

**NATURAL VALUES ASSESSMENT OF PROPOSED EARTH'S BLACK BOX (EBB1), QUEENSTOWN AERODROME, 24659 LYELL HIGHWAY, QUEENSTOWN, TASMANIA**



**Environmental Consulting Options Tasmania (ECOtas) for  
Room11 Architects & Project Partners**

**1 April 2022**

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## **AUTHORSHIP**

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Report production: Mark Wapstra

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Base data for mapping: LISTmap

Digital and aerial photography: Mark Wapstra, GoogleEarth, LISTmap

## **ACKNOWLEDGEMENTS**

Kate Phillips (Room11 Architects) provided background information on the project.

## **QUALIFICATIONS**

Except where otherwise stated, the opinions and interpretations of legislation and policy expressed in this report are made by the author and do not necessarily reflect those of the relevant agency. The client should confirm management prescriptions with the relevant agency before acting on the content of this report. This report and associated documents do not constitute legal advice.

Note that any reference to the Department of Primary Industries, Parks, Water & Environment (DPIPWE) now refers to the Department of Natural Resources and Environment Tasmania.

## **COVER ILLUSTRATION**

View south from the proposed location of EBB1.

Please note: the blank pages in this document are deliberate to facilitate double-sided printing.



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## SUMMARY

### **General**

Room11 Architects (on behalf of all project partners) engaged Environmental Consulting Options Tasmania (ECOtas) to undertake a natural values assessment of the proposed location of the Earth's Black Box project (EBB1), Queenstown Aerodrome, 24659 Lyell Highway, Queenstown, Tasmania, primarily to ensure that the requirements of the identified natural values are appropriately considered during any further project planning under local, State and Commonwealth government approval protocols.

### **Site assessment**

A natural values assessment of the project area was undertaken by Mark Wapstra (ECOtas) on 22 Mar. 2022.

### **Summary of key findings**

#### Threatened flora

- No plant species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and/or the Tasmanian *Threatened Species Protection Act 1995* (TSPA) were detected, or are known from database information, from the project area.

#### Threatened fauna

- No fauna species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and/or the Tasmanian *Threatened Species Protection Act 1995* (TSPA) were detected, or are known from database information, from the project area.

#### Vegetation types

- The project area supports the following TASVEG mapping units:
  - extra-urban miscellaneous (TASVEG code: FUM); and
  - western lowland sedgeland (TASVEG code: MSW).
- MSW does not equate to a native vegetation community listed as threatened on Schedule 3A of the Tasmanian *Nature Conservation Act 2002* or a threatened ecological community listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

#### Weeds

- No plant species classified as declared weed species within the meaning of the Tasmanian *Weed Management Act 1999* (*Biosecurity Act 2019*) were detected from the project area.

#### Plant disease

- No evidence of *Phytophthora cinnamomi* (PC, rootrot) was observed in susceptible vegetation or species within the project area.

- No evidence of myrtle wilt was recorded from within the project area.
- No evidence of myrtle rust was recorded from within the project area.

#### Animal disease (chytrid)

- The project area does support habitats suitable for amphibian species.

#### Geoconservation issues

- No sites of geoconservation significance were identified from the project area.

### **Recommendations**

#### Vegetation types

In general terms, minimising the extent of “clearance and conversion” and/or “disturbance” to native vegetation is recommended, albeit recognising the already highly modified nature of the vegetation (through repeated fires) with a very simple structure and species composition. That is, the specific project site is of no particular consequence in terms of the management of natural values.

#### Threatened flora

None identified – no special management required.

#### Threatened fauna

None identified – no special management required.

#### Weed and disease management

Strict machinery hygiene during the construction phase is recommended. Queenstown has several sites with high pressure vehicle washing facilities, which means it should be practical to ensure machinery entering the site during construction has a low risk of carrying weed propagules. It is also recommended that any gravel (or similar) material for driveways be sourced from a facility certified as *Phytophthora cinnamomi*-free.

Special management (e.g. a complex weed management plan) is not considered warranted although post-installation follow-up monitoring (and control if necessary) of weeds is suggested (e.g. a period of 6-24 months with the objective of minimising the risk of weeds establishing on the site. This will also detect short-lived species such as thistles, flatweeds and fleabanes that are widespread in the greater area and take advantage of temporarily exposed soil.

#### Legislative and policy implications

A permit under Section 51 of the Tasmanian *Threatened Species Protection Act 1995* (TSPA) will not be required.

A formal referral to the Commonwealth Department of Agriculture, Water and the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) is not considered required.

Development will require a planning permit pursuant to the provisions of the applicable planning scheme but specific permit conditions in relation to natural values to satisfy P1.1 & P1.2 of C7.6.2 of the Natural Assets Code of the *Tasmanian Planning Scheme – West Coast* are not recommended.



## **INTRODUCTION**

### ***Purpose***

Room11 Architects (on behalf of all project partners) engaged Environmental Consulting Options Tasmania (ECOtas) to undertake a natural values assessment of the proposed location of the Earth's Black Box project (EBB1), Queenstown Aerodrome, 24659 Lyell Highway, Queenstown, Tasmania, primarily to ensure that the requirements of the identified natural values are appropriately considered during any further project planning under local, State and Commonwealth government approval protocols.

### ***Scope***

This report relates to:

- flora and fauna species of conservation significance, including a discussion of listed threatened species (under the Tasmanian *Threatened Species Protection Act 1995* and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*) potentially present, and other species of conservation significance/interest;
- vegetation types (forest and non-forest, native and exotic) present, including a discussion of the distribution, condition, extent, composition and conservation significance of each community;
- plant and animal disease management issues;
- weed management issues; and
- a discussion of some of the policy and legislative implications of the identified ecological values.

This report follows the government-produced *Guidelines for Natural Values Surveys – Terrestrial Development Proposals* (DPIPWE 2015) in anticipation that the report (or extracts of it) may be required as part of various approval processes.

The report format should also be applicable to other assessment protocols as required by the Commonwealth Department of Agriculture, Water and the Environment (for any referral/approval that may be required under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*), which is unlikely to be required in this case.

More specifically, this assessment and report have been prepared to address specific provisions of the *Tasmanian Planning Scheme – West Coast*, with particular reference to provisions of the Natural Assets Code.

### ***Limitations***

The natural values assessment was undertaken on 22 Mar. 2022. Many plant species have ephemeral or seasonal growth or flowering habits, or patchy distributions (at varying scales), and it is possible that some species were not recorded for this reason. However, every effort was made to sample the range of habitats present in the survey area to maximise the opportunity of recording most species present (particularly those of conservation significance). Late spring and into summer is usually regarded as the most suitable period to undertake most botanical assessments. While

some species have more restricted flowering periods, a discussion of the potential for the site to support these is presented. In this case, the survey was timed to allow detection of species of late summer-flowering orchids listed as threatened known from the wider area (e.g. *Orthoceras strictum*, horned orchid) and other species with a high priority for conservation management in this part of the State.

The survey was also limited to vascular species: species of mosses, lichens and liverworts were not recorded. However, a consideration is made of threatened species (vascular and non-vascular) likely to be present (based on habitat information and database records) and reasons presented for their apparent absence.

Surveys for threatened fauna were largely limited to an examination of “potential habitat” (i.e. comparison of on-site habitat features to habitat descriptions for threatened fauna), and detection of tracks, scats and other signs.

### **Permit**

Any plant material was collected under DNRET permit TFL 21138 (in the names of Mark Wapstra). Relevant data will be entered into DNRE’s *Natural Values Atlas* database by the authors (point locations of populations of *Desmodium gunnii* and wees).

No vertebrate or invertebrate material was collected. A permit is not required to undertake the type of habitat-level assessment described herein.

### **PROJECT SUMMARY**

The land use proposal is to install Earth’s Black Box (EBB1), described as “an indestructible device that will continuously record a set of metrics that reflect the state of our planet and human society - safely storing the data for future generations”.

The construction and design are described as consisting of “four sections: an outer shell, a second core shell, separating shells for computing/storage components, and an insulation shell” where “each shell will be grounded into a thick concrete base that will ensure the box is immovable and indestructible with a robust titanium shell” with “the exterior a bright orange – achieved through an oxidation treatment of the surface material”.

It is understood that EBB1 will be pre-fabricated and crane-lifted on to the base on the low rise from the aerodrome’s surface.

### **PROJECT AREA**

The project area (Figures 1-4) is a low rise south of the Queenstown Aerodrome and east of the Lyell Highway, with the following cadastral details:

- “Queenstown Aerodrome”, 24659 Lyell Highway (Local Government Authority i.e. West Coast Council);
- PID 7769007;
- C.T. 156721/1; and
- LPI BWS32.

Land tenure and other categorisations relevant to natural values management of the project area are as follows:

- West Coast municipality, zoned as Rural pursuant to the *Tasmanian Planning Scheme – West Coast* (Figure 5), and partly subject to the Priority Vegetation overlay (Figure 6);
- Informal Reserve (as per LISTmap’s Tasmanian Reserve Estate layer, Figure 7);
- West bioregion, according to the IBRA 7 bioregions used by most government agencies); and
- NRM Cradle Coast Natural Resource Management (NRM) region.

## **METHODS**

### ***Nomenclature***

All grid references in this report are in GDA94, except where otherwise stated.

Vascular species nomenclature follows de Salas & Baker (2021) for scientific names and Wapstra et al. (2005+) for common names. Fauna species scientific and common names follow the listings in the cited *Natural Values Atlas* report (DNRET 2022).

Vegetation classification follows TASVEG 4.0, as described in *From Forest to Fjaeldmark: Descriptions of Tasmania’s Vegetation* (Kitchener & Harris 2013+).

### ***Preliminary investigation***

Available sources of previous reports, threatened flora records, vegetation mapping and other potential environmental values were interrogated. These sources include:

- Tasmanian Department of Natural Resources and Environment Tasmania’s *Natural Values Atlas* records for threatened flora and fauna (GIS coverage maintained by the author current as at date of report);
- Tasmanian Department of Natural Resources and Environment Tasmania’s *Natural Values Atlas* report ECOtas\_EBB1 for a point location defining the approximate project site (centred on 377676mE 5340844mN), buffered by 5 km, dated 20 Mar. 2022 (DNRET 2022) – Appendix E;
- Forest Practices Authority’s *Biodiversity Values Database* report, specifically the species’ information for grid reference centroid 377676mE 5340844mN (i.e. a point defining the approximate centre of the assessment area), buffered by 5 km and 2 km for threatened fauna and flora records, respectively, hyperlinked species’ profiles and predicted range boundary maps, dated 20 Mar. 2022 (FPA 2022) – Appendix F;
- Commonwealth Department of Agriculture, Water and the Environment’s *Protected Matters Report* for a point location defining the approximate project site, buffered by 5 km, dated 20 Mar. 2022 (CofA 2022) – Appendix G;
- the TASVEG 3.0, TASVEG 4.0 & TASVEG Live vegetation coverages (as available through GIS coverage and via LISTmap);
- GoogleEarth, LISTmap and ESRI aerial orthoimagery; and
- other sources listed in tables and text as indicated.

## ***Field assessment***

The assessment was undertaken by Mark Wapstra (ECOtas) on 22 Mar. 2022. Cadastral data uploaded to the iGIS application guided the in-field assessment. Meandering transects were used to capture the greater range of aspects, slopes and site conditions.

The survey was not limited by access due to the very small footprint of the project site and easily-traversed topography and vegetation. The assessment was expanded to cover the swathe of vegetation between the project site and the aerodrome pavement to the north and the Lyell Highway to the west, on the assumption that any such areas could be impacted during construction activities.

## Vegetation classification

Vegetation was classified by waypointing vegetation transitions for later comparison to aerial imagery. The structure and composition of the vegetation types was described using a nominal 30 m radius plot at a representative site within the vegetation type, and compiling a “running” species list for the balance of the vegetation and peripheral areas.

## Threatened flora

With reference to the threatened flora, the survey included consideration of the most likely habitats for such species. Further methods are not provided because no such species were detected.

## Threatened fauna

Surveys for threatened fauna were largely limited to an examination of “potential habitat” (i.e. comparison of on-site habitat features to habitat descriptions for threatened fauna), and detection of tracks, scats and other signs.

## Weeds

The project area was assessed with respect to plant species classified as declared weeds under the Tasmanian *Weed Management Act 1999 (Biosecurity Act 2019)*, Weeds of National Significance (WoNS) or “environmental weeds” (author opinion and as included in *A Guide to Environmental and Agricultural Weeds of Southern Tasmania*, NRM South 2017). Where such species were encountered, hand-held GPS (Garmin Oregon 600 or iGIS application) was used to waypoint individuals to act as both a counter and to define the extent of patches.

## Plant and animal disease issues

The project area was assessed with respect to potential impacts of plant and animal pathogens, by reference to habitat types and field symptoms.

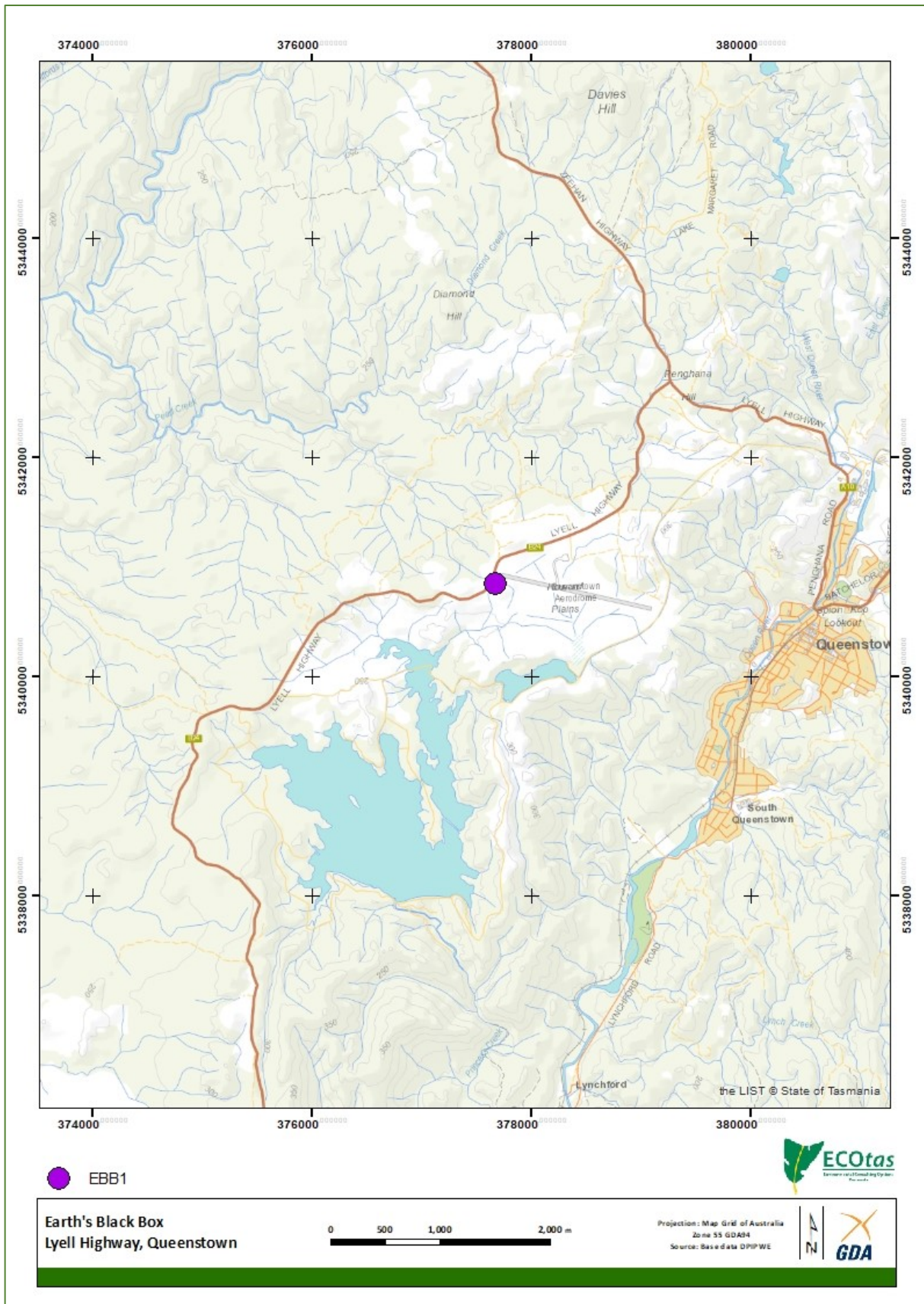
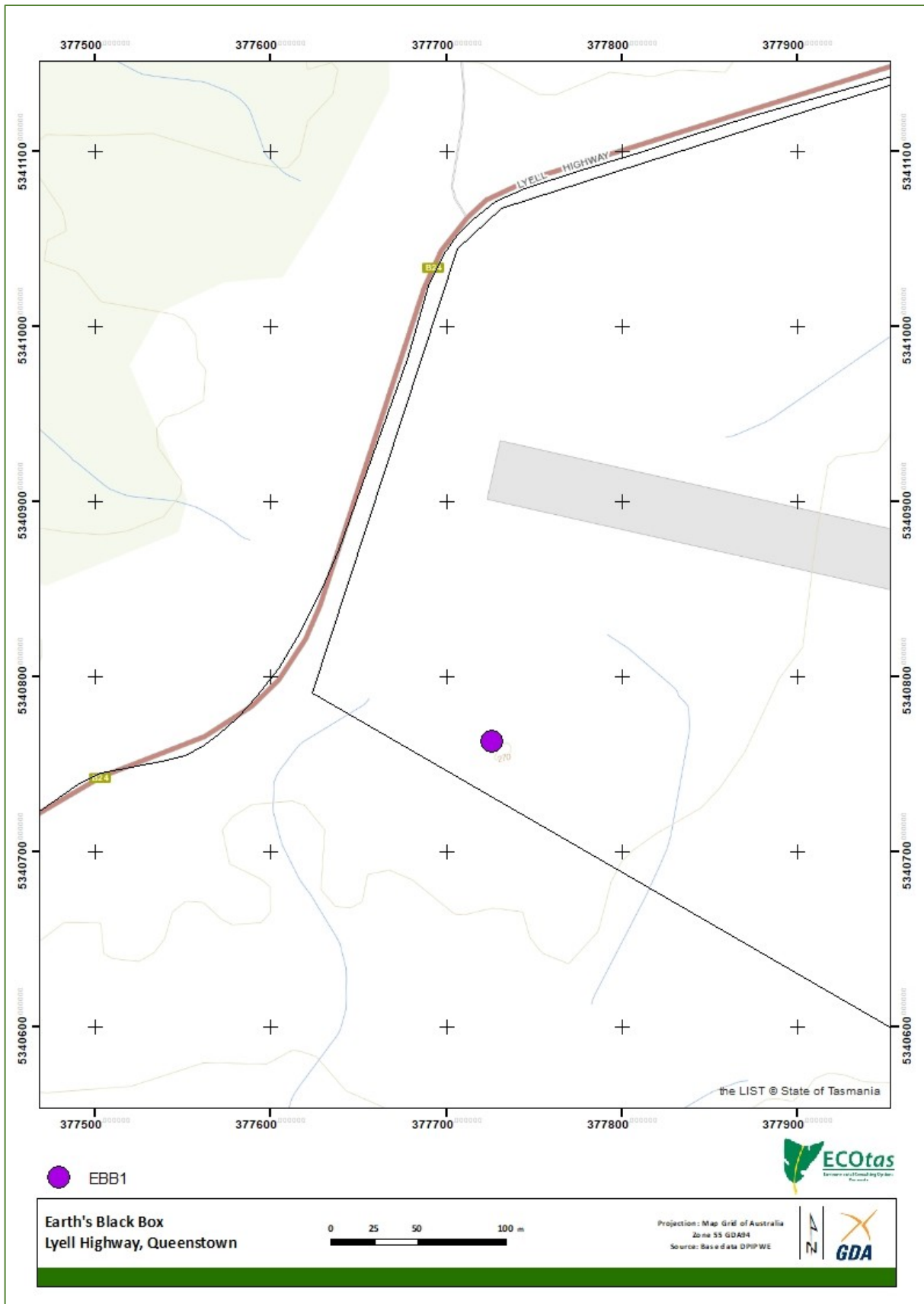


Figure 1. General location of the project area



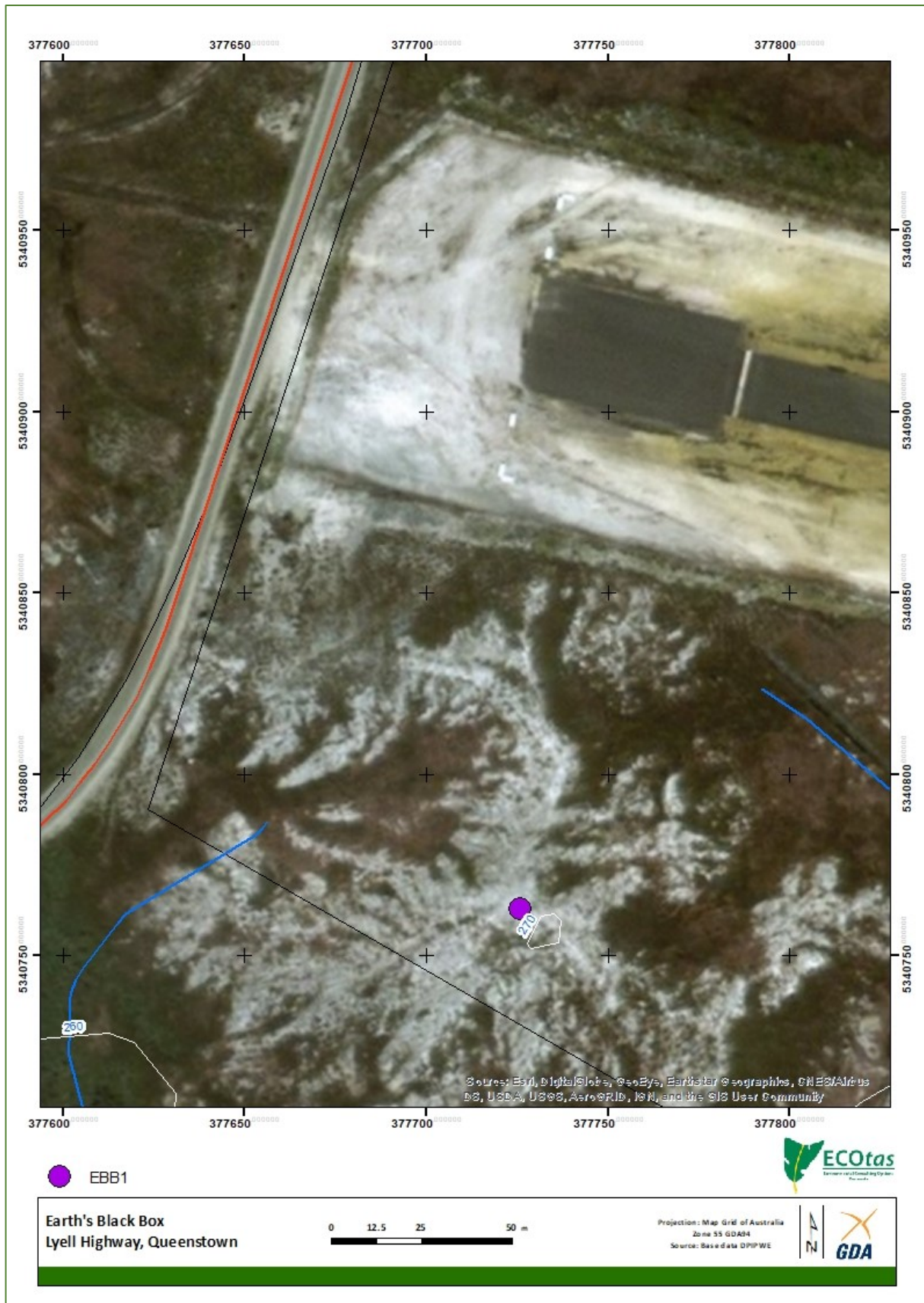


**Figure 2.** Detailed location of the project area showing general topographic and cadastral features



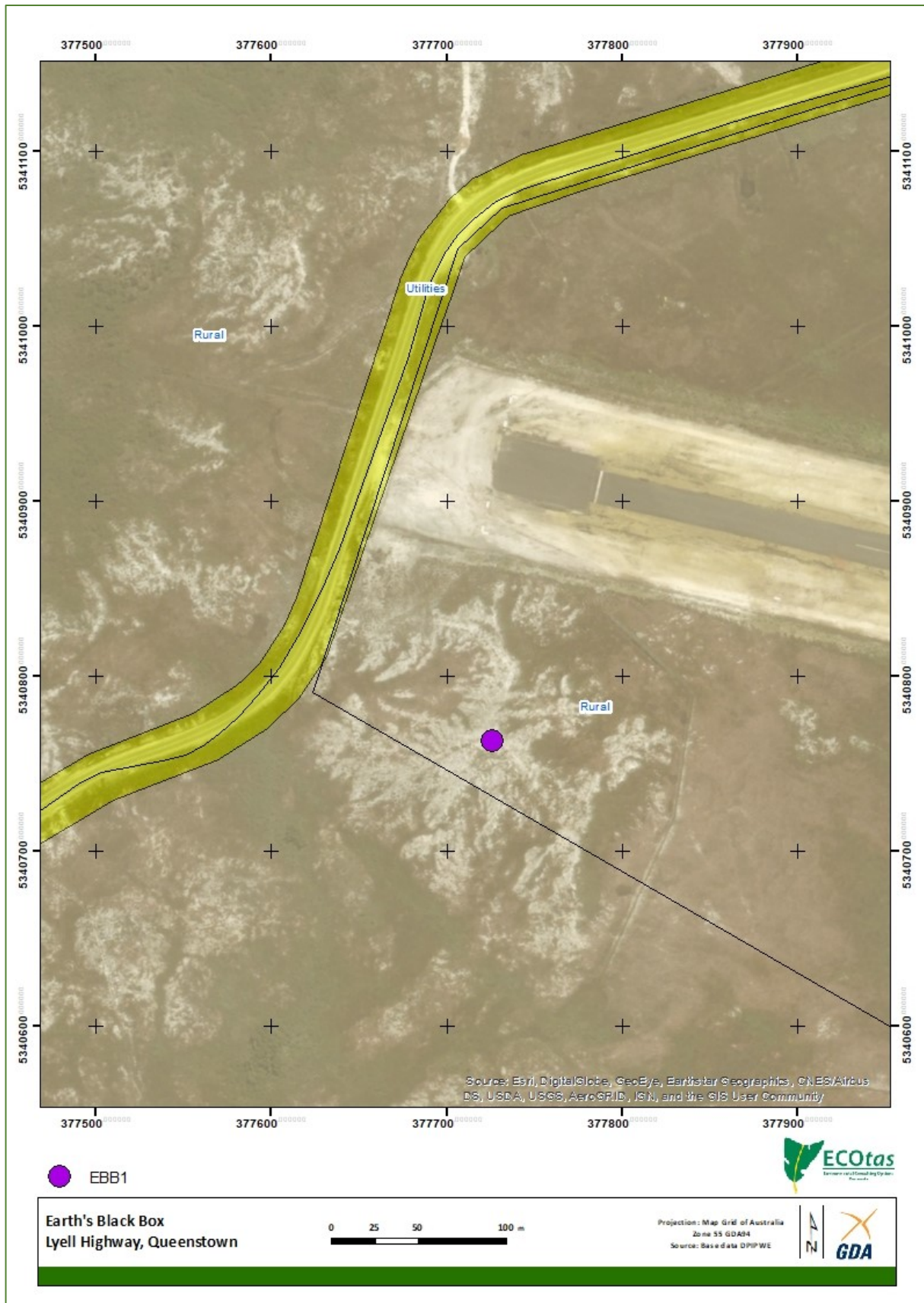
**Figure 3.** Detailed location of the project area showing recent aerial imagery and other features





**Figure 4.** More detailed location of the project area showing recent aerial imagery and other features





**Figure 5.** Zoning of project area and surrounds pursuant to the *Tasmanian Planning Scheme – West Coast*





**Figure 6.** Extent of Priority Vegetation overlay within and adjacent to the project area pursuant to the *Tasmanian Planning Scheme – West Coast*





Figure 7. Tenure of project area and surrounds

## FINDINGS

### *Overview of project site*

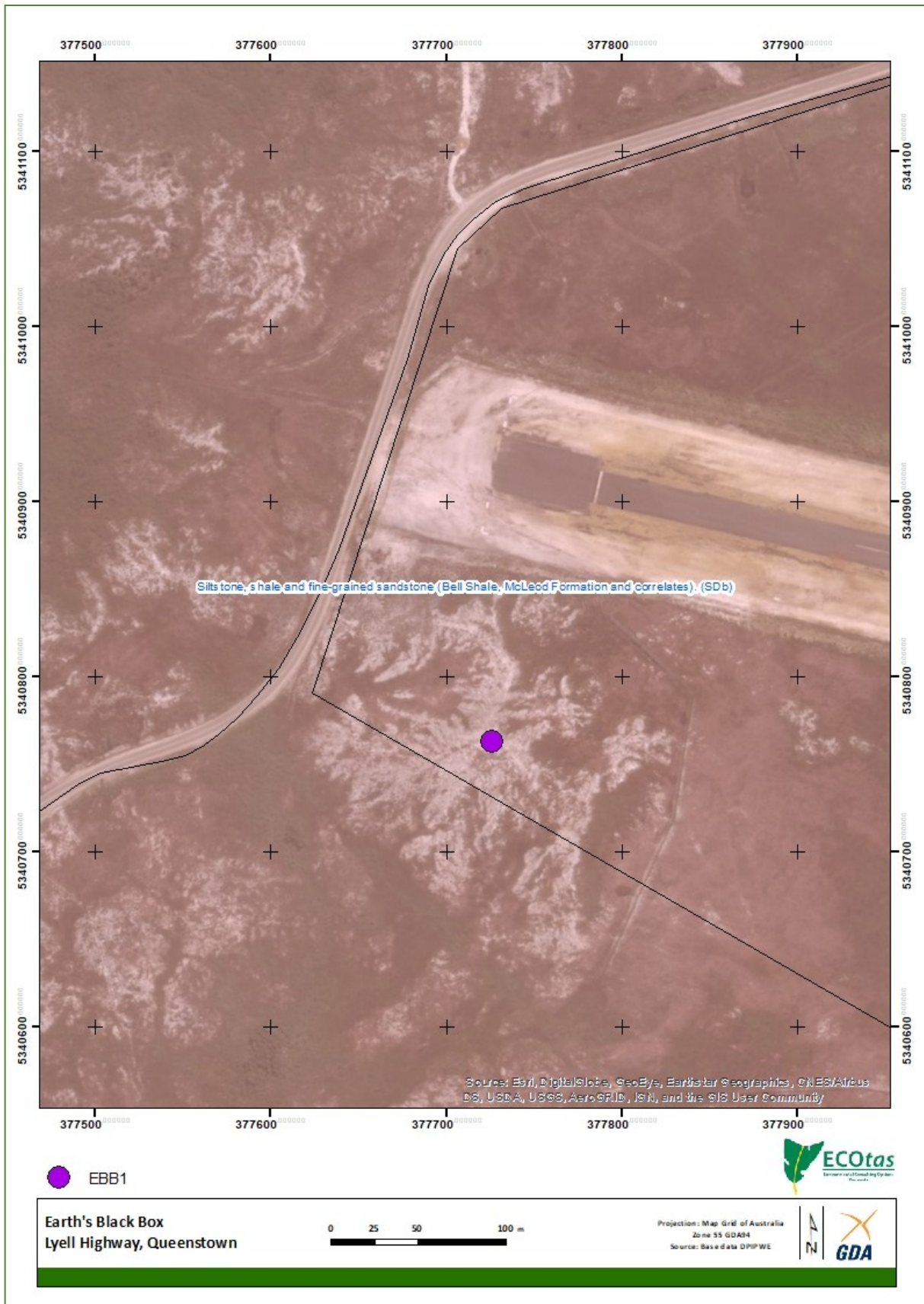
Topographically, the project site is at ca. 260-270 m a.s.l. on a low rise on otherwise gentle to moderate slopes with various aspects (Plates 1-4). The Land Systems of Tasmania classifies the site in the North West region, with annual rainfall of 2,000-,2500 mm, described in more detail as the "Tully River" land system, which is characterised by low hills and some areas of undulating plains surrounded by higher ridges. Soils are generally gravelly and peat is a feature of the surface layers over most of the system. Much of the land system shows major past disturbance, mainly associated with mining but also fires and other land uses.



**Plates 1-4.** Views from the project site: north (top left); east (top right); south (bottom right); west (bottom left)

The geology of the project area is mapped at a 1:250,000 scale (Figure 8) as Devonian-age "siltstone, shale and fine-grained sandstone (Bell Shale, McLeod Creek Formation and correlates)" (geocode: SDb), which is also indicated at the 1:25,000 scale (LISTmap). Site assessment confirmed this geology by reference to exposed rocks and soil type (Plates 5-8). The geology is mentioned because of its strong influence on vegetation classification, associated with threatened flora, and to a lesser extent, threatened fauna.



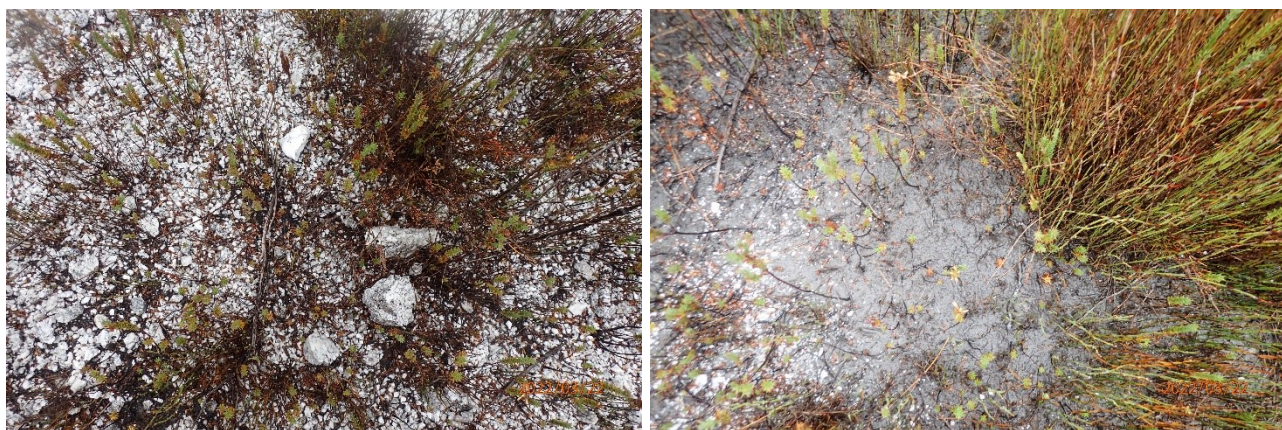


**Figure 8.** Geology (1:250,000 scale) of the project area and surrounds





**Plates 5 & 6.** Exposed fine-grained sedimentary rocks near project site



**Plates 7 & 8.** Exposed gravelly soils and patches of fine grey mud near project site

LISTmap does not indicate any sites of geoconservation significance at the specific project site, although Western Tasmania Blanket Bogs are mapped close to the site (Figure 9). This site is described as “the most extensive organosol terrain in Australia and the Southern Hemisphere”. Blanket bog distribution has not been mapped in detail and is generally defined by proxy as all areas covered by organosols and moorland vegetation in western Tasmania, extending from far northwest to far south Tasmania. Large areas south of Birchs Inlet and between Zeehan and the Pieman River have been largely stripped of blanket bog soils by anthropogenic firing. This is the case for the project area and surrounds with the site now represented by frequently burnt sedgeland with extensive exposed organic-poor gravelly soils and rock (Plates 5-8).

LISTmap’s Fire History layer (Figure 10) confirms several recorded recent fire events for the project area and surrounds (e.g. Incident Number 601, “Queenstown Aerodrome”, bushfire, 12 Dec. 1994 & Incident Number UACLSFD10, “Queenstown Aerodrome UACLSFD10, planned burn, 19 Mar. 2011), although the site and surrounds has been subject to a high fire frequency, evidenced by the lack of tree/scrub canopy and extensive areas of exposed rock and soil (Plates 5-8).

The project area itself is on a low but distinctive rise, with no watercourses evident on either topographic maps or observed in the field, with the lower-lying terrain between low rises having impeded drainage and supporting denser sedgeland (explaining the darker colour on aerial imagery) but with no obvious signs of ephemeral or permanent flow such as stream beds or banks. At a broader level, the project site is technically within the catchment of Princess Creek.





Figure 9. Extent of geoconservation site (Western Tasmania Blanket Bogs) close to project area





Figure 10. Fire history of project area and surrounds



## **Vegetation types**

### Comments on TASVEG mapping

This section, which comments on the existing TASVEG mapping for the project area, is included to highlight the differences between existing mapping and the more recent mapping from the present study to ensure that any parties assessing land use proposals (via this report) do not rely on existing mapping. Note that TASVEG mapping, which was mainly a desktop mapping exercise based on aerial photography, is often substantially different to ground-truthed vegetation mapping, especially at a local scale. An examination of existing vegetation mapping is usually a useful pre-assessment exercise to gain an understanding of the range of habitat types likely to be present and the level of previous botanical surveys.

In this case, it is useful to examine both TASVEG 3.0 & 4.0 mapping because while the latter should be the most up-to-date, the former has been used to inform the incoming *Tasmanian Planning Scheme* and specifically the Regional Ecosystem Model's mapping of the Priority Vegetation Area overlay.

In this case, the versions of TASVEG map the project area and surrounds differently, as follows (Figure 11 = TASVEG 3.0; Figure 12 = TASVEG 4.0- same as TASVEG Live):

- extra-urban miscellaneous (TASVEG code: FUM)

All versions of TASVEG map the aerodrome as FUM, but all under-estimate the extent of anthropogenic disturbance that can be reasonably allocated to FUM.

- buttongrass moorland (undifferentiated) (TASVEG code: MBU)
- western buttongrass moorland (TASVEG code: MBW)

TASVEG 3.0 maps MBU extensively around the project area, with these polygons "corrected" in TASVEG 4.0/Live to MBW.

- western regrowth complex (TASVEG code: SWR)

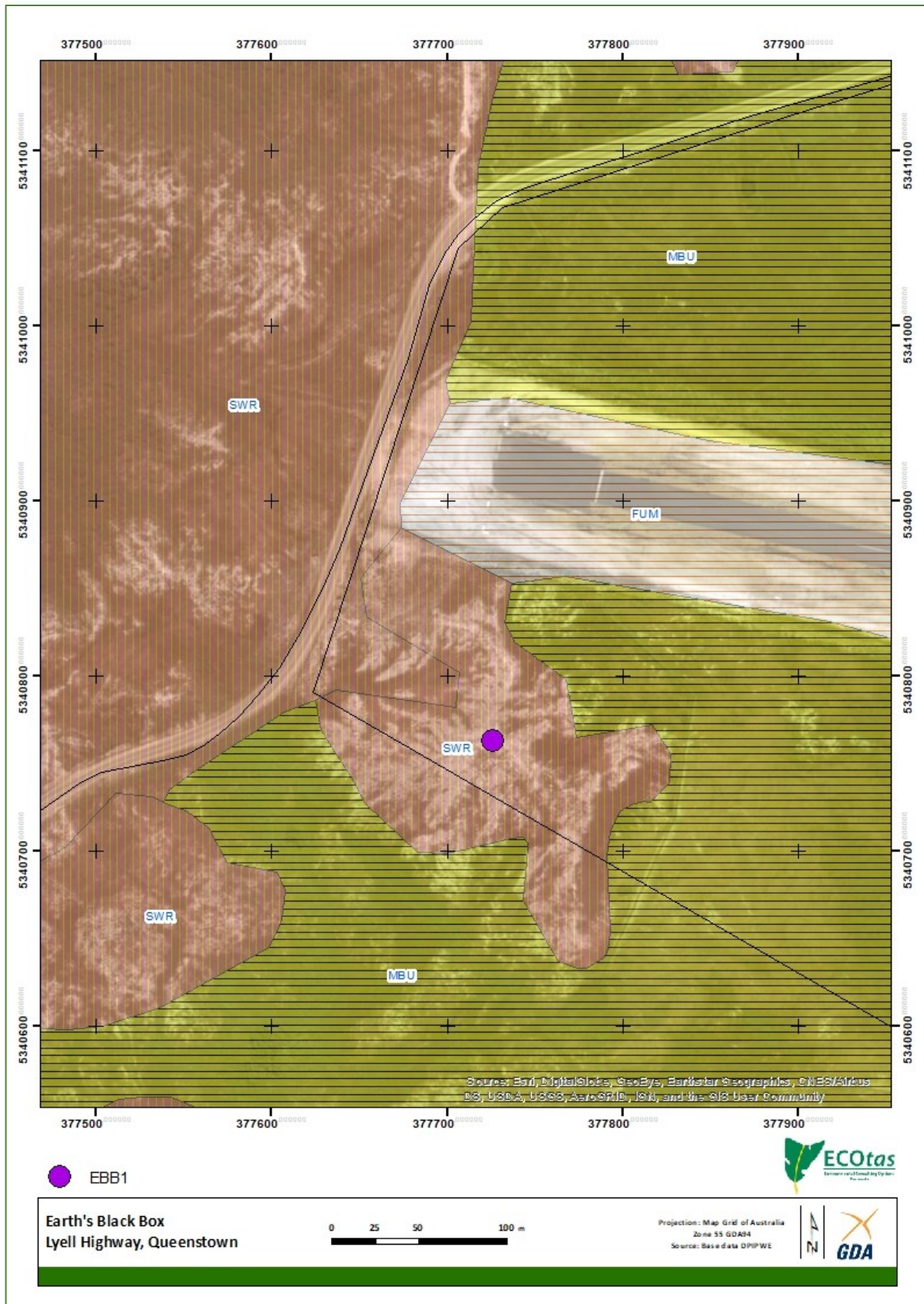
TASVEG 3.0 & 4.0 map SWR extensively within and surrounding the project area.

### Vegetation types recorded as part of the present study

Vegetation types have been classified according to TASVEG 4.0, as described in *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation* (Kitchener & Harris 2013+). Table 1 provides information on the mapping units identified from the project area and immediate surrounds (see also Figure 13). Refer to Appendix A for a more detailed description of the native vegetation mapping unit identified from the project area.

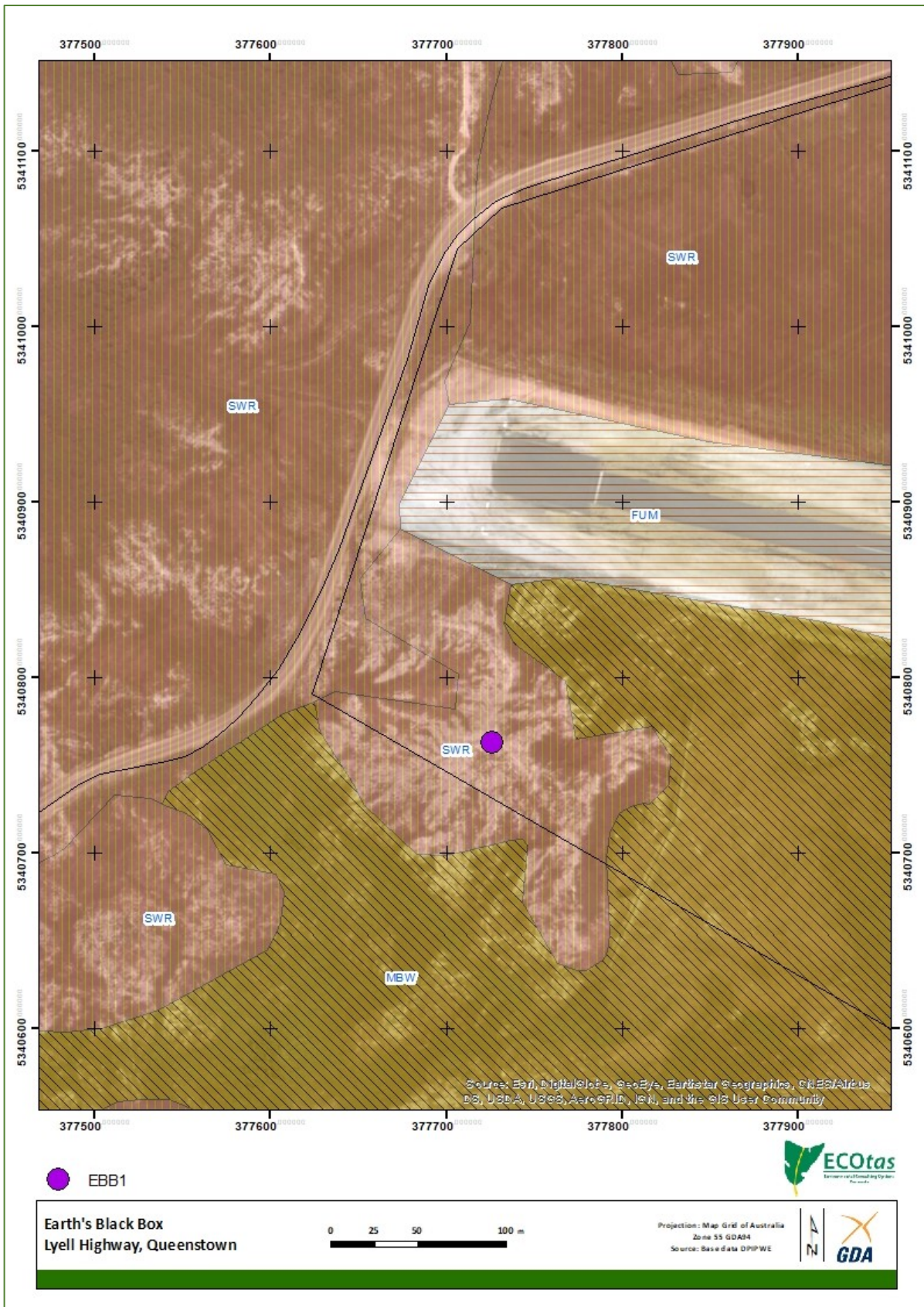
### Conservation significance of identified vegetation types

Of the vegetation mapping units identified from the project area and surrounds, western regrowth complex (TASVEG code: SWR) does not equate to a threatened vegetation community listed on Schedule 3A of the Tasmanian *Nature Conservation Act 2002* or a threatened ecological community listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. It is a widespread and essentially anthropogenically-created mapping unit with a very low conservation significance.



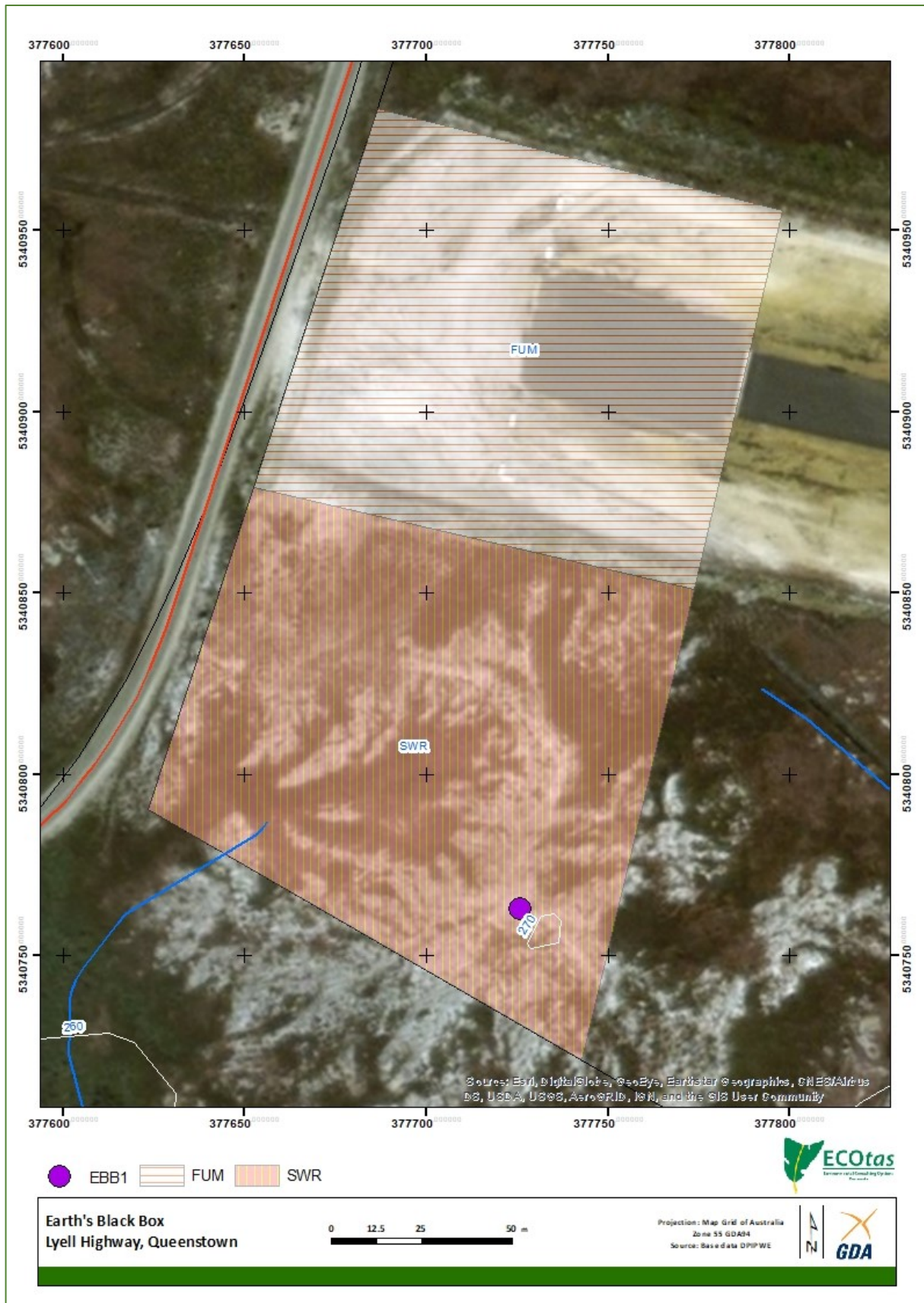
**Figure 11.** Project area and surrounds showing existing TASVEG 3.0 vegetation mapping (see text for codes)





**Figure 12.** Project area and surrounds showing existing TASVEG 4.0/Live vegetation mapping (see text for codes)





**Figure 13.** Revised vegetation mapping for the project area and immediate surrounds (see text for codes)

**Table 1.** Vegetation mapping units present in the project area and immediate surrounds

[conservation status: NCA – as per Schedule 3A of the Tasmanian *Nature Conservation Act 2002*, using units described by Kitchener & Harris (2013+), relating to TASVEG mapping units (DNRET 2022); EPBCA – as per the listing of ecological communities on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, relating to communities as described under that Act, but with equivalencies to TASVEG units]

<b>TASVEG mapping unit</b> (Kitchener & Harris 2013+)	<b>Conservation priority</b> NCA EPBCA	<b>Comments</b>
<b><i>Scrub, heathland and coastal complexes</i></b>		
western regrowth complex (SWR)	not threatened <i>not threatened</i>	SWR dominates the project area and surrounds, characterised by an absence of trees and only scattered low shrubs (with occasional copses of taller shrubs outside the project area) amongst a variably dense sward of Restionaceae with only scattered grasses, herbs and other graminoids. In adjacent swales, graminoid/sedge density becomes higher. On exposed rises, graminoid/sedge density is sparse to moderate with often extensive exposures of rock, gravelly soils and mud.
<b><i>Modified land</i></b>		
extra-urban miscellaneous (FUM)	not threatened <i>not threatened</i>	FUM is characterised by miscellaneous disturbed areas associated with human activities. FUM has been mapped across the aerodrome surface and its surrounds, slightly more extensively than shown on TASVEG mapping.

## ***Plant species***

### General information

A total of 36 vascular plant species were recorded from the project area and immediate surrounds (Appendix B), comprising 18 dicotyledons (including 6 endemic and 1 naturalised species), 15 monocotyledons (including 4 endemic and 1 naturalised species) and 2 pteridophyte (native). This very low species diversity is typical for this extensively anthropogenically-disturbed vegetation on this substrate in this part of the State.

Additional surveys at different times of the year may detect additional short-lived herbs and grasses but a follow-up survey is not considered warranted because of very low likelihood of species with a high priority for conservation management being present.

### Threatened flora

Database information indicates that the project area and immediate surrounds do not support known populations of flora listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* and/or the Commonwealth *Environment Protection and Biodiversity Protection Act 1999* (Figure 14). No such species were detected because of site assessment.

Appendix C provides a listing of threatened flora from within 5,000 m of the project area (nominal buffer width usually used to discuss the potential of a particular project area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.



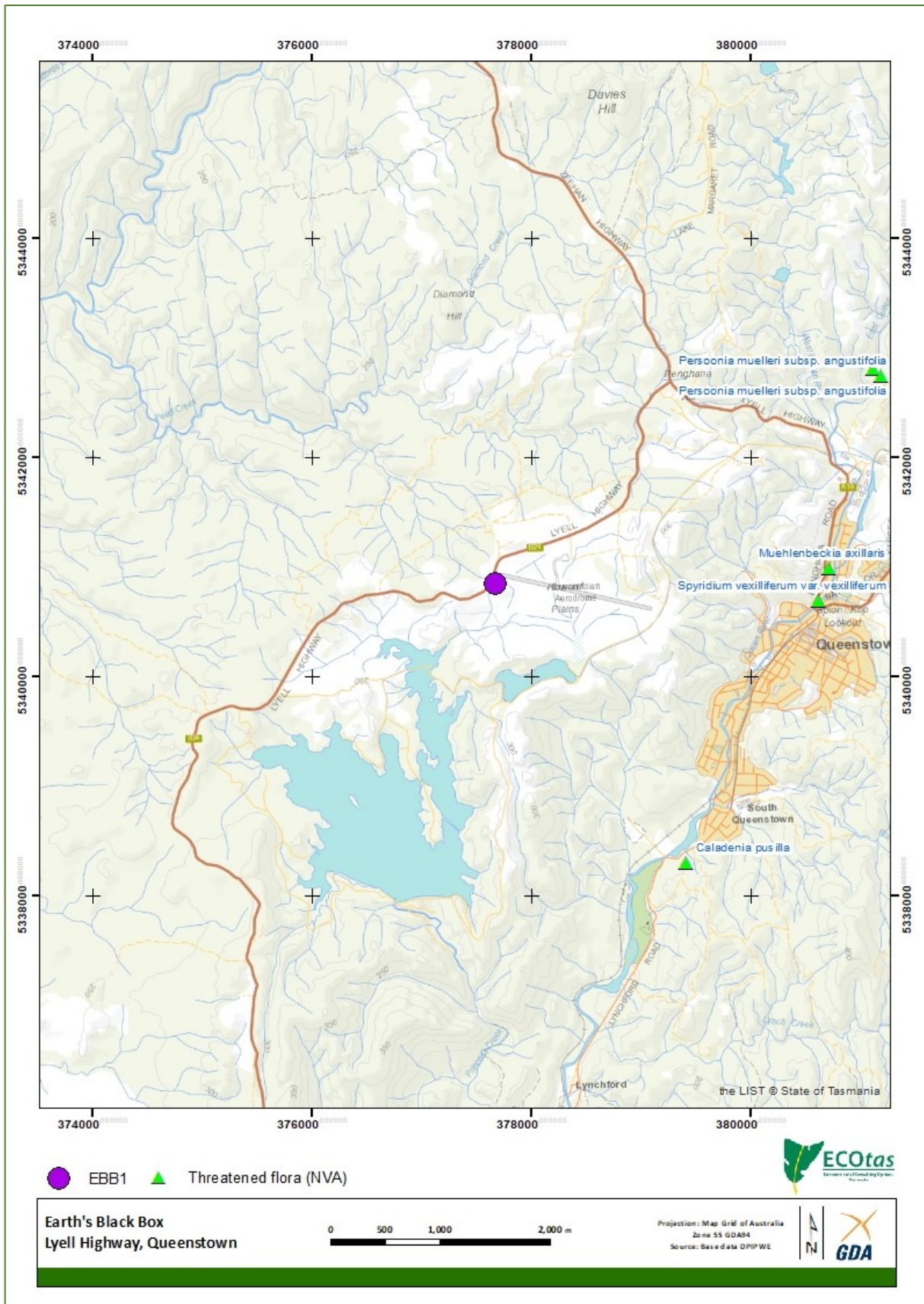


Figure 14. Distribution of threatened flora close to the project area

## Threatened fauna

Database information indicates that the project area and immediate surrounds do not support known populations of fauna listed as threatened on the Tasmanian *Threatened Species Protection Act 1995* and/or the Commonwealth *Environment Protection and Biodiversity Protection Act 1999* (Figure 15). No such species, or significant potential habitat of such species (including habitat features such as nests and dens), were detected because of site assessment.

Appendix D provides a listing of threatened fauna from within 5,000 m of the project area (nominal buffer width usually used to discuss the potential of a particular project area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.

## Other natural values

### Weed species

No plant species classified as declared weed species within the meaning of the Tasmanian *Weed Management Act 1999* (*Biosecurity Act 2019*) or considered as environmental weeds (author opinion) were detected from the immediate project area.

Two declared species (*Ilex aquifolium*, holly & *Erica lusitanica*, spanish heath) occur on the verge of the Lyell Highway with *Erica lusitanica* locally dense at the western end of the aerodrome and occasional on the rise immediately south of the end of the aerodrome above the Lyell Highway (Figure 16, Plate 9). There is one *Pinus radiata* (radiata pine) wildling on the slope above the western end of the aerodrome (Figure 16, Plate 10). These occurrences have been mentioned to highlight the risk of works, however localised, introducing weeds to a construction site. That said, in this case, it is proposed to install the EBB1 on the rise using a crane reaching in from the aerodrome, where such weed species were not recorded.



**Plate 9.** (LHS) Scattered plants of *Erica lusitanica* (spanish heath) on the low rise above the Lyell Highway (well outside immediate project site)

**Plate 10.** (RHS) Single wildling of *Pinus radiata* (radiata pine) on slope above aerodrome (also well outside immediate project site).



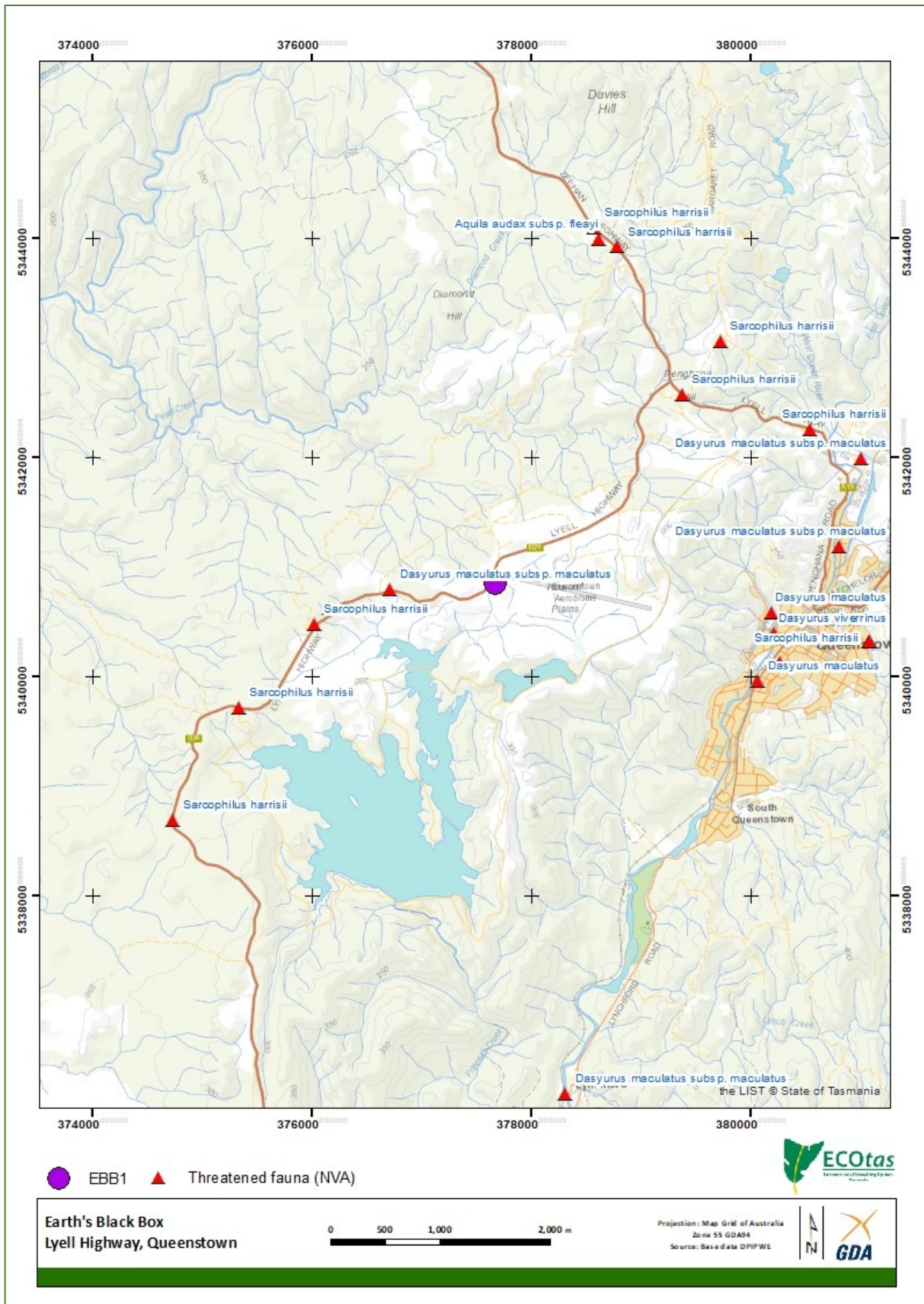


Figure 15. Distribution of threatened fauna close to the project area



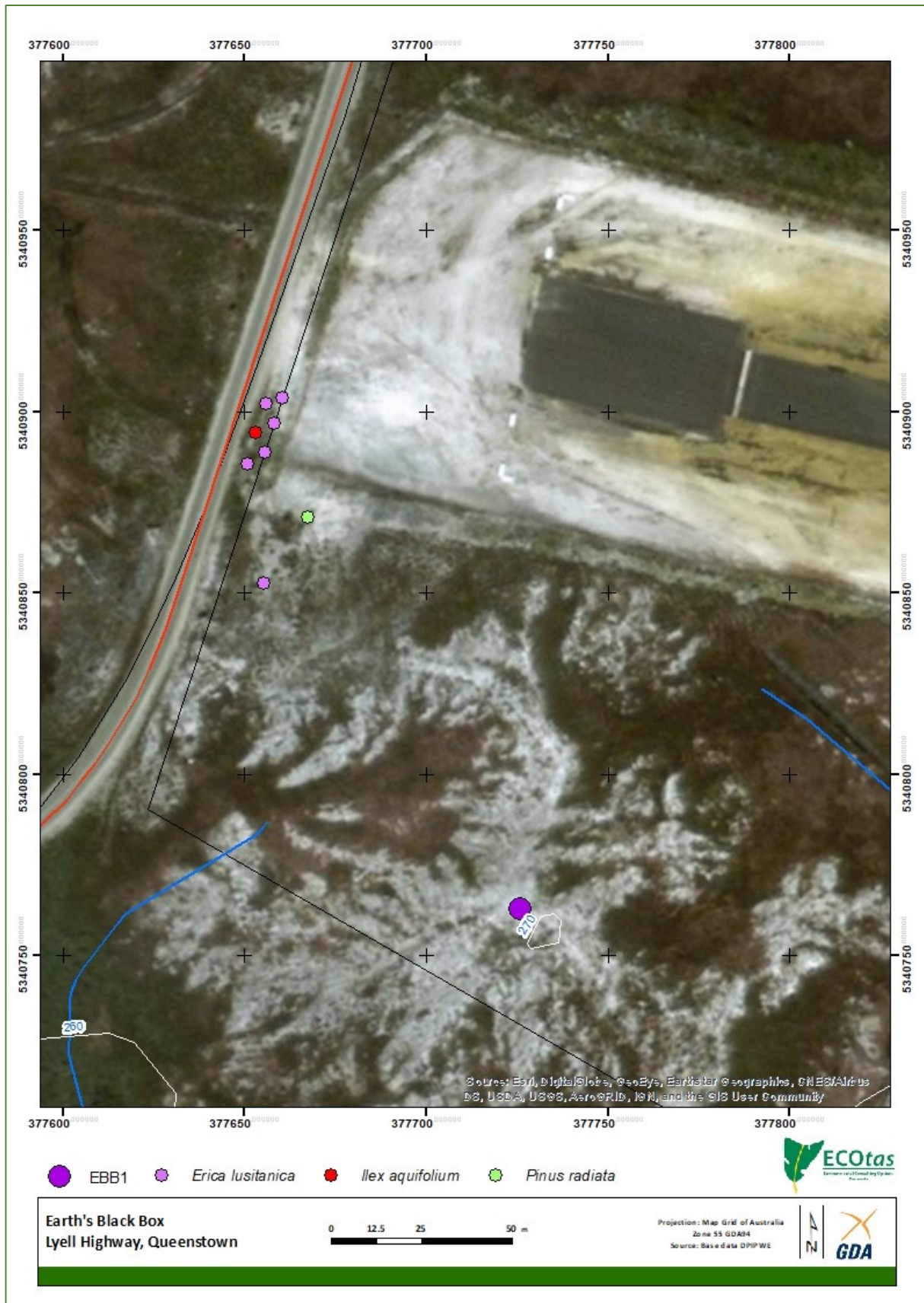


Figure 16. Distribution of declared and environmental weeds close to project area

Strict machinery hygiene during the construction phase is recommended. Queenstown has several sites with high pressure vehicle washing facilities, which means it should be practical to ensure machinery entering the site during construction has a low risk of carrying weed propagules.

It is also recommended that any gravel (or similar) material for driveways be sourced from a facility certified as PC-free (see Rootrot pathogen, *Phytophthora cinnamomi* section below) as such sites are also usually weed-free.

Special management (e.g. a complex weed management plan) is not considered warranted although post-installation follow-up monitoring (and control if necessary) of weeds is suggested (e.g. a period of 6-24 months with the objective of minimising the risk of weeds establishing on the site. This will also detect short-lived species such as thistles, flatweeds and fleabanes that are widespread in the greater area and take advantage of temporarily exposed soil.

Several planning manuals provide guidance on appropriate management actions, which can be referred to develop site-specific prescriptions for any proposed works in the project area. These manuals include:

- Allan, K. & Gartenstein, S. (2010). *Keeping It Clean: A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens*. NRM South, Hobart;
- Rudman T. (2005). *Interim Phytophthora cinnamomi Management Guidelines*. Nature Conservation Report 05/7, Biodiversity Conservation Branch, Department of Primary Industries, Water & Environment, Hobart;
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- DPIPWE (2015). *Weed and Disease Planning and Hygiene Guidelines – Preventing the Spread of Weeds and Diseases in Tasmania*. Department of Primary Industries, Parks, Water & Environment, Hobart.

#### Rootrot pathogen, *Phytophthora cinnamomi*

*Phytophthora cinnamomi* (PC) is widespread in lowland areas of Tasmania, across all land tenures. However, disease will not develop when soils are too cold or too dry. For these reasons, PC is not a threat to susceptible plant species that grow at altitudes higher than about 700 m or where annual rainfall is less than about 600 mm (e.g. Midlands and Derwent Valley). Furthermore, disease is unlikely to develop beneath a dense canopy of vegetation because shading cools the soils to below the optimum temperature for the pathogen. A continuous canopy of vegetation taller than about 2 m is sufficient to suppress disease. Hence PC is not considered a threat to susceptible plant species growing in wet sclerophyll forests, rainforests (except disturbed rainforests on infertile soils) and scrub e.g. teatree scrub (Rudman 2005; FPA 2009).

The vegetation type identified from the project area is recognised as being susceptible to PC in certain circumstances. However, site assessment did not record any field symptoms (dead and/or dying susceptible plant species) within members of the Ericaceae and Proteaceae families.

Any future works should be undertaken to minimise the risk of introducing the disease to the site. The key to this will be strict machinery hygiene during construction works and sourcing any gravels from a facility certified as PC-free – see also list of weed management documents listed under Weed species.

### Myrtle wilt

Myrtle wilt, caused by a wind-borne fungus (*Chalara australis*), occurs naturally in rainforest where myrtle beech (*Nothofagus cunninghamii*) is present. The fungus enters wounds in the tree, usually caused by damage from wood-boring insects, wind damage and forest clearing. The incidence of myrtle wilt often increases forest clearing events such as windthrow and wildfire.

The project area and surrounds do not support *Nothofagus cunninghamii*. No special management is required.

### Myrtle rust

Myrtle rust is a disease limited to plants in the Myrtaceae family. This plant disease is a member of the guava rust complex caused by *Austropuccinia psidii*, a known significant pathogen of Myrtaceae plants outside Australia. Infestations are currently limited to NSW, Victoria, Queensland and Tasmania (DPIPWE 2015).

No evidence of myrtle rust was noted. The longer-term management issue for the site is to ensure that any ornamental plantings source plants from a reputable nursery free from the pathogen (such businesses are already subject to strict biosecurity conditions).

### Chytrid fungus and other freshwater pathogens

Native freshwater species and habitat are under threat from freshwater pests and pathogens including *Batrachochytrium dendrobatidis* (chytrid frog disease), *Mucor amphibiorum* (platypus mucor disease) and the freshwater algal pest *Didymosphenia geminata* (didymo) (Allan & Gartenstein 2010). Freshwater pests and pathogens are spread to new areas when contaminated water, mud, gravel, soil and plant material or infected animals are moved between sites. Contaminated materials and animals are commonly transported on boots, equipment, vehicles tyres and during road construction and maintenance activities. Once a pest pathogen is present in a water system it is usually impossible to eradicate. The manual *Keeping it Clean - A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens* (Allan & Gartenstein 2010) provides information on how to prevent the spread of freshwater pests and pathogens in Tasmanian waterways wetlands, swamps and boggy areas.

The project area itself is on a low rise but is in a high rainfall area with drainage into low-lying swales that are likely to support amphibian species (most likely species being *Crinia tasmaniensis*). There are no records of chytrid in the immediate area (nearest records east of Lake Burbury and near Birchs Inlet). Special management should not be required for a project of this scale with the type of installation proposed.

### Additional "Matters of National Environmental Significance" – Threatened Ecological Communities

CofA (2022) indicates that the following threatened ecological communities listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) may occur within the area:

- Tasmanian Forests and Woodlands dominated by Black Gum or Brookers Gum (*Eucalyptus ovata* / *E. brookeriana*) [Critically Endangered]; and
- Tasmanian White Gum (*Eucalyptus viminalis*) Wet Forest [Critically Endangered].

Existing vegetation mapping (Figures 11 & 12) and revised vegetation mapping (Figure 13) indicates that these communities are not present within or adjacent to the project area i.e. there are no implications under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* in relation to threatened ecological communities.

## **DISCUSSION**

### ***Summary of key findings***

#### Threatened flora

- No plant species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and/or the Tasmanian *Threatened Species Protection Act 1995* (TSPA) were detected, or are known from database information, from the project area.

#### Threatened fauna

- No fauna species listed as threatened on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and/or the Tasmanian *Threatened Species Protection Act 1995* (TSPA) were detected, or are known from database information, from the project area.

#### Vegetation types

- The project area supports the following TASVEG mapping units:
  - extra-urban miscellaneous (TASVEG code: FUM); and
  - western lowland sedgeland (TASVEG code: MSW).
- MSW does not equate to a native vegetation community listed as threatened on Schedule 3A of the Tasmanian *Nature Conservation Act 2002* or a threatened ecological community listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

#### Weeds

- No plant species classified as declared weed species within the meaning of the Tasmanian *Weed Management Act 1999* (*Biosecurity Act 2019*) were detected from the project area.

#### Plant disease

- No evidence of *Phytophthora cinnamomi* (PC, rootrot) was observed in susceptible vegetation or species within the project area.
- No evidence of myrtle wilt was recorded from within the project area.
- No evidence of myrtle rust was recorded from within the project area.

#### Animal disease (chytrid)

- The project area does support habitats suitable for amphibian species.

#### Geoconservation issues

- No sites of geoconservation significance were identified from the project area.

## ***Legislative and policy implications***

Some commentary is provided below with respect to the key threatened species, vegetation management and other relevant legislation. Note that there may be other relevant policy instruments in addition to those discussed. The following information does not constitute legal advice and it is recommended that independent advice is sought from the relevant agency/authority.

### Tasmanian Threatened Species Protection Act 1995

Threatened flora and fauna on this Act are managed under Section 51, as follows:

#### 51. Offences relating to listed taxa

- (1) Subject to subsections (2) and (3), a person must not knowingly, without a permit –
  - (a) take, keep, trade in or process any specimen of a listed taxon of flora or fauna; or
  - (b) disturb any specimen of a listed taxon of flora or fauna found on land subject to an interim protection order; or
  - (c) disturb any specimen of a listed taxon of flora or fauna contrary to a land management agreement; or
  - (d) disturb any specimen of a listed taxon of flora or fauna that is subject to a conservation covenant entered into under Part 5 of the *Nature Conservation Act 2002*; or
  - (e) abandon or release any specimen of a listed taxon of flora or fauna into the wild.
- (2) A person may take, keep or process, without a permit, a specimen of a listed taxon of flora in a domestic garden.
- (3) A person acting in accordance with a certified forest practices plan or a public authority management agreement may take, without a permit, a specimen of a listed taxon of flora or fauna, unless the Secretary, by notice in writing, requires the person to obtain a permit.
- (4) A person undertaking dam works in accordance with a Division 3 permit issued under the *Water Management Act 1999* may take, without a permit, a specimen of a listed taxon of flora or fauna.

The simplest interpretation of this is that any activity that results in a specimen (i.e. individual) of listed flora or fauna being “knowingly taken” would require a permit to be issued through Conservation Assessments Section (CAS), Department of Natural Resources and Environment Tasmania, through a formal application process. In the absence of an identifiable known location of a specimen of a threatened flora or fauna species from the project area, the Act has no application. The Act does not refer to the clearance or disturbance of “potential habitat”.

### Commonwealth Environment Protection and Biodiversity Conservation Act 1999

Under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance.

Matters of national environmental significance considered under the EPBCA include:

- listed threatened species and communities



- listed migratory species;
- Ramsar wetlands of international importance;
- Commonwealth marine environment;
- world heritage properties;
- national heritage places;
- the Great Barrier Reef Marine Park;
- nuclear actions; and
- a water resource, in relation to coal seam gas development and large coal mining development.

The Commonwealth Department of Agriculture, Water and the Environment provides a policy statement titled *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (CofA 2013, herein the *Guidelines*), which provides overarching guidance on determining whether an action is likely to have a significant impact on a matter protected under the EPBCA.

The *Guidelines* define a **significant impact** as:

*"...an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts"*

and note that:

*"...all of these factors [need to be considered] when determining whether an action is likely to have a significant impact on matters of national environmental significance".*

The *Guidelines* provide advice on when a significant impact may be likely:

*"To be 'likely', it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility.*

*If there is scientific uncertainty about the impacts of your action and potential impacts are serious or irreversible, the precautionary principle is applicable. Accordingly, a lack of scientific certainty about the potential impacts of an action will not itself justify a decision that the action is not likely to have a significant impact on the environment".*

The *Guidelines* provide a set of Significant Impact Criteria (CofA 2013), which are "intended to assist...in determining whether the impacts of [the] proposed action on any matter of national environmental significance are likely to be significant impacts". It is noted that the criteria are "intended to provide general guidance on the types of actions that will require approval and the types of actions that will not require approval...[and]...not intended to be exhaustive or definitive".

#### *Listed ecological communities*

The project area does not support any such communities.

#### *Threatened flora*

The project area does not support any such species, nor potential habitat of such species.

#### *Threatened fauna*

The project area does not support populations of threatened fauna listed on the Act, nor significant habitat of such species.

The Commonwealth Department of Agriculture, Water and the Environment provides a *Significant Impact Guidelines* policy statement (CofA 2013) to determine if referral to the department is required. The *Guidelines* consider a "significant impact" to comprise loss that is likely to lead to a long-term decrease in the size of an important population of a species (unlikely to be the case); reduce the area of occupancy of an important population (also unlikely at any reasonable scale); fragment an existing important population into two or more populations (minor habitat loss will occur but not such that fragmentation will result); adversely affect habitat critical to the survival of a species ("critical habitat" has not been defined per se); disrupt the breeding cycle of an important population (unlikely); modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline (this seems unlikely – see previous commentary); result in invasive species that are harmful to a threatened species becoming established in the threatened species' habitat (unlikely); introduce disease that may cause the species to decline (unlikely to introduce and/or exacerbate Devil Facial Tumour Disease); or interfere substantially with the recovery of the species (unlikely at any reasonable scale).

This review of the *Guidelines* indicates that any proposal will not result in the need for a referral.

#### Tasmanian Forest Practices Act 1985 and associated Forest Practices Regulations 2017

The *Regulations* provide the following relevant circumstances in which a Forest Practices Plan is not required.

#### 4. Circumstances in which forest practices plan, &c., not required

For the purpose of section 17(6) of the Act, the following circumstances are prescribed:

- (a) the harvesting of timber or the clearing of trees, with the consent of the owner of the land, if the land is not vulnerable land and –
  - (i) the volume of timber harvested or trees cleared is less than 100 tonnes for each area of applicable land per year; or
  - (ii) the total area of land on which the harvesting or clearing occurs is less than one hectare for each area of applicable land per year –whichever is the lesser;
- (j) the harvesting of timber or the clearing of trees on any land, or the clearance and conversion of a threatened native vegetation community on any land, for the purpose of enabling –
  - (i) the construction of a building within the meaning of the *Land Use Planning and Approvals Act 1993* or of a group of such buildings; or
  - (ii) the carrying out of any associated development –if the construction of the buildings or carrying out of the associated development is authorised by a permit issued under that Act.

On this basis, a proposed development that is subject to a planning permit issued under the *Land Use Planning and Approvals Act 1993* should not require a Forest Practices Plan, noting that the site does not support trees or forest as defined by the Act.

#### Tasmanian Nature Conservation Act 2002

Schedule 3A of the Act lists vegetation types classified as threatened within Tasmania. The project area does not support any such vegetation types.

Tasmanian Weed Management Act 1999 (Biosecurity Act 2019)

No plant species listed on the Act have been identified from the immediate project site, such that the Act will have limited direct application. See also notes under **FINDINGS Other natural values** Weed species for more details.

Tasmanian Wildlife (General) Regulations 2010

While the assessment of the project area indicated the presence of species listed on schedules of the *Regulations* (i.e. "specially protected wildlife", "protected wildlife", "partly protected wildlife"), no individuals, or products (e.g. nests, dens, etc.), of these species, are likely to be directly physically affected by the works.

Tasmanian Land Use Planning and Approvals Act 1993

The applicable planning scheme for the project area is the *Tasmanian Planning Scheme – West Coast*. Note that the following is my interpretation of the provisions of the *Scheme* and may not necessarily represent the views of West Coast Council. The following does not constitute legal advice. It is recommended that formal advice be sought from the relevant agency prior to acting on any aspect of this statement.

The proposed works will occur within an area zoned as Rural and subject to the Priority Vegetation overlay pursuant to the *Tasmanian Planning Scheme – West Coast*, such that the Natural Assets Code has application (provisions reviewed below).

The purpose of the Natural Assets Code is stated below:

- C7.1 The purpose of the Natural Assets Code is:
  - C7.1.1 To minimise impacts on water quality, natural assets including native riparian vegetation, river condition and the natural ecological function of watercourses, wetlands and lakes.
  - C7.1.2 To minimise impacts on coastal and foreshore assets, native littoral vegetation, natural coastal processes and the natural ecological function of the coast.
  - C7.1.3 To protect vulnerable coastal areas to enable natural processes to continue to occur, including the landward transgression of sand dunes, wetlands, saltmarshes and other sensitive coastal habitats due to sea-level rise.
  - C7.1.4 To minimise impacts on identified priority vegetation.
  - C7.1.5 To manage impacts on threatened fauna species by minimising clearance of significant habitat.

The above purpose statements are essentially addressed through the relevant development standards. However, as a general statement, I do not believe that the small-scale project will compromise the intent of the purpose statements. Of the purpose statements, C7.1.4 is relevant to the present project.

The application of the Natural Assets Code is stated below:

- C7.2 Application of this Code:



C7.2.1 This code applies to development on land within the following areas:

- (a) a waterway and coastal protection area;
- (b) a future coastal refugia area; and
- (c) a priority vegetation area only if within the following zone:
  - (ii) Rural Zone

C7.2.2 This code does not apply to use.

The proposed development area is zoned as Rural and is subject to the Priority Vegetation Area overlay under the *Scheme* such that C7.2.1(c) may have application.

At this point, however, it is worth discussing the classification of the site with respect to the intention of the *Scheme's* definition of "priority vegetation", which is:

#### C7.3 Definition of Terms

C7.3.1 In this code, unless the contrary intention appears:

means native vegetation where any of the following apply:

- (a) it forms an integral part of a threatened native vegetation community as prescribed under Schedule 3A of the *Nature Conservation Act 2002*;
- (b) is a threatened flora species;
- (c) it forms a significant habitat for a threatened fauna species; or
- (d) it has been identified as native vegetation of local importance.

Under the Code, a "priority vegetation area" is defined as:

means land shown on an overlay map in the relevant Local Provisions Schedule, as within a priority vegetation area.

Site assessment indicates that the project site is mapped as western regrowth complex (TASVEG code: SWR, which is not classified as a threatened native vegetation community such that C7.3.1(a) is not applicable. The site does not support threatened flora such that C7.3.1(b) is not applicable. The site does not support significant habitat for threatened fauna such that C7.3.1(c) is not applicable. I am not aware that any part of the site has been "identified as native vegetation of local importance", noting that this cannot simply refer to a site subject to the overlay. Based on the above review, the site does not support "priority vegetation" but is still technically subject to the Priority Vegetation Area overlay. While acknowledging the apparent disconnect between C7.2.1(c), which refers to the "priority vegetation area", and C7.3.1, which defines "priority vegetation", the balance of the Natural Assets Code provisions is reviewed below to ensure that the application can be considered with respect to an alternative interpretation.

The relevant development standards of the Natural Assets Code are C7.6.2 (Clearance within a priority vegetation area), and have the following objective:

#### C7.6 Development Standards for Buildings and Works

##### C7.6.2 Clearance within a priority vegetation area

Objective:

That clearance of native vegetation within a priority vegetation area:

- (a) does not result in unreasonable loss of priority vegetation;
- (b) is appropriately managed to adequately protect identified priority vegetation; and
- (c) minimises and appropriately manages impacts from construction and development activities.

The above objective statements are essentially addressed through the relevant acceptable solutions or performance criteria. However, as a general statement, I do not believe that the small-scale project will compromise the intent of the objective statements.

It is difficult to address the objective statement in literal terms because while C7.6.2 refers to "clearance within a priority vegetation area" (which will occur at a very small scale), the sub-clauses then rely on the presence of "priority vegetation", which is not present (see previous discussion), which renders at least C7.6.2(a) & (b) somewhat moot.

The acceptable solution for C7.6.2 is stated as:

- A1 Clearance of native vegetation within a priority vegetation area must be within a building area on a sealed plan approved under this planning scheme.

Solution A1 is presumed to not be applicable because the project site is not subject to a "sealed plan approved under this planning scheme".

The performance criteria P1.1 are stated as:

Clearance of native vegetation within a priority vegetation area must be for:

- (a) an existing use on the site, provided any clearance is contained within the minimum area necessary to be cleared to provide adequate bushfire protection, as recommended by the Tasmanian Fire Service or an accredited person;
- (b) buildings and works associated with the construction of a single dwelling or an associated outbuilding;
- (c) subdivision in the General Residential Zone or Low Density Residential Zone;
- (d) use or development that will result in significant long term social and economic benefits and there is no feasible alternative location or design;
- (e) clearance of native vegetation where it is demonstrated that on-going pre-existing management cannot ensure the survival of the priority vegetation and there is little potential for long-term persistence; or
- (f) the clearance of native vegetation that is of limited scale relative to the extent of priority vegetation on the site.

In my opinion, P1.1(f) is relevant because there will be virtually no "clearance of native vegetation".

The performance criteria P1.2 are stated as:

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

- (a) the design and location of buildings and works and any constraints such as topography or land hazards;
- (b) any particular requirements for the buildings and works;
- (c) minimising impacts resulting from bushfire hazard management measures through siting and fire-resistant design of habitable buildings;
- (d) any mitigation measures implemented to minimise the residual impacts on priority vegetation;
- (e) any on-site biodiversity offsets; and
- (f) any existing cleared areas on the site.

To address this provision, it must be assumed that the proposed development site supports “priority vegetation”, which has not been identified as present because the site does not support threatened native vegetation communities listed under the *Nature Conservation Act 2002*, threatened flora species, or significant habitat for threatened fauna species. On this basis, the over-arching part of P1.2 is considered to be satisfied by default (actually somewhat irrelevant because of the phrasing).

Below the sub-criteria of P1.2 are addressed in turn.

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

I accept that the selected development site is a reasonable balance between site constraints and environmental values (no specific values identified from the proposed development site).

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

Uncertain application in relation to the identified natural values, except perhaps to indicate machinery and vehicle hygiene protocols in relation to weed and hygiene management to minimise the risk of introducing such to the site.

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

Not applicable.

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

Uncertain application in relation to the identified natural values, with the native vegetation having been classified as a non-threatened mapping unit and no residual impacts on priority vegetation (none proposed to be impacted).

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

No such offsets have been identified as necessary.

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

Not applicable.

In conclusion, the proposed development should meet the intent of P1.1 & P1.2 of the Natural Assets Code, without specific permit conditions in relation to natural values (but see **Recommendations** below).

## **Recommendations**

### Vegetation types

In general terms, minimising the extent of “clearance and conversion” and/or “disturbance” to native vegetation is recommended, albeit recognising the already highly modified nature of the vegetation (through repeated fires) with a very simple structure and species composition. That is, the specific project site is of no particular consequence in terms of the management of natural values.

### Threatened flora

None identified – no special management required.



### Threatened fauna

None identified – no special management required.

### Weed and disease management

Strict machinery hygiene during the construction phase is recommended. Queenstown has several sites with high pressure vehicle washing facilities, which means it should be practical to ensure machinery entering the site during construction has a low risk of carrying weed propagules. It is also recommended that any gravel (or similar) material for driveways be sourced from a facility certified as *Phytophthora cinnamomi*-free.

Special management (e.g. a complex weed management plan) is not considered warranted although post-installation follow-up monitoring (and control if necessary) of weeds is suggested (e.g. a period of 6-24 months with the objective of minimising the risk of weeds establishing on the site. This will also detect short-lived species such as thistles, flatweeds and fleabanes that are widespread in the greater area and take advantage of temporarily exposed soil.

### Legislative and policy implications

A permit under Section 51 of the Tasmanian *Threatened Species Protection Act 1995* (TSPA) will not be required.

A formal referral to the Commonwealth Department of Agriculture, Water and the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) is not considered required.

Development will require a planning permit pursuant to the provisions of the applicable planning scheme but specific permit conditions in relation to natural values to satisfy P1.1 & P1.2 of C7.6.2 of the Natural Assets Code of the *Tasmanian Planning Scheme – West Coast* are not recommended.


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**APPENDIX A. Vegetation community structure and composition**

The table below provides basic information on the structure and composition of the native vegetation mapping unit identified from the project area.

<b>western regrowth complex (TASVEG code: SWR)</b>		
<p>SWR dominates the project area and surrounds, characterised by an absence of trees and only scattered low shrubs (with occasional copses of taller shrubs outside the project area) amongst a variably dense sward of Restionaceae with only scattered grasses, herbs and other graminoids. In adjacent swales, graminoid/sedge density becomes higher. On exposed rises, graminoid/sedge density is sparse to moderate with often extensive exposures of rock, gravelly soils and mud.</p>		
		
View from project site		
<b>Stratum</b>	<b>Height (m) Cover (%)</b>	<b>Species</b> (underline = dominant, parentheses = sparse; + = present only)
Shrubs	<3 m <5%	<i>Agastachys odorata</i> , <i>Melaleuca squamea</i> , <i>Leptospermum nitidum</i> <i>Acacia mucronata</i> , <i>Cassinia aculeata</i> , <i>Epacris lanuginosa</i> <i>Sprengelia propinqua</i> , <i>Monotoca glauca</i> , <i>Monotoca scoparia</i> , <i>Atherosperma moschatum</i> , <i>Baeckea leptocaulis</i> , <i>Olearia stellulata</i> , <i>Leptospermum scoparium</i> , <i>Bauera rubioides</i> , <i>Pinus radiata</i> , <i>Erica lusitanica</i>
Graminoids	<1 m 5-80%%	<i>Gymnoschoenus sphaerocephalus</i> (1% cover), <i>Hypolaena fastigiata</i> , <i>Leptocarpus tenax</i> , <i>Baloskion tetraphyllum</i> , <i>Chordifex hookeri</i> , <i>Chordifex monocephalus</i> , <i>Gahnia grandis</i> , <i>Xyris operculata</i> , <i>Juncus squarrosus</i> , <i>Patersonia occidentalis</i> , <i>Empodisma minus</i> , <i>Calorophus elongatus</i>
Grasses	+	<i>Microlaena tasmanica</i> , <i>Deyeuxia quadriseta</i> , <i>Rytidosperma gracile</i>
Ground ferns	+	<i>Blechnum wattsii</i> , <i>Gleichenia dicarpa</i>
Herbs	+	<i>Stylidium graminifolium</i> , <i>Eriochilus cucullatus</i> , <i>Mitrasacme pilosa</i> , <i>Gonocarpus micranthus</i>



**APPENDIX B. Vascular plant species recorded from project area**

Botanical nomenclature follows *A Census of the Vascular Plants of Tasmania* (de Salas & Baker 2021), with family placement updated to reflect the nomenclatural changes recognised in the *Flora of Tasmania Online* (de Salas 2022+) and APG (2016); common nomenclature follows *The Little Book of Common Names of Tasmanian Plants* (Wapstra et al. 2005+, updated online at www.dpipwe.tas.gov.au).

e = endemic species; i = naturalised species

DW = declared weed under Tasmanian *Weed Management Act 1999 (Biosecurity Act 2019)*; EW = environmental weed (author opinion)

1 = immediate project site; 2 = wider area (but part of overall vegetation community)

**Table B1.** Summary of vascular species recorded from the broader project area

STATUS	ORDER			
	DICOTYLEDONAE	MONOCOTYLEDONAE	GYMNOSPERMAE	PTERIDOPHYTA
	11	10	-	2
e	6	4	-	-
i	1	1	1	-
<b>Sum</b>	<b>18</b>	<b>15</b>	<b>1</b>	<b>2</b>
<b>TOTAL</b>	<b>36</b>			

			1	2
<b>DICOTYLEDONAE</b>				
<b>ASTERACEAE</b>				
	<i>Cassinia aculeata</i> subsp. <i>aculeata</i>	common dollybush	+	
	<i>Olearia stellulata</i>	sawleaf daisybush	+	
<b>CUNONIACEAE</b>				
	<i>Bauera rubioides</i>	wiry bauera	+	
<b>ERICACEAE</b>				
	<i>Epacris lanuginosa</i>	swamp heath	+	
i	<i>Erica lusitanica</i>	spanish heath	+	DW
	<i>Monotoca glauca</i>	goldey wood	+	
e	<i>Monotoca submutica</i> var. <i>submutica</i>	mountain broomheath	+	
e	<i>Sprengelia propinqua</i>	western swampheath	+	
<b>FABACEAE</b>				
e	<i>Acacia mucronata</i> subsp. <i>mucronata</i>	erect caterpillar wattle	+	
<b>HALORAGACEAE</b>				
	<i>Gonocarpus micranthus</i> subsp. <i>micranthus</i>	creeping raspwort	+	
<b>LOGANIACEAE</b>				
	<i>Mitrasacme pilosa</i> var. <i>pilosa</i>	hairy mitrewort	+	
<b>MONIMIACEAE</b>				
	<i>Atherosperma moschatum</i> subsp. <i>moschatum</i>	sassafras	+	
<b>MYRTACEAE</b>				
e	<i>Baeckea leptocaulis</i>	slender heathmyrtle	+	
e	<i>Leptospermum nitidum</i>	shiny teatree	+	
	<i>Leptospermum scoparium</i>	common teatree	+	
	<i>Melaleuca squamea</i>	swamp honeymyrtle	+	
<b>PROTEACEAE</b>				
e	<i>Agastachys odorata</i>	fragrant candlebush	+	
<b>STYLIDIACEAE</b>				
	<i>Stylidium graminifolium</i>	narrowleaf triggerplant	+	
<b>GYMNOSPERMAE</b>				
<b>PINACEAE</b>				
i	<i>Pinus radiata</i>	radiata pine	+	EW

<b>MONOCOTYLEDONAE</b>			
<b>CYPERACEAE</b>			
	<i>Gahnia grandis</i>	cutting grass	+
	<i>Gymnoschoenus sphaerocephalus</i>	buttongrass	+
<b>IRIDACEAE</b>			
	<i>Patersonia occidentalis</i> var. <i>occidentalis</i>	long purpleflag	+
<b>JUNCACEAE</b>			
i	<i>Juncus squarrosus</i>	heath rush	+
<b>ORCHIDACEAE</b>			
	<i>Eriochilus cucullatus</i>	pale autumn orchid	+
<b>POACEAE</b>			
	<i>Deyeuxia quadriseta</i>	reed bentgrass	+
e	<i>Microlaena tasmanica</i> var. <i>tasmanica</i>	tasmanian ricegrass	+
	<i>Rytidosperma gracile</i>	graceful wallabygrass	+
<b>RESTIONACEAE</b>			
	<i>Baloskion tetraphyllum</i> subsp. <i>tetraphyllum</i>	tassel cordrush	+
	<i>Calorophus elongatus</i>	long roperush	+
e	<i>Chordifex hookeri</i>	woolly buttonrush	+
e	<i>Chordifex monocephalus</i>	smooth buttonrush	+
	<i>Empodisma minus</i>	spreading roperush	+
	<i>Leptocarpus tenax</i>	slender twinerush	+
<b>XYRIDACEAE</b>			
	<i>Xyris operculata</i>	tall yelloweye	+
<b>PTERIDOPHYTA</b>			
<b>BLECHNACEAE</b>			
	<i>Blechnum watsii</i>	hard waterfern	+
<b>GLEICHENIACEAE</b>			
	<i>Gleichenia dicarpa</i>	pouched coralfern	+

**APPENDIX C. Analysis of database records of threatened flora**

Table C1 provides a listing of threatened flora from within 5,000 m of the project area (nominal buffer width usually used to discuss the potential of a particular project area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.

**Table C1.** Threatened flora records from within 5,000 m of boundary of the project area

Species listed below are listed as rare (r), vulnerable (v), endangered (e), or extinct (x) on the Tasmanian *Threatened Species Protection Act 1995* (TSPA); vulnerable (VU), endangered (EN), critically endangered (CR) or extinct (EX) on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). Information below is sourced from DNRET's *Natural Values Atlas* (DNRET 2022) and other sources where indicated. Habitat descriptions are taken from FPA (2016), FPA (2017) and TSS (2003+), except where otherwise indicated.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Caladenia pusilla</i> tiny fingers	r -	<i>Caladenia pusilla</i> occurs mainly in heathland, shrubland, woodland and open eucalypt forest in near-coastal areas. It has been recorded from sandy loam, sandy peat, granite gravel and rocky ground. It is most frequent on well-drained soils but can extend to sites with impeded drainage.	Potential habitat very marginally present, albeit atypical of known locations, which tend to be on sandy soils in heathland and heathy woodland in near-coastal areas.  I suspect that the database record from 23 Nov. 1991, which is supported by a voucher at the Tasmanian Herbarium (HO411312) and is by a reliable observer, is actually a small-flowered member of the <i>Caladenia carnea</i> species-complex rather than "good" <i>Caladenia pusilla</i> .  The survey was outside the peak flowering period of the species (Wapstra 2018). A further timed-targeted survey to coincide with the peak flowering period (Wapstra 2018) is not considered warranted as there is a statistically very low likelihood of occurrence (because the species has a highly disjunct distribution and the site is highly atypical).
<i>Muehlenbeckia axillaris</i> matted lignum	r -	<i>Muehlenbeckia axillaris</i> is predominantly found in moist gravelly or rocky places on the Central Plateau, extending out to the west, northwest and lower reaches of the South Esk River.	Potential habitat marginally present, albeit atypical of known sites.  The only nearby database record is from 1 Apr. 1985 is supported by a voucher at the Tasmanian Herbarium (HO407509) and is by a reliable observer but is labelled "Queenstown, opposite Silver Hills Motel". I have searched this area with no success and it is difficult to discount this site as natural as there are limited other west coast records.  This species was not detected (no seasonal constraint on detection and/or identification).
<i>Persoonia muelleri</i> subsp. <i>angustifolia</i> narrowleaf geebung	r -	<i>Persoonia muelleri</i> subsp. <i>angustifolia</i> occurs in central and western Tasmania in rainforest to dense scrub and perhaps sub-alpine heath in a variety of sedimentary and metamorphic	Potential habitat absent, at least as described.



Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
		substrata. It typically occurs in the ecotone between dry scrub and rainforest, particularly where high light levels occur on the ground due to a shorter and more open scrub. It is found from 50-700 m a.s.l.	This species was not detected (no seasonal constraint on detection and/or identification).
<i>Planocarpa sulcata</i> grooved cheeseberry	r -	<i>Planocarpa sulcata</i> occurs in exposed alpine, coniferous and deciduous heath on shallow soils in the western mountains at elevations greater than 950 m a.s.l.	Potential habitat absent.
<i>Spyridium vexilliferum</i> var. <i>vexilliferum</i> helicopter bush	r -	<i>Spyridium vexilliferum</i> occurs in a range of vegetation types, including sandy heaths, rock plates and dry sclerophyll forest and woodland (mainly dominated by <i>Eucalyptus amygdalina</i> ). It is found on a range of substrates (e.g. mudstone, granite, laterite gravels) from near-coastal areas in the east, north and west of the State, to the Midlands and lower Derwent Valley. It is most abundant in open or disturbed areas, as it can proliferate from soil-stored seed after disturbance.	Potential habitat marginally present, albeit atypical of known sites. The only nearby database record is from 1 Nov. 1932 and is supported by a voucher at the Tasmanian Herbarium (HO21412), simply labelled "Queenstown". I have always doubted the veracity of this record because the variety is otherwise restricted to the east/northeast coast and parts of the Midlands with var. <i>latifolium</i> restricted to windswept coastal scrub/heath between Temma and Marawah i.e. Queenstown is unsuitable for both varieties, suggesting a mix-up with collection details. This species was not detected (no seasonal constraint on detection and/or identification).

**APPENDIX D. Analysis of database records of threatened fauna**

Table D1 provides a listing of threatened fauna from within 5,000 m of the project area (nominal buffer width usually used to discuss the potential of a particular project area to support various species listed in databases), with comments on whether potential habitat is present for the species, and possible reasons why a species was not recorded.

**Table D1.** Threatened fauna records from 5,000 m of boundary of the project area

Species listed below are listed as rare (r), vulnerable (v), endangered (e), or extinct (x) on the Tasmanian *Threatened Species Protection Act 1995* (TSPA); vulnerable (VU), endangered (EN), critically endangered (CR) or extinct (EX) on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). Information below is sourced from the DPIPWE's *Natural Values Atlas* (DNRET 2022), Bryant & Jackson (1999) and FPA (2022); marine, wholly pelagic and littoral species such as marine mammals, fish and offshore seabirds are excluded. Species marked with # are listed in CofA (2022).

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Accipiter novaehollandiae</i> grey goshawk	e -	Potential habitat is native forest with mature elements below 600 m altitude, particularly along watercourses. Significant habitat for the grey goshawk may be summarised as areas of wet forest, rainforest and damp forest patches in dry forest, with a relatively closed mature canopy, low stem density, and open understorey in close proximity to foraging habitat and a freshwater body.	Potential habitat absent (except in a very general sense). This species should not need to be considered as part of planning at the scale of the proposed works.
<i>Apus pacificus</i> fork-tailed swift	Migratory Marine Birds # only	Occasional non-breeding migrant to Tasmania only.	Potential habitat widespread but this is an aerially-foraging bird that rarely lands. This species should not need to be considered as part of planning at the scale of the proposed works.
<i>Aquila audax</i> subsp. <i>fleayi</i> wedge-tailed eagle	e EN #	Potential nesting habitat is tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest. Nest trees are usually amongst the largest in a locality. They are generally in sheltered positions on leeward slopes, between the lower and mid sections of a slope and with the top of the tree usually lower than the ground level of the top of the ridge, although in some parts of the State topographic shelter is not always a significant factor (e.g. parts of the northwest and Central Highlands).	Potential nesting habitat absent. No known nests within 1,000 m of project area. This species should not need to be considered as part of planning at the scale of the proposed works.
<i>Ceyx azureus</i> subsp. <i>diemenensis</i> Tasmanian azure kingfisher	e EN #	Potential foraging habitat is primarily freshwater (occasionally estuarine) waterbodies such as large rivers and streams with well-developed overhanging vegetation suitable for perching and water deep enough for dive-feeding. Potential breeding habitat is usually steep banks of large rivers (a breeding site is a hole (burrow) drilled in the bank).	Potential habitat absent. No ephemeral or permanent flowing waterbodies present.

Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Dasyurus maculatus</i> subsp. <i>maculatus</i> spotted-tailed quoll	r VU #	Potential habitat is coastal scrub, riparian areas, rainforest, wet forest, damp forest, dry forest and blackwood swamp forest (mature and regrowth), particularly where structurally complex and steep rocky areas are present, and includes remnant patches in cleared agricultural land.	Potential habitat effectively absent, except in a very general sense (in that the species can have a large territory/home range) with the site lacking any habitat suitable for denning. This species should not need to be considered as part of planning at the scale of the proposed works.
<i>Dasyurus viverrinus</i> eastern quoll	- EN	Potential habitat is a variety of habitats including rainforest, heathland, alpine areas and scrub. However, it seems to prefer dry forest/native grassland mosaics which are bounded by agricultural land.	See under spotted-tailed quoll.
<i>Haliaeetus leucogaster</i> white-bellied sea-eagle	v -	Potential habitat comprises potential nesting habitat and potential foraging habitat. Potential foraging habitat is any large waterbody (including sea coasts, estuaries, wide rivers, lakes, impoundments and even large farm dams) supporting prey items (fish). Potential nesting habitat is tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest within 5 km of the coast (nearest coast including shores, bays, inlets and peninsulas), large rivers (class 1), lakes or complexes of large farm dams. Scattered trees along river banks or pasture land may also be used.	See under wedge-tailed eagle.
<i>Hirundapus caudacutus</i> white-throated needletail	- VU #	Occasional non-breeding migrant to Tasmania only.	Potential habitat widespread but this is an aerially-foraging bird that rarely lands. This species should not need to be considered as part of planning at the scale of the proposed works.
<i>Lathamus discolor</i> swift parrot	e CR #	Potential foraging habitat comprises <i>E. globulus</i> or <i>E. ovata</i> trees that are old enough to flower. Potential nesting habitat is considered to comprise eucalypt forests that contain hollow-bearing trees.	Potential habitat absent as the site does not support <i>Eucalyptus globulus</i> , <i>Eucalyptus ovata</i> or hollow-bearing trees.
<i>Litoria raniformis</i> green and golden frog	v VU	Potential habitat is permanent and temporary waterbodies, usually with vegetation in or around them, including features such as natural lagoons, permanently or seasonally inundated swamps and wetlands, farm dams, irrigation channels, artificial water-holding sites such as old quarries, slow-flowing stretches of streams and rivers and drainage features.	Potential habitat absent. No ephemeral or permanent flowing waterbodies present.
<i>Myiagra cyanoleuca</i> satin flycatcher	Migratory Terrestrial Species # only	Potential habitat includes forest vegetation.	Potential habitat absent.



Scientific name Common name	Status TSPA EPBCA	Tasmanian habitat description (and distribution)	Comments on project area and database records
<i>Prototroctes maraena</i> Australian grayling	v VU #	Potential habitat is all streams and rivers in their lower to middle reaches. Areas above permanent barriers (e.g. Prosser River dam, weirs) that prevent fish migration, are not potential habitat.	Potential habitat absent. No ephemeral or permanent flowing waterbodies present.
<i>Pseudemoia pagenstecheri</i> tussock skink	v -	Potential habitat comprises native grasslands dominated by tussock-forming grasses.	Potential habitat absent. Native grassland is absent.
<i>Sarcophilus harrisii</i> Tasmanian devil	e EN #	Potential habitat is all terrestrial native habitats, forestry plantations and pasture. Devils require shelter (e.g. dense vegetation, hollow logs, burrows or caves) and hunting habitat (open understorey mixed with patches of dense vegetation) within their home range (4-27 km <sup>2</sup> ). Potential denning habitat is areas of burrowable, well-drained soil, log piles or sheltered overhangs such as cliffs, rocky outcrops, knolls, caves and earth banks, free from risk of inundation and with at least one entrance through which a devil could pass.	See under spotted-tailed quoll.
<i>Tyto novaehollandiae</i> subsp. <i>castanops</i> masked owl	e VU #	Potential habitat is all areas with trees with large hollows (≥15 cm entrance diameter). Remnants and paddock trees (in any dry or wet forest type) in agricultural areas may constitute potential habitat. Significant habitat is any areas within the core range of native dry forest with trees over 100 cm dbh with large hollows (≥15 cm entrance diameter).	Potential nesting habitat absent. Large trees with large hollows are absent from the project area. This species should not need to be considered as part of planning at the scale of the proposed works.

**APPENDIX E. DNRET's *Natural Values Atlas* report for the project area**

Appended as pdf file.

**APPENDIX F. Forest Practices Authority's *Biodiversity Values Atlas* report for the project area**

Appended as pdf file.

**APPENDIX G. CofA's *Protected Matters* report for the project area**

Appended as pdf file.

**ATTACHMENT**

- .shp or .dwg file of revised vegetation mapping