)
[101] Threatened Species Section (2018)
[102] Threatened Species Section (2018)
[103] FPA (2014)

sunset and continue for two and half hours after sunset, and then to record again for half an hour each side of sunrise[104] – *i.e.* a total of four hours of recording were completed each night. The recordings were wave files using a 48 kHz sampling rate to cover the maximum frequency of the call of the Tasmanian masked owl.

The audio-recordings from the survey were analysed using Song Scope software and a call recogniser compiled from calls collected across Tasmania[105]. This process identifies sounds that correspond to the call signature of the Tasmanian masked owl only.

In conjunction with the audio survey, our ground survey included examination of approximately 4.12 ha of dry forest habitat for suitability in accordance with the Forest Practices Authority (FPA) guidelines[106], and examination of hollow-bearing trees for evidence of occupation (including pellets, scratchings, white-wash, prey remains, *etc.*).

With the combination of these survey methods, the total survey effort for the Tasmanian masked owl was in excess of 80 hours over 20 nights, which well exceeds the DEWHA recommended survey effort (8 hours over 4 days).

*Tasmanian devil (and quolls)*

The former Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC, now named the Department of Environment and Energy) published guidelines for surveying Tasmanian devils and quolls; these have been largely superseded in relevancy and currency by DPIPWE guidelines relating specifically to surveying with respect to assessing the impacts of development proposals[107]. The major difference is the focus of the DPIPWE guidelines on potential denning opportunities, due to the importance of limiting demographic pressures on the devil in particular in an era of increased mortality because of Devil Facial Tumour Disease (DFTD). In contrast, the DSEWPaC guidelines were developed to detect presence of a species only[108], which has less utility in determining meaningful impacts from a proposal. As such, our survey for these species used a combination of techniques from both guidelines to establish presence/absence and determine the suitability of habitat for denning.

For presence/absence[109], diurnal searching was undertaken for scats and prints throughout the entire ground survey, with particular attention to potential dispersal routes (e.g. tracks) and soft substrate. Scats in particular are often detectable in latrine sites such as at track junctions and creek crossings[110] and can be differentiated using morphometric traits including colour, shape, size and contents[111]. Remote motion-operated cameras were placed at five locations near rocky outcrops at the Access Road for the same period as the song meter above. The cameras were placed at ground level at locations in which passive evidence of animal activity (well-worn tracks) and potential dens that had signs of use (i.e. tracks, fresh digging).

Characteristics of natal dens for these species include a dry, structurally stable inner chamber, a 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

[104] Todd (2012)
[105] Todd (2012)
[106] FPA (2014)
[107] Natural and Cultural Heritage Division (2015)
[108] DSEWPaC (2011)
[109] DSEWPaC (2011); Natural and Cultural Heritage Division (2015)
[110] DSEWPaC (2011)
[111] Triggs (1996)

presence of nooks and crannies for imps to hide in[112]. Preferable habit characteristics are considered to include: direct sun near the den entrance, shelter from predators around the den mouth, a dearth of predators in the area (excluding other devils), an adequate prey base, habitat heterogeneity, complex shelter elements (such as cliffs, caves, earth banks and log piles), and friable soil for the burrows[113]. Some of these traits are fine scale habitat attributes, whereas others are landscape scale (or have plausible proxies at the landscape scale).

A systematic search for possible den locations (reaching well in excess of 30 % visual coverage specified by DPIPWE guidelines[114]) has been conducted within areas of potential denning habitat (the extent of the Access Road).

## Results

### Song meter survey

The song meter survey did not record any threatened fauna. The large number of recordings made over the period were analysed to specifically target masked owl calls. Some similar screeches were infrequently recorded, however were deemed only to be the alarm calls of brush-tailed possums.

### Camera trap survey

Camera traps confirmed the presence of a single Tasmanian devil and one Eastern quoll over the survey period. Additional species recorded include brushtail possums and an owlet nightjar. All observations are detailed below:

| | Fauna observations |
|---|---|
| **Camera 9** | Tasmanian devil on 9/3. Eastern quoll 10/03. Brushtail possum 22/03 Owlet nightjar 27/03. |
| **Camera 18** | Tasmanian devil observed on 9/3. No other fauna observations. |
| **Camera 23** | Brushtail possum on 7/03. No other fauna observations. |
| **Camera 24** | No fauna observations. |
| **Camera 26** | Eastern quoll observed on the 10/03. No other fauna observations. |

[112] Mooney (2011)
[113] Mooney (2011); Natural and Cultural Heritage Division (2015)
[114] Natural and Cultural Heritage Division (2015)


**Tasmanian devil on camera 9**


**Eastern quoll on camera 9**


**Owlet nightjar on camera 9**


**Tasmanian devil on camera 18**


**Eastern quoll on camera 26**


**Brushtail possum on camera 9**

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Triggs, B. (1996). Tracks, Scats and Other Traces – A field guide to Australian Mammals. Oxford Press, pp. 352.

# APPENDIX D – FAUNA HABITAT TREE ASSESSMENT

## Significant trees

A number of large trees, many hollow-bearing, were identified in the survey area. These are comprised of *Eucalyptus tenuiramis, E. obliqua*, and *E. globulus*. These were mapped and classed by the proportion of the overlap of each trees Tree Protection Zone (TPZ) with the road corridor (Figures A & B).

A total of 92 trees will be impacted to varying degrees by the current Access Road design. Of these, 31 will be impacted to a fatal degree (i.e. greater than 50% of their TPZ will be impacted - basically the tree is located within the footprint). 61 trees be impacted between 10-50% of their TPZs, and these trees will require assessment by an arborist to determine their likelihood of survival. Opportunity will be sought to modify road cuttings and embankments where possible to reduce the impact where practical. TPZs impacted by less than 10% are not considered significant[115].

Details of all impacted trees with additional details and coordinates can be found in Table 1, including the aforementioned impacts broken down by tree species.

[115] Australian Standard AS 4970-2009

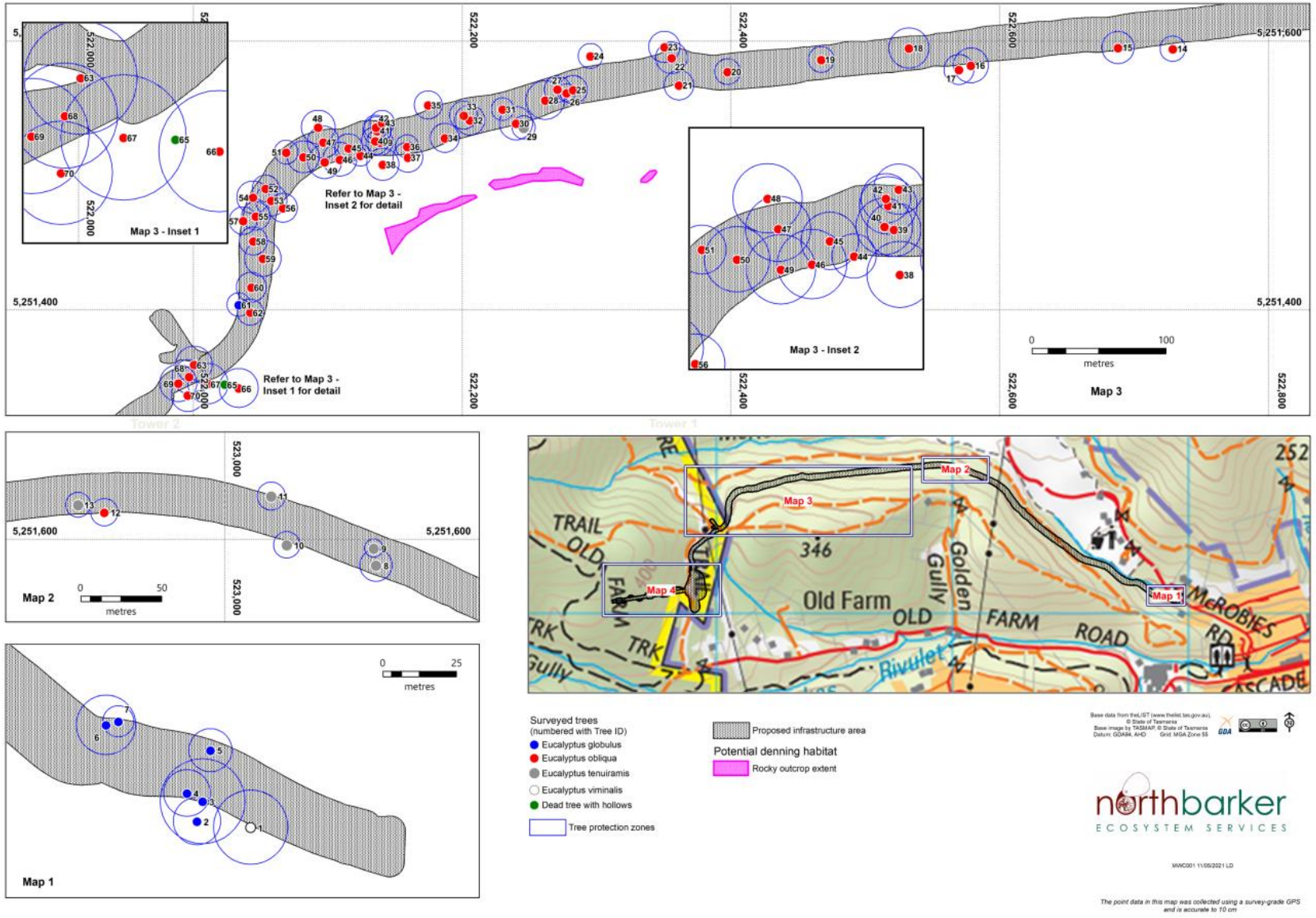



**Figure A: Potential threatened fauna habitat across the Access Road**

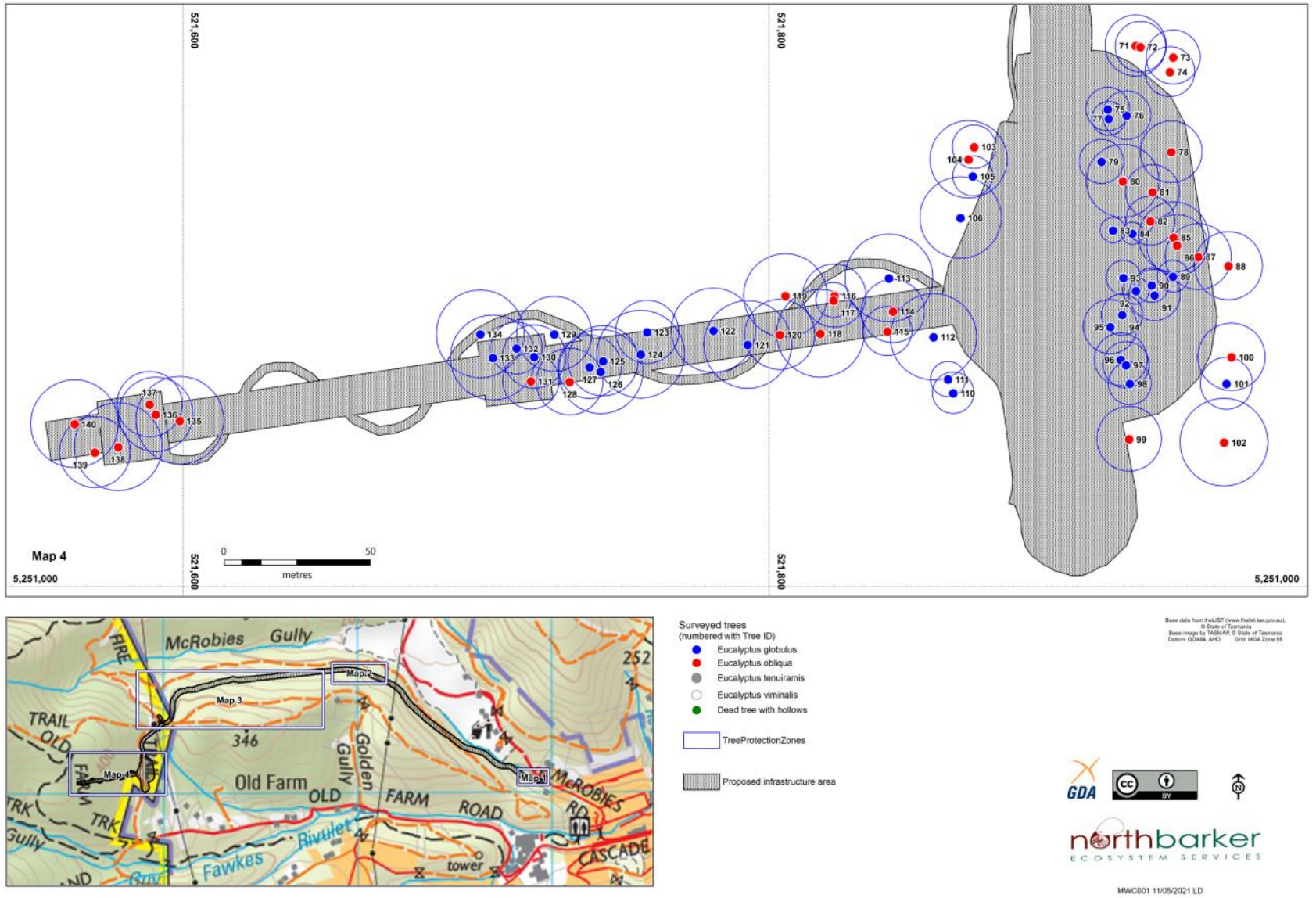



**Figure B: Potential threatened fauna habitat (trees only) in vicinity of Base Station**

**Table 1: Habitat Tree data**

All numbered trees are those within close proximity to design

Impacts scores indicate the extent of overlap with the Tree protection Zone g: 1 = >50%, 2 = 10-50, 3 <10%. HCC = Hobart City Council, WPMT = Wellington Park Management Trust

| TreeID | Fauna_Scientific | dbh_cm | Easting | Northing | Impact | Land tenure |
|---|---|---|---|---|---|---|
| 1 | Eucalyptus viminalis | 105 | 523906 | 5251055 | 2 | HCC |
| 2 | Eucalyptus globulus | 67 | 523888 | 5251057 | 3 | HCC |
| 3 | Eucalyptus globulus | 120 | 523890 | 5251064 | 1 | HCC |
| 4 | Eucalyptus globulus | 66 | 523885 | 5251067 | 1 | HCC |
| 5 | Eucalyptus globulus | 61 | 523893 | 5251081 | 1 | HCC |
| 6 | Eucalyptus globulus | 84 | 523857 | 5251090 | 1 | HCC |
| 7 | Eucalyptus globulus | 44 | 523862 | 5251091 | 1 | HCC |
| 8 | Eucalyptus tenuiramis | 83 | 523093 | 5251584 | 1 | HCC |
| 9 | Eucalyptus tenuiramis | 47 | 523092 | 5251595 | 1 | HCC |
| 10 | Eucalyptus tenuiramis | 68 | 523038 | 5251597 | 2 | HCC |
| 11 | Eucalyptus tenuiramis | 72 | 523029 | 5251627 | 1 | HCC |
| 12 | Eucalyptus obliqua | 70 | 522926 | 5251617 | 1 | HCC |
| 13 | Eucalyptus tenuiramis | 64 | 522910 | 5251621 | 1 | HCC |
| 14 | Eucalyptus obliqua | 79 | 522729 | 5251594 | 2 | HCC |
| 15 | Eucalyptus obliqua | 100 | 522688 | 5251595 | 1 | HCC |
| 16 | Eucalyptus obliqua | 108 | 522578 | 5251582 | 2 | HCC |
| 17 | Eucalyptus obliqua | 93 | 522570 | 5251579 | 2 | HCC |
| 18 | Eucalyptus obliqua | 135 | 522532 | 5251595 | 1 | HCC |
| 19 | Eucalyptus obliqua | 80 | 522467 | 5251586 | 1 | HCC |
| 20 | Eucalyptus obliqua | 80 | 522397 | 5251577 | 1 | HCC |
| 21 | Eucalyptus obliqua | 92 | 522361 | 5251567 | 1 | HCC |
| 22 | Eucalyptus obliqua | 98 | 522356 | 5251588 | 1 | HCC |
| 23 | Eucalyptus obliqua | 97 | 522350 | 5251596 | 2 | HCC |
| 24 | Eucalyptus obliqua | 77 | 522295 | 5251589 | 3 | HCC |
| 25 | Eucalyptus obliqua | 88 | 522282 | 5251564 | 1 | HCC |
| 26 | Eucalyptus obliqua | 56 | 522278 | 5251562 | 1 | HCC |
| 27 | Eucalyptus obliqua | 82 | 522271 | 5251564 | 1 | HCC |
| 28 | Eucalyptus obliqua | 120 | 522262 | 5251556 | 1 | HCC |
| 29 | Eucalyptus tenuiramis | 72 | 522246 | 5251536 | 2 | HCC |
| 30 | Eucalyptus obliqua | 103 | 522240 | 5251539 | 1 | HCC |
| 31 | Eucalyptus obliqua | 70 | 522230 | 5251550 | 1 | HCC |
| 32 | Eucalyptus obliqua | 93 | 522206 | 5251541 | 1 | HCC |
| 33 | Eucalyptus obliqua | 87 | 522201 | 5251545 | 1 | HCC |
| 34 | Eucalyptus obliqua | 90 | 522187 | 5251528 | 1 | HCC |
| 35 | Eucalyptus obliqua | 87 | 522175 | 5251553 | 2 | HCC |
| 36 | Eucalyptus obliqua | 72 | 522159 | 5251522 | 1 | HCC |
| 37 | Eucalyptus obliqua | 93 | 522160 | 5251514 | 2 | HCC |
| 38 | Eucalyptus obliqua | 100 | 522141 | 5251509 | 2 | HCC |
| 39 | Eucalyptus obliqua | 82 | 522139 | 5251525 | 1 | HCC |
| 40 | Eucalyptus obliqua | 86 | 522135 | 5251526 | 1 | HCC |
| 41 | Eucalyptus obliqua | 87 | 522137 | 5251534 | 1 | HCC |
| 42 | Eucalyptus obliqua | 75 | 522136 | 5251536 | 1 | HCC |
| 43 | Eucalyptus obliqua | 76 | 522140 | 5251539 | 1 | HCC |
| 44 | Eucalyptus obliqua | 67 | 522124 | 5251515 | 1 | HCC |
| 45 | Eucalyptus obliqua | 87 | 522115 | 5251521 | 1 | HCC |
| 46 | Eucalyptus obliqua | 105 | 522109 | 5251512 | 1 | HCC |
| 47 | Eucalyptus obliqua | 99 | 522097 | 5251525 | 1 | HCC |

| | | | | | | |
|---|---|---|---|---|---|---|
| 48 | Eucalyptus obliqua | 105 | 522093 | 5251536 | 1 | HCC |
| 49 | Eucalyptus obliqua | 105 | 522098 | 5251510 | 1 | HCC |
| 50 | Eucalyptus obliqua | 99 | 522082 | 5251514 | 1 | HCC |
| 51 | Eucalyptus obliqua | 74 | 522069 | 5251518 | 1 | HCC |
| 52 | Eucalyptus obliqua | 83 | 522054 | 5251491 | 1 | HCC |
| 53 | Eucalyptus obliqua | 98 | 522058 | 5251482 | 1 | HCC |
| 54 | Eucalyptus obliqua | 101 | 522044 | 5251484 | 1 | HCC |
| 55 | Eucalyptus obliqua | 88 | 522046 | 5251470 | 1 | HCC |
| 56 | Eucalyptus obliqua | 90 | 522067 | 5251476 | 1 | HCC |
| 57 | Eucalyptus obliqua | 86 | 522037 | 5251467 | 1 | HCC |
| 58 | Eucalyptus obliqua | 87 | 522045 | 5251451 | 1 | HCC |
| 59 | Eucalyptus obliqua | 113 | 522052 | 5251439 | 1 | HCC |
| 60 | Eucalyptus obliqua | 93 | 522043 | 5251417 | 1 | HCC |
| 61 | Eucalyptus globulus | 73 | 522034 | 5251404 | 1 | HCC |
| 62 | Eucalyptus obliqua | 81 | 522042 | 5251398 | 1 | HCC |
| 63 | Eucalyptus obliqua | 113 | 522000 | 5251360 | 1 | WPMT |
| 66 | Eucalyptus obliqua | 121 | 522034 | 5251342 | 1 | WPMT |
| 67 | Eucalyptus obliqua | 130 | 522011 | 5251345 | 2 | WPMT |
| 68 | Eucalyptus obliqua | 105 | 521997 | 5251351 | 1 | WPMT |
| 69 | Eucalyptus obliqua | 115 | 521989 | 5251346 | 1 | WPMT |
| 70 | Eucalyptus obliqua | 103 | 521996 | 5251337 | 2 | WPMT |
| 71 | Eucalyptus obliqua | 87 | 521925 | 5251185 | 2 | WPMT |
| 72 | Eucalyptus obliqua | 72 | 521927 | 5251184 | 3 | WPMT |
| 73 | Eucalyptus obliqua | 77 | 521938 | 5251181 | 1 | WPMT |
| 74 | Eucalyptus obliqua | 71 | 521937 | 5251176 | 3 | WPMT |
| 75 | Eucalyptus globulus | 62 | 521916 | 5251163 | 3 | WPMT |
| 76 | Eucalyptus globulus | 69 | 521922 | 5251161 | 1 | WPMT |
| 77 | Eucalyptus globulus | 48 | 521916 | 5251160 | 1 | WPMT |
| 78 | Eucalyptus obliqua | 88 | 521937 | 5251148 | 1 | WPMT |
| 79 | Eucalyptus globulus | 63 | 521913 | 5251145 | 1 | WPMT |
| 80 | Eucalyptus obliqua | 104 | 521921 | 5251139 | 3 | WPMT |
| 81 | Eucalyptus obliqua | 77 | 521931 | 5251135 | 1 | WPMT |
| 82 | Eucalyptus obliqua | 70 | 521930 | 5251125 | 1 | WPMT |
| 83 | Eucalyptus globulus | 36 | 521917 | 5251122 | 3 | WPMT |
| 84 | Eucalyptus globulus | 32 | 521924 | 5251121 | 1 | WPMT |
| 85 | Eucalyptus obliqua | 100 | 521938 | 5251119 | 1 | WPMT |
| 86 | Eucalyptus obliqua | 87 | 521939 | 5251117 | 3 | WPMT |
| 86 | Eucalyptus obliqua | 87 | 521939 | 5251117 | 1 | WPMT |
| 87 | Eucalyptus obliqua | 94 | 521946 | 5251113 | 1 | WPMT |
| 88 | Eucalyptus obliqua | 97 | 521957 | 5251110 | 2 | WPMT |
| 89 | Eucalyptus globulus | 45 | 521938 | 5251106 | 1 | WPMT |
| 90 | Eucalyptus globulus | 49 | 521931 | 5251103 | 1 | WPMT |
| 91 | Eucalyptus globulus | 73 | 521931 | 5251100 | 1 | WPMT |
| 92 | Eucalyptus globulus | 38 | 521925 | 5251101 | 1 | WPMT |
| 93 | Eucalyptus globulus | 49 | 521921 | 5251106 | 1 | WPMT |
| 93 | Eucalyptus globulus | 49 | 521921 | 5251106 | 3 | WPMT |
| 94 | Eucalyptus globulus | 59 | 521920 | 5251093 | 2 | WPMT |
| 95 | Eucalyptus globulus | 77 | 521916 | 5251089 | 1 | WPMT |
| 96 | Eucalyptus globulus | 75 | 521920 | 5251078 | 2 | WPMT |
| 96 | Eucalyptus globulus | 75 | 521920 | 5251078 | 1 | WPMT |
| 97 | Eucalyptus globulus | 66 | 521922 | 5251076 | 2 | WPMT |
| 98 | Eucalyptus globulus | 61 | 521923 | 5251069 | 1 | WPMT |
| 98 | Eucalyptus globulus | 61 | 521923 | 5251069 | 2 | WPMT |
| 99 | Eucalyptus obliqua | 92 | 521923 | 5251051 | 2 | WPMT |
| 100 | Eucalyptus obliqua | 96 | 521958 | 5251078 | 2 | WPMT |

| | | | | | | |
|---|---|---|---|---|---|---|
| 101 | Eucalyptus globulus | 74 | 521956 | 5251069 | 1 | WPMT |
| 102 | Eucalyptus obliqua | 150 | 521955 | 5251049 | 1 | WPMT |
| 103 | Eucalyptus obliqua | 62 | 521870 | 5251150 | 1 | WPMT |
| 103 | Eucalyptus obliqua | 62 | 521870 | 5251150 | 3 | WPMT |
| 104 | Eucalyptus obliqua | 110 | 521868 | 5251146 | 2 | WPMT |
| 105 | Eucalyptus globulus | 57 | 521869 | 5251140 | 2 | WPMT |
| 106 | Eucalyptus globulus | 116 | 521865 | 5251126 | 2 | WPMT |
| 110 | Eucalyptus globulus | 59 | 521863 | 5251066 | 1 | WPMT |
| 111 | Eucalyptus globulus | 50 | 521861 | 5251071 | 1 | WPMT |
| 112 | Eucalyptus globulus | 123 | 521856 | 5251085 | 2 | WPMT |
| 113 | Eucalyptus globulus | 197 | 521841 | 5251105 | 2 | WPMT |
| 114 | Eucalyptus obliqua | 90 | 521842 | 5251094 | 1 | WPMT |
| 115 | Eucalyptus obliqua | 70 | 521840 | 5251087 | 1 | WPMT |
| 116 | Eucalyptus obliqua | 90 | 521822 | 5251099 | 1 | WPMT |
| 117 | Eucalyptus obliqua | 50 | 521822 | 5251098 | 2 | WPMT |
| 118 | Eucalyptus obliqua | 160 | 521817 | 5251086 | 1 | WPMT |
| 119 | Eucalyptus obliqua | 119 | 521806 | 5251099 | 2 | WPMT |
| 120 | Eucalyptus obliqua | 100 | 521804 | 5251086 | 1 | WPMT |
| 121 | Eucalyptus globulus | 139 | 521793 | 5251083 | 1 | WPMT |
| 122 | Eucalyptus globulus | 120 | 521781 | 5251088 | 1 | WPMT |
| 123 | Eucalyptus globulus | 90 | 521758 | 5251087 | 1 | WPMT |
| 124 | Eucalyptus globulus | 158 | 521756 | 5251079 | 1 | WPMT |
| 125 | Eucalyptus globulus | 100 | 521743 | 5251077 | 1 | WPMT |
| 126 | Eucalyptus globulus | 120 | 521743 | 5251073 | 1 | WPMT |
| 127 | Eucalyptus globulus | 90 | 521739 | 5251075 | 1 | WPMT |
| 128 | Eucalyptus obliqua | 95 | 521732 | 5251070 | 1 | WPMT |
| 129 | Eucalyptus globulus | 107 | 521727 | 5251086 | 1 | WPMT |
| 130 | Eucalyptus globulus | 90 | 521720 | 5251079 | 1 | WPMT |
| 131 | Eucalyptus obliqua | 80 | 521719 | 5251070 | 1 | WPMT |
| 132 | Eucalyptus globulus | 74 | 521714 | 5251081 | 1 | WPMT |
| 133 | Eucalyptus globulus | 121 | 521706 | 5251078 | 1 | WPMT |
| 134 | Eucalyptus globulus | 127 | 521701 | 5251086 | 2 | WPMT |
| 135 | Eucalyptus obliqua | 145 | 521599 | 5251057 | 1 | WPMT |
| 136 | Eucalyptus obliqua | 106 | 521591 | 5251059 | 1 | WPMT |
| 137 | Eucalyptus obliqua | 93 | 521589 | 5251062 | 1 | WPMT |
| 138 | Eucalyptus obliqua | 176 | 521578 | 5251048 | 1 | WPMT |
| 139 | Eucalyptus obliqua | 101 | 521570 | 5251046 | 1 | WPMT |
| 140 | Eucalyptus obliqua | 176 | 521563 | 5251056 | 2 | WPMT |

# APPENDIX E - PORTABLE LIGHTWEIGHT CORE/ ROTARY DRILLING RIG

**KMR DRILLING** RIG 9

Tasmania's leader in drilling services

## UDR-KL10

*Description*

The UDR-KL10 Heli - Portable lightweight core / rotary drilling rig. This rig is ideally suited for very remote area "green fields" exploration drilling.

*Standard Design Features:*

Diesel Motor
- Deutz F4L2011 Air - Oil cooled with integrated cooling system
- 61.0 HP @ 2800 rpm
- Electric start

*Drill Mast:*
- Light steel channel section (perforated for reduced weight)
- Hydraulic tilting with locking pins
- Mast overall length ( 4710 mm)
- 3 meter rod pull capacity

*Drill Base:*
- Fully welded structure fabricated from light weight RHS and angle sections
- Base width 1800mm x base length 2200mm

*Rotation Head:*
- KL50W Multi Purpose Drive Head
- Hollow spindle direct drive
- Floating Head Plate
- Hydraulic Head Slide

*Weight:*

Total = 2000kg
Mast Assembly: 550kg
Base Frame: 835kg
Engine Frame: 620kg

*Depth Capacities:*

Diamond Drilling
- 80 metres HQ / • 125 metres NQ / • 165 metres BQ

RC Drilling • 26 metres x 76 mm rod

*Safety Features:*
- Guards on all rotating equipment
- Emergency Stop in the Control Cabinet

**Postal Address:** P.O. Box 156, Richmond Tasmania 7025
**Phone:** 03 6260 4122 **Mobile:** 0419 588 375
**Web:** www.kmrdrilling.com.au | **Email:** kmr_drilling@bigpond.com

Supplied by MWC Co Pty Ltd email 5/7/2019

# APPENDIX F - EAGLES EYRIE MAYDENA CONSTRUCTION EXAMPLES

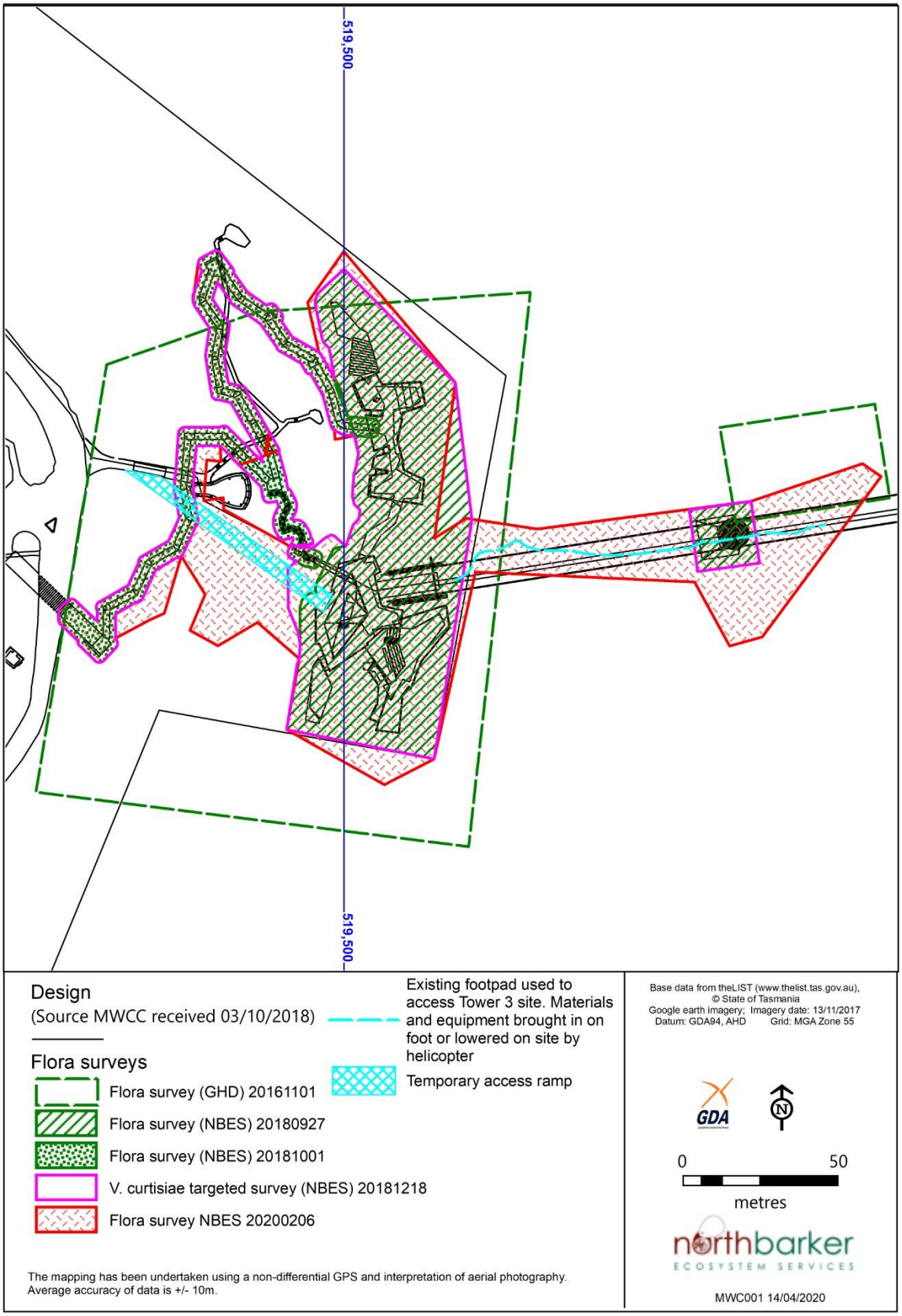
Supplied by VOS Constructions email 5 September 2019

Plate 1: Eagles Eyrie, Maydena (VOS)


Plate 2: Eagles Eyrie Access Ramp (VOS)


Plate 3: Access Ramp support detail (VOS)

# APPENDIX G - SURVEY COVERAGE




Pinnacle Centre

# APPENDIX H - ARBORIST REPORT

ELEMENT
TREE SERVICES

# DEVELOPMENT IMPACT ASSESSMENT

Mount Wellington Cableway
Mount Wellington/Kunyani

08/05/2021

**Alister Hodgman**
**Diploma (Hort/Arb)**
**QTRA Register User: 3743**

**Element Tree Services**
**Ph.: 0417144192**

alister@elementtree.com.au

**Summary**

This report focuses on the impacts to the significant trees as a result of the proposed development of the Mount Wellington Cableway. The inspections were limited to the potential habitat trees identified in the North Barker Natural Values Assessment (NBES 2019).

- It is expected that 36 individual high conservation value trees within the access road will be critically damaged.
    - Some more advanced engineering solutions may reduce this number further, but this will require ongoing consultation.

- An additional 38 high conservation value trees around the base station, cables and towers will be critically damaged.
    - The major loss here results from the requirement to address the bushfire management plan.
    - If the opportunity to microsite the final location of the tower is possible, root investigation will be required to ascertain the impacts on the selected trees. If this is not possible, and structural roots are damaged, some additional individuals may require removal.

- To gain adequate clearances from the built environment, some individuals may require pruning. If completed to *AS4373-2007 Pruning of amenity trees,* I do not expect there will be a major impact on the health or risk that these trees will pose.

- To offset the loss of potential nesting hollows, arboricultural practitioners could be engaged to create artificial hollows in some of the existing trees that are in poor condition or have died.

## Table of Contents

## 1. Terms of Reference

This report was requested by Mount Wellington Cableway Company, to assess the impacts of the Mount Wellington Cableway on the significant trees growing on the lower slopes of Mount Wellington/Kunyani. An assessment of the site was undertaken on the 15th and 16th of July 2019, and the 4th of May 2021. The report relies heavily on the data captured in the Natural Values Assessment (NBES 2019) supplied by the client[1].

Data collected for the trees includes a comment of their health and structure, the size of the tree protection zone (TPZ) and the likely outcome as a result of the works.

## 2. Study Area

There are two main areas which are subject to this report:

- ***Access Road***

  The access road starts at McRobies Road and continues to the north-west where it meets the proposed base station. This road will pass through predominately undeveloped land, although it does bisect a fire trail and mixed use track.

- ***Base Station***

  The base station is located on the eastern side of the Main Fire Trail which is accessed off Old Farm Road. From here, the cable way will pass through mature trees to the west. This area also includes two towers which will allow the cable to access the summit.

The scope of the assessment was wholly limited to these two locations and has not considered impacts elsewhere.

[1] At this stage there is no detailed road design so some assumptions will be made on how the works will be completed.

## 3. Site Findings

- ***Access Road***

The subject trees in this location are of varying health and structure. The majority have been damaged by fire which has resulted in the formation of decay and hollows. Some individuals had experienced some storm damage which is expected for trees of this condition.

The topography varies but does fall to the north where it meets McRobies Gully.

In their current situation, given the usage of the area, all of the trees would pose a broadly acceptable level of risk. Risks of this level are considered as low as reasonably practicable and require no management. Due to this outcome no work is currently for this population.

- ***Base Station***

The proposed base station will be developed on open ground to the east of the Main Fire Trail. It appears that this area has been devoid of trees for many years.

To the east of the proposed building, there is a stand of large eucalypts which may be impacted through the development of the base station and the associated fire management. These trees are of fair to good health and in their current situation will contribute to the setting for many years to come.

The trees to the west of the site, where the cables are to pass through, are of greater maturity and include some more significant defects. Some individuals present and elevated likelihood of failure and risk rating may increase if infrastructure is installed. Presently, in their current setting, I do not feel that any of the trees in this location present an unacceptable level of risk.

Like the access road, no maintenance or tree removal is currently required in this location.

## 4. Development Impacts

The road to the base station will potentially result in the loss of 36 high conservation value trees. The majority of these losses result from the trees being within the road footprint.

To limit the impact on some trees to be retained, design changes could include; the development of walls to avoid the dispersal of fill and increasing the batter angles to reduce the incursion on the TPZ. Additional to this is the introduction of larger aggregates as fill to allow adequate water and oxygen exchange with the roots below.

The road to the base station will potentially result in the loss of 38 high conservation value trees[2]. The biggest impact in this zone is the trees east of the base station for bushfire management. If their removal for bushfire management was not necessary, there would be no requirement to remove these trees as their risk is acceptable and they remain of good to fair health.

It is unclear how the construction of the towers will occur and what is required to get machinery onsite. Additional assessment of the impacts will have to be completed to ensure the trees to the west of the base station can be retained. To reduce damage, small machinery is recommended along with ground protection to reduce soil compaction.

It was indicated in the Natural Values Assessment that there was potential to microsite the towers to avoid the impacts on trees. If this is decided, then I recommend further investigation to identify structural root zones. This work may include ground penetrating radar or other root investigation methods.

To obtain adequate clearance from the infrastructure, pruning may be required on tree 113, 115, 119, 128, 129, 133, 135, 136, 137 and 140. I expect this can be done without compromising the trees if completed to the Australian Standard 4373-2007 *Pruning of amenity trees.*

[2] Some of these trees do not meet the size requirement for high conservation status but are included as they may reach this size range in the near future.

## 5. Tree Protection Measures

During development of this site, it is important that the tree protection zones are fenced, and signs installed to delineate the area. Where the tree is situated on the edge of the works, fencing should be installed along this alignment. Activities to avoid in this area include:

- Machine excavation including trenching;
- Excavation for silt fencing;
- Cultivation;
- Storage;
- Preparation of chemicals, including preparation of cement products;
- Parking of vehicles and plant;
- Refuelling;
- Dumping of waste;
- Wash down and cleaning of equipment;
- Placement of fill;
- Lighting of fires;
- Soil level changes;
- Temporary or permanent installation of utilities and signs, and
- Physical damage to the tree(s).

During excavation it is important to limit damage to any of the larger woody roots. To reduce the impact associated with traditional excavation, I recommend that any roots larger than 50mm diameter are not torn out with machinery but pruned off with a sharp tool. If the excavation is be left open for a prolonged period, the exposed edge should be covered with mulch or soil and kept moist to reduce the chances of the roots drying out.

## 6. Habitat Creation

If the loss of these trees is considered to be a significant impact on habitat value, there is the opportunity to offset through the creation of nesting hollows. These nesting hollows can be created on trees that are in advanced stages of decline or have expired.

Where the trees can be retained as an acceptable risk, these hollows can be formed to mimic natural features that can take in excess of 100 years to form. In this situation, there is significant scope to create a large number, potentially increasing the nesting habitat in the immediate vicinity.

Opposed to man made nesting boxes, these hollows are formed using the existing tree, and once weathered, have a low visual impact.

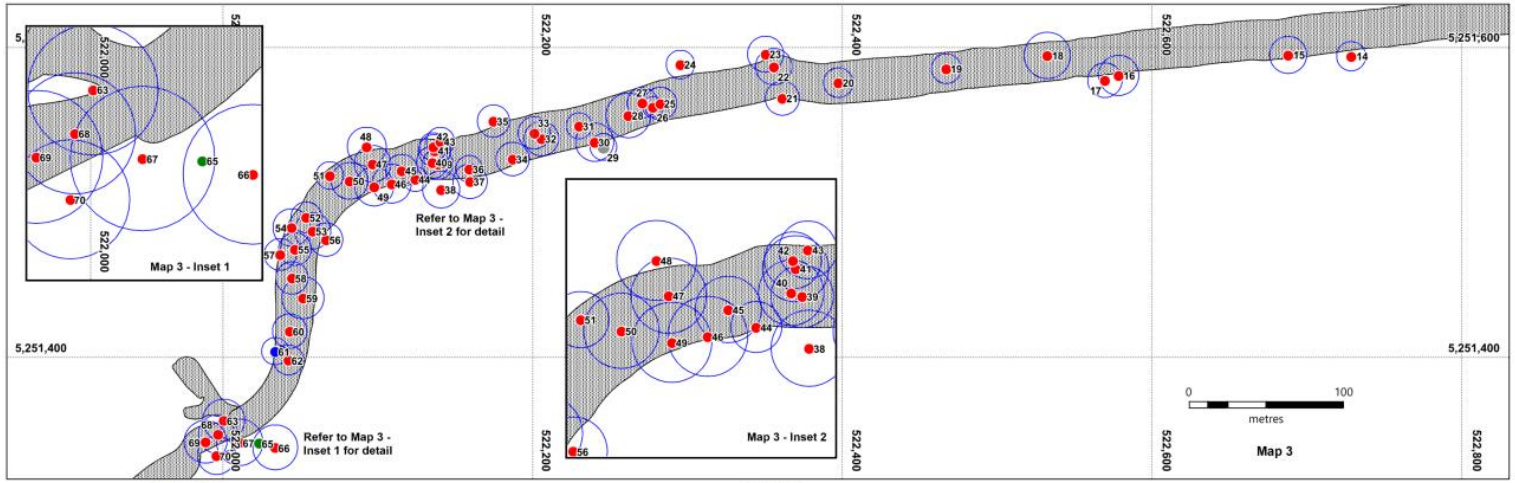
These artificial hollows have been created throughout Australia with very good results. The Victorian Tree Industry Organisation have been one of the leaders in this area and have produced some valuable information on how this work can be completed[3].

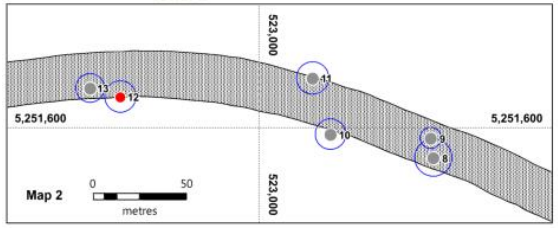
## 7. Conclusion

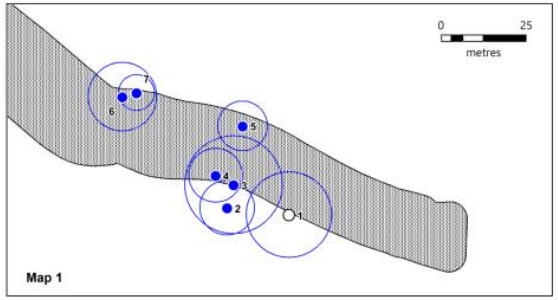
- I expect that the works will require the removal of 74 significant trees within the subject area.
- Some of the trees that will require removal have features which may provide suitable nesting opportunities for native fauna. To fully quantify the number impacted, the trees would need to be aerially assessed as many of these features may not be visible from the ground.
- To offset the potential loss of these nesting hollows, works could be completed to introduce arborist made features that will provide protection for native fauna.

[3] VTIO, Pruning for habitat http://vtio.org.au/wp-content/uploads/2010/09/Vtio_Habitat_Paper_SEPT_2010.pdf September 2010

# Appendix 1 – Tree Locations supplied by North Barker



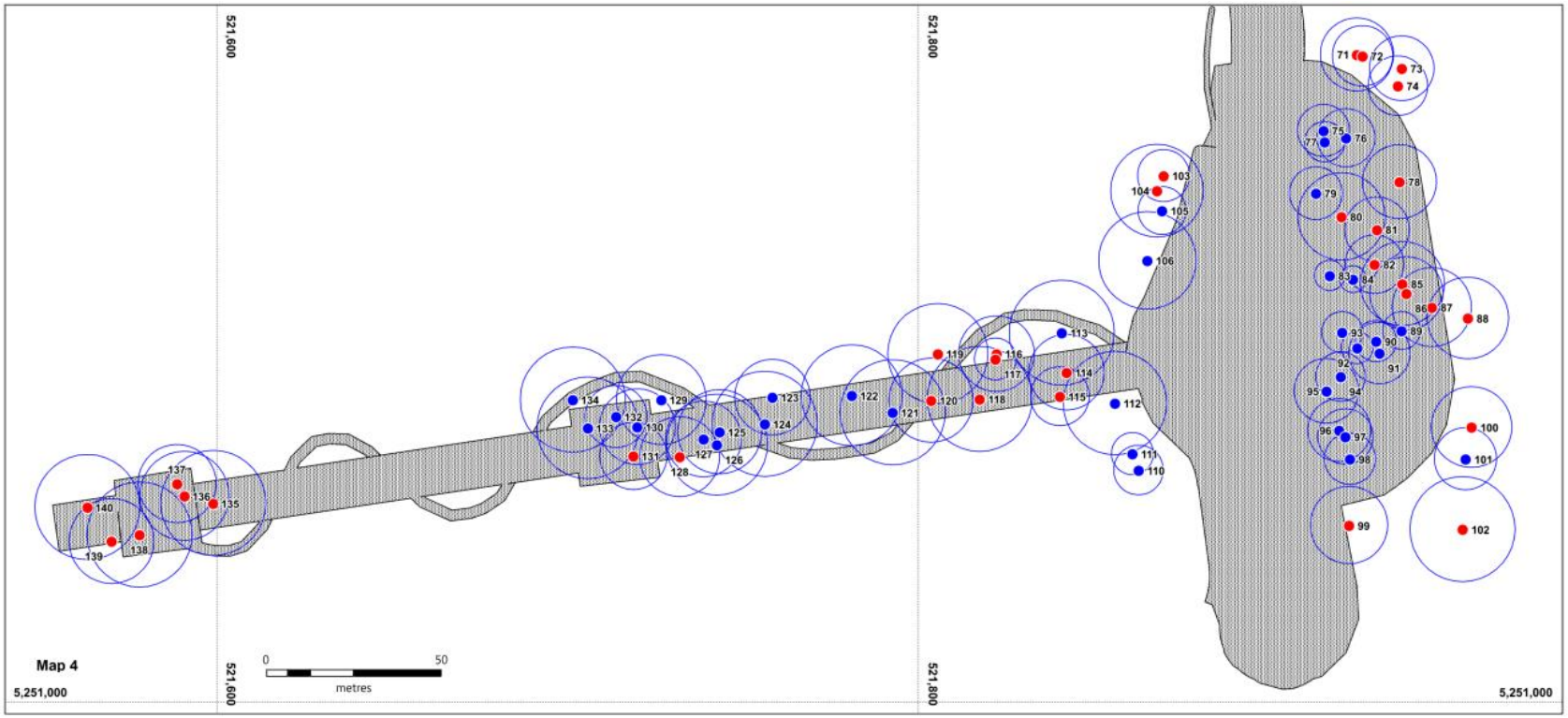


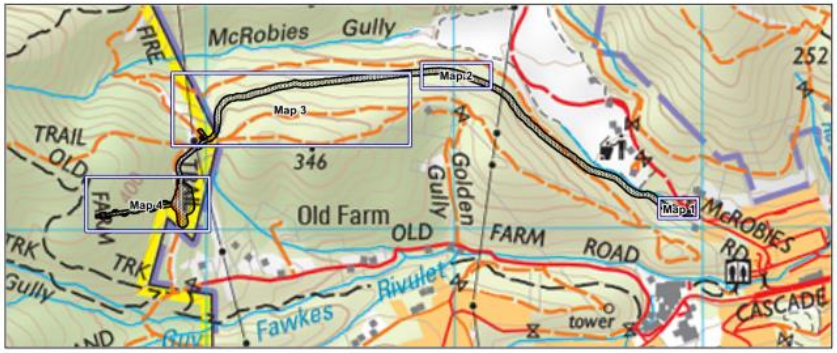
Surveyed trees
(numbered with Tree ID)
- Eucalyptus globulus
- Eucalyptus obliqua
- Eucalyptus tenuiramis
- Eucalyptus viminalis
- Dead tree with hollows
- Tree protection zones
- Proposed infrastructure area

northbarker
ECOSYSTEM SERVICES

MWC001 11/05/2021 LD

*The point data in this map was collected using a survey-grade GPS and is accurate to 10 cm*




Surveyed trees
(numbered with Tree ID)
- Eucalyptus globulus
- Eucalyptus obliqua
- Eucalyptus tenuiramis
- Eucalyptus viminalis
- Dead tree with hollows

TreeProtectionZones

Proposed infrastructure area



GDA

MWC001 11/05/2021 LD

## Appendix 2 – Findings Data

| ID | Species | DBH(m) | Health | Structure | Notes | TPZ | Retain | Reason |
|---|---|---|---|---|---|---|---|---|
| 1 | Eucalyptus viminalis | 1.05 | Fair | Good | Recent dieback to south | 12.6 | Yes | Ground already compacted where road is proposed |
| 2 | Eucalyptus globulus | 0.67 | Good | Good | Healthy tree | 8.04 | Yes | Minimal incursion - adequate space for future root |
| 3 | Eucalyptus globulus | 1.2 | Good | Good | Decay in base -drawn over road to north | 14.4 | Yes | Tolerable incursion |
| 4 | Eucalyptus globulus | 0.66 | Good | Good | Healthy tree | 7.92 | Yes | Tolerable incursion |
| 5 | Eucalyptus globulus | 0.61 | Good | Good | Healthy tree | 7.32 | Yes | Design to go no closer than existing seal – 3m from trunk |
| 6 | Eucalyptus globulus | 0.84 | Good | Good | Healthy tree | 10.08 | No | Significant incursion |
| 7 | Eucalyptus globulus | 0.44 | | | | 5.28 | No | Within proposed road |
| 8 | Eucalyptus tenuiramis | 0.83 | Fair | Good | Upper crown dying back. Epicormic crown | 9.96 | No | Works likely to cause major decline. Leans towards road |
| 9 | Eucalyptus tenuiramis | 0.47 | Good | Good | Healthy tree | 5.64 | No | Within proposed road |
| 10 | Eucalyptus tenuiramis | 0.68 | Good | Good | Healthy tree – some potential hollowing (future hollows) noted | 8.16 | Yes | Tolerable incursion |
| 11 | Eucalyptus tenuiramis | 0.72 | Fair | Good | Moderate foliage coverage. Leans away from road | 8.64 | Yes | Fill with large aggregate where works overlap TPZ |
| 12 | Eucalyptus obliqua | 0.7 | Fair | Good | Upper crown dying back – lower crown comprised of epicormic regrowth | 8.4 | Yes | Redesign to reduce cut – retain as far back as possible |
| 13 | Eucalyptus tenuiramis | 0.64 | Fair | Fair | Upper crown dead, only low epicormics remain. Leans towards proposed road | 7.68 | No | Excavation likely to cause decline |
| 14 | Eucalyptus obliqua | 0.79 | Fair | Good | crown thinning – may continue to decline | 9.48 | Yes | Minimal disturbance |
| 15 | Eucalyptus obliqua | 1 | Fair | Fair | Burnt base – large cavity. Crown dieback to north | 12 | No | Cut at base likely to lead to windthrow over road |
| 16 | Eucalyptus obliqua | 1.08 | Good | Good | Burnt tree – moderate to good foliage coverage | 12.96 | Yes | Topography already sloping away, works not expected to have major impact |
| 17 | Eucalyptus obliqua | 0.93 | Fair | Good | Burnt tree. Moderate foliage coverage | 11.16 | Yes | Likely to tolerate works |
| 18 | Eucalyptus obliqua | 1.35 | Fair | Fair | Veteran tree comprised of epicormic regrowth | 16.2 | No | Within proposed road |
| 19 | Eucalyptus obliqua | 0.8 | Fair | Fair | Burnt tree. Moderate foliage coverage | 9.6 | No | Within proposed road |
| 20 | Eucalyptus obliqua | 0.8 | Dead | Fair | Dead tree | 9.6 | No | Within proposed road |

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| ID | Species | DBH(m) | Health | Structure | Notes | TPZ | Retain | Reason |
|---|---|---|---|---|---|---|---|---|
| 21 | Eucalyptus obliqua | 0.92 | Fair | Poor | Base significantly burnt – increased probability of failure | 11.04 | Yes | May decline but risk could be tolerated – leaning away from road |
| 22 | Eucalyptus obliqua | 0.98 | Fair | Fair | Fire damaged tree, cavity in stem, central leader broken | 11.76 | No | Fill over roots and trunk may likely result in its decline |
| 23 | Eucalyptus obliqua | 0.97 | Fair | Fair | Fire damage to base, cavity in stem | 11.64 | Yes | Where works overlap TPZ, fill should be large aggregate |
| 24 | Eucalyptus obliqua | 0.77 | | | | 9.24 | Yes | Outside works footprint |
| 25 | Eucalyptus obliqua | 0.88 | Poor | Fair | Minimal foliage – nearly expired | 10.56 | No | Major incursion |
| 26 | Eucalyptus obliqua | 0.56 | Good | Good | Sound tree | 6.72 | No | Major incursion |
| 27 | Eucalyptus obliqua | 0.82 | Fair | Fair | Crown thinning | 9.84 | No | Within road |
| 28 | Eucalyptus obliqua | 1.2 | Good | Good | Sound tree | 14.4 | No | Major incursion |
| 29 | Eucalyptus tenuiramis | 0.72 | Fair | Fair | Heavily decayed, burnt base | 8.64 | Yes | Minimal incursion |
| 30 | Eucalyptus obliqua | 1.03 | Good | Good | Healthy tree | 12.36 | Yes | Design changes have accommodated tree |
| 31 | Eucalyptus obliqua | 0.7 | Good | Good | Healthy tree | 8.4 | No | Within proposed road |
| 32 | Eucalyptus obliqua | 0.93 | Good | Good | Sound tree | 11.16 | No | Within proposed road |
| 33 | Eucalyptus obliqua | 0.87 | Good | Good | Sound tree | 10.44 | No | Within proposed road |
| 34 | Eucalyptus obliqua | 0.9 | Good | Good | Sound tree | 10.8 | Yes | Design changes have accommodated tree |
| 35 | Eucalyptus obliqua | 0.87 | Dead | Fair | Dead tree | 10.44 | Yes | Minimal incursion |
| 36 | Eucalyptus obliqua | 0.72 | Poor | Fair | Thinning crown – stressed, nearly dead | 8.64 | No | Design changes have accommodated tree |
| 37 | Eucalyptus obliqua | 0.93 | Fair | Fair | Declining tree | 11.16 | Yes | Minor incursion may continue to decline |
| 38 | Eucalyptus obliqua | 1 | Good | Good | Drawn over road | 12 | Yes | Minor incursion. May require pruning over road. |
| 39 | Eucalyptus obliqua | 0.82 | Good | Good | Healthy tree | 9.84 | No | Within proposed road |
| 40 | Eucalyptus obliqua | 0.86 | Poor | Poor | Nearly expired | 10.32 | No | Within proposed road |
| 41 | Eucalyptus obliqua | 0.87 | Good | Good | Cavity in base | 10.44 | No | Will be covered with fill |
| 42 | Eucalyptus obliqua | 0.75 | Dead | Poor | Dead tree | 9 | No | Unsuitable for retention |
| 43 | Eucalyptus obliqua | 0.76 | Poor | Fair | Over 50 percent dead | 9.12 | Yes | Retain as broadly acceptable risk |
| 44 | Eucalyptus obliqua | 0.67 | Dead | Poor | Dead tree | 8.04 | No | Risk will be unacceptable |
| 45 | Eucalyptus obliqua | 0.87 | | | | 10.44 | No | On edge of cut |
| 46 | Eucalyptus obliqua | 1.05 | Good | Good | Sound tree | 12.6 | Yes | Cut will sever roots – will possibly die but could be retained as a tolerable risk |
| 47 | Eucalyptus obliqua | 0.99 | Good | Good | sound tree | 11.88 | No | Within proposed road |
| 48 | Eucalyptus obliqua | 1.05 | Dead | Poor | Dead tree | 12.6 | Yes | Could be retained as a decaying stump |

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| ID | Species | DBH(m) | Health | Structure | Notes | TPZ | Retain | Reason |
|---|---|---|---|---|---|---|---|---|
| 49 | Eucalyptus obliqua | 1.05 | Poor | Fair | Twin leader from 1.4m. Short life expectancy | 12.6 | Yes | Cut will sever roots – will possibly die but could be retained as a tolerable risk |
| 50 | Eucalyptus obliqua | 0.99 | Fair | Fair | Long extensions to north | 11.88 | No | Within proposed road |
| 51 | Eucalyptus obliqua | 0.74 | Good | Good | Healthy tree | 8.88 | Yes | Fill will bury roots, will probably decline but could be retained and given a chance |
| 52 | Eucalyptus obliqua | 0.83 | Poor | Poor | Heavily decayed, burnt base – short life expectancy | 9.96 | No | Within proposed road |
| 53 | Eucalyptus obliqua | 0.98 | Fair | Fair | Fire damaged, decayed, will lean over road | 11.76 | No | Within proposed road – unsuitable for retention |
| 54 | Eucalyptus obliqua | 1.01 | Fair | Fair | Burnt decayed base, leans away from road | 12.12 | Yes | Will possibly die but could be retained as a tolerable risk |
| 55 | Eucalyptus obliqua | 0.88 | Fair | Good | Thinning crown – stressed | 10.56 | No | On edge of road to be covered with fill |
| 56 | Eucalyptus obliqua | 0.9 | Fair | Good | Fire damaged base, fair health | 10.8 | Yes | Taper cut away |
| 57 | Eucalyptus obliqua | 0.86 | Fair | Good | Upper crown storm damage | 10.32 | Yes | Where fill covers tpz use large aggregate |
| 58 | Eucalyptus obliqua | 0.87 | Fair | Good | Fire damaged base, fair health | 10.44 | No | On edge of road to be covered with fill |
| 59 | Eucalyptus obliqua | 1.13 | Good | Good | Sound healthy tree | 13.56 | No | Within proposed road |
| 60 | Eucalyptus obliqua | 0.93 | Fair | Fair | Fire and storm damaged tree | 11.16 | No | Within proposed road |
| 61 | Eucalyptus globulus | 0.73 | Fair | Good | Sound tree of fair health | 8.76 | Yes | Taper fill away from base |
| 62 | Eucalyptus obliqua | 0.81 | Poor | Good | Minimal crown mass. Stressed tree | 9.72 | No | Within proposed road |
| 63 | Eucalyptus obliqua | 1.13 | Fair | Fair | Heavily decayed, burnt base | 13.56 | No | Major incursion - may lead to windthrow |
| 65 | Eucalyptus obliqua | | Dead | | Dead tree with hollows | | Yes | |
| 66 | Eucalyptus obliqua | 1.21 | | | | 14.52 | Yes | |
| 67 | Eucalyptus obliqua | 1.3 | Fair | Fair | Burnt tree. Large failure to west. | 15 | Yes | May tolerate disturbance |
| 68 | Eucalyptus obliqua | 1.05 | Good | Good | Healthy tree | 12.6 | No | Within proposed road |
| 69 | Eucalyptus obliqua | 1.15 | Good | Good | Fire damaged tree, hollow at 6m to NE | 13.8 | No | Within proposed road |
| 70 | Eucalyptus obliqua | 1.03 | Fair | Fair | Burnt base, leans away from road | 12.36 | Yes | Minimal incursion |
| 71 | Eucalyptus obliqua | 0.87 | Good | Good | Hollow in trunk to W at 8m and further potential hollows noted | 10.44 | Yes | |
| 72 | Eucalyptus obliqua | 0.72 | Good | Good | fire damaged base with good response growth | 8.64 | Yes | |
| 73 | Eucalyptus obliqua | 0.77 | Good | Good | Potential hollow to N. | 9.24 | Yes | |

| ID | Species | DBH(m) | Health | Structure | Notes | TPZ | Retain | Reason |
|---|---|---|---|---|---|---|---|---|
| 74 | Eucalyptus obliqua | 0.71 | Poor | Fair | Twin leader from ground. Significant decay in base of trunk. | 8.52 | Yes | |
| 75 | Eucalyptus globulus | 0.62 | Fair | Good | Potentially stressed | 7.44 | No | Bush fire management |
| 76 | Eucalyptus globulus | 0.69 | Good | Good | Healthy well-formed tree | 8.28 | No | Bush fire management |
| 77 | Eucalyptus globulus | 0.48 | Good | Good | | 5.76 | No | Bush fire management |
| 78 | Eucalyptus obliqua | 0.88 | Fair | Good | Significant volume of epicormics, fire damage at base | 10.56 | No | Bush fire management |
| 79 | Eucalyptus globulus | 0.63 | Good | Good | Well-formed tree | 7.56 | No | Bush fire management |
| 80 | Eucalyptus obliqua | 1.04 | Fair | Fair | Significant fire damage at base - increased probability of failure | 12.48 | No | Bush fire management |
| 81 | Eucalyptus obliqua | 0.77 | Fair | Good | Slight health decline | 9.24 | No | Bush fire management |
| 82 | Eucalyptus obliqua | 0.7 | Fair | Good | Significant volume of epicormics | 8.4 | No | Bush fire management |
| 83 | Eucalyptus globulus | 0.36 | Good | Good | | 4.32 | No | Bush fire management |
| 84 | Eucalyptus globulus | 0.32 | Good | Good | | 3.84 | No | Bush fire management |
| 85 | Eucalyptus obliqua | 1 | Good | Fair | Decaying tree with potential hollows | 12 | No | Bush fire management |
| 86 | Eucalyptus obliqua | 0.87 | Fair | Good | Significant volume of epicormics | 10.44 | No | Bush fire management |
| 87 | Eucalyptus obliqua | 0.94 | Fair | Fair | Fire damaged base | 11.28 | No | Bush fire management |
| 88 | Eucalyptus obliqua | 0.97 | Good | Fair | Located in an area of blown down trees, may experience altered wind patterns. | 11.64 | Yes | |
| 89 | Eucalyptus globulus | 0.45 | Good | Good | | 5.4 | No | Bush fire management |
| 90 | Eucalyptus globulus | 0.49 | Good | Good | | 5.88 | No | Bush fire management |
| 91 | Eucalyptus globulus | 0.73 | Good | Good | | 8.76 | No | Bush fire management |
| 92 | Eucalyptus globulus | 0.38 | Good | Good | | 4.56 | No | Bush fire management |
| 93 | Eucalyptus globulus | 0.49 | Good | Good | | 5.88 | No | Bush fire management |
| 94 | Eucalyptus globulus | 0.59 | Good | Good | | 7.08 | No | Bush fire management |
| 95 | Eucalyptus globulus | 0.77 | Good | Good | Well-formed tree | 9.24 | No | Bush fire management |
| 96 | Eucalyptus globulus | 0.75 | Good | Good | Well-formed tree | 9 | No | Bush fire management |
| 97 | Eucalyptus globulus | 0.66 | Poor | Fair | Upper crown dying back, cambium damage mid to upper trunk (in advanced decline May 2021) | 7.92 | No | Bush fire management |
| 98 | Eucalyptus globulus | 0.61 | Good | Good | | 7.32 | No | Bush fire management |
| 99 | Eucalyptus obliqua | 0.92 | Good | Good | | 11.04 | Yes | |
| 100 | Eucalyptus obliqua | 0.96 | Good | Good | | 11.52 | Yes | |
| 101 | Eucalyptus globulus | 0.74 | Fair | Fair | Decay in trunk, fire damage | 8.88 | Yes | |

| ID | Species | DBH(m) | Health | Structure | Notes | TPZ | Retain | Reason |
|---|---|---|---|---|---|---|---|---|
| 102 | Eucalyptus obliqua | 1.5 | Good | Good | Fire damage | 15 | Yes | |
| 103 | Eucalyptus obliqua | 0.62 | Good | Good | Younger scorched tree | 7.44 | Yes | Minimal incursion |
| 104 | Eucalyptus obliqua | 1.1 | Fair | Fair | Fire damaged tree comprised of epicormic regrowth | 13.2 | Yes | Protect tree through placing a wall on the edge of the TPZ to avoid batter |
| 105 | Eucalyptus globulus | 0.57 | Fair | Good | Potential root decay fungi. Crown drawn to south. | 6.84 | Yes | Minimal incursion |
| 106 | Eucalyptus globulus | 1.16 | Fair | Good | Crown experiencing slight decline | 13.92 | No | Major disturbance. Unable to alter design |
| 110 | Eucalyptus globulus | 0.59 | Good | Fair | Crown drawn to east | 7.08 | Yes | Minimal incursion |
| 111 | Eucalyptus globulus | 0.5 | Good | Good | Crown drawn to east | 6 | Yes | Minimal incursion |
| 112 | Eucalyptus globulus | 1.23 | Good | Good | Large healthy tree | 14.76 | Yes | Redesign to remove carparking from TPZ |
| 113 | Eucalyptus globulus | 1.97 | Good | Fair | Historic fire damage | 15 | Yes | May require one dead branch to be removed |
| 114 | Eucalyptus obliqua | 0.9 | Fair | Fair | Previous storm damage | 10.8 | No | Within alignment |
| 115 | Eucalyptus obliqua | 0.7 | Good | Fair | Heavily decayed, burnt base. Tree leans away from cables | 8.4 | Yes | May require clearance pruning |
| 116 | Eucalyptus obliqua | 0.9 | Fair | Fair | Thin crown comprised of epicormic growth | 10.8 | Yes | Outside of alignment |
| 117 | Eucalyptus obliqua | 0.5 | Good | Poor | Crown leans heavily to south | 6 | No | Crown within alignment |
| 118 | Eucalyptus obliqua | 1.6 | Good | Fair | Heavily burnt base | 15 | No | Within alignment |
| 119 | Eucalyptus obliqua | 1.19 | Fair | Fair | Moderate foliage coverage | 14.28 | Yes | May require clearance pruning |
| 120 | Eucalyptus obliqua | 1 | Good | Good | Tight crown typical of low light forest tree | 12 | No | Within alignment |
| 121 | Eucalyptus globulus | 1.39 | Dead | Poor | Large dead tree | 15 | No | Within alignment |
| 122 | Eucalyptus globulus | 1.2 | Dead | Poor | Large dead tree | 14.4 | No | Within alignment |
| 123 | Eucalyptus globulus | 0.9 | Good | Good | Tall upright tree with very few branches | 10.8 | No | Within alignment |
| 124 | Eucalyptus globulus | 1.58 | Good | Fair | Historic damage to base. Epicormic crown | 15 | No | Within alignment |
| 125 | Eucalyptus globulus | 1 | Good | Fair | Growing as a copse with 92 and 91 | 12 | No | Within alignment |
| 126 | Eucalyptus globulus | 1.2 | Good | Fair | Growing as a copse with 92 and 90 | 14.4 | No | Within alignment |
| 127 | Eucalyptus globulus | 0.9 | Good | Fair | Growing as a copse with 91 and 90 | 10.8 | No | Within alignment |
| 128 | Eucalyptus obliqua | 0.95 | Good | Fair | Crown biased to the north | 11.4 | Yes | May require some branch reduction |
| 129 | Eucalyptus globulus | 1.07 | Fair | Poor | Major cavity in mid trunk – heavily decayed. May require significant reduction to reduce its probability of failure | 12.84 | Yes | Reduce crown to create habitat tree |
| 130 | Eucalyptus globulus | 0.9 | Fair | Poor | Heavily decayed tree. High probability of failure | 10.8 | No | Within alignment |
| 131 | Eucalyptus obliqua | 0.8 | Fair | Good | Healthy tree | 9.6 | No | Within alignment |
| 132 | Eucalyptus globulus | 0.74 | Poor | Poor | Heavily decayed tree. High probability of failure | 8.88 | No | High probability of failure |

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Development Impact Assessment
Mount Wellington Cableway

| ID | Species | DBH(m) | Health | Structure | Notes | TPZ | Retain | Reason |
|---|---|---|---|---|---|---|---|---|
| 133 | Eucalyptus globulus | 1.21 | Fair | Poor | Heavily decayed tree. Evidence of recent large branch failure | 14.52 | Yes* | May require pruning – possible habitat tree |
| 134 | Eucalyptus globulus | 1.27 | Fair | Fair | Heavily decayed trunk, small crown volume | 15 | Yes* | Assess footing impacts |
| 135 | Eucalyptus obliqua | 1.45 | Good | Fair | Historic fire damage to base – crown drawn to east | 15 | Yes* | May require some pruning |
| 136 | Eucalyptus obliqua | 1.06 | Good | Good | Healthy tree | 12.72 | Yes* | May require some pruning |
| 137 | Eucalyptus obliqua | 0.93 | Good | Fair | Decay in crown | 11.16 | Yes* | May require some reduction to reduce branch failure |
| 138 | Eucalyptus obliqua | 1.76 | Good | Good | Large veteran tree | 15 | Yes* | Leaning away from cables |
| 139 | Eucalyptus obliqua | 1.01 | Fair | Fair | Heavily decayed – history of storm damage | 12.12 | Yes* | Adequate clearance from proposed cables |
| 140 | Eucalyptus obliqua | 1.76 | Fair | Fair | Large veteran tree | 15 | Yes* | May require some pruning |

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# APPENDIX I - ARBORIST REPORT ADDENDUM

NOT APPLICABLE IN THIS REPORT VERSION (SUPERSEDED BY SINGLE REPORT IN APPENDIX H)

# APPENDIX J - CREATION OF ARTIFICIAL TREE HOLLOWS AND REUSE OF EXISTING STRUCTURES

From Guidelines for the Relocation of Large Tree Hollows, NSW Central Coast Council, Wyong, 2016

Figure 11: Place faceplate in position

Figure 12: Secure faceplate to trunk

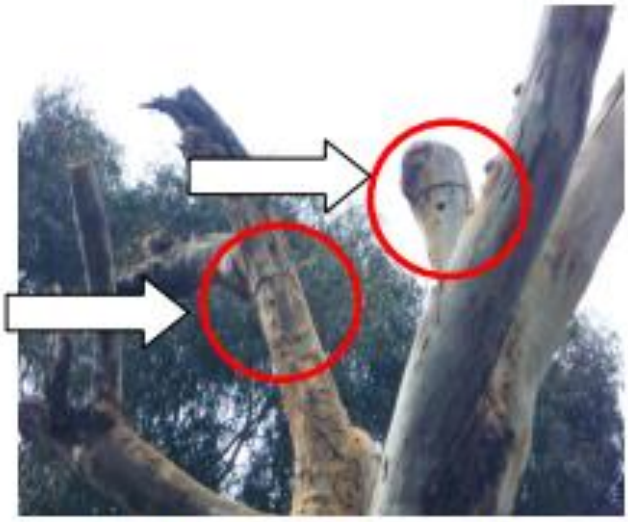


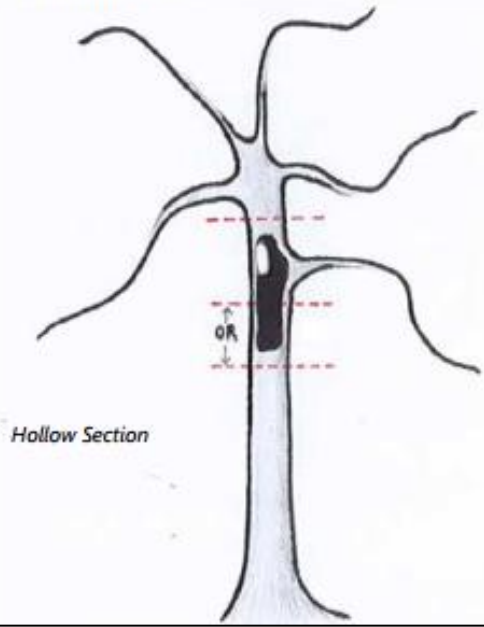
Figure 13: Completed habitat tree with hollows.

Figure 14: Various hole and cavity sizes will determine the different types of wildlife

Figure 20: Drill entrance, and or drainage hole.

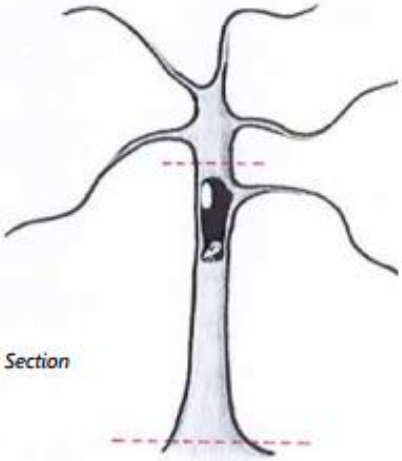
Figure 21: Attached faceplate.

**Hollow section** - the section of the tree containing the hollow chamber from the entry hole to the base of the cavity. A section may be shortened to reduce the distance between the entry hole to the base of the cavity by cutting above the natural floor and adding a floor at a desired length to create a section of a manageable size.




*Hollow Section*

**Trunk section** - the entire trunk from ground level up to above the hollow chamber. Branches not containing any hollows may be removed for manageability.



*Trunk Section*

northbarker
ECOSYSTEM SERVICES

# Mt Wellington Cableway
# Development Application PLN-19-345

## Request for Further Information
## Clause 5a (b)- -Biodiversity Matters

30 April 2020

For Mt Wellington Cableway Co

MWC001

# Introduction

This document provides a response to a specific clause in the select matters listed in the Request for Further information from Hobart City Council 17 January 2020.

It acts as an addendum to the report titled: *Mt Wellington cableway, Mt Wellington / kunanyi, Natural Values Impacts Assessment* (North Barker Ecosystem Services, 17 April 2020).

# B5a

> **In regard to (b) the justification in amended planning report (p 95-96) is not considered sufficient to demonstrate that there is no feasible alternative location as well as that the access road has been designed to locate and minimise impacts (as required by E10.7.1, P1(c)(i)).**
>
> **Details quantifying distances of each access option and differences between impacts including ecological impacts should be provided.**

The following discussion is limited to the last clause relating to a comparison of ecological values between each of the nominated options.

Figure 1 presents five route options.

Option 1 is the preferred route from McRobie's Road and forms part of the planning application. 2.35km.

Option 2 links off the end of Old Farm Road. 0.41 km.

Option 3 links off Pottery Road. 3.36 km.

Option 3a nominates an alternate section where the route crosses McRobie's Gully which links to the upper section of Option 1. 3.67 km.

Option 4 starts off Strickland Avenue before sharing the upper portion of Option 2. 1.34 km.

The ecological impacts of each option are determined from analysis of the following values documented on exiting datasets including TASVEG 3.1 and the Natural Values Atlas:

- Native vegetation communities including threatened vegetation
- Threatened flora
- Threatened fauna including GobMap (swift parrot habitat)

Figure 2 presents the mapped vegetation communities along each option (TASVEG 3.1).

Figure 3 presents the records of threatened flora and fauna on the Natural Values Atlas.

Figure 4 shows records specifically relating to swift parrot – nests, foraging and nesting habitat

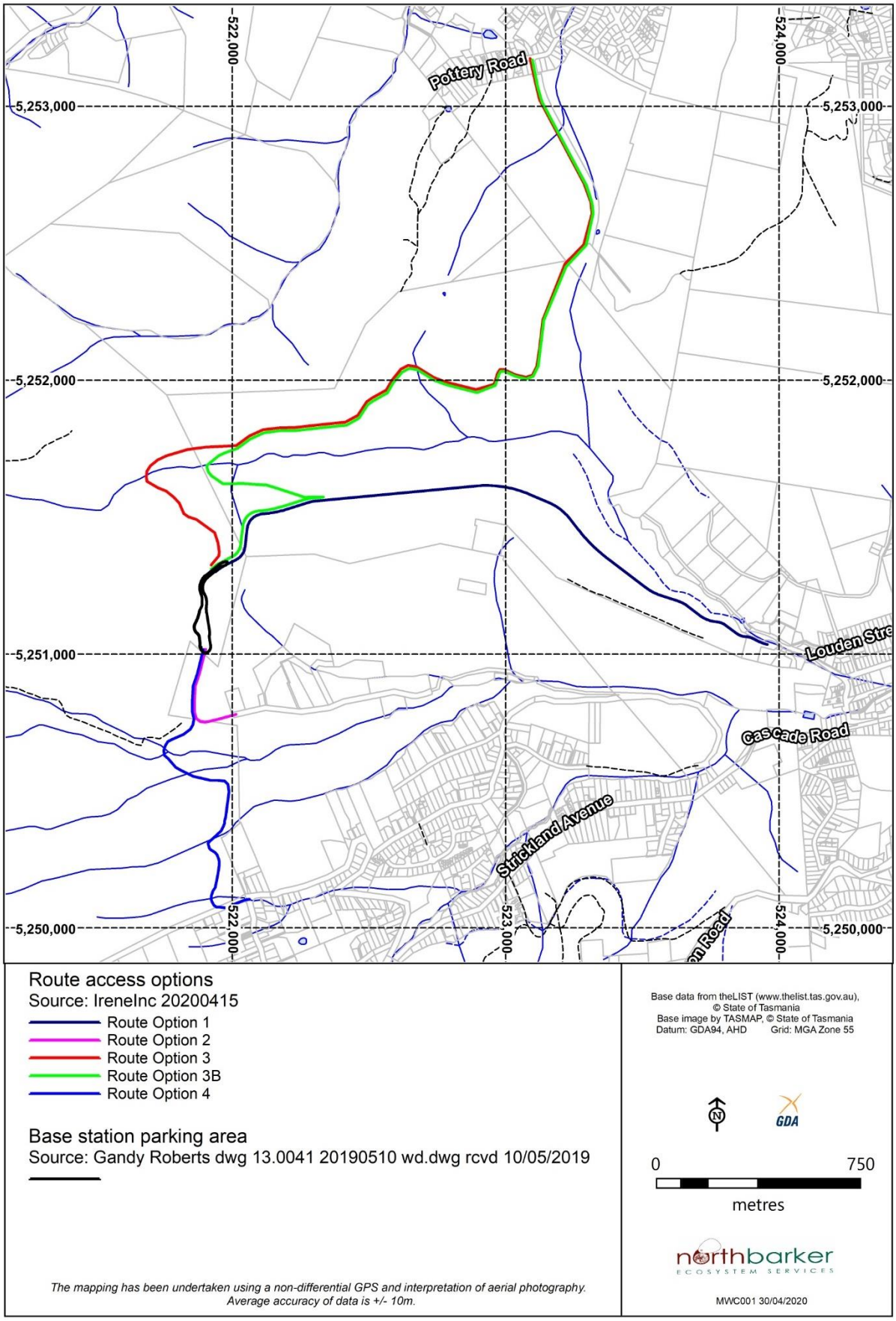



*Figure 1 - Mt Wellington Cableway Base Station Access Road Route options*

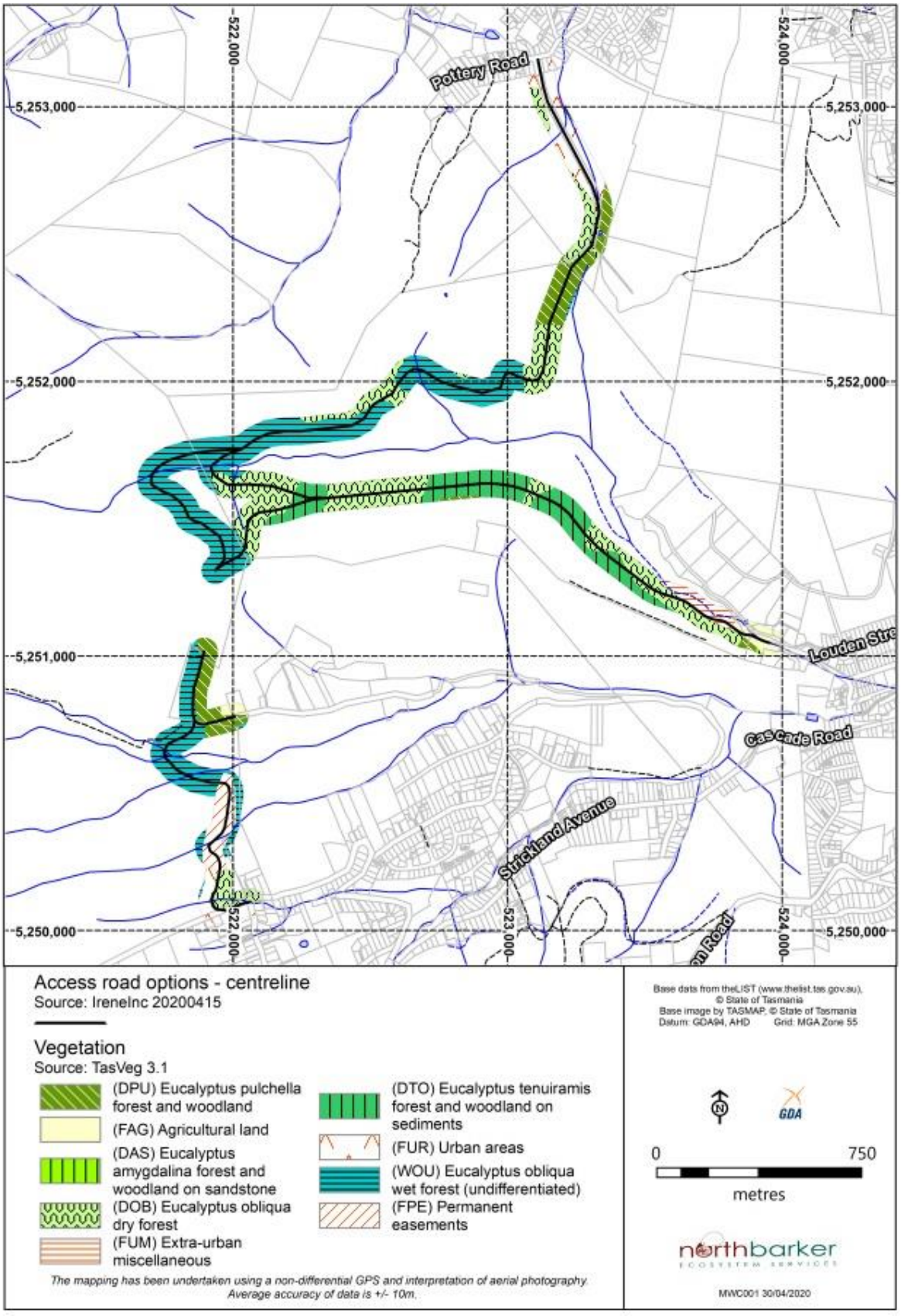



*Figure 2 - Native vegetation communities*

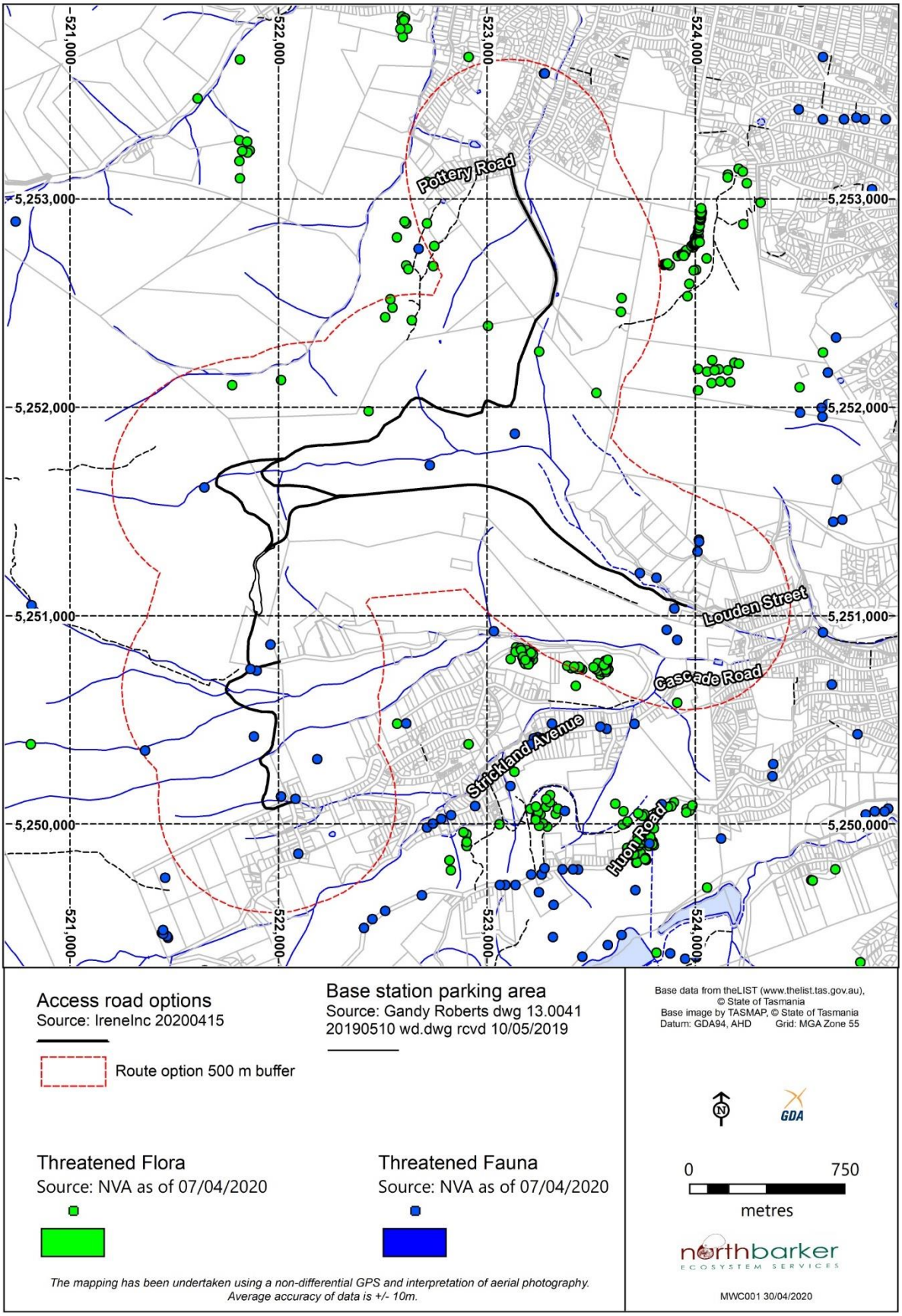



*Figure 3 - Threatened species records NVA*

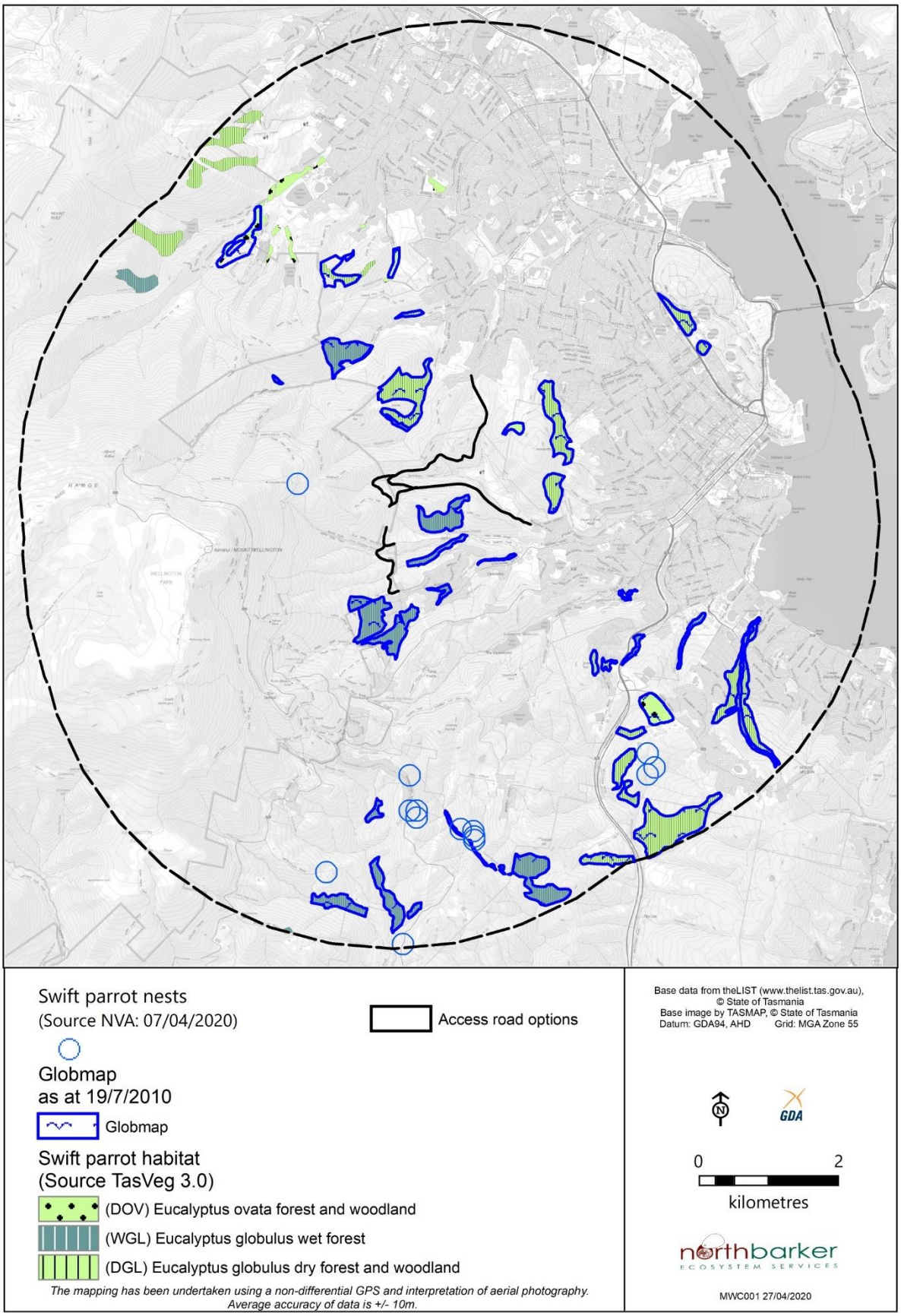



*Figure 4 - Swift parrot habitat*

Vegetation Communities

Table 1 list the extent of each community for each Option assuming a corridor of 25m. This is based on extrapolating the average width of the design footprint for Option 1. It also differentiates threatened vegetation communities listed under Schedule 3a of the *Nature Conservation Act 2002*. Data is taken from TASVEG 3.1. Actual extent of impact calculated for Option 1 is provided as a comparison which is an indication of mapping reliability of TASVEG.

*Table 1: Area of Vegetation Communities (TASVEG 3.1) by Option*

| Community | Threatened NCA | 1 | 2 | 3 | 3a | 4 |
|---|---|---|---|---|---|---|
| DOB - *Eucalyptus obliqua* dry forest | | 2.53 (2.29) | 0.00 | 1.35 | 2.80 | 0.46 |
| DGL – *Eucalyptus globulus* dry forest | YES | (0.20) | | | | |
| DPU - *Eucalyptus pulchella* forest and woodland | | 0.00 (0.00) | 0.54 | 0.77 | 0.77 | 0.23 |
| DTO - *Eucalyptus tenuiramis* forest and woodland on sediments | YES | 2.16 (3.15) | 0.00 | 0.00 | 0.51 | 0.00 |
| WOU *Eucalyptus obliqua* wet forest | | 0.38 (0.00) | 0.52 | 4.82 | 3.47 | 1.48 |
| Total forest | | 5.07 (5.64) | 1.06 | 6.94 | 7.55 | 2.17 |
| FAG, FUM, FUR, FPE Agricultural/Urban | | 0.81 (0.11) | 0.02 | 1.48 | 1.48 | 1.23 |
| Total | | 5.88 (5.75) | 1.08 | 8.42 | 9.03 | 3.40 |

Areas provided in brackets for Option 1 provide the actual calculated areas of the design against amended vegetation mapping presented in the Natural Values Assessment. Although these show some discrepancy in area calculations the analysis of TASVEG is an acceptable tool for comparing options.

The extent of impact to vegetation is greatest for Options 3 and 3a simply due to their greater length. By the same token Option 2 impacts the least vegetation, being almost entirely confined to the existing fire trail. Option 1 impacts on the greatest extent of threatened vegetation (DTO and DGL). It is quite likely that other options also include some DGL especially Options 3 and 3a.

Threatened fauna

There are few records along any route option of threatened fauna on the Natural Values Atlas (figure 3) with most being of observation records of eastern quoll, masked owl and swift parrot, all of which could potentially occur throughout the forested areas of each option. Analysis of swift parrot habitat (Figure 4) shows no significant habitat mapped that intersects with any option. Our investigations along Option 1 located occasional blue gums

(*Eucalyptus globulus*) which provide foraging habitat for swift parrot. It is very likely these occur in areas mapped as DPU, DOB and WOU and so are likely to occur along all options to varying degrees. However, it is not possible to do a quantified comparison of each option for impact to foraging trees.

It is likely that the more forest being cleared the greater the impact to swift parrot habitat, and on that basis relative impacts can be interpreted from Table 1

Threatened Flora

Very few records of threatened flora within 500m with the largest number occurring in the vicinity of Option 3. No Options are likely to have a significant impact to threatened flora.

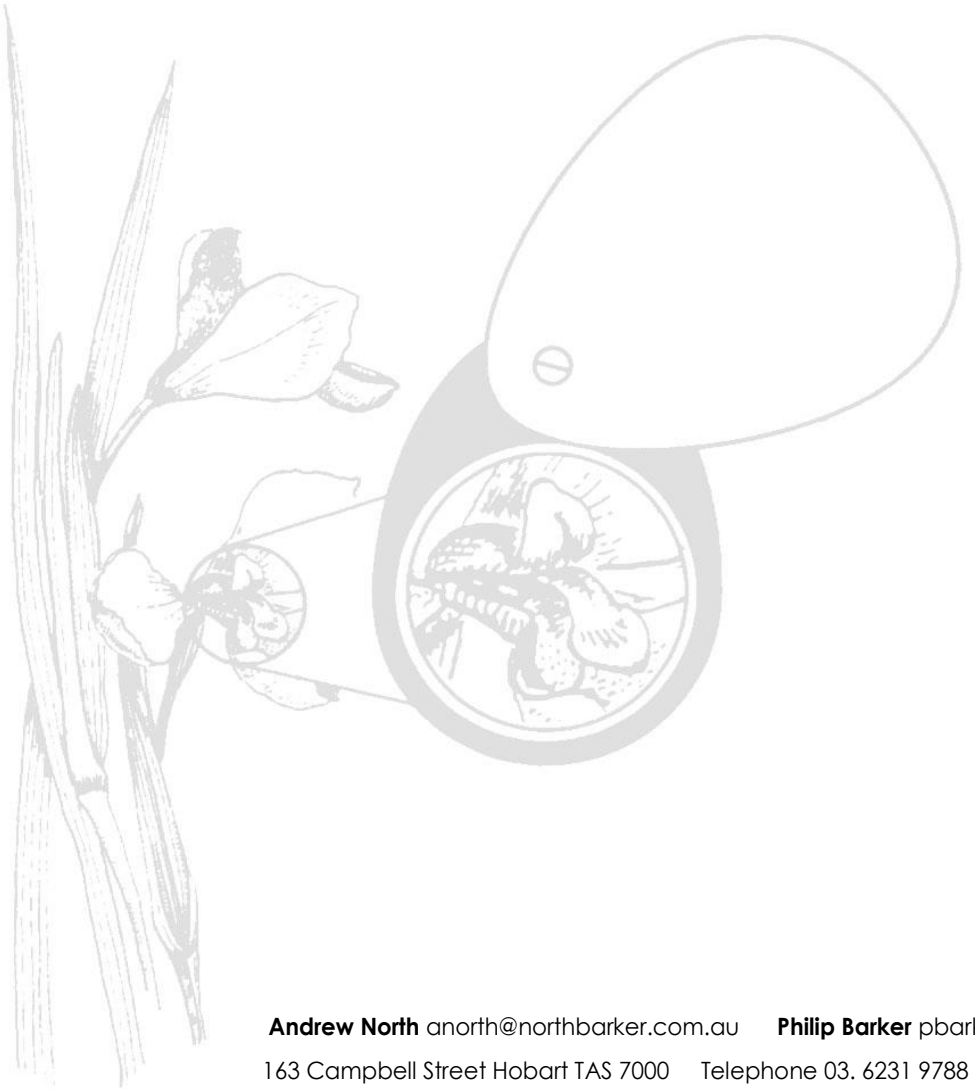
northbarker
ECOSYSTEM SERVICES

# Mount Wellington Cableway

## Roadkill Risk Report and
## Draft Roadkill Mitigation Plan

April 16th 2020

For Mount Wellington Cableway Company (MWC001)



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**100 PINNACLE ROAD, MOUNT WELLINGTON & 30 MCROBIES ROAD, SOUTH HOBART CABLEWAY AND ASSOCIATED FACILITIES, INFRASTRUCTURE AND WORKS**

**APPLICATION NO. PLN-19-345**

**Request for further information by the City of Hobart 21 June 2019**

**BIODIVERSITY**

| | | |
|---|---|---|
| B5b | 21 June 2019 | An roadkill risk report prepared by a suitably qualified person, analyzing the roadkill risk, particularly to threatened fauna, presented by the proposal including risks along the new access road to the base station as well as Pinnacle Road with respect to potential change in evening/night traffic associated with the uses within the Pinnacle Building (including restaurant and bar) and construction impacts.<br><br>This analysis should include a draft Roadkill Mitigation Plan confirming how roadkill risks will be mitigated and managed. |

# 1 Introduction

This document was prepared by North Barker Ecosystem Services in response to B5b. Further amendments were made following further response from Council.

**Request for further information by the City of Hobart 17 January 2020**

This request is not satisfied.

Specifically:

- The proponent claims (and reproduced in North Barker report) that the construction and operation of the cable car will not increase traffic volumes on Pinnacle Road by >10%.
- Visitation report indicates a greater rise in usage and hence an increase in traffic volume to the Pinnacle. Increased traffic volumes will increase roadkill risk and as such a roadkill assessment should be undertaken of the Pinnacle Road and mitigation measures developed based on the assessment. This should be considered in light of the response to request T1 above.
- There are a number of apparent typos in the document which can cause some confusion (e.g. p. 1 "east of the end of Old Farm Road" should be north).
- A range of mitigation measures proposed for the access road and Pinnacle Road. Both include measures to 'restrict hours of operation of construction vehicles and machinery to during the day (including 1 hour after dusk and 1 hour after dawn)'. The period 1 hour after dusk and 1 hour after dawn are high risk times and movements should be restricted during this time (looks to be an error only based on other measures).
- Section 3.1.10 does not mention the eastern barred bandicoot (p. 13). This species is not considered in relation to the access road. It is unclear under the plan whether it will trigger a review of the roadkill mitigation measures, if this species is recorded dead on the access road.

## 1.1 Applicable areas

As part of a proposal to construct an aerial tramway, Mt Wellington Cableway Company propose to construct a 2.2 km access road from McRobies Road in South Hobart to the proposed location of the Base Station. This access road will be used during construction and

operation of the cableway. The proposed construction of a new access road increases the risk of native animals being killed by collisions with vehicles, during both the construction and operation of the proposed development. In addition, a change in the level of traffic (particularly at night-time) on the existing Pinnacle Road could also alter the mortality risk to native wildlife (however, we have been advised by the proponent that their traffic modelling indicates that during construction and operation, traffic volumes on Pinnacle Road, which rises from Ferntree to the summit of Mt Wellington (a distance of 10.8 km), will not change from current levels).

These two roads are thus the subject of this risk assessment and plan.

## 1.2 Threatened fauna species at risk

Both roads pass through bushland that supports faunal assemblages typical of the habitat types and landscape locations. Threatened fauna species are known to occur within 500 m of both the proposed access road[1] and Pinnacle Road[2]. Road mortality is recognised as a major threatening process for three of these species: the Tasmanian devil[3], the spotted-tailed quoll[4] and the eastern quoll[5]:

- The Tasmanian devil (*Sarcophilus harrisii*) is listed as endangered under the *Environment Protection and Biodiversity Conservation Act* 1999[6] (EPBCA) and the *Threatened Species Protection Act* 1995[7] (TSPA).
- The spotted-tailed quoll (*Dasyurus maculatus* spp. *maculatus* – Tasmanian population) is listed as vulnerable under the EPBCA and rare under the TSPA.
- The eastern quoll (*Dasyurus viverrinus*) is listed as endangered under the EPBCA and is not listed under the TSPA.

These species are particularly vulnerable to adverse population effects from road mortalities because they are ground dwelling, their populations are relatively small, they have large home range sizes, they can use roads as dispersal and movement corridors, and they scavenge on animal carcasses and insects (eastern quoll only) found on roads[8].

Tasmanian devil populations have declined markedly since the emergence of Devil Facial Tumour Disease[9]. In areas where the disease is long-established and has caused significant population declines, the viability of local devil populations may be threatened if exposed to additional demographic pressures, such as an increase in deaths occurring on newly developed roads or when traffic volume or speed increases on existing roads[10]. A previous

[1] Natural Values Report, DPIPWE, 18/09/2019, nvr_1_18-Sep-2019.
[2] Natural Values Report, DPIPWE, 03/09/2019, nvr_1_03-Sep-2019.
[3] Threatened Species Scientific Committee (2009). *Commonwealth Listing Advice on Sarcophilus harrisii*. Department of the Environment, Water, Heritage and the Arts.
[4] Department of Environment, Land, Water and Planning (2016). *National Recovery Plan for the Spotted-tailed Quoll Dasyurus maculatus*, Australian Government.
[5] Threatened Species Scientific Committee (2015). *Conservation Advice Dasyurus viverrinus eastern quoll*. Canberra: Department of the Environment.
[6] Commonwealth of Australia (1999). *Environment Protection and Biodiversity Conservation Act 1999*. No. 91, 1999.
[7] Tasmanian State Government (1995) *Threatened Species Protection Act 1995*. No. 83 of 1995. Government Printer, Hobart, Tasmania.
[8] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research*.
[9] Lazenby, BT, Tobler, MW, Brown, WE, *et al.* (2018). Density trends and demographic signals uncover the long-term impact of transmissible cancer in Tasmanian devils. *Journal of Applied Ecology*.
[10] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research;* Department of the Environment and

study found that increases in roadkill rates due to road upgrades (resulting in increased traffic volumes and speeds) caused a 50 % decline in the local population of devils, and eliminated the local population of eastern quolls[11,12]. A three-year study conducted between 2001-2004 estimated that 3392 Tasmanian devils were being killed annually on roads, suggesting that between 3.8 and 5.7 % of the total population is killed on roads every year[13].

The eastern barred bandicoot (*Perameles gunnii gunnii*) is also known to occur around the project area. This species is listed as vulnerable nationally under the EPBCA but is not listed as rare or threatened in Tasmania under the TSPA. It occurs in many modified habitats in Tasmania[14] and has been found to be abundant in periurban areas of the southeast, where its high fecundity and habitat preferences appear to mitigate relatively high demographic pressures including road mortality[15]. Road mortality is not listed as a major threat to mainland populations, for which there is more extensive conservation advice[16]. For these reasons, this species is not considered to be at the same level of risk as the above mammals from the proposed roads.

In addition to threatened mammal species, birds of prey can also be at risk of road collision trauma when scavenging carcasses. In the context of the current assessment, threatened species of birds with this risk include the grey goshawk (*Accipiter novaehollandiae*), the Tasmanian masked owl (*Tyto novaehollandiae castanops*), and the Tasmanian wedge-tailed eagle (*Aquila audax* ssp. *fleayi*).

# 2 Roadkill risk - process for assessment and mitigation of roadkill impacts

The '*Survey guidelines and management advice for development proposals that may impact on the* Tasmanian Devil 2015' (referred to as the *Survey Guidelines*)[17] outlines a process for assessing the potential impacts of road developments on Tasmanian devils. This process focuses on identifying and mitigating impacts on devils, but the mitigation measures are also suitable for reducing road mortalities for other native fauna, including quolls. The process involves completing a traffic impact assessment, then, if Tasmanian devil roadkill mortalities are expected to increase by more than 10 %, a roadkill assessment and roadkill mitigation plan must be completed.

---

Heritage (2006). *Tasmanian Devil (Sarcophilus harrisii) - EPBC Policy Statement 3.6,* Australian Government; Saving the Tasmanian Devil: Recovery through Science-based Management.

[11] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*

[12] Threatened Species Scientific Committee (2009*). Commonwealth Listing Advice on Sarcophilus harrisii*. Department of the Environment, Water, Heritage and the Arts.

[13] Hobday, AJ and Minstrell, ML (2008). Distribution and abundance of roadkill on Tasmanian highways: human management options. *Wildlife Research;* Threatened Species Scientific Committee (2009*). Commonwealth Listing Advice on Sarcophilus harrisii*. Department of the Environment, Water, Heritage and the Arts.

[14] Threatened Species Section (2019). *Perameles gunnii (Eastern Barred Bandicoot): Species Management Profile for Tasmania's Threatened Species Link*. DPIPWE, Tasmania. Accessed 4/9/2019.

[15] Daniels, G. and Kirkpatrick (2012). The influence of landscape context on the distribution of flightless mammals in exurban developments. *Landscape and Urban Planning*, v 104 (1), pp. 114-123; Daniels (2011). Ecological implications of exurban development: The effects of people, pets and paddocks on avian and mammalian wildlife. Unpublished PhD thesis, University of Tasmania.

[16] Hill, R, Winnard, A and Watson, M (2010). *National Recovery Plan for the Eastern Barred Bandicoot (mainland) Perameles gunnii*. Department of Sustainability and Environment, Melbourne.

[17] Natural and Cultural Heritage Division (2015). *Survey guidelines and management advice for development proposals that may impact on the Tasmanian Devil (Sarcophilus harrisii)*, DPIPWE.

## 2.1 Traffic impact assessment and roadkill assessment guidelines

The construction of the proposed new access road is a *Medium* scale activity (road construction or upgrade >1-10 km) as defined by the *Survey Guidelines*. Due to the potential for increased road mortality, a traffic impact assessment is required[18]. As defined in the *Survey Guidelines,* a traffic impact assessment involves:

> "*comparison of current and projected night time traffic rates (i.e. between one hour before dusk to one hour after dawn) including volume of traffic, types of traffic (light versus heavy vehicles) and/or increased speed on road*." Then, "*If [the] traffic assessment indicates potential for a substantial impact on the local devil population (i.e. >10 % increase in [night-time][19] traffic or speed etc.): roadkill assessment required.*"

A roadkill assessment involves extended field surveys that aim to establish baseline roadkill mortality. According to the *Survey Guidelines,* a roadkill assessment is:

> *"to be conducted where desktop assessment of the local devil population and the projected roadkill risk indicate potential for a substantial impact on the local population (i.e. predicted >10 % increase in deaths). Ideally, the survey should be conducted regularly over a long period of time, preferably covering all seasons (noting that January to April is when peak roadkill of weaned devils may occur). Notwithstanding the previous point, at a minimum, survey of roadkilled devils should cover one of the following set periods of time - either 3 months for weaned devils between January and April or 6 months over the remainder of the year. If assessing the impact of traffic associated with a proposed development on the devil, it is necessary to understand the current roadkill rate, potential construction phase roadkill rate, and potential post-development roadkill rate."*

If the roadkill assessment determines that there is likely to be a greater than 10 % increase in deaths, the prescribed action is to:

> "*mitigate any >10 % potential increase in roadkill risk. If [mitigation is] not possible or practical then consider offset options."*[20]

## 2.2 Assessment of traffic impacts for the new access road and Pinnacle Road

### 2.2.1 Access road

The location of the proposed access road is largely undeveloped bushland. Although located near an existing fire trail, for the purposes of this assessment we assume that the current baseline roadkill rate is zero, and therefore the development of a new access road would exceed the threshold of >10 % increase in roadkill mortality risk. As stipulated in the *Survey Guidelines,* a roadkill mitigation plan must therefore be developed and implemented for this road.

### 2.2.2 Pinnacle Road

According to the traffic modelling of the proponent, the volume or weight of traffic on Pinnacle Road is not expected to increase by > 10 % during construction and/or operation. North Barker have not been supplied with data to determine if this applies to night-times (as per the definition in the *Survey Guidelines*) and thus will not exceed the risk threshold defined

[18] Natural and Cultural Heritage Division (2015). *Survey guidelines and management advice for development proposals that may impact on the Tasmanian Devil (Sarcophilus harrisii)*, DPIPWE.
[19] Text in square brackets inserted by North Barker for clarity.
[20] Natural and Cultural Heritage Division (2015). *Survey guidelines and management advice for development proposals that may impact on the Tasmanian Devil (Sarcophilus harrisii)*. DPIPWE.

in the *Survey Guidelines.* However, as part of ensuring a limit on night-time traffic associated with their development, the proponent proposes to implement access restrictions in the pinnacle facilities – this would consist of the self-regulated prevention of patronage of the facilities at night-time to those that do not have a return ticket to descend the mountain via the cable car.

Based on the proponent advising us that their modelling indicates that Pinnacle Road traffic will not increase by more than 10 %, and that there will be no change in night-time traffic associated with the operation of their facilities, in accordance with the *Survey Guidelines*, a roadkill assessment is not required for Pinnacle Road. Nonetheless, consistent with the precautionary principle, as stipulated within the EPBCA *Survey guidelines for Australia's threatened mammals*[21], we recommend the implementation of traffic monitoring on Pinnacle Road and outline some mitigation contingencies that should be applied should night-time traffic volumes increase beyond the 10 % threshold (section 3.2).

## 2.3 Threatened species presence and potential roadkill impacts

As part of the natural values assessment for the proposed development, a ground survey focused on detecting the presence of Tasmanian devils and quolls (as well as the presence of suitable denning habitat) was conducted for the access road and surrounding areas[22]. Diurnal searching was undertaken for scats and prints throughout the survey area, with survey effort favouring potential dispersal routes (e.g. tracks) and soft substrates. A targeted remote motion-triggered camera survey using five cameras deployed for 20 nights each was conducted in an area identified as potential devil and quoll denning habitat. The cameras were located within 100 m of the proposed access road.

To supplement the surveys conducted for the natural values assessment, a literature search and a search of the Tasmanian Natural Values Atlas (NVA) were conducted to determine the extent of available baseline data on species presence. To the best of our knowledge, no long-term systematic studies on the abundance, population demographics or habitat use of the three threatened species of particular concern (Tasmanian devil, spotted-tailed quoll, and eastern quoll) have been published for these locations.

### 2.3.1 Access road: available data

The Tasmanian Natural Values Atlas (NVA) contains nine records for eastern quolls within 500 m of the location of the proposed access road. The presence of the species was confirmed on camera footage during the natural values assessment (Figure 1).

Despite no NVA records for the Tasmanian devil or the spotted-tailed quoll being attributed to within 500 m of the access road route, the devil was confirmed as present in the area on camera footage during the natural values assessment (Figure 1).

There are seven records for spotted-tailed quoll attributed to within 5 km on the NVA, with the most recently recorded in 2018. There are 44 records for the Tasmanian devil within 5 km of the proposed location, with the most recently recorded in 2018.[23]

No prominent dispersal routes crossing the location of the proposed access road were identified during the ground survey in the natural values assessment.

[21] Department of Sustainability, Environment, Water, Population and Communities (2011). *Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act.* Australian Government.

[22] North Barker Ecosystem Services (2019). *Mt Wellington Cable Way Natural Values Impacts Assessment.*

[23] Natural Values Report, DPIPWE, 18/09/2019, nvr_1_18-Sep-2019.

### 2.3.2 Pinnacle Road: available data

Pinnacle Road is purportedly regularly checked for roadkill by contractors for Hobart City Council, but as of the time of submitting this report we have not received data on collections from the Council. There are no published roadkill assessments for the road.

Tasmanian devils, eastern and spotted-tailed quolls are nonetheless known to occur within 500 m of Pinnacle Road. The NVA contains four records of devils within 500 m of the Pinnacle Road (most recently recorded 2016) and 36 records within 5 km (most recently recorded 2019). There are six spotted-tailed quoll records within 500 m (most recently recorded 2014) and 16 within 5 km (most recently recorded 2018). There are seven eastern quoll records within 500 m (most recently recorded 2011) and 64 records within 5 km (most recently recorded 2018)[24].

The NVA contains records of two Tasmanian devil carcasses found on Pinnacle Road, recorded from January 2015 and 2016 (Figure 2). No records of eastern quoll or spotted-tailed quoll carcasses are attributed to Pinnacle Road. (Three eastern barred bandicoot carcasses are attributed to Pinnacle Road on the NVA.)

In the absence of detailed abundance, demographic and habitat use data for the species of concern, there are limitations to determining baseline roadkill rates and the subsequent effects any additional deaths may have on local and regional population viability. Even with the limited data available, it is important to note that the actual number of road-killed animals is likely to exceed the number recorded, due to wounded animals dying off the road[25], carcasses being consumed by scavengers, and observations not being lodged on databases.

[24] Natural Values Report, DPIPWE, 03/09/2019, nvr_1_03-Sep-2019.
[25] Hobday, AJ and Minstrell, ML (2008). Distribution and abundance of roadkill on Tasmanian highways: human management options. *Wildlife Research.*

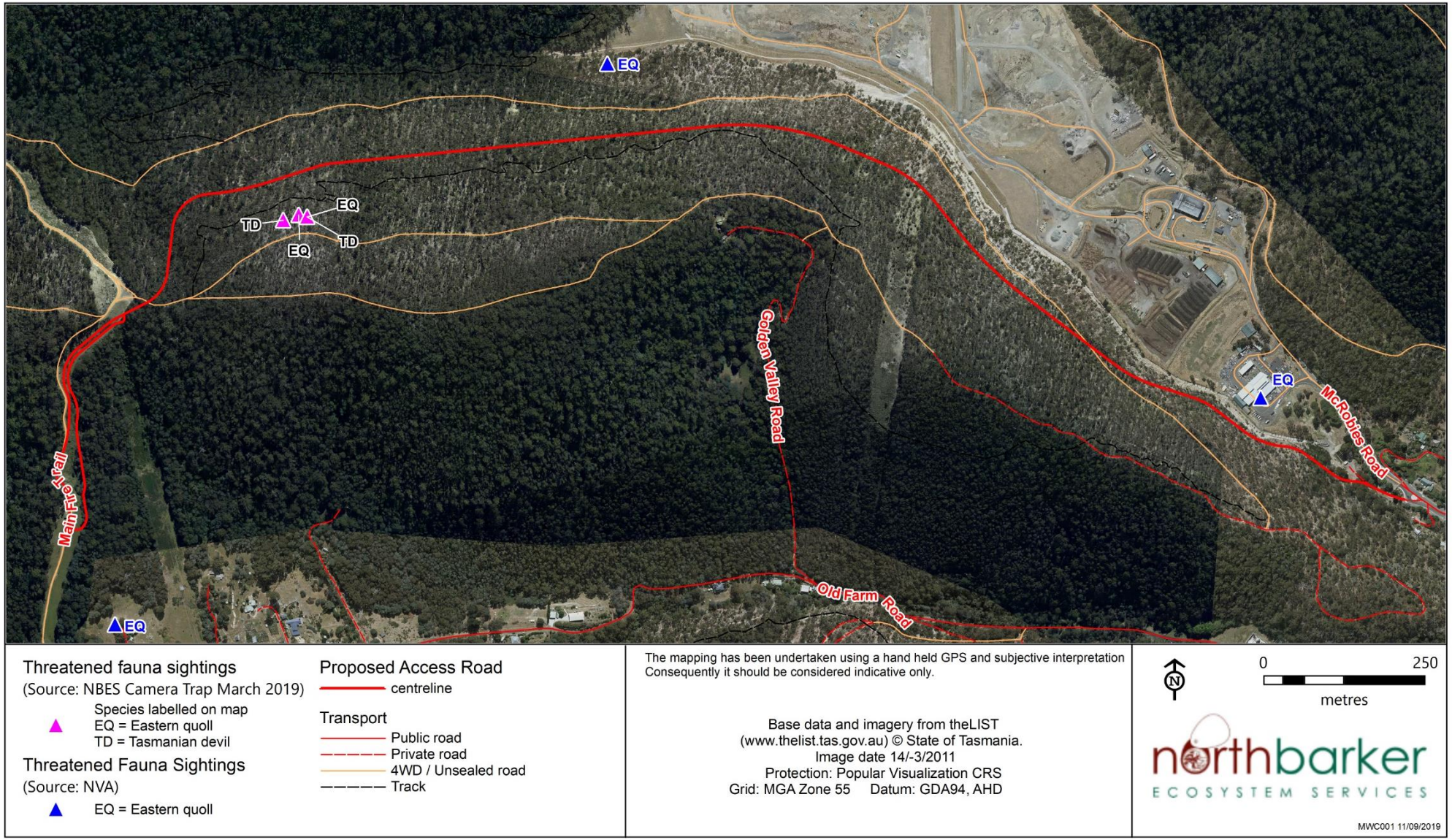


**Figure 1. Observations of threatened fauna at risk of road mortality in vicinity of proposed Mt Wellington Cableway access road.**

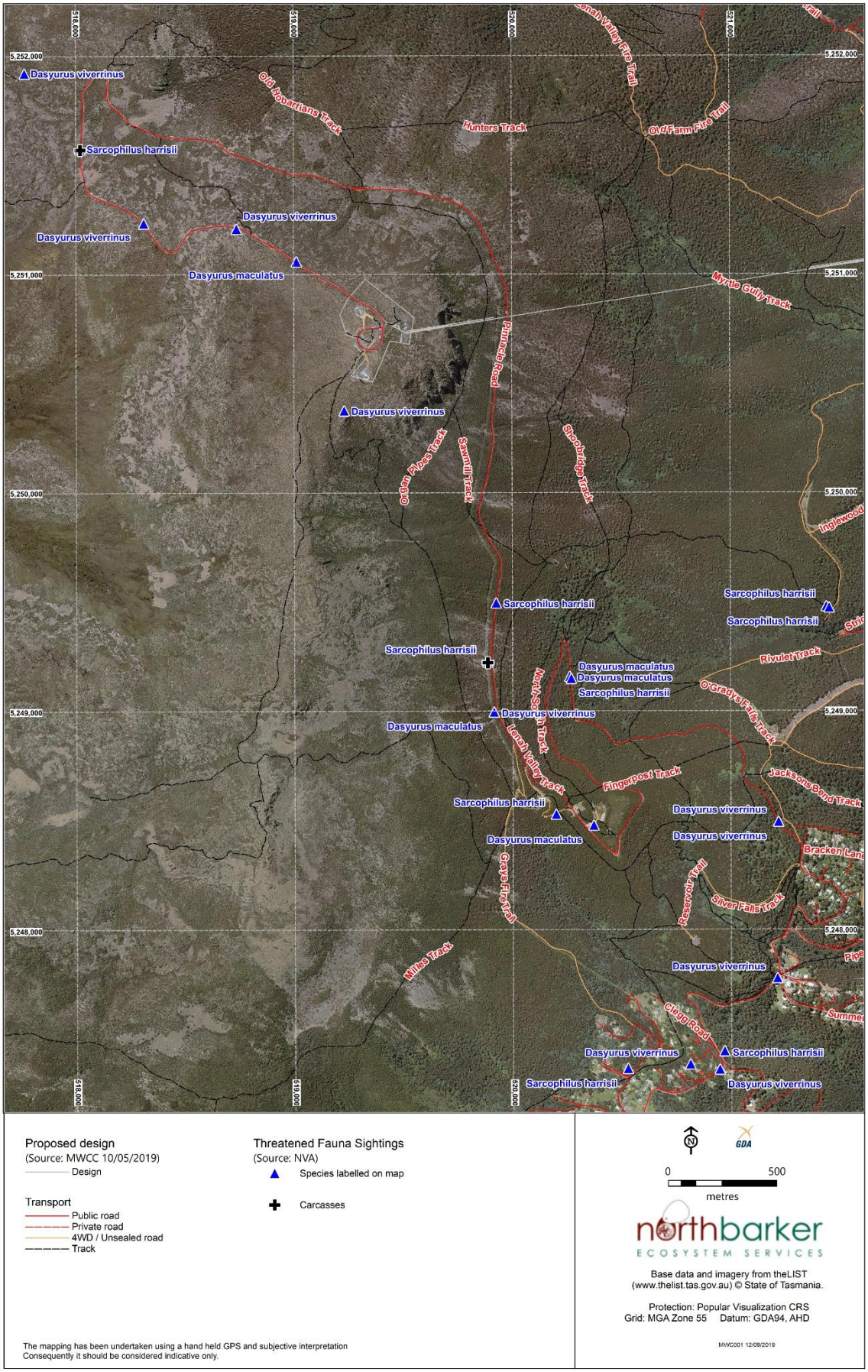


**Figure 2. Locations of Tasmanian devil, eastern quoll, and spotted tailed quoll occurrence records from Pinnacle Road and surrounds. Two records of Tasmanian devil carcasses are shown.**

# 3 Draft Roadkill Mitigation Plan

This plan outlines measures to be implemented by the proponent to mitigate the risk of road mortalities generated by the development of the proposed access road connecting McRobies Road to the cableway Base Station, and for meeting the requirements of the *Survey Guidelines* in relation to Pinnacle Road.

A range of mitigation measures have been proven to reduce the number of animals killed on roads.[26] The mitigation strategies presented in this plan have been demonstrated to effectively reduce wildlife mortalities in Tasmania and elsewhere. No single mitigation measure has been shown to eliminate roadkill risk; therefore, a range of complementary strategies are prescribed. By using a combination of measures shown to effectively reduce wildlife road deaths, it is possible to reduce the risk of road mortality associated with the proposed development to an acceptable level in accordance with the *Survey Guidelines* [27].

The mitigation measures prescribed for the access road are (Figure 3):

- Restrict hours of operation of construction vehicles and machinery to during the day (defined as the time between 1 hour after dawn until 1 hour before dusk)
- Set regulatory speed limit to 40 km/hr during construction and operation
- Prior to opening to the public, install traffic calming structures
- Install virtual fence along length of access road
- Install alternate pathways and escape routes
- Conduct awareness and injured animal training for drivers involved during construction, as well as operations staff
- Install signage, particularly in high risk areas
- Remove road killed animals from the road to prevent secondary deaths of threatened species scavenging on road killed carcasses, record and report roadkill
- Monitor impact and assess against thresholds
- Implement offsets if threshold exceeded and periodically review options for improved mitigation

The prescriptions for Pinnacle Road are:

- Install traffic monitoring devices to accurately measure traffic levels before and after the development (including differentiation of night and day)
- Restrict hours of operation of construction vehicles and machinery to during the day (defined as the time between 1 hour after dawn until 1 hour before dusk)
- Remove roadkill from road, record and report

In the event that monitoring of Pinnacle Road shows that the development has resulted in an increase in roadkill risk in accordance with the *Survey Guidelines*, the recommended contingency mitigation measure is to install virtual fencing, either along the length of the road or in specific spots of high roadkill risk.

Details and justification for each prescription and mitigation strategy are found below.

[26] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research;* Fox, S, Potts, JM, Pemberton, D and Crosswell, D (2018) Roadkill mitigation: trialing virtual fence devices on the west coast of Tasmania. *Australian Mammalogy*.

[27] Noting the assumptions necessary based on the limited baseline data and the fact that the *Survey Guidelines* only require the proponent to mitigate any potential increase in roadkill risk >10 %.

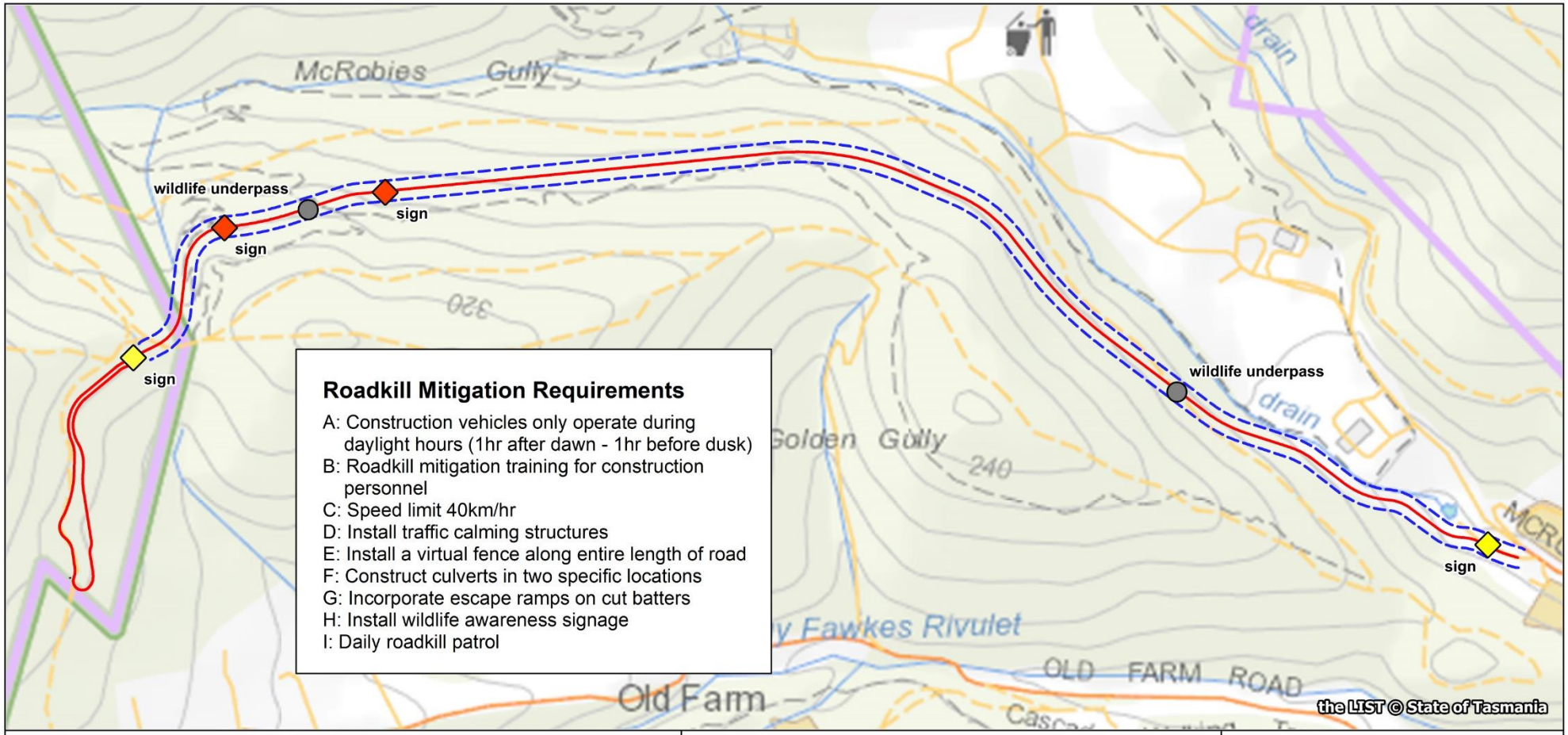


**Figure 3. Indicative locations of roadkill mitigation measures for Mt Wellington Cableway access road.**

## 3.1 Access road: mitigation strategies

Note: physical mitigation requirements C-H must be installed prior to the road being opened for use.

### 3.1.1 Restrict operation of vehicles to daylight hours during construction

The threatened species at greatest risk of being killed on the road are primarily (though not exclusively) nocturnal and are at greater risk of being killed at night. Restricting the operation of vehicles to daylight hours will substantially reduce the risk of threatened fauna species being killed on the access road during the construction phase.

**Requirement A:** During construction, vehicles (including machinery) may only operate during daylight hours, that is, they may not operate between the hours from one hour before dusk to one hour after dawn. This requirement is to be included in contract conditions.

Once operational, there will be night-time traffic on the access road, and additional mitigation measures are required to mitigate roadkill risk.

### 3.1.2 Train drivers of construction and maintenance vehicles, and operations staff

Drivers of vehicles involved in construction are to receive training (from suitably qualified wildlife carers) with regards to:

- Presence of wildlife in the area
- Potential for serious declines in threatened wildlife populations because of road deaths
- How to reduce risk to wildlife – reduce speed, remain attentive
- Location of wildlife hotspots
- What to do if an animal is hit

Requirements for the development and delivery of this training are to be written into contract conditions.

**Requirement B:** Implement training program for construction and operational personnel in relation to how to limit roadkill incidences and what to do when an animal is hit.

### 3.1.3 Set regulatory speed limit to 40 km/hr

Reducing traffic speed has been shown to effectively reduce wildlife road mortalities[28]. A study investigating night-time driver detection distances for several Tasmanian wildlife species found that Tasmanian devils were detected at the shortest distances, and that when driving with headlights on low beam attentive drivers could safely stop and avoid hitting devils at an average speed of 38 km/hr.[29] Given that Tasmanian devils are known to occur in the area, we recommend that the regulatory speed limit on the access road be set to 40 km/hr.

We recommend setting the regulatory speed limit to 40 km/hr rather than installing advisory speed limits and signage. Advisory limits and signage (e.g. "slow down dusk to dawn") have been found to be of limited effectiveness[30], particularly in the absence of accompanying physical structures that slow traffic.

[28] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*

[29] Hobday, AJ (2010). Nighttime driver detection distances for Tasmanian fauna: informing speed limits to reduce roadkill. *Wildlife Research.*

[30] Dique, DS, Thompson, J, Preece, HJ, Penfold, GC, de Villiers, DL, and Leslie, RS (2003). Koala mortality on roads in south-east Queensland: the koala speed-zone trial. *Wildlife Research.*

**Requirement C:** Set access road speed limit to 40 km/hr during construction and operation of the proposed development.

### 3.1.4 Install traffic calming structures

Reducing traffic speed has been shown to effectively reduce roadkill; however, signage stipulating regulatory speed limits, and particularly non-enforceable advisory speed limits, have been found to be of limited effectiveness in slowing traffic[31]. In addition to setting the regulatory speed limit to 40 km/hr, structures that physically reduce traffic speed to 40 km/hr are to be installed, prior to the operation phase of the proposed development (Figure 3

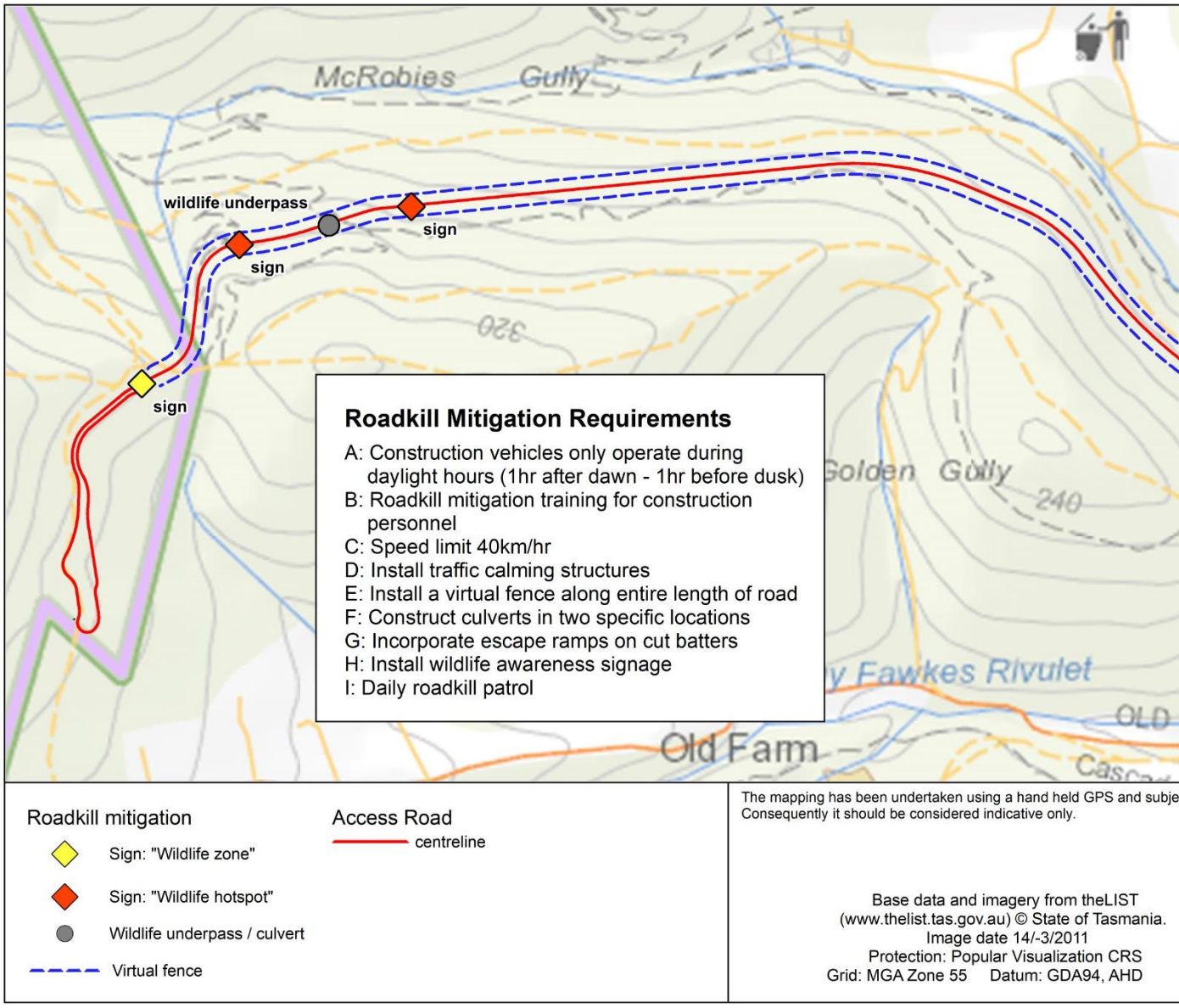


Figure 3). With regards to the specific design of traffic calming structures, this will be the decision of road engineers, but our recommended placements should be adhered to.

**Requirement D:** Install traffic calming structures.

[31] Dique, DS, Thompson, J, Preece, HJ, Penfold, GC, de Villiers, DL, and Leslie, RS (2003). Koala mortality on roads in south-east Queensland: the koala speed-zone trial. *Wildlife Research*.

### 3.1.5 Install virtual fence along length of access road

Virtual fencing involves installing devices which, when triggered by car headlights, emit light and sound, thus creating a 'virtual fence' that scares wildlife off the road and prevents wildlife from entering the road while a car is approaching. The devices are solar powered and mounted on poles alongside the road, facing away from the road.

Virtual fencing reduced wildlife mortality by 50 % in a study conducted over three years in northwest Tasmania[32]. Devices were installed on both sides of the road, at staggered intervals, so there was a 50 m distance between devices on the same side of the road, and a 25 m distance between devices on opposite sides of the road. Although a subsequent study found a negligible effect of the devices in reducing roadkill, the test area for that study was a highway with high vehicle speed, high volume of traffic and high density of animals.[33] It is thus possible to that the effectiveness of the devices is only apparent in low speed, low volume and/or low-density areas. Based on this, it is expected the devices can contribute to the current proposal as part of a suite of roadkill mitigation measures.

**Requirement E:** Install a virtual fence along the length of the access road. Include maintenance regime to maintain function of the fence.

### 3.1.6 Install alternate pathways and escape ramps

#### *3.1.6.1 Alternate pathways: underpass culverts*

Underpasses reduce roadkill risk by providing an alternative pathway for wildlife movement. There has been little work comparing the effectiveness of different underpass designs for Tasmanian wildlife[34]. Underpasses are more likely to be useful for the smaller Tasmanian mammals and those that use burrows (e.g. Tasmanian devils, quolls, bandicoots, wombats)[35]. Culverts of 300-450 mm in diameter have been recommended for small to medium mammals and are known to be used by Tasmanian devils and spotted-tailed quolls, and less frequently by eastern quolls, who may fear predation in such environments[36].

We recommend that 300-450 mm culverts (with supporting design specifications to funnel animals into the culvert[37]) are installed along the proposed access road in two specific locations – the first location is adjacent to an area of potential denning habitat, and the second is near the McRobies Gully Waste Management Centre (which we suggest may receive a relatively high volume of animal traffic due to the abundance of foraging opportunities around the tip site).

During the ground survey, no distinct animal pathways were observed crossing the location of the proposed access road, and therefore we have no basis to recommend further specific locations outside of these two areas. It is possible however, that road engineers will

[32] Fox, S, Potts, JM, Pemberton, D and Crosswell, D (2018). Roadkill mitigation: trialing virtual fence devices on the west coast of Tasmania. *Australian Mammalogy*.

[33] Department of State Growth (unpublished data)

[34] Magnus, K, Kriwoken, LK, Mooney, N, Jones, ME (2004). *Reducing the incidence of wildlife roadkill: improving the visitor experience in Tasmania.* CRC Sustainable Tourism; Jones, ME (2000). Road upgrade, road mortality

[35] Magnus, K, Kriwoken, LK, Mooney, N, Jones, ME (2004) *Reducing the incidence of wildlife roadkill: improving the visitor experience in Tasmania.* CRC Sustainable Tourism; Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*

[36] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*

[37] Magnus, K, Kriwoken, LK, Mooney, N, Jones, ME (2004) *Reducing the incidence of wildlife roadkill: improving the visitor experience in Tasmania.* CRC Sustainable Tourism; Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*

recommend that additional culverts are put in place to aid road integrity – in such scenarios we recommend any culverts are 300-450 mm in diameter and include the same design specifications as the recommended culverts.

**Requirement F:** Construct culverts in two specific locations along the proposed access road.

#### *3.1.6.2 Escape ramps*

Banks, cuttings and fences can trap animals on the road and be associated with increased roadkill[38]. These risks can be mitigated by providing escape routes from the road surface. Previous work found that ramps constructed by installing 2 m sections of 300 mm culvert pipe in roadside drains, placed parallel to the road, with a gravel ramp constructed over the culvert connecting the road verge to the top of the embankment, provided an effective escape ramp. These escape routes were constructed at approximately 25 m intervals within roadkill hotspots and were used by wildlife[39]. Reducing the steepness of batter slopes has also been suggested as a mitigation measure facilitating wildlife escape from roads[40] but remains to be tested systematically and is not always achievable from an engineering perspective or where other natural values require avoidance.

Where deep gutters and steep embankments occur along the proposed access road, we recommend the installation of ramps as described above. Where possible, reducing the batter angle will also decrease the likelihood of animals failing to escape the road. However, in this situation, such an option is not feasible where narrowing the footprint is desirable to reduce impact to trees, many of which provide fauna habitat.

Given the topographic setting of the road, cutting across the mid slope of a hill, we expect that embankments will be constructed along sections of the road. In the absence of a detailed road design, it is not possible to indicate the locations that may require escape ramps at this time.

**Requirement G:** In consultation with eventual road specifications and an ecologist, specify locations for escape ramps and install these ramps.

### 3.1.7 Install signage, particularly in high risk areas

General wildlife signage and advisory speed limits are of limited effectiveness in mitigating wildlife road mortalities[41]; however, signs bracketing and alerting drivers to specific roadkill hotspots have been shown to be effective, particularly when implemented alongside physical measures such as traffic calming structures such as chicanes and rumble strips[42].

Despite limited evidence in support of its effectiveness, we recommend the installation of wildlife signage as an awareness and educational measure, so that drivers are aware of the reasons for other mitigation measures such as the 40 km/hr speed limit and traffic calming structures on the proposed access road.

**Requirement H:** Install wildlife awareness signage at the beginning and end of the proposed access road. Install specific 'wildlife hotspot' signage at either end the area of potential

[38] Magnus, K, Kriwoken, LK, Mooney, N, Jones, ME (2004). *Reducing the incidence of wildlife roadkill: improving the visitor experience in Tasmania.* CRC Sustainable Tourism.
[39] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*
[40] Magnus, K, Kriwoken, LK, Mooney, N, Jones, ME (2004). *Reducing the incidence of wildlife roadkill: improving the visitor experience in Tasmania.* CRC Sustainable Tourism.
[41] Dique, DS, Thompson, J, Preece, HJ, Penfold, GC, de Villiers, DL, and Leslie, RS (2003). Koala mortality on roads in south-east Queensland: the koala speed-zone trial. *Wildlife Research.*
[42] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*

denning habitat where Tasmanian devils and eastern quolls were recorded during the natural values assessment.

### 3.1.8 Keep road verges clear of vegetation

Maintaining short and open understorey vegetation alongside a road can increase driver visibility and increase the likelihood that animals will flush earlier, thus increasing escape time and the time available for drivers to respond. Slashing is not recommended as a vegetation control measure in these scenarios as it encourages new growth which is attractive to grazing wildlife. Regular spraying with a biodegradable herbicide is the recommended treatment[43]. In relation to the proposed new access road however, the surrounding vegetation is a native forest community with a naturally relatively sparse understorey and a low tendency to support lush green growth. Based on this we don't see any reason to require additional vegetation control beyond what the responsible road authority will already do for the maintenance of road safety and condition.

### 3.1.9 Remove road-killed animals from the road, record and report

Removing road-killed animals from the road prevents secondary deaths of species which scavenge on road-killed animals[44], including potentially the birds of prey in section 1.2. Removing roadkill early in the morning is required to prevent scavengers being attracted to mortalities to the previous night and becoming casualties themselves.

To aid monitoring and assessment of success, road-killed animals should be documented, with data maintained in a database by the proponent and records submitted to NVA.

**Requirement I:** Patrol road daily within 2 hours of sunrise: remove (by several metres), record and report road-killed animals to the NVA.

### 3.1.10 Monitor impacts and assess against mortality threshold

To monitor the effectiveness of the prescribed mitigation strategies it is essential that impacts of the proposed access road are monitored and assessed. Given that the baseline roadkill rate in this area is being taken as zero, the threshold for mortality to threatened species should be treated as zero[45]; any roadkill death of a threatened fauna species, including the Tasmanian devil, eastern quoll, spotted-tailed quoll, grey goshawk, Tasmanian masked owl and Tasmanian wedge-tailed eagle (but excluding the eastern barred bandicoot for reasons outlined in section 1.2), will thus exceed the threshold for acceptable mortality and trigger a review of existing mitigation measures and consideration of additional options or offsets in accordance with the *Survey Guidelines*. As the eastern barred bandicoot is not considered to be at the same level of risk from roadkill as the above species, but is nonetheless threatened nationally under the EPBCA, we recommend the annual mortality threshold for this species on the access road is two individuals – more than two recorded mortalities on the access road within a calendar year will thus exceed the threshold for acceptable mortality and trigger a review of existing mitigation measures and consideration of additional options or offsets in accordance with the Survey Guidelines.

Given that the extensive suite of mitigation measures prescribed by this plan are the measures currently known to be most effective for the species at risk, it is possible that a review of mitigation measures (should it be precipitated by the breaching of mortality thresholds) in the near future (e.g. next several years) is unlikely to uncover better mitigation measures than those recommended. Based on this, in addition to reviewing available

[43] Magnus, K, Kriwoken, LK, Mooney, N, Jones, ME (2004). *Reducing the incidence of wildlife roadkill: improving the visitor experience in Tasmania.* CRC Sustainable Tourism.
[44] Jones, ME (2000). Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. *Wildlife Research.*
[45] Excluding the eastern barred bandicoot, for reasons outlined in section 1.2

mitigations measures, we recommend that an offset is required for every threatened fauna roadkill mortality recorded on the access road above the recommended thresholds. Equivalent mortality offsets in association with developments elsewhere have involved financial contributions made to conservation programs and/or research on the specific species. This will be the most effective offset measure for this proposal and the size of the offset should be determined by regulators with consultation with the Policy and Conservation Branch of DPIPWE. Alternate offsets can be achieved by addressing roadkill on Pinnacle Road should there be identifiable roadkill levels that would be effectively reduced with mitigation there. Irrespective of mortality levels, a review of roadkill mitigation strategies in conjunction with the mortality offsets, should be undertaken every five years to determine the potential for new effective methods or improvements.

**Requirement J:** Follow offset requirements (to be prescribed by the relevant regulators) for each threatened fauna roadkill mortality recorded on the access road above the recommended thresholds.

**Requirement K:** Undertake a review of roadkill mitigation strategies every five years to determine the potential for new effective methods or improvements.

## 3.2 Pinnacle Road: mitigation strategies

Pinnacle Road is an existing public access road. The following are prescribed on the basis that the proposed development will not result in Pinnacle Road having a night-time increase in traffic volume beyond the 10 % threshold. Should traffic exceed this change, then in the absence of robust baseline data there is some risk that the consequences of unanticipated traffic increase to roadkill incidences will not be known. As such, monitoring is considered to be the most appropriate course of action in association with a mitigation measure during construction; an additional mitigation measure is suggested as a contingency should it be shown to be warranted by monitoring.

### 3.2.1 Monitor changes in night-time traffic during construction and operation

An increase in night-time traffic of greater than 10 % will warrant a roadkill assessment and potentially implementation of the contingency mitigation measure (requirement Q).

**Requirement L:** Install traffic monitoring devices (> 3 months before construction) and analyse traffic data annually (this informs the need for requirement Q).

### 3.2.2 Driver training

**Requirement M:** Implement training program for construction and operational personnel in relation to how to limit roadkill incidences and what to do when an animal is hit.

### 3.2.3 Restrict operation of vehicles to daylight hours during construction

**Requirement N:** During construction, vehicles (including machinery) may only operate during daylight hours, that is, they may not operate between the hours from one hour before dusk to one hour after dawn. This requirement is to be included in contract conditions.

### 3.2.4 Remove road kill from road, record and report for monitoring

For the same reasons outlined above for the access road, we recommend that roadkill be removed, recorded and data submitted to the NVA.

**Requirement O:** Patrol road daily within 2 hours of sunrise: remove (by several metres), record and report road-killed animals to the NVA.

**Requirement P:** Have monitoring data independently reviewed after five years to determine if additional mitigation measures or offsets are warranted in relation to the Pinnacle Road.

### 3.2.5 Restrict use of summit facilities to cable car patrons during night-time hours

MWCC have stated that they plan to implement policies that will reduce or eliminate increases in night-time traffic on Pinnacle Road during the operational phase of the proposed development. In particular, they have proposed to restrict restaurant night-time bookings to patrons travelling to and from the summit via the cableway.

### 3.2.6 Contingency mitigation: Install virtual fence

**Requirement Q:** If warranted by monitoring of traffic volumes and a subsequent roadkill assessment, install virtual fencing, either along the length of Pinnacle Road or in specific roadkill hotspots. Include maintenance regime to maintain function of the fence.

## 3.3 Conclusion and list of requirements

A *Roadkill Risk Report and Draft Roadkill Mitigation Plan* has been prepared in response to B5b of the RFI from Hobart City Council, in relation to application no. PLN-19-345. Both the proposed new access road and Pinnacle Road have been considered. A suite of monitoring and mitigation measures have been proposed for the new access road on the basis that a new road by default represents a > 10 % increased risk of roadkill. In contrast, the roadkill risk on Pinnacle Road is not expected to significantly increase based on an expectation of less than a 10% change to traffic volumes. Recommended measures for that road are focussed on monitoring, with scope for future mitigation in the event of increases in levels of roadkill. Future mitigation to Pinnacle Road (independent of traffic monitoring results) provides an alternate offset to any residual roadkill impacts occurring along the access road following recommended mitigation for that road.

Access road

- **Requirement A:** During construction, vehicles (including machinery) may only operate during daylight hours, that is, they may not operate between the hours from one hour before dusk to one hour after dawn. This requirement is to be included in contract conditions.
- **Requirement B:** Implement training program for construction and operational personnel in relation to how to limit roadkill incidences and what to do when an animal is hit.
- **Requirement C:** Set access road speed limit to 40 km/hr during construction and operation of the proposed development.
- **Requirement D:** Install traffic calming structures.
- **Requirement E:** Install a virtual fence along the length of the access road. Include maintenance regime to maintain function of the fence.
- **Requirement F:** Construct culverts in two specific locations along the proposed access road.
- **Requirement G:** In consultation with eventual road specifications and an ecologist, specify locations for escape ramps and install these ramps.
- **Requirement H:** Install wildlife awareness signage at the beginning and end of the proposed access road. Install specific 'wildlife hotspot' signage at either end the area of potential denning habitat where Tasmanian devils and eastern quolls were recorded during the natural values assessment.
- **Requirement I:** Patrol road daily within 2 hours of sunrise: remove (by several metres), record and report road-killed animals to the NVA.
- **Requirement J:** Follow offset requirements (to be prescribed by the relevant regulators) for each threatened fauna roadkill mortality recorded on the access road above the recommended thresholds.

- **Requirement K:** Undertake a review of roadkill mitigation strategies every five years to determine the potential for new effective methods or improvements.

Pinnacle Road

- **Requirement L:** Install traffic monitoring devices (> 3 months before construction) and analyse traffic data annually (this informs the need for requirement Q).
- **Requirement M:** Implement training program for construction and operational personnel in relation to how to limit roadkill incidences and what to do when an animal is hit.
- **Requirement N:** During construction, vehicles (including machinery) may only operate during daylight hours, that is, they may not operate between the hours from one hour before dusk to one hour after dawn. This requirement is to be included in contract conditions.
- **Requirement O:** Patrol road daily within 2 hours of sunrise: remove (by several metres), record and report road-killed animals to the NVA.
- **Requirement P:** Have monitoring data independently reviewed after five years to determine if additional mitigation measures or offsets are warranted in relation to the Pinnacle Road.
- **Requirement Q:** If warranted by monitoring of traffic volumes and a subsequent roadkill assessment, install a virtual fencing, targeting specific roadkill hotspots. Include maintenance regime to maintain function of the fence.

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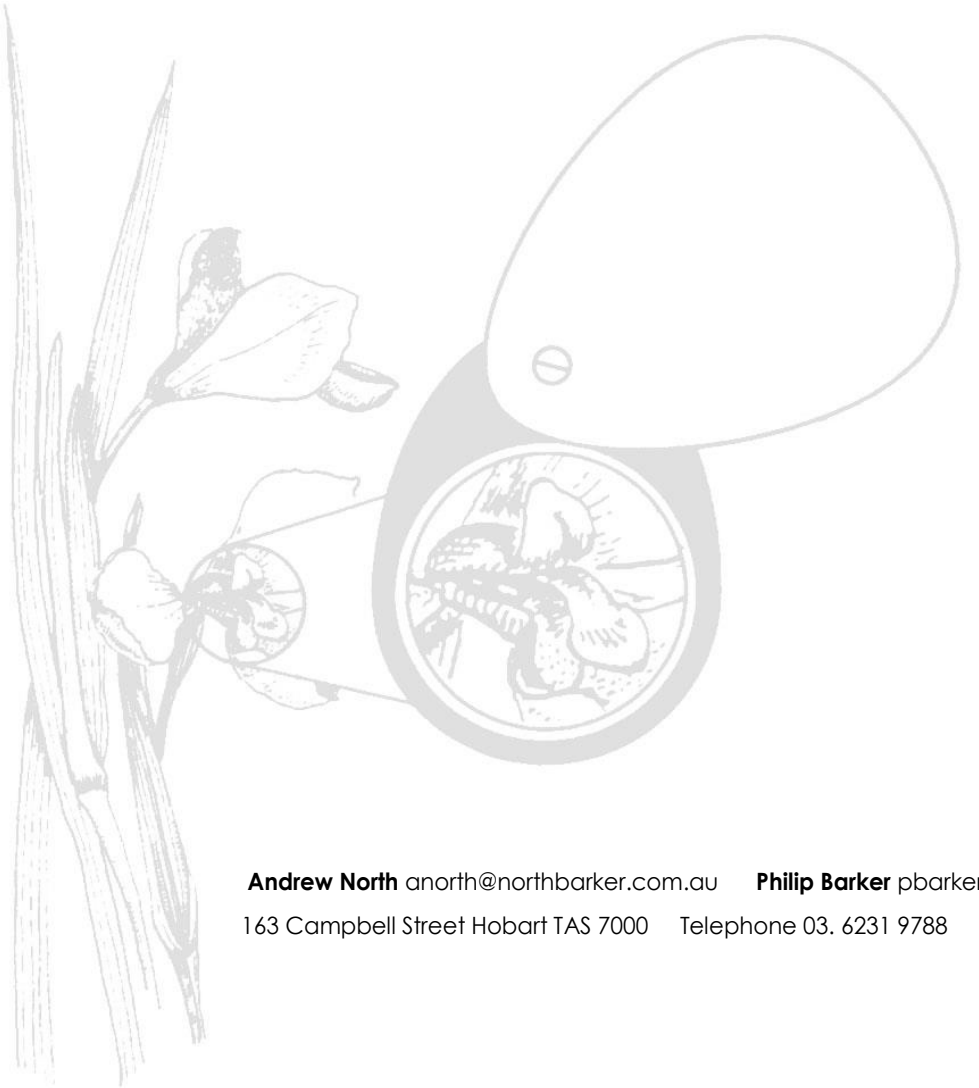
northbarker
ECOSYSTEM SERVICES

# Mount Wellington Cableway

## Collision Risk Report

March16th 2020

For Mount Wellington Cableway Company (MWC001)



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**APPLICATION NO. PLN-19-345**

**Request for further information by the city of Hobart**

**BIODIVERSITY**

| | | |
|---|---|---|
| B6 | 21 June 2019 | A bird collision report prepared by a suitably qualified person, analyzing the risk of bird collision with cables and other structures (including windows in buildings) as well as during construction, having regard to the intended use of helicopters.<br><br>This bird collision report should specifically consider the likelihood of risk to threatened avifauna that are likely or are known to be present within the area. |

# 1 Collision risks from development components

Any infrastructure can create a potential collision hazard to birds if it is not clearly visible and avoidable. The proposed development has the potential to introduce new collision threats to birds within the development footprint and as part of the construction phase. Birds could be at risk of colliding with both of the buildings (Pinnacle Centre and Base Station), the cable way infrastructure (aerial cables, towers and cable cars), and with helicopters used during construction. Each of these components of the proposed development pose varying collision risks to different bird species.

## 1.1 Buildings

In almost all scenarios, the risk that buildings pose to bird collisions relates to the design and location of windows. Threats posed by windows can be classified into two main categories: reflections and transparency.

- When seen from the outside of a building, glass often has a reflective quality, mirroring the sky, trees and other features. Some types are worse than others. The reflectivity increases when glass is seen at an oblique angle, regardless of whether the glass is transparent or tinted.
- Birds do not understand that a reflection is false. Instead, they perceive a continuation of their habitat or flight path and try to fly to/through it, resulting in collisions.
- Birds cannot differentiate between clear glass and unobstructed airspace; it is invisible to them. Glass lobbies, balconies, windows or glass walls that meet at a corner, or aligned windows (windows installed parallel to each other, on opposite sides of the building) may provide an unobstructed view of habitat and sky on the other side of the building and be particularly dangerous: birds perceive a passageway and attempt to fly straight through. Also, transparent window panes mimic tinted reflective panes when little or no light is visible behind them.

The risk of collision posed by a building's windows can thus be assessed by considering the design and the potential for reflections and/or transparency. In cases where there is a reasonable expectation that collisions could result, the design and/or placement of windows can be mitigated to reduce reflectance and the appearance of flight paths. A range of potential window mitigation options are available. Although, to our knowledge, results of systematic tests of window collision mitigations are not present in the scientific literature, the

options are sound from an ecological perspective and have been applied/accepted as mitigation measures in several developments around the Greater Hobart area.

### 1.1.1 Pinnacle Centre design

#### *1.1.1.1 Eastern elevation*

The Pinnacle Centre planning assessment and architectural design documents indicate that windows on the eastern aspect facing Hobart will be tilted downwards or screened in order to reduce reflectance and visibility from the city (Figure 1)[1]. These design principles will reduce reflections and create the perception of solid barriers, which will effectively reduce the risk of reflection-related bird collisions along the eastern face. There is however a potential issue with perceived transparency through the glazed tunnel walkway linking the north and south sections of the building (section 1.1.1.5).

#### *1.1.1.2 Southern elevation*

Two relatively large windows at the southern end of the building lack screens, are not tilted, and are elevated above the surrounding landforms (Figure 2). The southern aspect of these faces in relation to the direction of the sun means that large mirror-like reflections are unlikely. There is still some potential for moderate levels of reflectivity from the diffuse light and reflections at close range. However, given the windows are embedded within and adjacent to solid surfaces (either screens/walls of the building, or the face of the mountain), the scope for reflections of sky or habitat that might entice a bird to attempt to fly through is considered quite low. Subsequently these windows are considered to represent a low risk of reflection-related collisions.

#### *1.1.1.3 Western elevation*

Windows on the western aspect of the building are also not screened or tilted (Figure 3). The potential collision risk associated with reflectivity on this face is low. The likelihood of windows on that face reflecting the sky is very low due to that side of the building being low set into the face of the slope. Habitat reflections are possible but would most likely be at close range due to the slope. In such cases, the close-range reflections are most likely to represent a potential collision risk to small birds utilising adjacent habitat and undertaking short flights. Under such circumstances, any potential collision with the western elevation can reasonably be expected to occur at low speed and thus have a relatively low likelihood of injury and/or mortality.

#### *1.1.1.4 Northern elevation*

The northern elevation includes relatively little exposed glass. Due to the surrounding slopes, other components of the building, and its position in relation to adjacent habitat, the small amount of glass front present on the north face is seen to have a relatively low risk of potential reflection-related collisions in relation the sky and/or adjacent habitat.

#### *1.1.1.5 Potential transparencies – perceived flight paths*

The proposed building is set on a slope and embedded low in the surrounding landscape; these factors, in conjunction with the proposed alignments of windows (and other glass elements), eliminate much of the possibility of sightlines throughout the building. The following exceptions are however seen as having the greatest potential as sight lines:

[1] Ireneinc Planning (2019), *Mt Wellington Cable Car Planning Assessment Report*, last updated 12 June 2019, submitted as part of application no. PLN-19-345, Mt Wellington Cableway Company Development Application; JAWS Architects (2019), *Architecture – Pinnacle Centre*, submitted as part of application no. PLN-19-345, Mt Wellington Cableway Company, Development Application

- The ceiling above one of the windows on the southern elevation (the window in the Sanctum) appears to be partially glazed, which creates the potential for the perception of a clear flightpath through the top corner of this section.
- An enclosed walkway connecting the northern and southern components of the building is glazed on both sides, creating the potential for perception of a flight path through the glazed tunnel.
- A mostly glass room on the upper level of the southern building may in perceived sight lines from a north-south direction in particular.

Each of these potential sight lines is seen as a relatively minor risk, particularly in the context of the immediately surrounding highland vegetation supporting a relatively low density and species richness of birds. In relation to the potential sight lines from the Sanctum and the glass room, these are seen as low risk primarily on the basis that the faces representing potential sight lines are quite small in the context of the open surrounding landscape with few obstructions. Based on this, birds can be expected to avoid the isolated building as a whole, rather than attempt to fly through a relatively narrow perceived flight line through the middle of the only structure in the area. The potential perceived flight path through the glass tunnel is seen as an even lower risk due to the alignment of the western face with the adjacent slope comprised of many rocks, which will strongly reduce the area of perceived flight space.

#### *1.1.1.6 Existing Observation Shelter*

The proposed development of the Pinnacle Centre includes the partial dismantling of the existing observation shelter. The roof and windows and framework infrastructure are proposed for removal leaving the existing stone walls only. This structure appears in Figures 1-3 as a prominent structure that does not fit into the contours in the same way of the new development. It also breaks the skyline. The extensive glazing is likely to have greater reflectivity than the glazing associated with the Pinnacle Centre. It also has see-through glass where the windows wrap around approximately 270 degrees. There is no data available on the incidence of bird collisions with this structure.

**Plate 1: Existing lookout shelter, northern elevation [2]**

[2] Photo M Newton c/o https://www.greaterhobarttrails.com.au/track/hobart-to-the-pinnacle/

#### *1.1.1.7 Overall risk*

Based on the current location and design of the Pinnacle Centre, the building is considered to represent a low risk for bird collisions. This is on account the immediately surrounding highland vegetation supporting a relatively low density and species richness of birds by Tasmanian standards, many window faces either being tilted or screened, and the potential for perceived flight paths from transparent sight lines being quite low.

The removal of the high-risk existing observation shelter will more than offset the added risk presented by the new Pinnacle Centre.

In the event that monitoring (section 3) finds that some windows represent a greater level of collision risk than anticipated, there is scope for later mitigation by applying tints and opaque obstructions to windows.

### 1.1.2 Base Station design

The architectural design document for the Base Station indicates all glazing will be screened by timber and metal composite screens[3]. Provided that glazing is screened as depicted in the design document, we anticipate that the risk of bird collisions with the proposed Base Station building will be low.

[3] JAWS Architects (2019), *Architecture – Base Station*, submitted as part of application no. PLN-19-345, Mt Wellington Cableway Company, Development Application

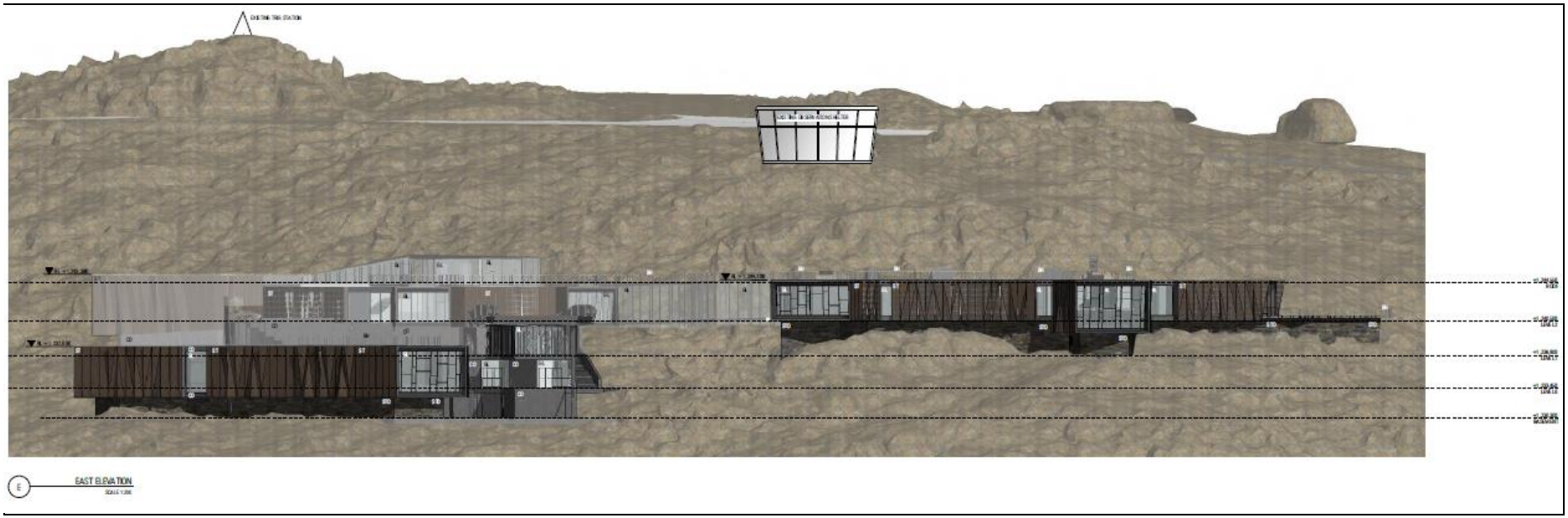


**Figure 1: Building design from perspective of eastern elevation, showing north and south sections of the building, the adjoining enclosed glass walkway, and the proposed obstructions on eastern face windows that may have posed a reflective risk**


**Figure 2: Building design from perspective of southern elevation, showing north and south sections of the building, the adjoining enclosed glass walkway, and the proposed obstructions on eastern face windows that may have posed a reflective risk**

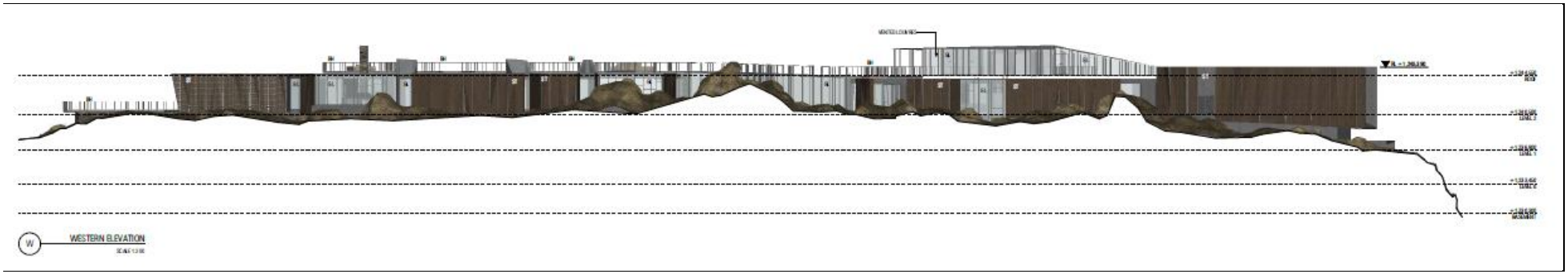


**Figure 3: Building design from perspective of western elevation, showing north and south sections of the building, the adjoining enclosed glass walkway, and the proposed obstructions on eastern face windows that may have posed a reflective risk**

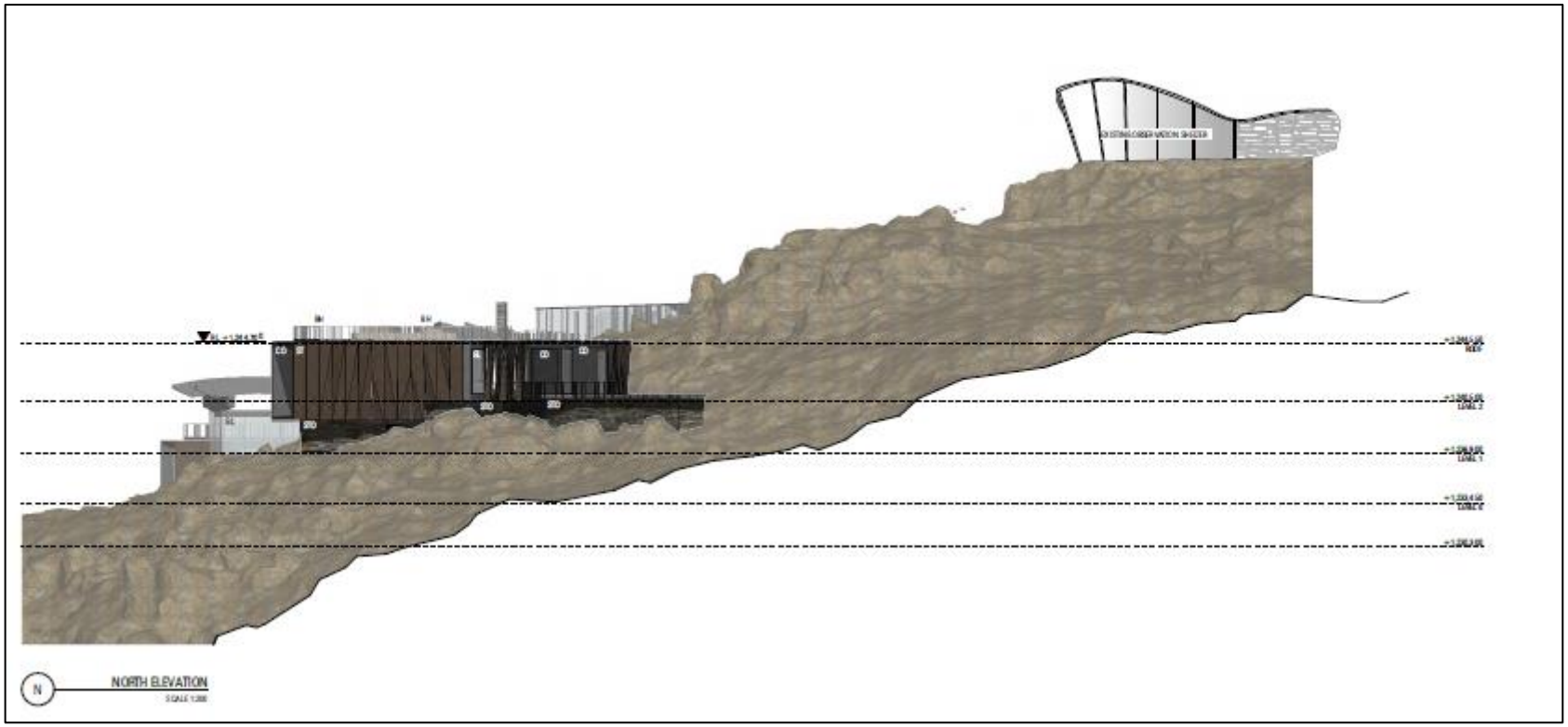


**Figure 4: Building design from perspective of northern elevation, showing north and south sections of the building, the adjoining enclosed glass walkway, and the proposed obstructions on eastern face windows that may have posed a reflective risk**

## 1.2 Cableway infrastructure: aerial cables, towers and cable cars

It is widely accepted that collisions with aerial cables are a source of bird mortality in some species and some situations[4]. However, there is limited scientific literature from Australia that investigates the variations of collision rates between species, locations, and types of cables, with most reports and commentary on relative risks being anecdotal and speculative. There is some scope to apply the findings of international research, however no studies that we are aware of relate to collision risks associated with a cableway and cable cars of similar design to the current proposal under investigation. A similar type of infrastructure that has been studied are ski-lift cables with very small cabins, which have been found to be a significant source of mortality for some bird species in Europe[5]. The majority of cable collision studies however focus on the collision risk posed by powerlines – this is in part due to their abundance in the landscape.

In general, the risk of bird collisions with aerial cables appears to be influenced by a mix of ecological, environmental, and engineering factors[6]. With regard to the current proposal, the species-specific ecological and environmental collision risk factors pertinent to the local suite of threatened species with the potential to occur around the proposal area are examined in Section 2. Engineering factors that influence collision risk are discussed briefly below.

Engineering factors that influence aerial cable collision risk include: cable diameter, height, placement, and span length[7]. It is generally suggested that smaller diameter cables (e.g. shield/earth wires 1 - 1.3 cm) cause most collisions, with larger diameters (e.g. phase conductors 2.5 - 5 cm) posing less risk of collision. Ostensibly this relates to comparative visibility (with smaller diameters being less visible) but studies haven't definitively established this due to confounding factors in the powerlines investigated; e.g. where small diameter earth wires are hung above larger diameter phase conductors, making it difficult to separate the influence of relative height from diameter[8]. Consistent with the visibility hypothesis however, birds are less susceptible to collisions with towers than with cables[9], and collision rates with cables are lower near towers than in spans between towers[10].

In relation to relative landscape position and placement, it has been shown that cables located below the line of a forest canopy cause fewer collisions[11], potentially because subcanopy species are adept at manoeuvring within obstruction rich environments, while other species may avoid the cables by being active above the canopy. Conversely, cables located near take-off and landing areas can be expected to pose an increased collision risk due to the vertical changes associated with these flights intersecting with the line of a horizontal cable[12].

### 1.2.1 Proposed design Mt Wellington Cableway

The proposed cableway design involves two bundles of three cables (2 x 55 mm and 1 x 40 mm) running parallel to one another for the approximately 2.3 km horizontal span of the cableway[13]. The design includes three towers: tower 1 placed 170 m from the Base Station,

[4] Avian Power Line Interaction Committee (APLIC) (2012)
[5] Bech (2012); Buffet (2010)
[6] Avian Power Line Interaction Committee (APLIC) (2012)
[7] Bernardino (2018)
[8] Bernardino (2018)
[9] Bernardino (2018)
[10] Bernardino (2018)
[11] Avian Power Line Interaction Committee (2012)
[12] Avian Power Line Interaction Committee (APLIC) (2012)
[13] Garaventa (2018)

tower 2 placed 130 m from tower 1, and tower 3 placed 2000 m from tower 2 and 99 m from the Pinnacle Centre. Due to the length of the span between towers 2 and 3, the height of the cables will vary with load tension. Based on estimations from the design drawing[14], the height of the cable between the Base Station and tower 1 will be approximately 20 to 45 m. Between towers 1 and 2, cable height will be approximately 40 to 55 m above ground, with the cables located above the current tree canopy. Between towers 2 and 3, the cable will be located above the canopy, and the height above ground level could vary considerably from approximately 45 m to approximately 200 m[15].

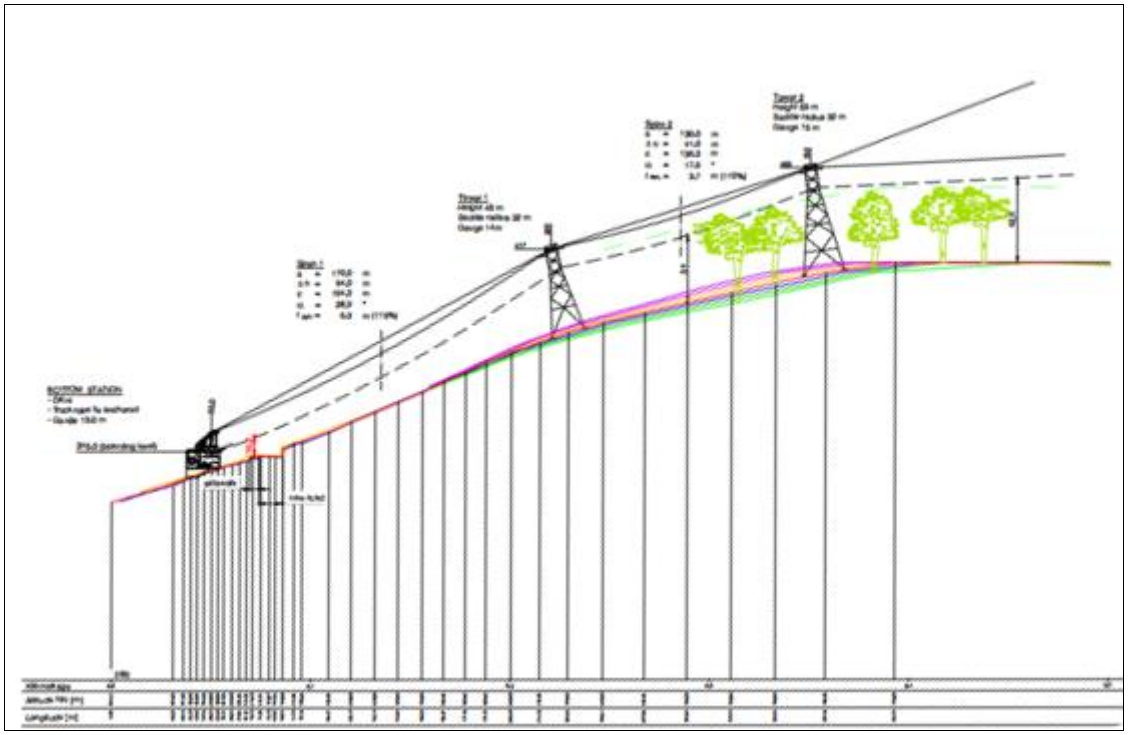

**Figure 5: Conformation of aerial cables and canopy. Base Station to tower 2**

The greatest risk posed by the design is likely to be the long span between towers 2 and 3, where birds will not be able to benefit from the added visibility of closely adjacent towers. However, across the entire span, the very large cable diameter and the bundling of the cables should make the cables highly visible to birds, limiting the potential risk of collisions even within inter-tower spans.

The movement of cable cars could potentially disturb birds where there is little separation between the cableway and the vegetation below, potentially causing birds to flush and be at risk of collision. This would be most relevant in the lower section of the route, where the cabins are proposed to rise through the canopy and then travel in relatively close proximity to vegetation for the first 500 m. At the top of the route, near the top of the Organ Pipes, the cabins will again be close to potential bird habitat, travelling within 5 m of the cliff edge[16]. In the latter scenario there is very little risk of collision from flushing birds, primarily because very few birds are expected to be present on that part of the Organ Pipes due to the altitude and the limited habitat value of the vegetation. The situation towards the lower part of the route, around the height of the forest canopy, can be seen as a relatively greater risk of resulting in

[14] Garaventa (2018)
[15] Garaventa (2018)
[16] Garaventa (2018)

collisions. However, the actual risk is still considered to be very low even in this location. The scenario is comparable to the risk of driving a car through a road in a forest environment and startled birds being at risk of colliding with the car when they flush. Although this type of road mortality does occur, it is far less prevalent and threatening than birds hit by cars when attempting to forage on a road. Furthermore, the travel speed of the cable car will be significantly lower than the road traffic example.

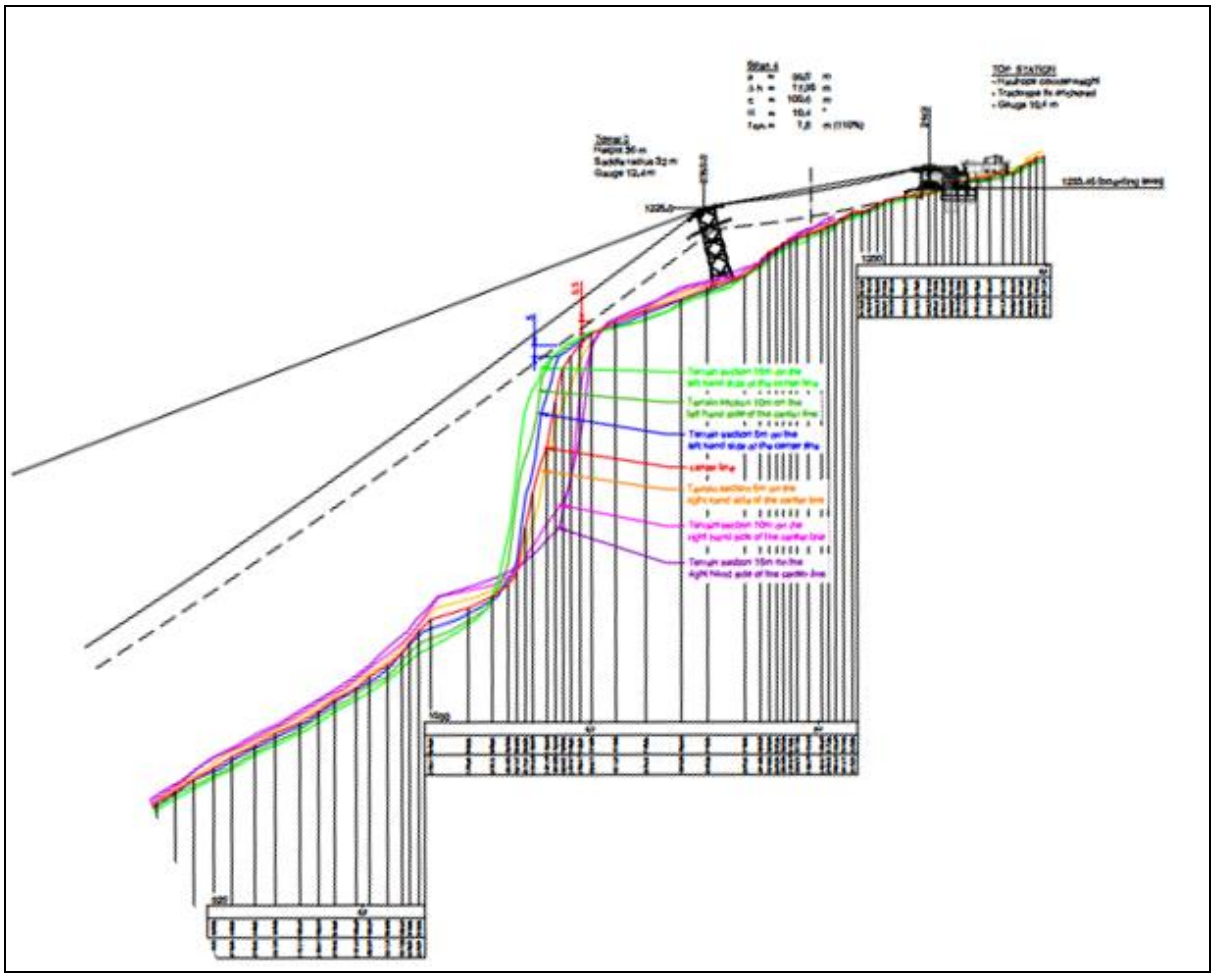

**Figure 6: Profile of aerial cable at the Organ Pipes showing tower 3 and Pinnacle Centre**

## 1.3 Helicopters

The use of helicopters during construction poses a risk of collision with birds, particularly large territorial birds defending their territories and nest sites from perceived intrusion. Several collisions between wedge-tailed eagles and helicopters have occurred in Tasmania. This is discussed in further in section 2.2.2 as eagles are the only local species conceivably at risk from this factor.

# 2 Collision risk and potential impact on threatened bird species

In particular locations or environments, collisions with human infrastructure can represent a significant source of mortality for birds. There is however a limited understanding of the impacts of this mortality on broader population viability for most species and specific scenarios. It can be reasonably expected however, that collision mortality poses the greatest risk to small populations of long-lived, slow breeding species[17], which are inherently at risk from elevated demographic pressures.

Table 1 summarises the threatened bird species with the potential to occur in or around the proposal area with respect to their relative risk of collisions with different components of the proposed development. The relative risk categories are derived from combined consideration of surrounding habitat (influencing the likelihood of species occurrence) and reported observations, consideration of available literature in relation to collision risk, and assessment of the proposed infrastructure with respect to collision risk.

**Table 1. Summary of relative collision risk of threatened bird species that may occur within the vicinity of the proposal.**

| Species | EPBCA status | TSPA status | Likelihood of collision without mitigation | | |
|---|---|---|---|---|---|
| | | | Buildings | Cableway infrastructure | Helicopters |
| swift parrot *Lathamus discolor* | Critically Endangered | Endangered | Low | Very low | Very low |
| wedge-tailed eagle *Aquila audax fleayi* | Endangered | Endangered | Very low | Moderate | Moderate |
| masked owl *Tyto novaehollandiae castanops* | Vulnerable | Endangered | Very low | Very low | Very low |
| white-throated needletail *Hirundapus caudacutus* | Vulnerable, Migratory, Marine | - | Very low | Low | Very low |
| grey goshawk *Accipiter novaehollandiae* | - | Endangered | Very low | Very low | Very low |
| white-bellied sea-eagle *Haliaeetus leucogaster* | Migratory (northern Australian birds only) | Vulnerable | Very low | Very low | Very low |

## 2.1 Swift parrot (*Lathamus discolor*)

Swift parrots are annual spring/summer migrants to Tasmania. From August to March they feed primarily on nectar of the Tasmanian blue gum (*Eucalyptus globulus*) and black gum (*E. ovata*). Breeding occurs in tree hollows in areas within proximity (< 10 km) to foraging habitat.

The location of the proposed development is within the core breeding and foraging range of the swift parrot. The forest between the Base Station and tower 2 contains mature blue gums,

[17] Avian Power Line Interaction Committee (APLIC) (2012); D'Amico (2019)

which are potential foraging and nesting habitat. Due to the stressed condition of the majority of these trees (historic fire damage, small crowns, low crown foliage density and negligible flower capsules evident) it was previously concluded that these trees are unlikely to be prolific flowerers and were therefore classed as low-quality swift parrot foraging habitat[18]. A smaller patch of dry blue gum forest close to McRobies Road supports trees likely to provide foraging habitat in most years based on the evident tree and habitat condition at the time of survey[19]. Blue gums were also recorded just upslope of the proposed Base Station car park and downslope of the fire trail adjacent to the Base Station. Potential nesting habitat (trees with the potential to support viable hollows) is present in the vicinity of the Base Station, access road and towers 1 and 2. The presence of nesting and foraging habitat around the Base Station location can be taken as an indicator of potential swift parrot presence and creates the risk that the building may intersect with their local flight paths.

Swift parrots have previously been recognised as a species that suffers from collision induced mortality, to the extent that there are guidelines for minimising the swift parrot collision threat[20]. Swift parrots are susceptible to collision with a range of artificial structures. Of greatest risk is open fencing, wires, and buildings with reflective glass or see-through flight lines or corners[21]. Pfennigwerth (2008) estimated that up to 2 % of the swift parrot breeding population is killed every year because of collisions, although this was not derived from a systematic survey of collisions or the population as a whole. Furthermore, an investigation of collisions as a contributor to current population demographic pressures has not been undertaken in the context of substantive levels of local predation from the previously unrecognised threat of sugar gliders[22]. The swift parrot national recovery plan discusses collision mortality as a threat to the species[23], but relies on referencing Pfennigwerth (2008) and other limited evidence. The Recovery Plan also acknowledges that the incidences of collisions were not quantifiable during the period covered by the previous recovery plan. In addition, despite 'fauna collision with human infrastructure such as windows' being a threat class[24] under the EPBCA, the swift parrot is not included among the six species listed as being at risk from this threat[25]. 'Continuing to raise public awareness of the risks of collisions and how these can be minimised' is however identified as a conservation and management priority for the species within the EPBCA Conservation Listing Advice.

### 2.1.1 Risk of collision with Base Station building

We have identified that the Base Station footprint is located relatively close to swift parrot foraging and nesting resources (Figure 7). Therefore, the proposed building has the potential to intersect with swift parrot flight paths and collision risks posed by the proposed building warrant consideration. Based on the design specifying that all windows will be screened[26], and that no other apparent structural elements associated with the building pose a collision risk, the likelihood of swift parrots colliding with the Base Station building is considered to be low.

[18] North Barker Ecosystem Services (2019) *Natural Values Impacts Assessment Mt Wellington Cableway*, Hobart, Tasmania
[19] North Barker Ecosystem Services (2019) *Natural Values Impacts Assessment Mt Wellington Cableway*
[20] Pfennigwerth (2008)
[21] Pfennigwerth (2008)
[22] Stojanovic *et al.* (2014)
[23] Saunders and Tzaros (2011)
[24] A sub-threat under 'Residential and Commercial Development' and 'Housing and Urban Areas'.
[25] EPBCA SPRAT profile search
[26] JAWS Architects (2019), *Architecture – Base Station*, submitted as part of application no. PLN-19-345, Mt Wellington Cableway Company, Development Application

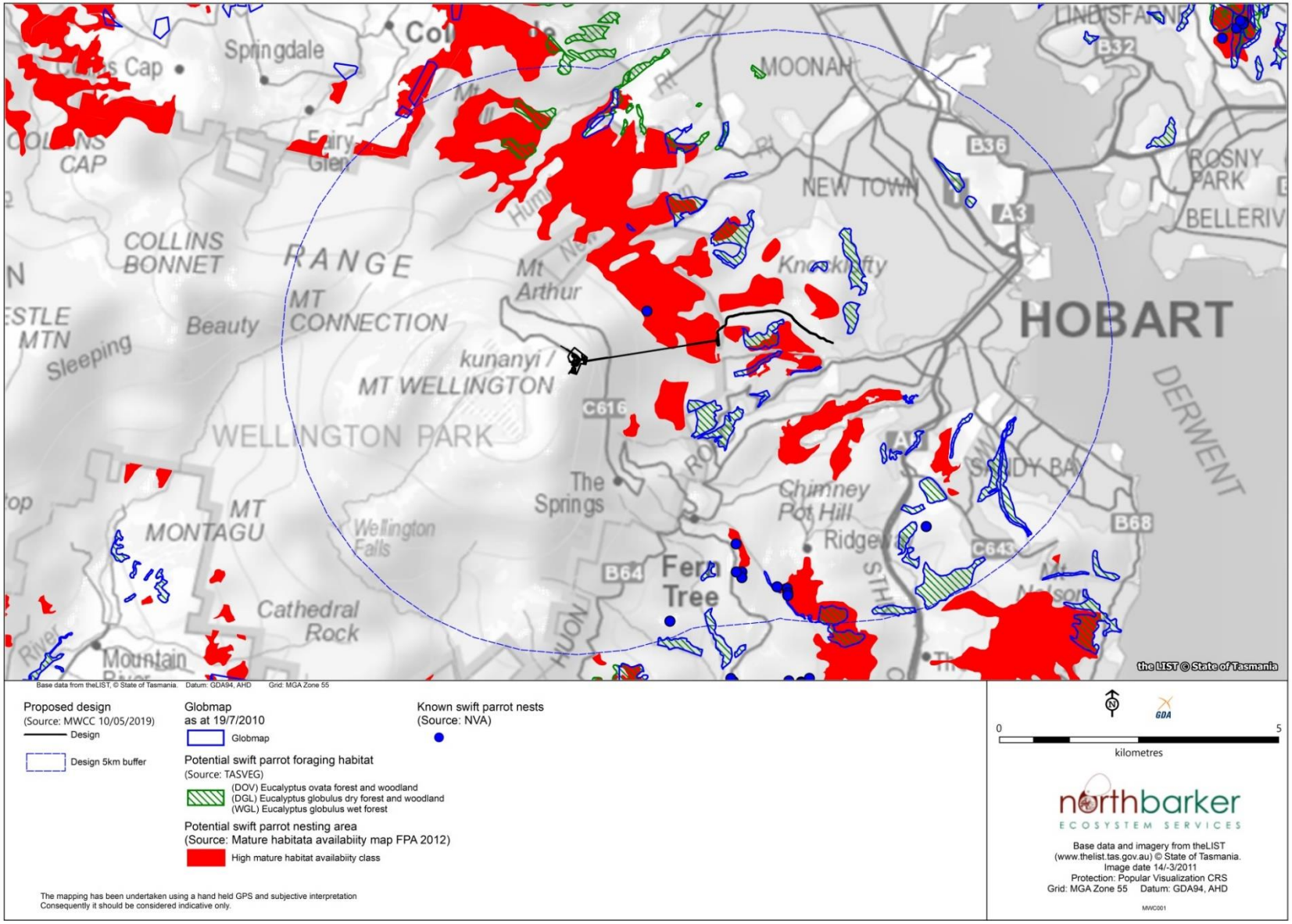


**Figure 7. Distribution of potential swift parrot foraging and nesting habitat in the vicinity of the proposed Mt Wellington Cableway.**

### 2.1.2 Risk of collision with aerial cables

Wires have not been identified as a structure that present a particular collision risk to swift parrots[27]. Potentially, a species which is adapted for flying through the canopy and manoeuvring to avoid impacts from natural habitat obstructions (e.g. limbs and trunks) is able to effectively avoid even narrow-gauge wires such as those used for domestic power lines. The cables used for the cableway are of significantly larger dimensions than power lines and bundled in threes, and so should be obvious (highly visible) and easily avoided. We consider the collision risk to be low between the Base Station and tower 1 and then reducing further to an insignificant level as it separates above the forest canopy.

### 2.1.3 Risk of collision with Pinnacle Centre building

The pinnacle area does not support foraging or nesting resources for swift parrots. The risk of collisions from localised movements between resources is thus non-existent. However, the lower slopes of Mt Wellington contain foraging and nesting resources for this species (Figure 7), which means that individual birds and flocks could traverse the pinnacle area during sub-regional (or greater) movements between habitat patches. For long distant flights birds have been shown to take a high flight path trajectory. However, given the proximity to the pinnacle it is possible that birds following a direct route 'over the top' could approach close to ground level at the pinnacle. It may be, however, that birds prefer to hold the contour and so fly around the mountain between resources. Largely this is conjecture and would require utilisation studies to provide greater certainty.

However, based on the distribution of potential habitat, and the absence of observation records of swift parrots from the pinnacle area on the Tasmanian Natural Values Atlas[28], we conclude that the area of the Pinnacle Centre appears to be an unlikely flight path. Based on this, and the general collision risk assessment for the building in section 1.1.1, the collision risk to swift parrots posed by the Pinnacle Centre is low.

## 2.2 Tasmanian wedge-tailed eagle (*Aquila audax fleayi*)

Collisions with transmission lines and helicopters are known risk factors for wedge-tailed eagles[29]. The population of wedge-tailed eagles in Tasmania is small and the cumulative impact of mortality from collisions with human infrastructure (in conjunction with disruptions to breeding caused by human disturbance) may represent a serious threat to the persistence of the species in Tasmania[30].

Pairs of eagles defend large territories and are typically highly sensitive to disturbance of nesting sites during the breeding season. Novel disturbance occurring even hundreds of metres from a nest site may cause breeding eagles to temporarily desert eggs and chicks, or even to abandon a nest site for many years. They require large trees capable of supporting their massive nests, usually eucalypts, in sheltered aspects typically high in a gully. Viable nesting habitat (in terms of vegetation structure and topography – Figure 8) occurs in the wet eucalypt forest north of the Base Station area in the upper catchment of McRobies Gully. However, the proximity to the noise and activity of the landfill site, and periodic disturbances

[27] Pfennigwerth (2008)
[28] At the time of writing there is only one observation record on the NVA attributed to the pinnacle area for the swift parrot; this record is from 1984 with a spatial accuracy of 2000 m – the actual observation thus may well have been in the habitat downslope
[29] Threatened Species Section (2019), *Aquila audax* subsp. *fleayi (Tasmanian Wedge-tailed Eagle): Species Management Profile for Tasmania's Threatened Species Link*
[30] Department of the Environment (2019). Aquila audax fleayi *in Species Profile and Threats Database*, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed 18/09/2019

from cyclists and walkers on the fire trail, suggest the area is unlikely to be favoured for nest establishment.

The species is known to occur within the vicinity of the proposal area. The nearest known nest site is 4.2 km away from the proposed development, located north of the Wellington Range (Figure 9). According to records obtained from the Tasmanian Natural Values Atlas (NVA) (accessed 12/09/2019) this nest was last observed in 1985. Additional nests located approximately 6 km to the south and west of the site were present in 2014 and 2010 respectively according to records. The data suggest that there has not been a survey for nests for a considerable time in this eastern half of the Wellington Range.

### 2.2.1 Collisions with aerial cables

Collisions with aerial cables are recognised as a major threat to the Tasmanian wedge-tailed eagle[31], with collisions and electrocutions caused by overhead powerlines a significant source of mortality. In the financial year 2017-18, 29 wedge-tailed eagles were found dead beneath Tasmanian powerlines[32]. The cause of death in each case (electrocution or collision) was not disclosed. In 2018-19 TasNetworks reported 24 incidents of threatened birds being killed or injured following collision with their infrastructure[33]. It is likely that more birds died but were not discovered, due to a lack of systematic searches, imperfect detection by observers, the phenomenon of crippling bias (where injured birds travel some distance away from the impact site before dying, thus escaping detection[34]), and because bird carcasses may be scavenged or degrade before detection[35]. Similarly, electrocutions causing power outages are more likely to be detected than collisions that do not interrupt power supply.

The wedge-tailed eagle is a large-bodied bird that employs soaring flight to travel large distances. Radiotelemetry studies on other species of eagles have shown that they disproportionately use landscape features that generate lift. For example, rugged terrain, steep slopes and cliffs generate orographic lift, as air flows are deflected upwards; subsequently, these areas are disproportionately used by eagles[36]. Similarly, to exploit the same effect of the wind, eagles and other birds engaged in long distance movement also frequently fly parallel to or along landscape features such as ridges and cliff lines[37]. Eagles have been found to fly closer to the ground when overflying cliffs and ridgelines. For example, a study of golden eagles in North America found that tracked individuals flew on average 150 m above cliffs and ridgelines[38]. Eagles have also been shown to have concentrated activity in areas of relatively high prey densities, avoid areas with low prey density, and to frequently travel along and near forest edges[39]. All of these traits are consistent with our understanding of how wedge-tailed eagles use the Tasmanian landscape.

[31] Threatened Species Section (2006), *Threatened Tasmanian Eagles Recovery Plan 2006-2010*
[32] TasNetworks (2018), *TasNetworks Annual Report 2017-18*, Hobart, Tasmania
[33] Email from T. Webster (TasNetworks) (21 Aug 2019)
[34] Bech (2012)
[35] Ponce (2010); Barrientos (2018); Riding and Loss (2018)
[36] Sandgren (2013), Singh (2016), Fielding (2019)
[37] Katzner (2012)
[38] Katzner (2012)
[39] Singh (2016), Sandgren (2014)

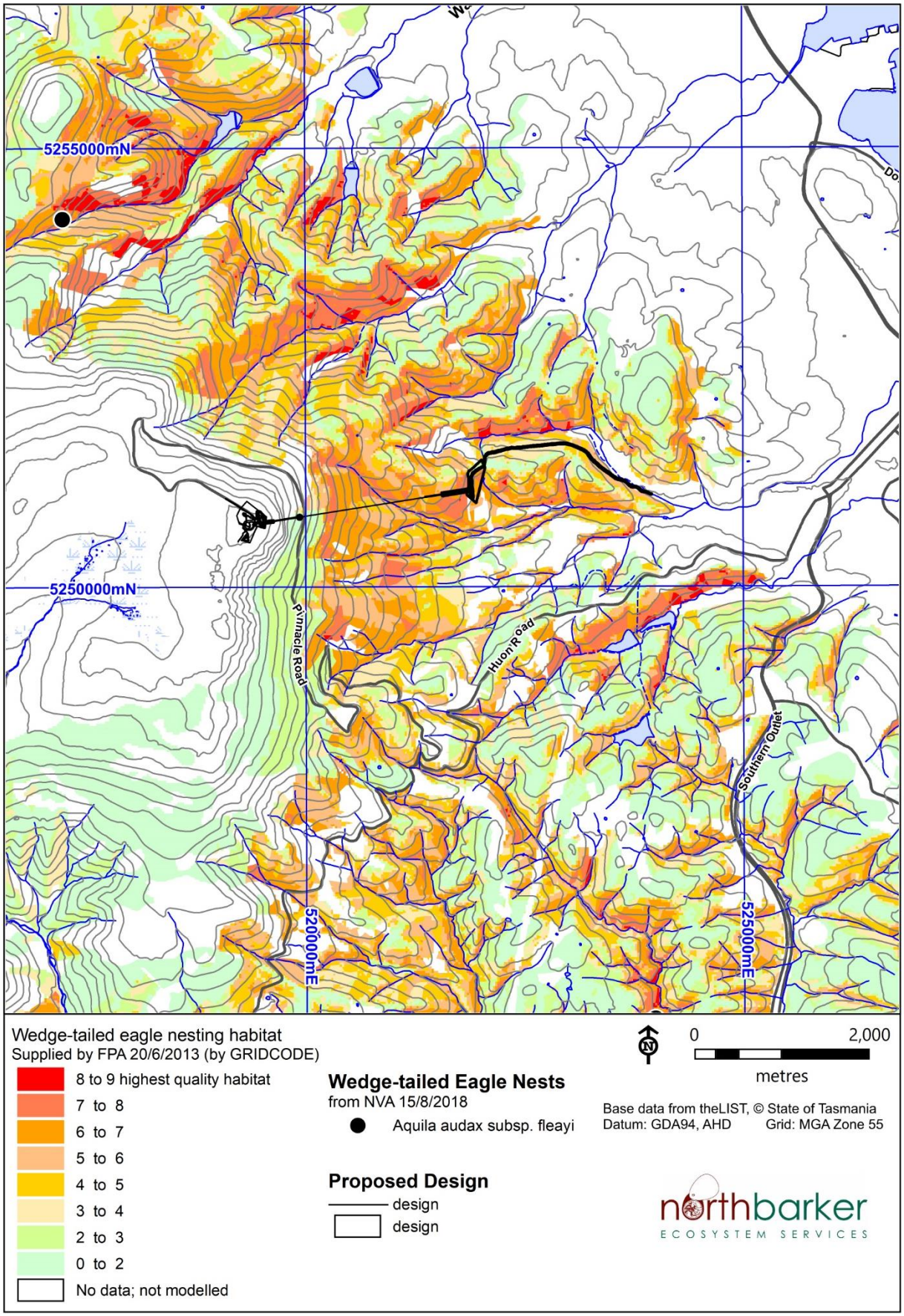


**Figure 8. Modelled nesting habitat suitability for wedge-tailed eagles in the immediate vicinity of the proposed Mt Wellington Cableway.**


**Figure 9. Wedge-tailed eagle nest sites in the broader vicinity of the proposed Mt Wellington Cableway.**

#### 2.2.1.1 Potential risk from the proposal

Based on the expected flying habits of eagles, we have assessed that the upper third of the cable span between towers 2 and 3 poses a moderate collision risk for the wedge-tailed eagle, primarily based on the fact that the cables cross a cliff line (the Organ Pipes). We expect that this area receives disproportionate flight use by eagles and the cables present a risk by intersecting with both the horizontal and vertical planes of potential flight paths along and up the Organ Pipes.

Forest edges and open areas may be preferentially used by eagles. The proposal will however not create new forest edges at a scale attractive to eagles.

Cables near nesting and roosting sites also pose risks to birds, as they can be expected to have a disproportionate amount of flying activity around those areas[40]. Based on the current distribution of known nests in proximity (5 km) to the proposal (Figure 9) and our assessment of local habitat and expected disturbance levels, an elevated collision risk from this factor is not expected from the proposal. It is noted however, that a systematic nest search within the surrounding 5 km may alter this assessment (if more nests are located). We also note that due to the locations proximity to the city of Hobart, high voltage transmission lines are already present in the vicinity of the proposed cable car location (Figure 10). As far as we know, these cables are not systematically searched for eagle mortalities and thus it is not possible to determine the present mortality rates arising from these cables. It is possible however that the addition of cables to an area that already contains cables will result in a smaller collision risk increase than installing cables in an undeveloped area lacking cables. It is also possible however, that the relative risk in such scenarios is entirely dependent on flight utilisation and other habitat variables.

### 2.2.2 Collision risk from helicopters

Helicopters will be used during construction to install towers and cables. Wedge-tailed eagles may menace helicopters while attempting to drive them from their territories. A number of close encounters and collisions between helicopters and eagles have occurred in Tasmania[41]. These collisions are usually fatal for the eagle and present a significant risk to human life. Low, slow flights involving hovering manoeuvres are considered high risk, and are more likely to be perceived as threatening by adult eagles. Eagles are particularly sensitive to helicopter flights near (within 1000 m) active nests.

Guidelines have been developed (and implemented) to manage helicopter flight paths to reduce risks to eagles and human safety[42]. We are not aware of a nominated flight path of helicopters to be used in this proposal. Due to this we cannot assess the level of risk represented to eagles by this factor, other than the to say that there is likely to be a potential risk and it will require mitigation in relation to flight paths and flight timing.

[40] Bernardino (2018)
[41] Forest Practices Authority (2007), Eagle Nest Management, Fauna Technical Note No. 1
[42] Forest Practices Authority (2007), Eagle Nest Management, Fauna Technical Note No. 1

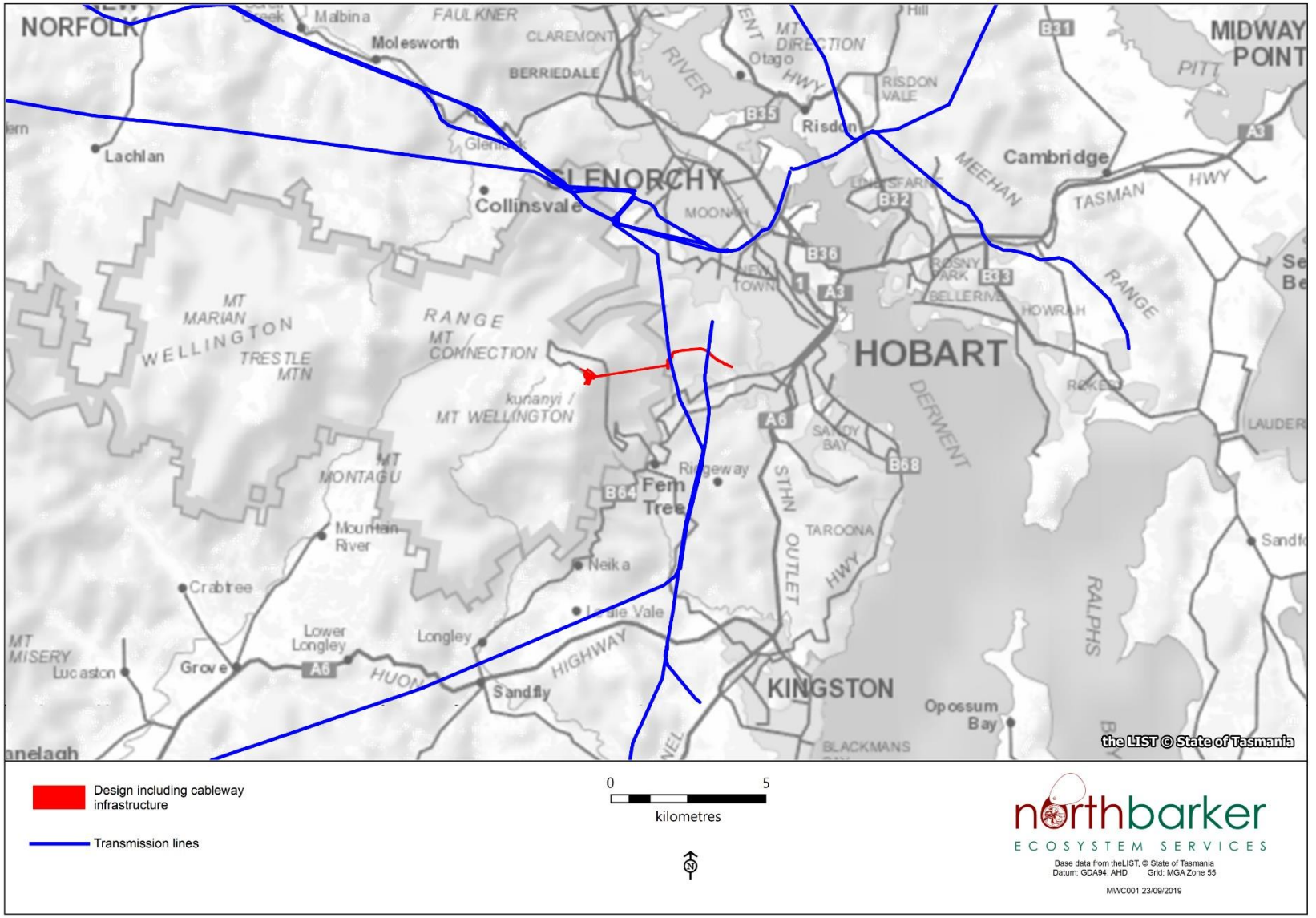


**Figure 10: High voltage transmission lines in vicinity of proposed Mt Wellington Cableway[43].**

[43] Source: ListMap

## 2.3 Masked owl (*Tyto novaehollandiae castanops*)

The species has large home range sizes and moves between forest, woodland edges and open habitats; this behaviour has been postulated to increase the risk of collisions with artificial structures (such as powerlines) due to the greater number of structures encountered as a range increases and in particular when it includes human-modified habitats[44]. Based on this link, collisions with vehicles and man-made structures, including powerlines, are considered a conservation risk to masked owls in Tasmania[45]. However, there is little or no research exploring factors affecting collision risks and rates for the species. Electrocution and collision with powerlines are significant sources of mortality for other owl species, such as eagle owls in the Swiss[46] and Italian Alps[47].

There are two records on the NVA of masked owls observed within 500 m of the Base Station and lower towers, one of which is from 2018 on a fire trail near the end of Old Farm Road. No masked owls were recorded during a three-week period of monitoring during March 2019 using a song meter placed at the saddle at the top of the proposed access road in an area considered to have the best likelihood of supporting a resident bird[48]. Nonetheless, based on the 2018 observation and habitat values, it is reasonable to assume that the area may still be utilised by the species on occasions. A resident nesting pair is possible but unlikely; there are old growth trees with the potential for supporting viable nesting hollows in the vicinity of the Base Station and towers 1 and 2. Although viable nesting hollows may be present, the wet forest in the proposal area constitutes suboptimal habitat for the species[49]. The proposed Base Station is located within an existing clearing and this area could form part of a foraging territory for the species.

With respect to potential collision risk from the proposal, the possibility of collision with the Base Station building is low, given that glazing is screened throughout the building and that a nocturnal species is unlikely to be active in light conditions most conducive to reflections and transparency. In relation to potential collision with aerial cables and towers, this is considered to be a very low risk where the cable is higher than the canopy, as this is not expected to a frequent flight zone for this species, which largely hunts below the canopy. Consequently, the span of cable that is around or below canopy level is likely to present a relatively higher risk. The risk of collisions with helicopters is considered to be negligible.

## 2.4 White-throated needletail (*Hirundapus caudacutus*)

The species is migratory, and when in Australia individuals are at risk of collision with overhead wires, wind turbines, windows and lighthouses. However, it is considered that the overall impact of collisions on population viability is low and collisions are not considered a threat to the survival of the species[50]. At a local level we consider the proposal to represents a very low risk to the species as it is relatively infrequently seen in Tasmania and is predominantly active at heights well above the proposed infrastructure.

[44] Threatened Species Scientific Committee (TSSC) (2010). *Commonwealth Listing Advice on* Tyto novaehollandiae castanops *(Masked Owl (Tasmanian))*
[45] Threatened Species Scientific Committee (TSSC) (2010). *Commonwealth Listing Advice on* Tyto novaehollandiae castanops *(Masked Owl (Tasmanian))*
[46] Schaub (2010)
[47] Rubolini (2002)
[48] North Barker Ecosystem Services (2019)
[49] Forest Practices Authority (2014)
[50] Threatened Species Scientific Committee (2019). *Conservation Advice* Hirundapus caudacutus *White-throated Needletail*. Canberra: Department of the Environment and Energy.

## 2.5 Grey goshawk (*Accipiter novaehollandiae*)

This species has a moderate likelihood of occurring within wet forest in the vicinity of the Base Station and lower cableway infrastructure. No studies examining collision risk factors for this species are available, however we consider the current proposal represents a very low risk based on the species' ecology and expected habitat use. In particular, the species is highly adept at rapidly manoeuvring within vegetation while hunting, which is likely facilitated by acute vision and natural avoidance of branches and trees, which may manifest in the same capacity to avoid non-natural obstructions.

## 2.6 White-bellied sea eagle (*Haliaeetus leucogaster*)

A species of largely coastal environments and large inland waterbodies. No nest sites are known in the vicinity of the proposal and are unlikely to be present. The species is unlikely to be present in the area with any meaningful frequency and is therefore a very low risk of collision. Recommended mitigation measures for the wedge-tailed eagle are expected to also reduce collision risk for this species in the unlikely event it may be present.

# 3 Mitigation options – monitoring and modification

A number of mitigation options are available that could reduce what we have concluded is a relatively low collision risk of the proposal as a whole. In addition, monitoring will assist in refining recommendations and ensuring the proposal maintains a low risk of collision into the future.

## 3.1 Monitor bird utilisation pre- and post-development

Although the available bird data for the area, in conjunction with habitat assessments, has been sufficient for making collision risk estimates, the process could be improved with better data on bird presence and use of the area. To address this, we recommend bird utilisation surveys (such as those applied for collision risk assessments in the development of wind farms) are undertaken from the point of approval for a minimum of two years after the cableway opens for operation, therefore capturing pre- and post-development activity levels and utilisation areas. These surveys would establish better baseline bird occupancy and habitat use data, could be used to validate bird collision risk assessments, would aid in the refinement of physical mitigation measures, and would show if birds are modifying their behaviour in response to the development. The methods and results of these surveys would need to be regulated by the relevant planning authority.

## 3.2 Complete aerial eagle nest search

Prior to the commencement of works (but not more than 2 years prior), an aerial nest search (according to the prescriptions of the Forest Practices Authority) should be conducted examining areas of suitable wedge-tailed eagle nesting habitat within the vicinity of the proposed cable path and proposed helicopter flight paths, to mitigate the possibility of disturbing eagles around their nests and the associated risks of collisions and mortalities. Any new nests discovered must be assessed for potential disturbance risk, with scope to alter helicopter flight paths for avoidance (noting that any route variation would also need to be free from risk of impacting eagles and thus require the same level of survey certainty). A more thorough understanding of the number of active nests within 5 km of the project area will provide greater confidence around our assessment of collision risk for the cableway.

## 3.3 Develop and implement helicopter use protocol

In conjunction with the results of 3.2, develop a protocol for helicopter use, including defining flight times, flight paths, and protocols to follow when an eagle is detected.

## 3.4 Implement staff training

A subset of staff at both the Base Station and Pinnacle Centre must receive recognised training in how to care for injured animals and what to do in the scenario of bird strikes.

## 3.5 Conduct regular carcass searches

The terrain and vegetation structure preclude opportunity to locate carcasses below the upper section of the cableway. The service track below the cableway route between the Base Station and tower 2 and the perimeter of both buildings should be searched weekly for dead birds (by staff trained in accordance with 3.4), and records kept of species identification, injuries and mortalities. Searches must be undertaken early in the morning (prior to 9 am) to limit the likelihood of carcasses being lost to predation.

## 3.6 Install line marking in relatively high-risk areas of cable

Line marking relatively high-risk sections of the aerial cables may reduce collision risk by increasing visibility and available reaction time for birds on the wing. We have identified two areas of potentially elevated risk along the cable path (Figure 11). The first is the upper third of the span between tower 2 and 3, which is expected to be used disproportionately by wedge-tailed eagles. The second area is the span between the Base Station and tower 2, where the cable passes through or just above the canopy and thus can be expected to pose a possible collision risk to the masked owl as well as general woodland birds. Immediately upon construction, both of these areas should have line marking devices installed, such as the flappers which are widely applied on sections of powerlines throughout Tasmania.

## 3.7 Assess monitoring and mitigation measures

Two years after the commencement of operations, the bird utilisation surveys and carcass search data should be independently assessed and a report produced to outline the evident collision impacts in comparison to the initial risk assessments, the efficacy of mitigation measures, the scope for further mitigation measures if warranted, and the consideration of offsets for any residual impacts. Any new research published in that time can also be considered for relevance, such a pending investigation of eagle flight paths using GPS tracking.

Regulation of this assessment and any subsequent recommended actions would fall to the relevant planning authority.

## 3.8 Apply contingencies if warranted

Potential contingencies exist to improve mitigation measures if the assessment under 3.7 demonstrates initial measures are failing. These include screening additional windows on buildings, reducing the potential for reflections and transparencies on windows by adding decal layers of tint or opaque shapes, and adding line markers to additional areas of the cable found to be relatively high-risk.

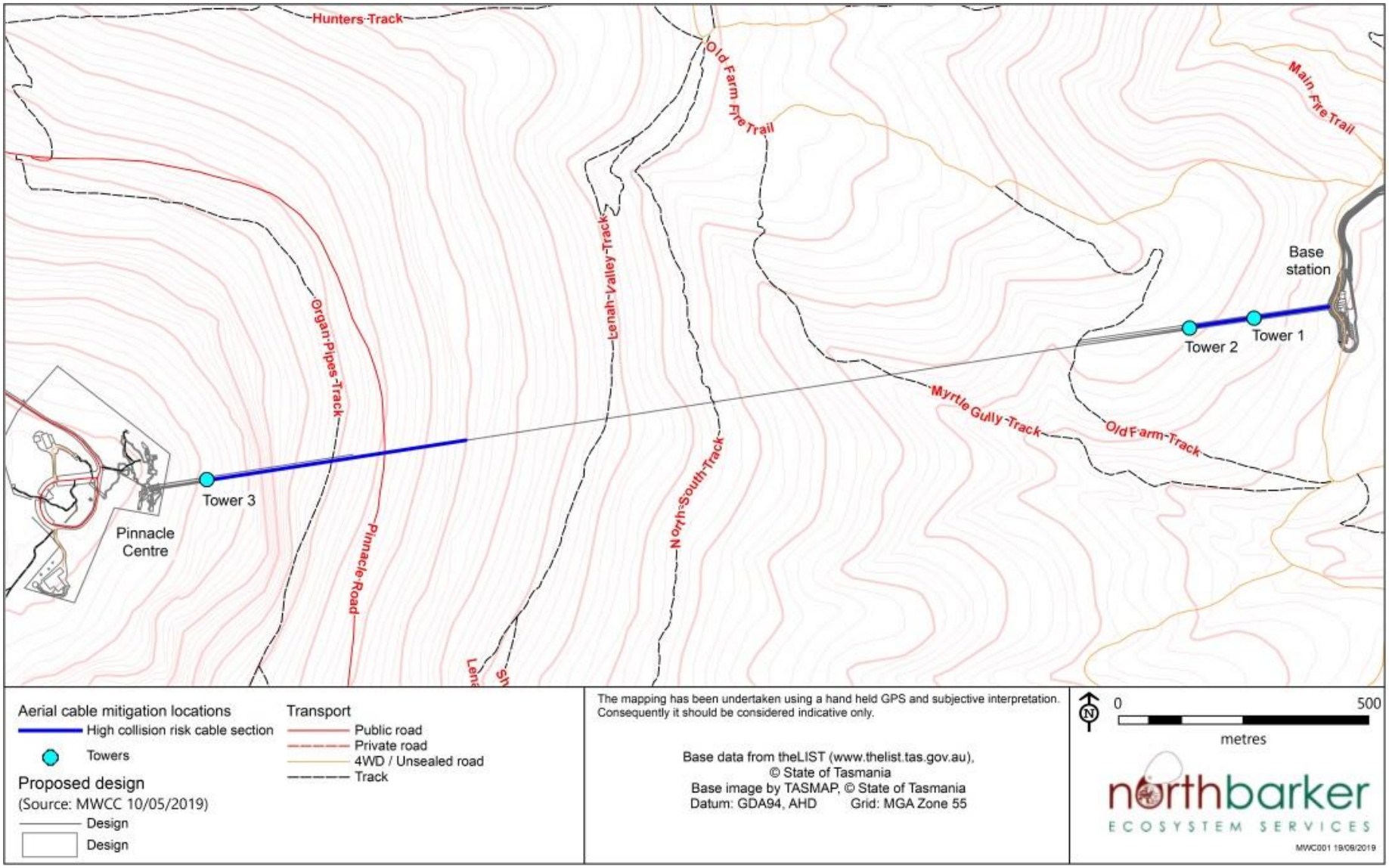


**Figure 11. Relatively higher risk sections of cableway.**

# 4 Conclusion and list of recommendations

The Proposed Mt Wellington Cableway introduces a range of novel infrastructure into a natural and predominantly vegetated landscape, utilised by a range of fauna species including several listed threatened birds which are recognised as being vulnerable to collision mortality with built infrastructure. We have assessed the locations and design of the Pinnacle Centre, Base Station, cableway and associated towers. We identify several elements in the project were there is an elevated risk. These include the vicinity of the Organ Pipes for wedge-tailed eagles and the vicinity of Base Station to tower 2 for the swift parrot.

We conclude that the risk is low to moderate overall and propose a suite of mitigation measures to reduce this risk to acceptable levels:

- Design and implement bird utilisation survey.
- Complete aerial eagle nest survey.
- Develop and implement helicopter use protocol.
- Implement staff training.
- Conduct regular carcass searches.
- Install line marking in relatively high-risk areas of cable.
- Assess monitoring and mitigation measures.
- Apply contingencies if warranted.

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Dear Andrew,

**CABLEWAY HEIGHTS RELATIVE TO NATURAL GROUND LEVEL**

As requested, I have deduced a series of approximate heights of the cables associated with our proposed tramway every 100m or so between towers 2 and 3.

The data in the attached table is based on the approved line profile designed for us by Doppelmayr Garaventa; *MWCC_ATW Line Profile Longitudinal Section Garaventa (2018)*.

This line profile drawing shows the maximum sag and chord length between fixed points and I suggest the table is read in conjunction with this drawing. The chord length line should not be considered minimum sag levels (i.e max height of cable) due to the mass of the cable themselves will cause sag under their own weight. (even without the weight of a tramway cabin).

One way to understand the variability of the cable height is to consider, during operation, the cables slowly rise and fall from their static state position as they compensate for the weight of the cabin at any position along the tramway line.

Doppelmayr confirm that such questions regarding the variable cable height have never been asked for by a client for the purposes of satisfying a planning authority. Discussing a more realistic non-cabin weight sag height along the length of the tramway, Doppelmayr have calculated the minimum sag line is around a quarter of the distance between max sag and the chord length line.

I have attached this longitudinal profile and provided such measurements in the attached table. Note these are approximate deduction but I believe based on our discussions this is sufficient for your purposes.

Please refer to the two letters received from comparable Australian operators, Scenic World NSW and Arthur's Seat Eagle VIC, explaining their experience with and/or mitigation strategies regarding the protection of avian species.

| Location description / + distance | Longitude (m) | NGL Altitude (m) | Min Height of cable above NGL with cabin weight (max sag) (m) | *Approx. extra cable height without cabin weight (min sag) (m) ** | Max Height of cable above NGL (m) |
|---|---|---|---|---|---|
| Tower 2, + | 357 | 405 | 55 | *0* | 55 |
| 35 | 392 | 410 | 49 | *3.5* | 52.5 |
| 150 | 542 | 410 | 57 | *15* | 72 |
| 72 | 614 | 405 | 70 | *20* | 90 |
| 83 | 697 | 415 | 74 | *24.5* | 98.5 |
| 106 | 803 | 440 | 70 | *29* | 99 |
| 91 | 894 | 440 | 91 | *32.5* | 123.5 |
| 108 | 1002 | 430 | 130 | *36* | 166 |
| 99 | 1101 | 480 | 109 | *38.5* | 147.5 |
| 97 | 1198 | 525 | 95 | *39.5* | 134.5 |
| 105 | 1303 | 565 | 93 | *40.5* | 133.5 |
| 98 | 1401 | 620 | 77 | *40.5* | 117.5 |
| 94 | 1495 | 655 | 77 | *40* | 117 |
| 107 | 1602 | 700 | 79 | *38.5* | 117.5 |
| 98 | 1700 | 745 | 80 | *36.5* | 116.5 |
| 102 | 1802 | 795 | 81 | *34* | 115 |
| 102 | 1904 | 850 | 80 | *30.5* | 110.5 |
| Pinnacle Road | 2003 | 900 | 86 | *26* | 112 |
| 98 | 2101 | 960 | 87 | *20* | 107 |
| < Organ Pipes | 2203 | 1020 | 96 | *12.5* | 108.5 |
| > Organ Pipes | 2300 | 1170 | 17 | *4.5* | 21.5 |
| Tower 3 | 2350 | 1225 | 35 | *0* | 35 |

**Deduced figures measured from scaled line profile*

I trust this information assists your report.

Adrian Bold
Executive Director

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Re: Bird Strikes around Cable Cars

21/07/2019

To whom it may concern,

Scenic World which is located in the Katoomba, NSW has been operating the Scenic Skyway cable car (384m long) across the Jamison Valley since 1957 and the Scenic Cableway (510m long) which travels into the Jamison Valley since 2000. Both these ropeways have 4 ropes (2 large and 2 small) which travel the length of the ropeways.

Mount Wellington Cable Car has inquired as to whether there have been any issues with bird strikes to our cable cars (ropes or cabins).

In the time we have been operating the rides we have had no incidents of bird strikes into either the cables or cabins to our knowledge. Given that we operate 365 days a year and our cabins are manned by an operator if there were ongoing issues with bird strikes, our staff, who are generally very passionate about the environment would be making us aware so that we could take action around it.

I would be happy to answer further enquiries regarding this matter.

Kind Regards

Anthea Hammon

Managing Director
Scenic World

**31 July 2019**

**Mr Adrian Bold**
**Director and Project Lead**
**Mount Wellington Cable Car**

**Re: Arthurs Seat Eagle Interaction with Native Birds**

The Arthurs Seat Eagle Cable Car is located in Arthurs Seat State Park on Victoria's Mornington Peninsula. The park is home to a diverse range of native birds including: Kookaburras, King Parrots, Rosellas, Cockatoos, Southern Emu-Wrens, Lewin's Rails, Powerful Owls and of course, our namesake the Wedge-tailed Eagle.

The Eagle's Management team work closely with Parks Victoria to ensure the diverse native fauna and flora of the Park is protected. Soon after construction native birds returned to the lift easement, and now happily feed in our native gardens. To ensure the habitat of the native birds and animals is kept as pristine as possible staff from the Eagle regularly removes weeds and rubbish from the state park. Eagle team members have also been proactive in the rescue of and successful release of injured native birds from nesting from the surrounding. Our staff have a keen interest in saving and assisting any native animal in the Park which otherwise would be left to fend for itself if not seen by Park Rangers.

The lift has no issues with the native birdlife in the park and The Eagle has been proactive in reducing the risk of any bird incidents. Some of the preventative initiatives include:

- Maintaining habitat trees in the Lift Easement
- Installation of mesh guard to prevent birds nesting on towers
- Installation of flags to prevent Kookaburras riding the wire rope
- Use of Artificial Owls to deter birds from entering stations (talking owls are the best)
- Use of Eagle kites to reduce interactions with birds at our summit station windows

The Management and staff of The Eagle feel privileged to be located in the Arthurs Seat State Park and will continue to make every effort to protect native birds and their habitat. For further information on the Arthurs Seat Eagle please refer to our website https://aseagle.com.au/.

Kind regards

**Madonna Walters**
General Manager
Arthurs Seat Eagle
www.aseagle.com.au