



Pioneer Sand Quarry **NATURAL VALUES ASSESSMENT**

30 January 2024

For Sanbar Pty Ltd

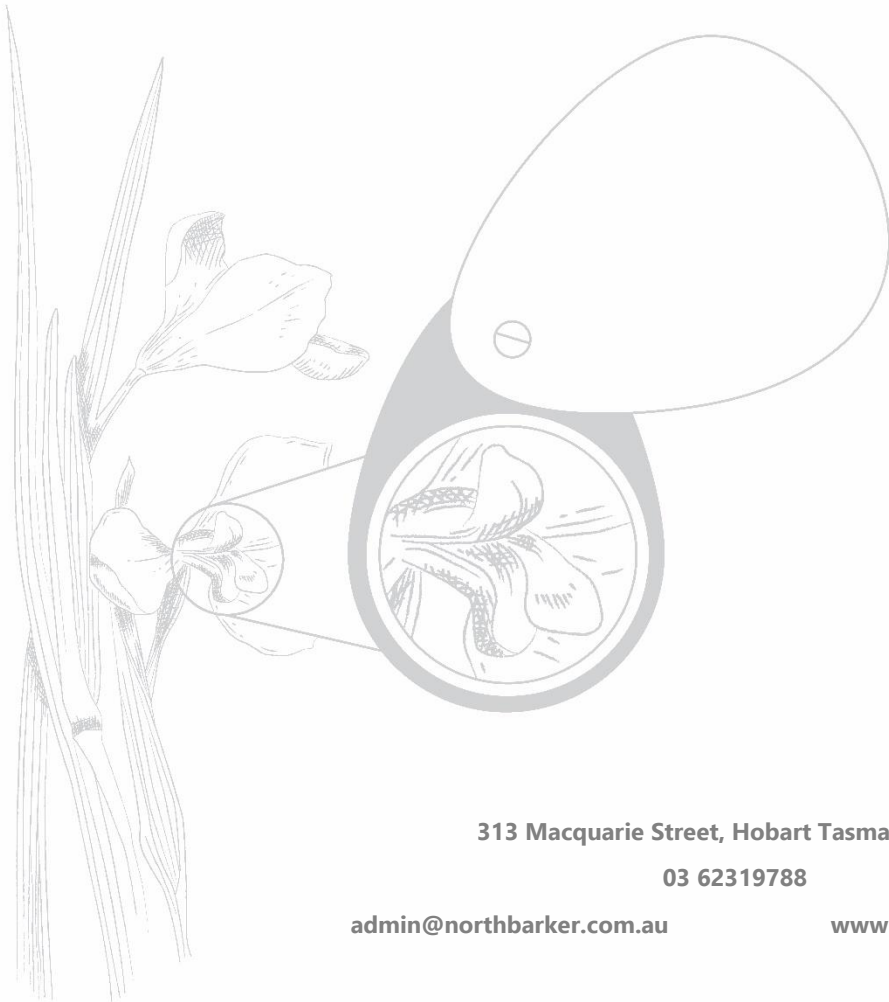
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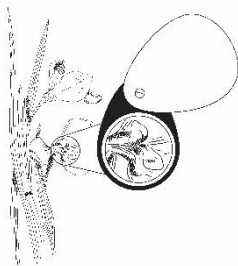
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EXECUTIVE SUMMARY

Sanbar Pty Ltd Is investigating the reworking of mine tailings at the mining lease 10M/2008 at Pioneer in the northeast of Tasmania.

This report describes a natural values assessment of the property including consideration of potential impacts and recommendations for mitigation.

The site consists of regenerating native vegetation on tailings heaps with small patches of more intact native vegetation generally associated with watercourses.

VEGETATION COMMUNITIES

The site is a highly disturbed site due to the history of past mining with predominantly one mapping unit of modified land, Regenerating Cleared Land (TASVEG FRG). The site has largely regenerated with species typical of this part of Tasmania on similar geologies. It also includes small areas of five distinct native vegetation communities or mapping units as remnants or on the edge of the study area. Four of these units are frequently occurring communities that are well represented and reserved both in the local bioregion and statewide.

One vegetation community (*Eucalyptus ovata* forest and woodland – DOV) is listed as threatened under the Tasmanian *Nature Conservation Act 2002*. It is a small patch occupying just 0.1 ha.

THREATENED FLORA

No flora species listed under the Tasmanian *Threatened Species Protection Act 1995* or under the *Environment Protection and Biodiversity Conservation Act 1999* EPBCA was recorded during the field survey or thought likely to be impacted.

THREATENED FAUNA

Habitat, potential habitat or presence of several threatened fauna species exists.

Blue-winged parrot

There are five trees of sufficient size to potentially support nesting hollows suitable for the blue-winged parrot. The scale of impact to potential nesting habitat is small. Retention of these trees which are located close to the project area footprint would eliminate risk of loss. Likelihood of disturbance to nesting birds, if present in vicinity is not known.

Tasmanian masked owl

During the survey, both the study area and a buffer of 150 m were considered for potential nesting habitat for masked owl. All eucalypt trees greater than 100 cm DBH and any with a hollow were located using handheld GPS. Four trees are present in the project area footprint and 22 trees were located in the buffer. Trees with hollows were considered for their suitability for masked owl. Although several trees with small hollows were noted, the eucalypts here in general are of a smaller size than those likely to have sufficient hollow development. Both the study area and buffer forest are suitable for masked owl foraging. No evidence such as whitewash or boli (pellets) were noted in the vicinity of the trees.

Tasmanian devil, spotted-tail quoll, eastern quoll

Evidence of eastern quoll, in the form of scats and a possible den, were recorded during surveys. While Tasmanian devil and spotted-tail quoll scats were not recorded during the survey, it is possible that both species use the site as part of a territory.

Green and gold frog and striped marsh frog

No evidence of either species was noted. However, there are some small wetlands within the project area that support characteristic habitat values suited to these species.



INTRODUCED PLANTS AND PATHOGENS

One species of declared weed, Spanish heath, was recorded in the main study area and Canary broom is present in the vicinity (150 m buffer). Environmental weeds are present in the main impact area with radiata pine being locally abundant. In the buffer adjacent to the township of Pioneer, environmental weeds are more frequent including arum lily and other garden escapes.

CONCLUSION

The proposed works is focused on previously disturbed environments and will not impact any threatened flora and has a low likelihood of impacting threatened fauna.

No further targeted surveys are deemed necessary considering the scale of impact and context of available habitats in the vicinity.

Some general impact mitigation advice is provided to reduce likelihood of impacts and to manage disturbance.



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LIST OF ACRONYMS AND ABBREVIATIONS

CAR – Comprehensive, Adequate and Representative (Reserve System)
CR – critically endangered (EPBCA)
DAC - *Eucalyptus amygdalina* coastal forest and woodland (TASVEG mapping unit)
DBH – Diameter at breast height
DFTD – Devil Facial Tumour Disease
DOB – *Eucalyptus obliqua* dry forest (TASVEG mapping unit)
DOV - *Eucalyptus ovata* forest and woodland (TASVEG mapping unit)
e - Endangered (TSPA)
EER - Environmental Effects Report
EMPCA - *Environmental Management and Pollution Control Act 1994*
EN – Endangered (EPBCA)
EPA – Environment Protection Authority Tasmania
EPBCA – Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FPA – Forest Practices Authority
FPP - Forest Practices Plan
FRG - regenerating cleared land (TASVEG mapping unit)
GPS – global positioning system
ILM – Integrated Land Management and Planning
JANIS - Joint Australian New Zealand National Forest Policy Statement Implementation Sub Committee
LIST - Land Information System Tasmania
LUPAA – Tasmanian *Land Use and Planning Approvals Act 1993*
MNES – Matters of National Environmental Significance (EPBCA)
NBES – North Barker Ecosystem Services
NCA – Tasmanian *Nature Conservation Act 2022*
NRE – Department of Natural Resources and Environment (Tasmania)
OAQ – water (TASVEG mapping unit)
RAMSAR - Wetland sites of international importance
PC - *Phytophthora cinnamomi*
Sh - Spanish heath
SMR - *Melaleuca squarrosa* scrub (TASVEG mapping unit)
TASVEG - Digital Vegetation Map of Tasmania
TSPA - Tasmanian *Threatened Species Protection Act 1995*
v – Vulnerable (TSPA)
VU – VULNERABLE (EPBCA)
WHMP – Weed and Hygiene Management Plan

1 INTRODUCTION AND BACKGROUND

Sanbar Pty Ltd Is investigating the reworking of mine tailings at the mining lease 10M/2008 at Pioneer in the northeast of Tasmania. The area has been previously mined for gold and tin from alluvial deposits between 1877 and 1955.

The proponent engaged North Barker Ecosystem Services to undertake flora surveys and fauna habitat assessment of the project area, and to make recommendations to minimise impacts to threatened natural values, listed at the State (Tasmania) level but also limiting the likelihood of significant impacts to Matters of National Environmental Significance, listed nationally.

This report addresses Section 4 'Natural Values' of the Environmental Effects Report (EER) Guidelines¹ issued by the Environment Protection Authority (EPA). In addition to a review of all species recorded from the vicinity the ERR guidelines specifically require a check for devil denning habitat, potential habitat for chaostola skipper and a survey for mature trees within 150 m of the project area for potential nesting habitat for masked owls. Other matters raised include noise and light disturbance, roadkill and geoconservation site impacts.

1.1 PROJECT AREA

The proposed site for reworking the tailings is approximately 1 km west of the township of Pioneer (Figure 1). Pioneer is located approximately 120 km east of Launceston. The site consists of regenerating native vegetation on tailings heaps with small patches of more intact native vegetation generally associated with watercourses. The project area is at the eastern extremity of the Pioneer Lake, which is an artificial waterbody created when old mine workings flooded. Native aquatic vegetation has established on the shallower edges of the lake that is a popular recreational resource for people living nearby. The project area covers 31.2 hectares, and there is a further buffer of 76.9 hectares that was investigated for the potential for masked owl nesting habitat.

The site is accessible off Racecourse Road on an all-weather gravel road. There is a network of tracks that provide access to swimming and boating on Pioneer Lake and vehicular access to the project area.

The project area is located in the Ben Lomond bioregion² and the municipality of the Dorset Council. The tenure of the project area is entirely Future Potential Production Forest (Crown).

1.2 CLIMATE

Pioneer has a long-term average rainfall of 956 mm, with a mean annual number of 142 rain days³. The predominant wind direction is from the northwest⁴. The previous 5-year average daytime temperature is given as a low of 10.8 °C and average high of 18.1 °C.

1.3 TOPOGRAPHY, GEOLOGY, AND VEGETATION CHARACTERISTICS

The altitude of the project area is from just below 80 m to just above 90 m above sea level. The topography is largely altered by the past mining as the land surface is largely tailings. The surface soils are coarse sandy sediments predominantly from granitic sources.

The project area has been historically disturbed by alluvial mining and is revegetating with predominantly local native species, although some areas have a significant cover of radiata pine. The soils have largely stabilised with a surface crust of lichens and mosses although higher plants are sparse. Remnant native vegetation remains in the drainage lines supporting dry eucalypt forest. The buffer area

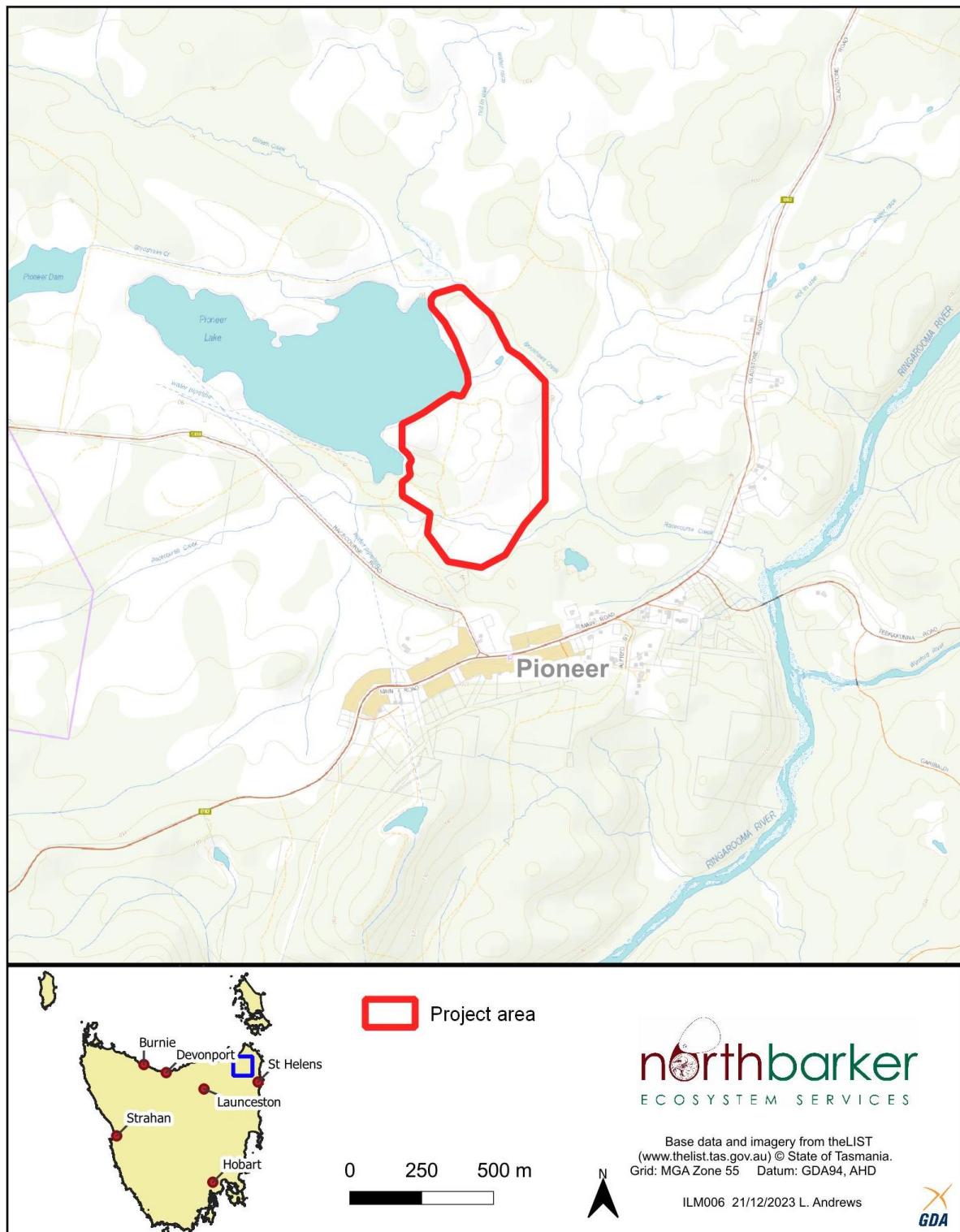
¹ Environment Protection Authority (2023)

² Department of Climate Change, Energy, the Environment and Water (2020)

³ Farmonline weather (2023)

⁴ Willyweather (2023)

supports mature eucalypt forest and scrub communities with smaller patches of regenerating native vegetation.



2 METHODS

2.1 BACKGROUND RESEARCH

The following resources were reviewed:

- EPBCA Protected Matters Report⁵ – all matters of national environmental significance that may occur in the area or relate to the area in some way.
- Natural Values Atlas⁶ – This NRE database includes biological records.
- Land Information System Tasmania (LIST).

2.2 VEGETATION MAPPING

In Tasmania, the primary source on the distribution of vegetation is the statewide TASVEG⁷ mapping database (with TASVEG 4.0 being the latest iteration, and current distribution data available in the TASVEG Live database version). The compilation of TASVEG has been an iterative process of improvement on and refinement of the original base layer that was collated from several sources⁸. As a result, data within TASVEG do not completely represent vegetation extent and distribution at a single date. Some areas are mapped at a scale of 1:25,000 or based on interpretation of imagery more than ten years old⁹. Furthermore, vegetation mapping at any scale can be an exercise in judgement, with an inherent potential for errors in interpretation. Consequently, it is standard practice to truth TASVEG data using recent imagery and ground sampling¹⁰.

Ground sampling was undertaken over 14-16 November 2023 by two ecologists. This involved the ecologists traversing the survey area on foot, in a stratified fashion that ensured ground sampling of the complete range of image signatures. When a patch is ground sampled, the observer assesses 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 manual¹¹. Boundary discrimination is based on image interpretation and is aided by point data to be collected on handheld GPS units. All ground sampling was conducted during the daytime.

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), as well as conservation priorities for the Dorset area under the Tasmanian Regional Forest Agreement.

2.3 FLORISTIC SURVEYS, INCLUDING THREATENED FLORA SEARCHES

To support the determination of TASVEG units (as per NRE guidelines¹²) and provide general floristic data, within each native vegetation community at least one full vascular plant species list was taken in representative 0.25 ha plots using a timed meander search procedure¹³. This method requires the observer to continue survey effort until survey yields (new species observations) diminish towards zero. Outside the 0.25 ha plots, threatened species observations, and observations of additional non-threatened plant species, were noted as encountered while traversing the site and while conducting all other observations. Where nodes of additional plants were present, additional plots were sampled.

⁵ Department of Climate Change, Energy, the Environment & Water (2023a)

⁶ Department of Natural Resources & Environment (2023)

⁷ Department of Primary Industries, Parks, Water & Environment (2020)

⁸ Kitchener & Harris (2013)

⁹ Kitchener & Harris (2013)

¹⁰ Tasmanian Vegetation Monitoring & Mapping Program (2013)

¹¹ Kitchener & Harris (2013)

¹² Department of Primary Industries, Parks, Water & Environment (2015a)

¹³ Goff *et al.* (1982)

Surveys for the current assessment included 11 floristic plots distributed across the project area. Outside of these plots, disproportionately higher flora survey effort was applied within locations considered likely to contain threatened species habitat (based on NBES knowledge and NRE guidelines¹⁴) or that were found to contain species not noted earlier (based on observations of habitat variation at the sub-community scale).

To further increase the survey effectiveness in capturing threatened flora, the survey times in 2023 have been chosen to maximise the potential for recording threatened species (based on species known to occur within 5 km), particularly those with narrow windows for accurate identification, such as orchids¹⁵.

Botanical nomenclature follows the current census of Tasmanian plants¹⁶. Field data recording forms are included in Appendix A.

2.3.1 Limitations

Due to seasonal variations in detectability and difficulty in accurately discriminating between closely related species, there may be some herb, orchid and/or graminoid species present on the site that have been overlooked because they flower at times of the year other than when the surveys were undertaken. To compensate for these limitations to some degree, field data from the present study were supplemented with data from the Tasmanian Natural Values Atlas¹⁷ and the EPBCA Significant Matters database¹⁸. All threatened plant species known to occur in the local area (within 5 km) are considered in terms of habitat suitability on site.

2.4 INTRODUCED PLANTS AND PATHOGENS

2.4.1 Declared and environmental weeds

A 'declared' weed is a plant species that has been listed under the Tasmanian *Biosecurity Regulations 2022*. Some weeds are naturalised and limited in their distribution, making these species a priority target for eradication, while other species are far more widespread, where total eradication is not feasible, but containment and localised eradication is viable¹⁹. Non-declared environmental weeds are species that are not listed under the BSA but that can have impacts on natural environments and thus should be managed appropriately through effective hygiene standards and control measures.

Declared²⁰ and environmental weeds were searched for and recorded with a handheld GPS and photographed where evident within or close to (such as on an adjacent road) the project area.

2.4.2 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. By parasitising its feeder roots, PC can fatally starve its host plants of nutrients and water. Members of the Ericaceae, Myrtaceae and Proteaceae families, among them numerous threatened species, are known to be highly susceptible to PC²¹. 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

¹⁴ Department of Primary Industries, Parks, Water and Environment (2015a)

¹⁵ Wapstra (2018)

¹⁶ de Salas & Baker (2023)

¹⁷ Department of Natural Resources and Environment (2023)

¹⁸ Department of Climate Change, Energy, the Environment and Water (2023)

¹⁹ Department of Primary Industries, Parks, Water and Environment (2015b)

²⁰ Tasmanian *Biosecurity Act 2019*

²¹ Podger & Brown (1989); Barker & Wardlaw (1995)

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.

The establishment and spread of PC are generally restricted to areas that receive above 600 mm of rainfall per annum and are below 900 m altitude (predominantly below 600 m)²². Temperature is critical, with the disease not impacting areas where the mean annual temperature is below 7.5 °C, and in closed-canopy environments requiring disturbance that facilitates soil temperatures to exceed 15 °C. Rainfall is crucial because the life cycle of PC depends on moist conditions for growth, spore production and dispersal.

Humans are the primary long-distance dispersal agent of PC, with contaminated soil being spread on vehicles, construction machinery and walking boots²³. PC spores and infected root material can be transported in minute quantities of soil, but the risk of infection increases with the quantity of soil moved. Thus, vehicles that tend to accumulate large sods of soils during works pose the greatest risk of spreading contaminants. Once established at a site, PC can spread rapidly through root contact and water movement (above and below ground).

Standard hygiene practices²⁴ have been applied during field assessments, which included washing down vehicles prior to site access, cleaning all equipment, and spraying footwear with an F10 solution to disinfect it. All areas exhibiting symptomatic evidence of PC are recorded with a handheld GPS and photographs taken where occurrences are within or close to (such as on an adjacent road) the project area.

Evidence of symptomatic evidence of PC as expressed through yellowing and dying off of susceptible species was searched for. Where any such evidence was noted, then locations were to be recorded with a handheld GPS and photographs were to be taken of occurrences within or close to (such as on an adjacent road) the project area.

2.4.3 Chytrid fungus

Chytrid fungus (*Batrachochytrium dendrobatidis*) causes the infectious disease, chytridiomycosis, which is affecting amphibians worldwide, including Tasmania. The fungus grows on the animal's skin and causes it to harden²⁵. Frogs absorb water and mineral salts through the skin and the infected hardened skin is no longer able to perform this function. The resulting imbalance causes metabolic changes that kill the animal. It is capable of causing sporadic deaths in some populations and up to 100 per cent mortality in others.

Human population density has been found to be a highly influential (positive) variable in the presence of the pathogen²⁶. The spread of the pathogen is considered likely to be promoted by human activity in Tasmania, as its occurrence in remote wilderness areas is positively associated with variables linked to human-disturbance, including gravel roads²⁷.

Evidence of chytrid fungus is not specifically searched for although management of risk of spread is considered. Standard hygiene practices²⁸ are applied for all field assessments, which includes washing down vehicles prior to site access, cleaning all equipment, and spraying footwear with an F10 solution to disinfect.

²² Podger & Brown (1989); Podger *et al.* (1990)

²³ Department of Primary Industries, Parks, Water and Environment (2015b)

²⁴ Department of Primary Industries, Parks, Water and Environment (2015b)

²⁵ Department of Primary Industries, Parks, Water & Environment (2015b)

²⁶ Rohr *et al.* (2011)

²⁷ Pauza *et al.* (2010)

²⁸ Department of Primary Industries, Parks, Water & Environment (2015b)

2.5 FAUNA SURVEY METHODS

Surveys for threatened fauna were restricted to assessing the suitability of habitat to support particular species, as well as observing any evidence of their occurrence. Important terrestrial habitat elements such as potential nest and den sites and foraging resources, were considered. Where located, the signs and habitat of probable species were recorded using a handheld GPS device. Details of surveys for individual species are given below.

2.5.1 Tasmanian devil, eastern quoll and spotted-tail quoll

2.5.1.1 Eastern quoll

The eastern quoll (*Dasyurus viverrinus*) is a medium-sized marsupial carnivore listed under the EPBCA as endangered but not currently listed as threatened in Tasmania. Eastern quolls are widespread in Tasmania. They are considered extinct on the mainland of Australia with the last wild sighting being in 1963 (though some reintroductions have since been undertaken).

Home ranges for this species are upwards of 35 to 44 ha (females and males respectively), with an extensive amount of overlap between individuals²⁹. Suitable habitat includes dry grasslands and forest mosaics, including adjacent agricultural lands. No recovery plan has been developed for this species. As an endangered species, all populations are seen as important, although some areas might be considered as the primary strongholds for the species (e.g., Cradoc and North Bruny Island)³⁰.

2.5.1.2 Spotted- tail quoll

The spotted-tail quoll (*Dasyurus maculatus maculatus*), which is listed as rare under the TSPA, and vulnerable under the EPBCA, occurs throughout Tasmania and also in eastern Australia. On the mainland, the species' numbers have declined, and Tasmania is now their stronghold. The spotted-tailed quoll is most abundant in areas containing rainforest, wet forest, and blackwood swamp forest. Highest quality habitat is fertile extensive unfragmented lowland wet forest vegetation. The home ranges of females range in size depending on site productivity³¹.

2.5.1.3 Tasmanian devil

The Tasmanian devil (*Sarcophilus harrisii*) occupies a wide range of habitats across Tasmania and exploits landscapes with a mosaic of pasture and forest with elevated prey densities and is attracted to roadkill hotspots with concentrated scavenging resource. 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 given due to the mortalities from demographic pressures.

2.5.1.4 Surveys

Commonwealth guidelines for surveying Tasmanian devils and quolls³² focus on detecting the presence of a species. The NRE guidelines³³ are designed to assess impacts of development proposals and focus on potential denning opportunities, recognising the importance of limiting pressures affecting breeding success. This is particularly relevant to the Tasmanian devil in an era of increased mortality resulting from devil facial tumour disease DFTD. Surveying for these species uses a combination of techniques from both guidelines to establish presence/absence and determine the suitability of habitat for denning.

²⁹ Threatened Species Scientific Committee (2015)

³⁰ Threatened Species Scientific Committee (2015)

³¹ Bryant & Jackson (1999)

³² Department of Sustainability, Environment, Water, Population and Communities (2011)

³³ Natural and Cultural Heritage Division (2015)

Regardless of the broad-scale habitat suitability survey approach, presence/absence was surveyed concurrently with other survey efforts. For presence/absence, diurnal searching was undertaken for scats and prints, with particular attention given 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 crossings³⁴ and can be differentiated using morphometric traits including colour, shape, size and contents³⁵.

Characteristics of suitable natal dens for these species include a dry, structurally stable inner chamber, a chamber that is of sufficient size for the mother and litter but is not so large as to be undefendable (which includes an entrance that is a tight fit for the mother), and the presence of nooks and crannies for the young to hide in. Preferred habitat characteristics include direct sun near the den entrance, shelter from predators around the den, a low number 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) or friable soil for the burrows³⁶. Some of these traits are fine-scale habitat attributes, whereas others are landscape scale (or have plausible proxies at the landscape scale). Thus, to determine the denning potential during surveys, observers considered the presence of burrows or potential den sites, as well as higher-level traits including hydrology, soil and vegetation structure. Whilst it was not an aim of this assessment to undertake a systematic search for all possible den structures, our survey coverage exceeded the minimum of 30 % visual coverage recommended in the NRE guidelines³⁷.

To quantify areas of potential natal denning habitat, vegetation communities in the project area are modelled according to the likelihood of that community containing suitable habitat as described above. Classes, their associated vegetation communities, and the rationale for assigning the community to that class, are provided in Table 1. It should be stressed that this is a model only and is therefore indicative only of the distribution of potentially viable habitat within the landscape. A limitation of the model is that areas of fine-scale changes in the vegetation not captured in the vegetation mapping may mean that areas mapped as one suitability class may contain small areas of another suitability class.

Table 1: Natal den habitat suitability classes for the Tasmanian devil, eastern quoll and spotted-tail quoll

Suitability class for devil maternal natal den	Rationale
Optimal	<p>This category contains areas deemed optimal for denning opportunities based on field observations. Optimal denning habitat does not imply that a high density of devils may be present because that would also require high prey abundance, which is independent of the availability of den structures. Characteristics of optimal den habitat may include:</p> <ul style="list-style-type: none"> • Areas containing observed burrows, dens, and/or latrines; • Areas with potential denning structures; • Areas of structurally complex dry eucalypt forest with well-drained soils, sheltered rock features, and logs and root discs; • Areas of structurally complex wet eucalypt, mixed forest, and rainforest with features suitable for denning.
Suboptimal	<p>This category includes areas that contain forest that is potentially suitable but may not be optimal due to relatively simple forest structure and/or poor drainage. Characteristics may include:</p> <ul style="list-style-type: none"> • Apparent lack of denning structures or opportunities;

³⁴ Department of Sustainability, Environment, Water, Population & Communities (2011)

³⁵ Triggs (2004)

³⁶ Environment Strategic Business Unit (2023)

³⁷ Environment Strategic Business Unit (2023)

Suitability class for devil maternal natal den	Rationale
	<ul style="list-style-type: none"> Areas with some apparent denning opportunity but having poor drainage and/or being prone to flooding; Areas of wet eucalypt forest and well-drained moorland lacking structurally complex features.
Unsuitable	<p>This class captures all areas that are deemed unsuitable for denning opportunities based on field observations. Characteristics of this class may include:</p> <ul style="list-style-type: none"> Vegetation that is typically prone to flooding, including wetlands and swampy areas; Areas of structurally simple wet heathland and wet scrub; Areas with no denning opportunities.

2.5.2 Tasmanian masked owl

The Tasmanian subspecies of the masked owl, *Tyto novaehollandiae castanops*, is a nocturnal vertebrate predator that is most active at night and roosts during the day. It feeds predominantly on introduced rodents and rabbits on agricultural land, and arboreal marsupials, terrestrial mammals and native birds in less disturbed habitats. The subspecies' diet can vary greatly between sites, and individuals can switch between prey items depending on availability and prey size³⁸. The subspecies inhabits a diverse range of forests and woodlands including agricultural and forest mosaics. Forests with relatively open understoreys, particularly when these habitats adjoin areas of open or cleared land, are particularly favoured³⁹. The subspecies is generally found in territorial pairs, or as solitary individuals that are most likely juveniles⁴⁰. Pair bonds are lifelong, and pairs appear to occupy a permanent home range or territory⁴¹. Breeding is reported to be highly seasonal in Tasmania⁴², with most females laying in mid-October to early November,⁴³ though in May 2006 a nest was found containing a small chick (Phil Bell, pers. comm.). Nesting occurs in large tree hollows of living or dead trees, but sometimes in vertical spouts or limbs⁴⁴. Sexual maturity occurs at around 1 year of age, but age of first breeding is not reported⁴⁵. The subspecies' generation length is unknown but is estimated to be 5 years⁴⁶.

The owl has not been recorded within 5 km of the project area; however, the site is flagged as core habitat according to the published ranges⁴⁷, the Natural Values Atlas⁴⁸ and EPBCA Protected Matters Report⁴⁹.

Habitat mapping

The potential for hollow-bearing tree habitat has been determined from a field assessment. Field assessments are conducted by traversing the project area, noting the presence of potential and

³⁸ Green (1982); Green & Rainbird (1985); Mooney (1992); Mooney (1993)

³⁹ Debus (1993); Bell *et al.* (1997); Higgins (1999)

⁴⁰ Higgins (1999)

⁴¹ Hill (1955); Kavanagh & Murray (1996)

⁴² Mooney (1997)

⁴³ Green (1982); Mooney (1997)

⁴⁴ Bell *et al.* (1997); Higgins (1999)

⁴⁵ Higgins (1999)

⁴⁶ Garnett & Crowley (2000)

⁴⁷ Todd (2012); Forest Practices Authority (2014a)

⁴⁸ Department of Natural Resources & Environment (2023)

⁴⁹ Department of Climate Change, Energy, the Environment and Water (2023)

significant habitat (trees with large hollows > 15 cm entrance diameter and/or a DBH > 100 cm)⁵⁰. Ground surveys included examination of habitat for suitability in accordance with the FPA guidelines, and examination of hollow-bearing trees for evidence of occupation (including pellets, scratching, white-wash and prey remains). Additionally, all eucalypt trees within the study area and buffer with a diameter greater than 100 cm DBH had their location recorded with a handheld GPS to provide an understanding of the potential for the area to develop nesting habitat over time.

2.5.3 Tasmanian wedge-tailed eagle – *Aquila audax* subsp. *fleayi* & white-bellied sea eagle – *Haliaeetus leucogaster*

The Tasmanian subspecies of the wedge-tailed eagle occurs only in Tasmania and as a single population⁵¹. It has been estimated that the total population in the state is between ~1,000 and ~1,500 individuals⁵².

The subspecies occurs throughout the state of Tasmania. Territory sizes have been estimated from the known nest distribution and range from 20–30 km² in the drier, more fertile and open habitats of the lowlands, to much larger territories of 1,200 km² in the highlands and in the western regions⁵³.

Tasmanian wedge-tailed eagles nest in a range of old-growth native forests and are dependent on forest for nesting. This species requires large, sheltered trees for nesting and is highly sensitive to anthropogenic disturbances during the breeding season. Territories can contain up to five nests typically clustered in a territory and are usually close to each (but may be up to 1 km apart where habitat is locally restricted).

Detection of nests of these species is best conducted using an aerial survey method. Aerial survey areas are stratified according to the suitability of the habitat based on the Forest Practices Authority's eagle habitat suitability model⁵⁴.

Assessment of the nesting habitat suitability model is the first step and has been undertaken for this project. Given the highly modified nature of the project area, the absence of moderate or high quality nesting habitat within 1 km of the project area aerial nest searches are not justified.

2.5.4 Giant freshwater crayfish – *Astacopsis gouldi*

There are two naturally disjunct ranges for the giant freshwater crayfish (*Astacopsis gouldi*) in northern Tasmania (east and west of the Tamar River), and although there is no evidence to suggest these are separate lineages, weight differences in males have been shown to occur between the two ranges⁵⁵. No important populations have been formally defined in the recovery plan or conservation advice for the species⁵⁶; however, given there are two geographically distinct populations with limited ranges, and the decline of and threats to the species throughout both ranges, both populations are considered important to the long-term survival and recovery of the species, and may therefore be regarded as important populations⁵⁷.

This species requires well-shaded streams that have good water quality, low sediment levels, snags, pools and undercut banks⁵⁸. Adequate riparian vegetation, instream vegetation and woody debris and a stable thermal regime of cool water temperature are also important habitat features⁵⁹. More specific habitat requirements for this species vary depending on the age-class in question. Adults often move

⁵⁰ Forest Practices Authority (2014a)

⁵¹ Threatened Species Section (2006)

⁵² Mooney (2005); Threatened Species Section (2006a)

⁵³ Bell & Mooney (1998)

⁵⁴ Forest Practices Authority (2014b)

⁵⁵ Richardson & Walsh (2019)

⁵⁶ Commonwealth of Australia (2017a) and Commonwealth of Australia (2017b)

⁵⁷ Commonwealth of Australia (2013)

⁵⁸ Lynch (1967); Hamr (1990); Growns (1995)

⁵⁹ Lynch & Bluhdorn (1997); Hamr (1990)

to larger, slower-flowing reaches where they dig burrows in stream banks and underneath logs and boulders in the stream bed⁶⁰. Juveniles are typically found in shallow, fast-flowing streams and creeks with cobbles and boulders, which they use for shelter. Juveniles will use low-order streams (Class 4)⁶¹ but occur at lower densities than in larger streams (Class 2), especially those with a moderate catchment size and wider channels⁶². Within these habitats, adults are typically quite sedentary but will occasionally undertake large-scale movements⁶³.

Areas of potential habitat were identified, and habitat characteristics noted for further analysis.

2.5.5 Chaostola skipper – *Antipodia chaostola leucophaea*

The chaostola skipper (*Antipodia chaostola leucophaea*) is a medium-sized (32–35 mm), brown-coloured butterfly⁶⁴. It is restricted to dry forest and woodland supporting sedges of *Gahnia radula* and/or *G. microstachya*, and occurs in isolated populations in northeastern, eastern, and southeastern Tasmania in subcoastal locations⁶⁵. The adults fly for only a few weeks between October and December, but larval subpopulations can be detected by the distinctive larval shelters at any time of the year⁶⁶. The chaostola skipper, in contrast to other skippers occupying similar habitats, has the entrance of the larval shelter located at the bottom with the larva's head facing downward.

The species is threatened by any activity which removes or degrades its *Gahnia* habitat including land clearing, urban development, inappropriate burning regimes, and forest harvesting. The main objective for management of this species is to protect known subpopulations⁶⁷.

Targeted surveys for this species were not conducted as part of this assessment; however, any patches of *Gahnia radula* or *G. microstachya* were mapped as potential habitat.

2.5.6 Aquatic Fauna Values

Surveys for aquatic values are not included in the report (with the exception of habitat assessments for the giant freshwater crayfish).

2.6 ASSESSMENT OF CONSERVATION SIGNIFICANCE

The state and federal governments are committed to achieving a Comprehensive, Adequate and Representative (CAR) reserve system based on TASVEG mapping. The reservation target of a vegetation type relates to its current extent compared with the modelled extent prior to European settlement. This comparison provides an estimate of the proportion lost due to land clearing. Those vegetation types that are rare (generally less than 1,000 ha) or have suffered considerable loss (approaching 70% for vulnerable and 90% for endangered types) qualify for listing as “threatened” under the Tasmanian *Nature Conservation Act 2002*⁶⁸.

For forests, reservation targets were set using the nationally agreed Joint Australian New Zealand National Forest Policy Statement Implementation Sub-committee (JANIS) criteria⁶⁹ as part of the Tasmanian RFA. These aim to achieve a 15% reservation level of the area of extent prior to European settlement (often referred to as pre-1750). The reservation targets reflect the extent of loss, with “threatened” vegetation types having higher targets. The JANIS principles also include the consideration of the bioregional representation of each vegetation type within the CAR reserve system.

⁶⁰ Lynch & Bluhdorn (1997)

⁶¹ As defined in the Forest Practices Code

⁶² Davies & Cook (2004)

⁶³ Commonwealth of Australia (2017b)

⁶⁴ Threatened Species Section (2023)

⁶⁵ Neyland & Bell (2000)

⁶⁶ Threatened Species Section (2023)

⁶⁷ Threatened Species Section (2023)

⁶⁸ Schedule 3A Tasmanian *Nature Conservation Act 2002*

⁶⁹ Commonwealth of Australia (1997)

The reservation at state and bioregional levels has been calculated for all TASVEG 4.0 communities⁷⁰. This does not include any modelling of pre-1750 levels but is based on a tenure analysis of what is currently mapped.

The most recent bioregional and state analysis reservation against JANIS criteria was completed for the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement⁷¹. This analysis calculates areas required to achieve a CAR reserve system based on the RFA modelling. No similar modelling has been undertaken for the current TASVEG non-forest communities, although native grassland communities have been assessed at the state level⁷².

The conservation significance of species is determined at a state and federal level by the Tasmanian TSPA and Commonwealth EPBCA (Appendix B), the implications of which are considered according to relevant legislation (Appendix C).

2.7 GEOCONSERVATION SITES

The *guidelines for natural values surveys*⁷³ requires a desktop assessment that can be done using a review of Geoconservation Database that is included with a *natural values report*. Any identified sites within 1 km are then considered specifically.

3 BIOLOGICAL VALUES

3.1 VEGETATION DESCRIPTION

The project area consists mainly of regenerating cleared land (FRG) with sections of dry eucalypt forest and a small area of *Melaleuca* scrub. The FRG occupies not so much cleared land as naturally vegetated stockpiles of previous mine working tailings. The eucalypt forest within the project area and surrounding buffer zone is predominantly *Eucalyptus amygdalina* coastal forest and woodland (DAC) with smaller areas of *Eucalyptus obliqua* dry forest (DOB). The northeast area of the buffer zone supports an older forest with many trees reaching a diameter at breast height (DBH) over 1 m, with some suitable hollows for threatened fauna observed. The southern to southeastern sections of the project area contain a higher proportion of weeds, with radiata pine (*Pinus radiata*) dominating the canopy. There is a small patch of *Eucalyptus ovata* forest and woodland (DOV) on the edge of an impounded watercourse, immediately adjacent to *Melaleuca squarrosa* scrub (SMR).

3.2 VEGETATION COMMUNITIES

Field surveys identified 5 native vegetation communities, as well as 1 modified land mapping unit. These vegetation mapping units are summarised in Table 2 and are described in detail in the following subsections.

Appendix D lists plant species present in each community.

Figure 2 illustrates the distribution of the TASVEG vegetation mapping units recorded on the site.

⁷⁰ Department of Primary Industries, Parks, Water and Environment (2021)

⁷¹ Knight (2012)

⁷² Lowland Grassland Review Expert Group (2008)

⁷³ Department of Primary Industries, Parks, Water and Environment (2015a)

Table 2: Summary of vegetation communities present in the project area

Vegetation Community	TASVEG Code	Area (ha)	Percentage (%) of Project Area	Location
<i>Eucalyptus amygdalina</i> coastal forests and woodland	DAC	5.15	16.5	Two patches in the north, and three patches in the southern section of the project area
<i>Eucalyptus obliqua</i> dry forest	DOB	0.87	2.8	Two patches in the north of the project area
<i>Eucalyptus ovata</i> forest and woodland	DOV	0.15	0.5	Edge of impounded watercourse and included with SMR community
<i>Melaleuca squarrosa</i> scrub	SMR	0.66	0.3	In poorly drained riparian areas
Regenerating cleared land	FRG	24.31	77.9	The majority of the project area contains regenerating land

3.2.1 DAC – *Eucalyptus amygdalina* coastal forest and woodland

This community was recorded as a main patch within the southwestern section of the project area and towards the edge of the project area (in the northern extent), which forms part of a more extensive forest areas of the same community (Plate 1). It is the most intact native vegetation within the project area. It is also the most widespread forest community in the 150 m buffer area.

The forest, while containing areas of fairly advanced regrowth, does not have well-developed tree hollows. The trees are on the cusp of being of a suitable size and age to start to develop tree hollows. The tall shrub layer is the most developed layer with *Kunzea ambigua* being the dominant species. Low shrubs, herbs, ferns and graminoids, while moderately diverse, are patchy in distribution. The area appears to be burnt regularly and is generally open away from the riparian zone.

Eucalyptus viminalis is sometimes present and at one location is the dominant eucalypt.

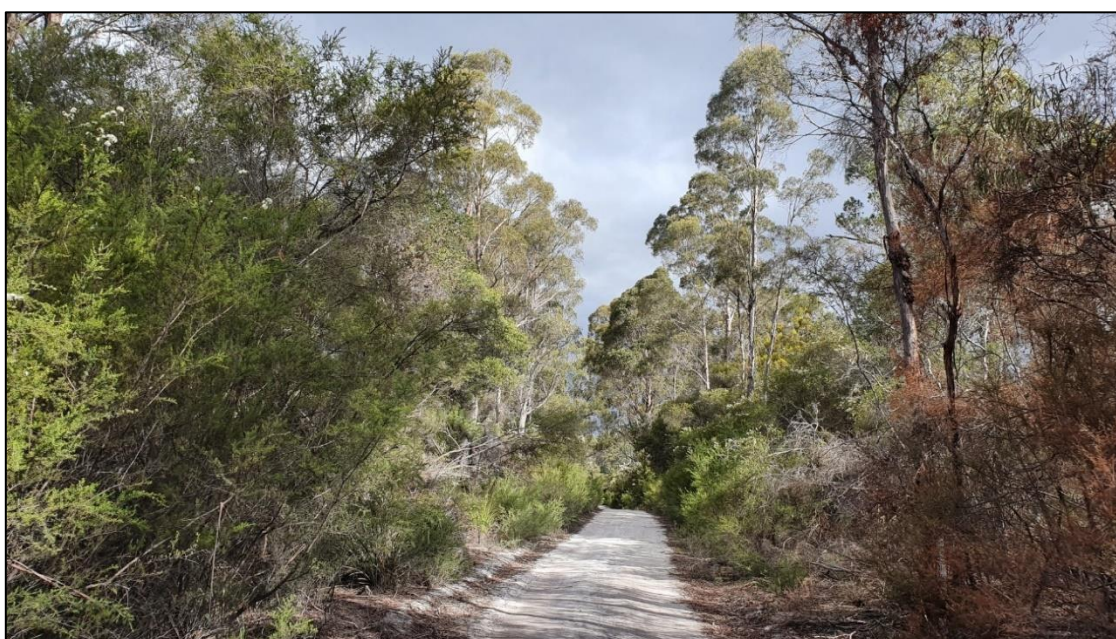


Plate 1: DAC along the road into the project area

3.2.2 DOB – *Eucalyptus obliqua* dry forest

This community was recorded in the northern extremity of the project area (Plate 2). While it has been disturbed by past mining to a minor extent, it has essentially retained structural and species diversity. There is a track to the north of the forest that is used by motorcycles. On the edge of the track there is a patch of Spanish heath.

The *Eucalyptus obliqua* is dominant to *E. amygdalina* and *E. viminalis*. The larger trees are of sufficient size to support the development of hollows suitable for use by nesting birds. The tall shrub layer is patchy, with more intact vegetation present on the lower slopes of this forest type.



Plate 2: DOB forest on the north of the project area

3.2.3 DOV – *Eucalyptus ovata* forest and woodland

This community was recorded as a very small patch within the project area on the edge of an impounded watercourse in the northern section of the project area (Plate 3).

The canopy cover of eucalypts is just sufficient for this area to be classed a eucalypt community. The diameter of the trees is generally less than 20 cm DBH, the trees still being saplings. The canopy cover will increase as trees mature.

The impounded watercourse has likely created suitable habitat for the DOV.



Plate 3: Emergent *Eucalyptus ovata* on the edge of a patch of SMR

3.2.4 SMR – *Melaleuca squarrosa* scrub

This community was recorded in two areas, both in drainage lines. The facies were quite different in that the one in the north was more mature, whereas the other in the east had been much more recently burnt and had a much greater *Gahnia* component. Again, there is difficulty in attributing these small areas disturbed and isolated by historical mining to TASVEG mapping units.

Acacia melanoxylon occurs only occasionally over a patchy shrub layer dominated by *Melaleuca squarrosa* and *Leptospermum lanigerum*. Both areas being subject to inundation, there are a range of aquatic and riparian graminoids present (Plate 4).



Plate 4: Wetland elements within SMR

3.2.5 FRG – Regenerating cleared land

This mapping unit is the most extensive (Plate 6). It is not a natural vegetation community but a result of native plants re-establishing after alluvial mining. There are significant populations of radiata pine but otherwise the area is relatively free of serious weed infestations, which is possibly due to the nutrient-poor status of the soils. There are large areas of bare sands or sand covered by a crust of lichen and moss. The species composition is typical of the location and geology, but the vegetation structure and density is greatly altered).



Plate 5: FRG is the most prevalent mapping unit throughout the project area

3.3 EXTENT AND RESERVATION STATUS OF VEGETATION COMMUNITIES

The most appropriate measure of reservation status (using JANIS criteria) relies on a 15 % reserved target of extent prior to European settlement (pre-1750). A reserved area greater than 15 % is considered to meet the minimum reservation target. The reservation status for each forest community is assessed against pre-European (pre-1750) extent of vegetation⁷⁴. Reservation status for non-forest communities is assessed against the current extent of vegetation⁷⁵, as pre-European levels have not been calculated. Refer to Section 2.6 for further details and Appendix F for the current status.

Of the communities being impacted by the proposed project DAC and DOB are adequately reserved. DOV is inadequately reserved with just 2.4 % reserved statewide and 3.89 % in the Ben Lomond bioregion.

3.4 FLORA OF CONSERVATION SIGNIFICANCE

Field surveys of the project area recorded a total of 107 vascular plant species, 3 of these being endemic to Tasmania. No species listed under the Tasmanian *Threatened Species Protection Act 1995* or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded during the surveys.

A list of all vascular plants recorded in this survey is provided in Appendix E.

⁷⁴ Knight (2012)

⁷⁵ Department of Primary Industries, Parks, Water & Environment (2021)

The Natural Values Atlas database⁷⁶ lists no records of threatened flora species within 500 m of the project area. Eight species are known from within 5 km of the project area. Nine additional species are included in the EPBCA Protected Matters Report⁷⁷. Appendix G reviews these species and discusses the potential for each species to occur within the project area based on habitat and the context of known records. No EPBCA listed species are considered to potentially occur. Of TSPA species recorded within 5 km, one is considered to have no likelihood of occurrence based on habitat suitability and likelihood of being overlooked. Seven are considered of very low likelihood, one low and none of moderate or high likelihood. In conclusion the likelihood of any threatened flora being impacted is low to very low. No further targeted surveys are justified.

3.5 FAUNA OF CONSERVATION SIGNIFICANCE

The field surveys established that the native vegetation in the project area contains potential denning and foraging habitat for several threatened terrestrial vertebrate fauna. Appendix H lists threatened fauna species with observation records attributed to within a 5 km radius or included in the EPBC Protected Matters Report and discusses the potential for each species to occur within the project area based on habitat and the context of known records.

Ten listed fauna species may utilise habitat within the project area in an incidental manner, but most are not likely to nest or breed on site. There are no significant habitat features within the project area for many of these species.

Surveys for aquatic values were not conducted. Given the significant siltation of the waterbodies within the study area and immediately adjacent from historic mining activities, the quality of habitat is compromised for aquatic fauna such as juvenile giant freshwater crayfish, freshwater snails and freshwater fish. The study area is unlikely to provide significant habitat for these species.

The following species are considered in more detail:

3.5.1 Tasmanian devil, eastern quoll & spotted-tail quoll

One potential quoll den was observed in DAC in the southwest of the project area, and evidence in the form of an eastern quoll scat (Plate 6) was observed in the north of the project area (Figure 2). The entire site is suitable for foraging by all three vertebrate carnivores although no evidence dens or scats were observed for spotted tail quoll or Tasmanian devil.

Characterisation the denning suitability classes for devils and quolls applying the methodology described in section 2.5.1 has been applied to the project area (Figure 2).

⁷⁶ Department of Natural Resources & Environment (2023)

⁷⁷ Department of Climate Change, Energy, the Environment and Water (2023)



Plate 6: Eastern quoll scat recorded in the north of the project area

3.5.2 Tasmanian masked owl

Four trees of sufficient size to potentially contain hollows suitable for the Tasmanian masked owl were recorded in the northernmost extent of the project area. A further 22 potential habitat trees were recorded within 150 m of the project area (Figure 2). Although several trees with small hollows were noted, the eucalypts here in general are of a smaller size than those likely to have sufficient hollow development. The likelihood of owls utilising the project area for nesting is considered to be low and there are ample nesting opportunities in the surrounding area. No evidence such as whitewash or boli (pellets) were noted in the vicinity of the trees. The entire project area provides foraging habitat for owls.

3.5.3 Wedge-tailed eagle & white-bellied sea eagle

The project area's suitability for eagle nesting is very low (Figure 4), and no nests were observed. There is almost no moderate to high quality nesting habitat modelled within 1 km of the project area, and the nearest known nest is ~3.5 km northwest of the project area. The likelihood of eagles nesting within the project area is extremely low; however, the site does provide a viable foraging resource for eagles.

3.5.4 Swift parrot and blue-winged parrot

Although swift parrots have been recorded in the broader area in recent times, there have been no records within 5 km of the study area, and there is only marginal foraging habitat recorded in the form of a small patch of *Eucalyptus ovata* forest (DOV).

It is highly unlikely that swift parrots utilise the project area for breeding. There is very little prime foraging habitat nearby. Foraging habitat is present in the form of just 0.1 ha of DOV forest, with no mature trees greater than 40 cm DBH, which is considered the minimum size for foraging trees to offer a significant nectar resource. As such, any impacts are likely to have a negligible impact on the foraging habitat for swift parrots. The project area falls outside known swift parrot breeding areas.

Five trees that may contain hollows suitable for blue-winged parrots were recorded in the northernmost extent of the project area. A further 25 trees that may contain hollows or have structural traits that may lead to the formation of hollows, were recorded within 150 m of the project area. No parrots were observed during field surveys.

3.5.5 Green and gold frog and striped marsh frog

Although there are no observation records for either frog within 5 km vicinity of the project area is within the potential range of both species and habitat is present in localised marshes and wetlands with emergent vegetation. The scale of impact is not likely to have a significant impact to these species should they be present.

3.5.6 Giant freshwater crayfish

The project area is located within the known range of this species, with several records linked to the Ringarooma River catchment. Although no crayfish were observed during field surveys, Bradshaws Creek and a small stream within SMR vegetation was identified as containing marginal habitat suitable for adult crayfish. Due to high silt levels, no streams suitable for juveniles are present in the project area.

3.5.7 Chaostola skipper

Field surveys identified isolated occurrences of the host plant, *Gahnia radula*, in very low densities within the project area. The project area is on the edge of the potential range of this species, and given the sparse coverage of *Gahnia radula*, the project area is highly unlikely to support this species.

3.6 DECLARED AND ENVIRONMENTAL WEEDS

Introduced plant species are generally sparse across the project area, with only a small number of isolated occurrences recorded. A total of seven introduced species were recorded, with only one (Spanish heath) being listed as 'declared' under the Tasmanian *Biosecurity Regulations 2022* (in effect under the Tasmanian *Biosecurity Act 2019*).

The project area is largely weed-free, with a few environmental weeds such as radiata pine prevalent in the south of the site. Spanish heath (*Erica lusitanica*) is the only species of declared weed present. Within the project area, a patch covering ~100 m² was recorded in DAC vegetation in the southwest of the site (Plate 8). Spanish heath was also recorded ~30 m north of the northernmost extent of the project area in DOB vegetation.

Canary broom and Spanish heath are present in the vicinity (150m buffer). Additionally, environmental weeds are present in the main impact area with radiata pine being locally abundant. In the buffer adjacent to the township of Pioneer, environmental weeds are more frequent including arum lily and other garden escapes.



Plate 7: Spanish heath infestation within DAC vegetation

3.7 GEOCONSERVATION SITES

The *natural values report* identifies a geoconservation site, *Pioneer Oligocene -Miocene Plant Fossil Site* considered of State significance forming one of many *Cenozoic Plant Macrofossils of Tasmania* that collectively are considered of global significance. This site is made up of 'mudstone lenses exposed by the Pioneer tin mine' that contain 'abundant mummified leaves and reproductive structures' dated from the late Oligocene / Early Miocene⁷⁸. This is only one of two lowland flora fossil sites in Tasmania. The natural values report identifies it to be located outside and 150 m north west of the project area. More significantly it is described as being submerged beneath the waters of Pioneer Lake which was allowed to fill at the cessation of mining operations⁷⁹.

⁷⁸ Jordan & Hill (2002)

⁷⁹ Jordan & Hill (2002)

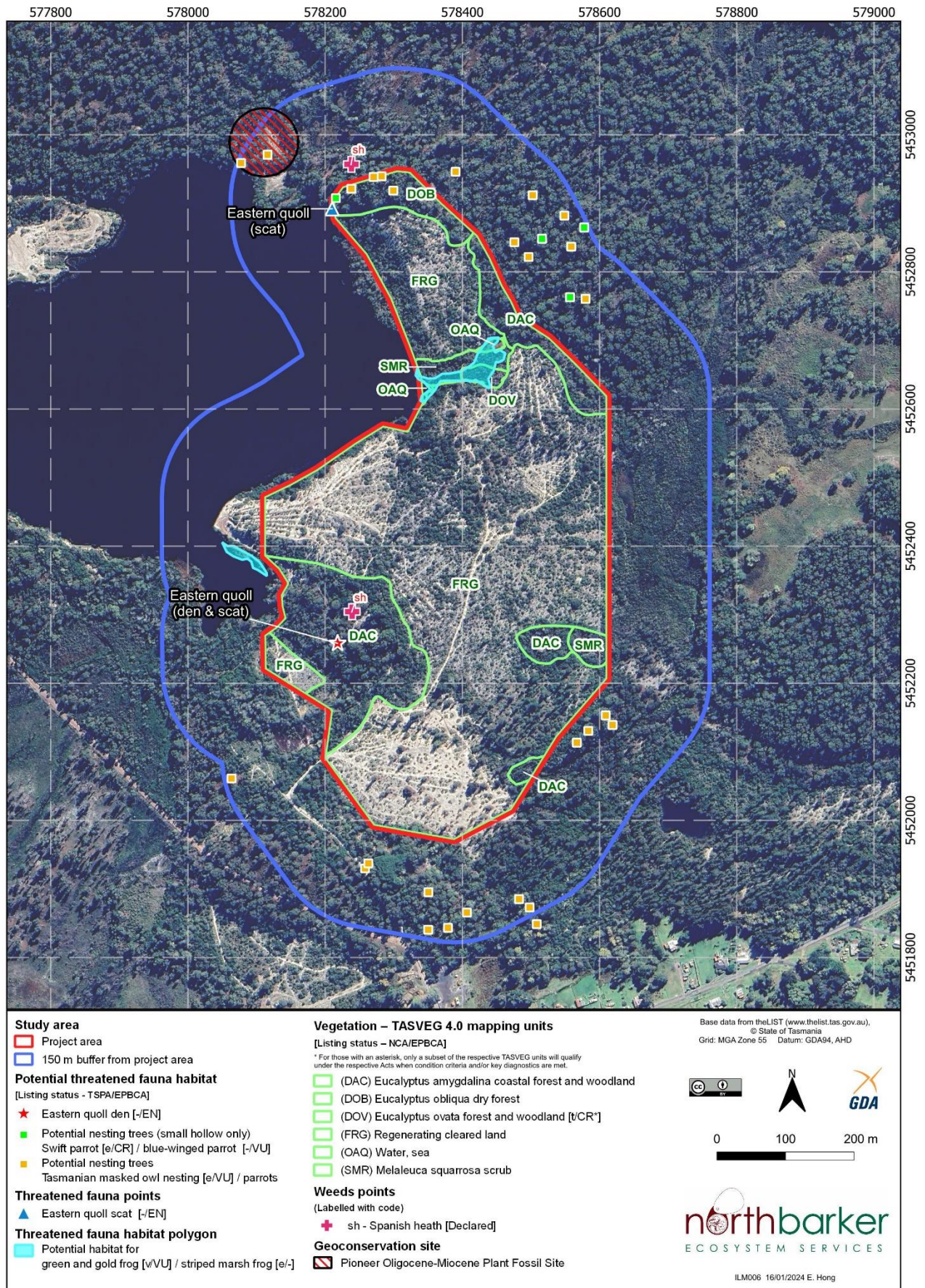


Figure 2: Natural Values and Constraints

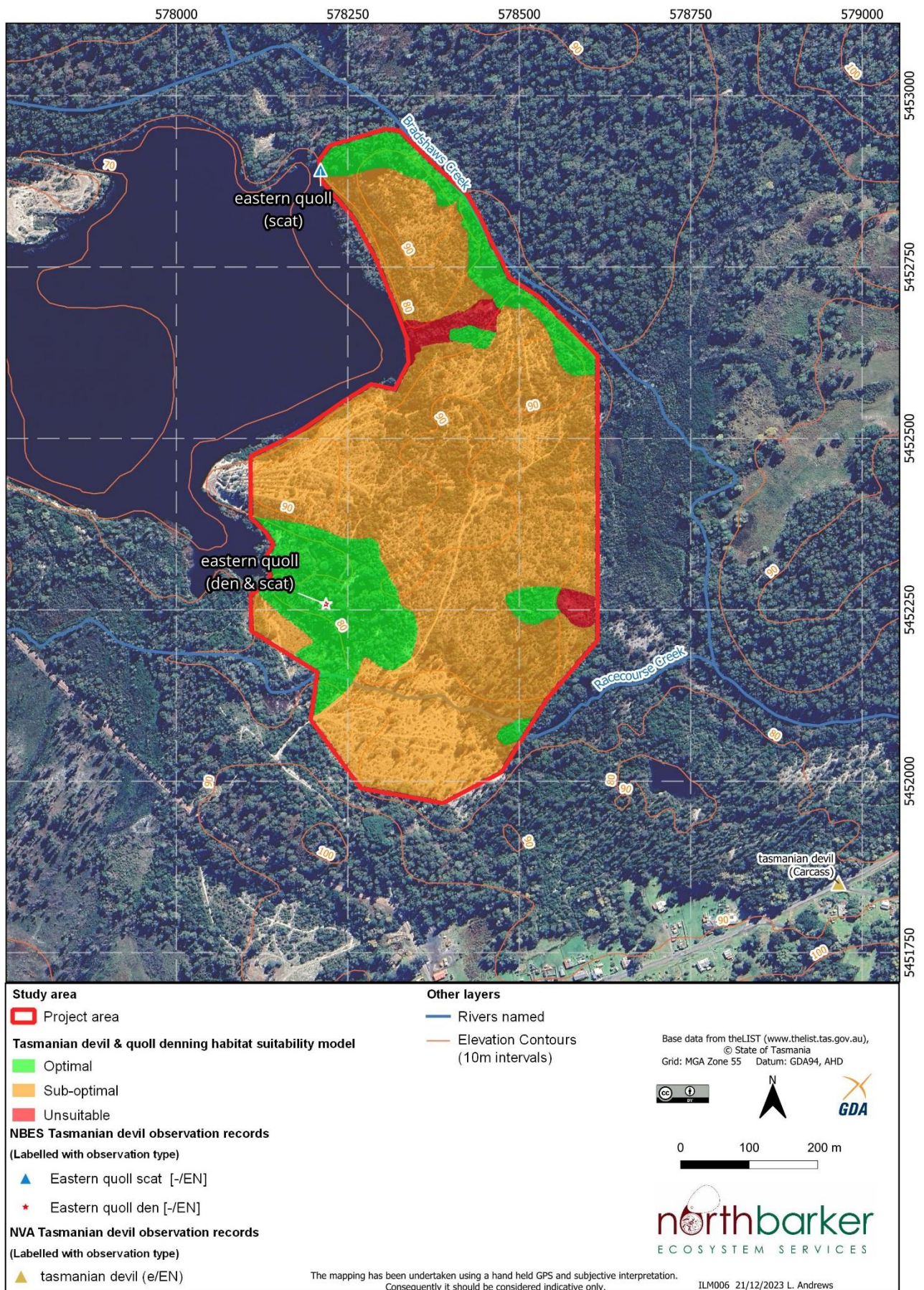


Figure 3: Tasmanian devil and quoll habitat and evidence

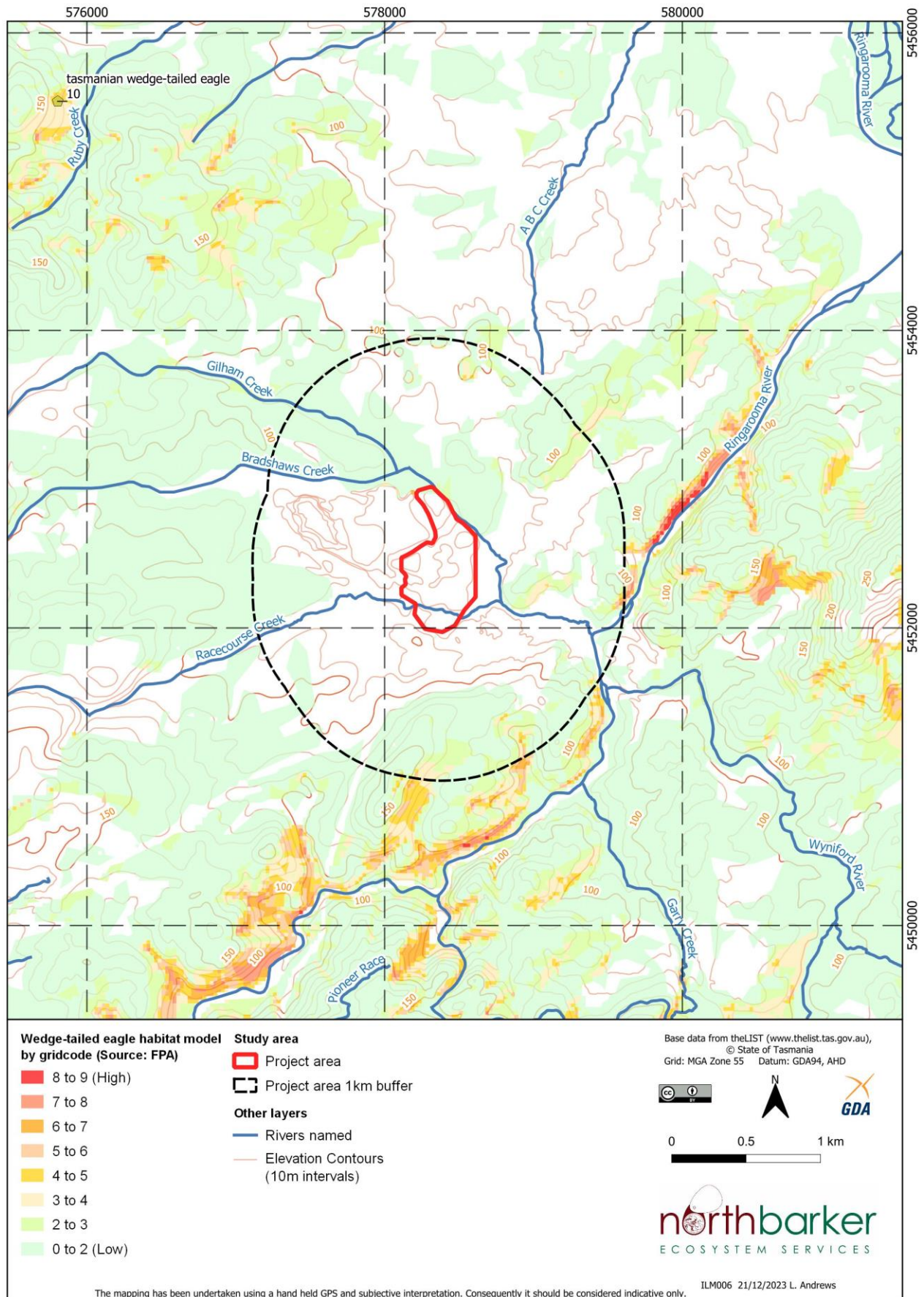


Figure 4: Wedge-tailed nesting habitat model

4 ASSESSMENT OF IMPACT AND MITIGATION

4.1 VEGETATION COMMUNITIES

Assuming complete disturbance the maximum footprint of the project area is 31.14 ha. The main impact area is regenerating vegetation on old spoil heaps. Only 6.83 ha (22 %) supports classifiable native vegetation communities. Only 0.15 ha (<0.005 %) constitutes a threatened vegetation community (DOV).

Table 3: Summary of vegetation communities and reservation status in the project area

TASVEG Code	Description	Total Area (ha)	Conservation and Reservation Status (NCA)
DAC	<i>Eucalyptus amygdalina</i> coastal forest and woodland	5.15	Not threatened
DOB	<i>Eucalyptus obliqua</i> dry forest	0.87	Not threatened
DOV	<i>Eucalyptus ovata</i> forest and woodland	0.15	Threatened
SMR	<i>Melaleuca squarrosa</i> scrub	0.66	Not threatened
FRG	Regenerating cleared land	24.31	N/A
Total		31.14	

Mitigation

The impacts of vegetation clearance are difficult to mitigate; however, the risk of unnecessary and indirect impacts on vegetation in the buffer zone and outside the project area could be minimised by following these measures:

- Clearly define the extent of clearance required for the project and ensure that any additional impacts are avoided.
- Mark the works area on operation plans and on site, and confine all works, vehicles and materials to the works area.
- Develop a revegetation plan that progressively restores areas of the site once finished with back to the original native vegetation community using locally sourced propagation material.

4.2 FLORA OF CONSERVATION SIGNIFICANCE

No threatened flora species were recorded during the field survey, and the likelihood of threatened flora occurring on the site is very low.

Mitigation

Specific mitigation for threatened flora is not warranted.

4.3 FAUNA OF CONSERVATION SIGNIFICANCE

4.3.1 Tasmanian devil, spotted-tail quoll and eastern quoll

Evidence of eastern quoll, in the form of scats and a den, were recorded during the survey. Habitat suitable for denning of quolls and Tasmanian devils is present across sections of the project area.

The scale of development proposed (6.83 ha loss of native vegetation) will not significantly impact on the overall carrying capacity of the site for devils and quolls and will not result in localised effects on populations.

The development is unlikely to have a marked impact on the populations of species that can have home ranges of several hundred hectares (e.g. Tasmanian devil, spotted-tail quoll) and have relatively broad foraging niches. The site is also contiguous (or effectively so), with extensive amounts of equivalent quality foraging habitat. Thus, unless the site (and broader extents of individual home ranges) is in the unlikely scenario of being at full saturation in use of available habitat, there is likely to be some capacity to absorb the loss of habitat without a reduction of the population size. If this was not the case, the contraction of the effective population size would be equivalent to less than 1 individual – even if a conservative home range estimate of 200 ha is used for tasmanian devils, 6.83 ha is only equivalent to less than 4 % of the range of 1 individual. The number of individuals using this area is unknown but possibly 2-3.

The key to limiting the potential impact of the habitat clearance at the population level will be reducing the likelihood of interrupting denning activities. Based on our observations, the footprint is unlikely to support a cluster of dens or one used repeatedly over the course of many years, as such keystone denning elements become conspicuous from the level of use, and are thus unlikely to have been overlooked. It could support one or more isolated dens with the potential for use within any given season, although the likelihood is low. Nonetheless, to mitigate any potential for disruption of an active den, it is recommended that a pre-clearance survey and den management protocol is applied (under permit) in accordance with the *Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian devil*⁸⁰.

Roadkill can be a significant cause of mortality for all vertebrate carnivores. The Survey Guidelines and Management Advice⁸¹ consider increases in road use, especially at dawn and dusk can result in an increased risk of roadkill. The guidelines (Table 1) suggest that an increase >10 % in traffic volume combined with a high abundance of devils or incidence of roadkill warrant a roadkill assessment.

The proposal allows for a full production of 77,000 tonnes of sand per year to be exported off site. This equates to a maximum of 14 heavy vehicle movements per day with the expectation that initially there may be significantly fewer traffic volumes than that⁸². All vehicles will use approximately 200 m of Racecourse Road before turning into Gladstone Road and continuing through the township of Pioneer. The expectation as throughout this activity vehicle speeds will be less than 30 km / hr. When taking into account speeds and truck noise, this constitutes a low collision risk. The change to traffic volumes on Gladstone Road, even at maximum traffic volumes, will be considerably less than 10 % of existing volumes. Consequently, the impact to roadkill incidences is considered insignificant and does not warrant any specific road kill mitigation planning.

Mitigation

To mitigate any potential for disruption of an active den, it is recommended that a pre-clearance survey and den management protocol is applied (under permit) in accordance with the *Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian devil*⁸³.

4.3.2 Tasmanian masked owl

Four trees of sufficient size to potentially contain hollows suitable for the Tasmanian masked owl were recorded in the northernmost extent of the project area. Although the scale of loss is small the potential

⁸⁰ v 2.0 Environment Strategic Business Unit (2023) DNRE

⁸¹ Environment Strategic Business Unit (2023)

⁸² Barry Williams pes.com

⁸³ v 2.0 Environment Strategic Business Unit (2023) DNRE

for use remains. The likelihood of disturbance of a nesting tree located in the buffer is also low but also cannot be discounted.

Targeted surveys for presence of masked owls can be achieved through use of song meters left to record calls over a period of time.

The likelihood of owls utilising the project area for nesting is considered to be low and there are ample nesting opportunities in the surrounding area. Although trees with trunk diameter exceeding 100cm were recorded as they meet the recognised threshold for potential nesting trees, no evidence of hollows of sufficient size were apparent and the likelihood of any being overlooked is small.

Mitigation

Considering that no trees in the buffer or project area are likely to support hollows large enough to be utilised by masked owls, no further measures are recommended.

However, if any tree with trunk diameter > 100 cm is deemed a potential masked owl tree then further investigations may be required. These would involve use of song meter recorder for a period of time that meets current survey guidelines. Should owls be confirmed active the area then further survey will be necessary to determine whether owls are nesting in tree on site or within the buffer. If no evidence is found, then it is reasonable to conclude the trees are not in active use in the vicinity. Surveys should be undertaken within acceptable timeframe prior to works commencing.

If any large trees of potential habitat size are to be removed, then a hollow bearing tree management protocol should be applied. This would include closer inspection of trees including climbing, if necessary, to determine the presence of suitable nesting hollows and potential occupancy. Minor adjustment to the project area would allow for the retention of habitat trees.

4.3.3 Wedge-tailed eagle & white-bellied sea eagle

The absence of suitable nesting habitat within 1 km of the nest suggests no likelihood of impact.

Mitigation

No mitigation measures are recommended.

4.3.4 Swift parrot and blue-winged parrot

No impact to swift parrot is anticipated as there is limited preferable foraging habitat and the project area is outside the breeding range of the species.

Five trees that may contain hollows suitable for blue-winged parrots were recorded in the northernmost extent of the project area. A further 25 trees that may contain hollows or have structural traits that may lead to the formation of hollows, were recorded within 150 m of the project area. The scale of sensitivity to disturbance to nesting parrots is not known.

Mitigation

If any trees of potential habitat size are to be removed, then a hollow bearing tree management protocol should be applied. This would include closer inspection of trees including climbing, if necessary, to determine the presence of suitable nesting hollows and potential occupancy. Minor adjustment to the project area would allow for the retention of habitat trees.

4.3.5 Green and gold frog and striped marsh frog

There is habitat for both the green and gold frog and striped marsh frog within the project area. This is localised and although likely to provide breeding habitat in wet years is unlikely to support breeding habitat through periods of drought when they will be constrained to larger and more permanent water bodies with the necessary habitat features. The scale of impact to habitat is not significant and is not likely to adversely impact local populations in any meaningful way.

Mitigation

To confirm their presence would require targeted surveys during the spring breeding season when frogs are active and calling. Surveys should be conducted prior to removing or filling the identified potential habitat.

4.3.6 Giant freshwater crayfish

No habitat present or considered likely to be impacted.

Mitigation

No mitigation measures are recommended.

4.3.7 Chaostola skipper

Very limited habitat present and likelihood of impact is remote.

Mitigation

No mitigation measures are recommended.

4.4 INTRODUCED PLANTS AND PATHOGENS

4.4.1 Weeds

The only declared weed present in the project area is Spanish heath. There are also substantial numbers of radiata pine present in the regenerating cleared land. Near the township of Pioneer, both declared and environmental weeds are more diverse and abundant.

Mitigation

As only a small number of declared weeds are present, and the main impact area is largely weed-free, a Weed and Hygiene Management Plan (WHMP) specific to the project is recommended. The WHMP should address the following areas:

1. A weed management plan that covers all relevant aspects of the control and management of declared and environmental weeds. The weed management plan to include:
 - An overarching set of objectives and the context in which they are to be achieved;
 - An assessment of the potential impact of the introduction of weeds, including immediate and adjacent areas which are free of weeds;
 - Strategies for managing weeds including their eradication within the project area and on any public roads used for mine-related transport.
 - Strategies for ongoing monitoring and control of weeds within the project area; and
 - Identification of appropriate herbicides for control and how they are to be used.
2. A hygiene plan also aimed at pathogen control is part of the WHMP to ensure there is no introduction of pathogens or 'declared' weeds or significant environmental weed species into the area, translocation of weeds within the study area or the import of existing declared weeds from outside the area. The hygiene plan should cover, but not be limited to:
 - Vehicle, machinery and equipment hygiene;
 - Washdown protocols when travelling between clean and contaminated areas;
 - Location and management of washdown areas and facilities, including management of effluent;
 - Maintaining logbooks detailing adherence to hygiene protocols for all contractors; and
 - Material hygiene (soils, gravel, plant material etc.) – ensuring that no materials contaminated with weed propagules (seed, propagative vegetative material) are imported into the project area.

As a minimum standard, all works should follow the following best-practice guidelines:

- *Keeping it clean – A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens*⁸⁴;
- *Weed and Disease Planning and Hygiene Guidelines – Preventing the spread of weeds and diseases in Tasmania*⁸⁵;
- *Tasmanian Washdown Guidelines for Weed and Disease Control. Machinery, Vehicles & Equipment*⁸⁶
- *Wetlands and Waterways Works Manual*⁸⁷.

4.4.2 Phytophthora cinnamomi

No evidence of PC was recorded during field surveys; however, susceptible vegetation is present in the project area and thus mitigation measures are required to manage this risk.

Mitigation

The greatest risk of spread of PC is to the surrounding vegetation or regenerating open areas on the margins of clearings. Soil disturbance should be restricted to the footprint of works.

The vehicle washdown hygiene protocols adopted in the WHMP will also be effective in minimising the risk of introducing PC to the project area, which at this stage is believed to be largely PC-free.

Active management to continually limit the spread of PC remains a focus of Tasmania's control strategy. Ongoing monitoring for future infections plays an important role should be included in the Weed and Hygiene Management Plan (WHMP).

4.4.3 Chytrid fungus

Although no frogs were recorded during field surveys, there is habitat suitable for frogs on the site, including the green and gold frog and the striped marsh frog. The project presents a risk of spreading this fungus and, as such, mitigation measures are required.

Mitigation

The greatest risk of spreading chytrid fungus into the project area is by the construction of new roads and the movement of vehicles to the site. The spread of the pathogen is considered likely to be promoted by human activity in Tasmania, as its occurrence in remote wilderness areas is correlated with variables linked to human disturbance, including the presence of gravel roads⁸⁸.

The vehicle washdown hygiene protocols adopted in a WHMP will also be effective in minimising the risk of introducing chytrid fungus to the project area, which at this stage is believed to be chytrid free.

4.5 GEOCONSERVATION SITES

The one geoconservation site in the vicinity (*Pioneer Oligocene -Miocene Plant Fossil Site*) is located outside the project area and submerged beneath Pioneer Lake. The proposed works will not impact on this site.

⁸⁴ Allen & Gartenstein (2010)

⁸⁵ Department of Primary Industries, Parks, Water and Environment (2015b)

⁸⁶ Department of Primary Industries, Parks, Water and Environment (2004)

⁸⁷ Department of Primary Industries, Parks, Water and Environment (2003)

⁸⁸ Pauza *et al.* (2010)

5 LEGISLATIVE IMPLICATIONS

5.1 TASMANIAN *ENVIRONMENTAL MANAGEMENT AND POLLUTION CONTROL ACT 1994*

The project is being assessed as a Level 2 Activity by Tasmania's Environmental Protection Agency (EPA) under this legislation. This will require the preparation of an Environmental Effects Report (EER) to be assessed against EMPCA.

This document (natural values report) forms part of the documentation to address Part C sections 4 and 5 of the Environmental Effects Report guidelines.

5.2 COMMONWEALTH *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999*

The EPBCA is structured for self-assessment; the proponent must determine whether the project has the potential for significant impacts to MNES and the potential to be a 'controlled action', which, if confirmed, would require assessment and approval from the Commonwealth Minister.

Referral under the EPBC Act will be necessary if there is potential for significant impacts to MNES.

Based on the current understanding of potential MNES within the project area, the most likely triggers for referral can be expected to be potential impacts to eastern quoll and green and gold frog. The scale of impact related to this project is not likely to be significant. Worst case the project will impact an active eastern quoll den and a small wetland potentially supporting green and gold frog. These impacts are unlikely to trigger significant impact guidelines⁸⁹ Targeted surveys are very likely to confirm neither is breeding on site thus reducing the scale of impact further.

5.3 TASMANIAN *THREATENED SPECIES PROTECTION ACT 1995*

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

Disturbance to either threatened flora or fauna species within the meaning of the word 'take' under the Act will trigger the requirement for a permit under this Act.

No threatened flora species are present that can be impacted. Full determination of the likely impact to listed fauna would require further investigation, notably confirmation whether or not the small wetland supports green and gold frog. Application of den survey protocols will ensure no impact to devils or quolls that would necessitate a permit.

5.4 TASMANIAN *FOREST PRACTICES ACT 1995*

Under the Tasmanian *Forest Practices Act 1995*, a Forest Practices Plan (FPP) is required for clearing of land. However, Section 6 states that this does not apply in prescribed circumstances. The prescribed circumstances are defined in the *Forest Practices Regulations 2017*.

Section 4 of the Regulations states under what circumstances an FPP is not required. These circumstances include:

- (i) 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, in the course of mineral exploration activities, or mining activities, that are authorised under –
 - (i) a permit granted under the *Land Use Planning and Approvals Act 1993*;

⁸⁹ Commonwealth of Australia (2013)

A permit granted under the tasmanian Planning Scheme meets this criterion; consequently, the activity is exempt from the *Forest Practices Act 1995*.

5.5 TASMANIAN BIOSECURITY ACT 2019

According to the provisions of the Tasmanian *Biosecurity Regulation 2022* (which operates under the Tasmanian *Biosecurity Act 2019*), Zone B municipalities are those which host moderate or large infestations of a 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. Further, there is a requirement to prevent spread of the weeds to properties containing sites for significant flora, fauna, and vegetation communities.

Zone A localities are areas in which eradication is deemed feasible (generally due to the existence of a targeted management plan) and is the responsibility of the landowner or land manager or, in the case of disturbance, the development proponent.

The relevant statutory weed management plans define the Dorset Council as a Zone A municipality for infestations of Spanish heath (*Erica lusitanica*). Eradication may not be possible in this circumstance. However, a Weed and Hygiene Management Plan (WHMP) is recommended as part of the project which includes specific measures to control and limit any risk of spreading Spanish heath.

5.6 TASMANIAN LAND USE PLANNING AND APPROVALS ACT 1993

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 1'⁹⁰.

Schedule 1 includes 'The objectives of the Resource Management and Planning System of Tasmania' which are (amongst other things): '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'⁹¹.

Over and above threatened species and forest clearance issues it should be incumbent on the proponent to demonstrate that the works will include measures to fulfil this aim by:

- incorporating measures to control environmental weeds; and
- maintain water quality through the proper management of erosion and drainage.

It is anticipated that these aspects will be addressed in the Environmental Effects Report.

5.7 TASMANIAN PLANNING SCHEME

In consideration of the requirements of LUPAA, each municipal area incorporates development standards codes under the appropriate planning scheme. The project area is located entirely within the Dorset Council area, which is covered by the Tasmanian Planning Scheme.

5.7.1 Rural Zone

All of the project area is designated as Rural Zone (20).

The Rural Zone does not have any specifications in relation to the protection of natural values, so the project will not conflict with zone purpose statements (in relation to natural values).

⁹⁰ section 51(2)(b) – Part 4 Enforcement of Planning Control – Division 2 Development Control Tasmanian *Land Use Planning and Approvals Act 1993*

⁹¹ p.56, Tasmanian *Land Use Planning and Approvals Act 1993*

5.7.2 Natural Assets Code C7

Figure 5 identifies the extent of coverage of two overlays with implications for natural values covered in this assessment. The Waterways and Coastal Protection overlay follows corridors along Racecourse Creek which passes through the southern part of the project area and Bradshaw's Creek which approximates to the eastern boundary. The priority vegetation area overlay includes most of the forested patches.

Certain uses and developments are exempt from the Natural Assets Code including:

C7.4.1 (b) development assessed as a Level 2 Activity.

Matters addressed by the Natural Assets Code can be expected to be covered off in the Environment Effects report assessment process. So, to avoid doubling up the Natural Assets Code need not be considered.

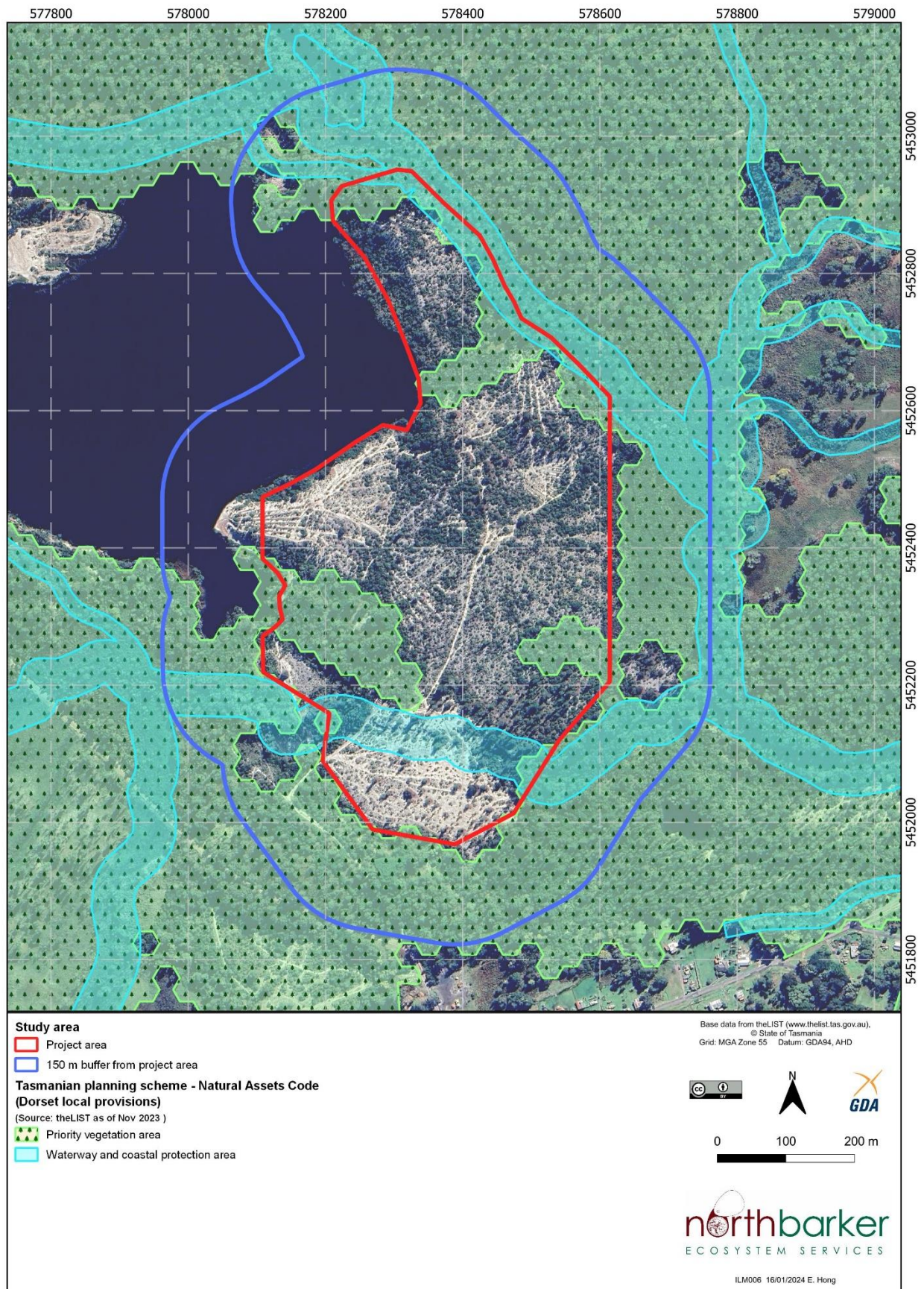


Figure 5: Natural Assets Code

6 CONCLUSION AND RECOMMENDATIONS

The proposed reworking of mine tailings and stockpiles east of Pioneer Lake have been subject to a thorough natural values survey. This has confirmed that few significant biodiversity conservation values are at risk of impact. Some low risk impacts are recognised along with potential environmental disturbance from the works. Several measures are recommended to ensure any such risk is minimised to acceptable levels and adequate mitigation is included.

It is concluded that the environmental assessment process being conducted at the State level through EMPCA is sufficient and that impacts to national values (matters of national environmental significance) are not significant justifying a recommendation to not refer the project through the *Environment Protection and Biodiversity Conservation Act 1999*.

6.1 NATIVE VEGETATION

- To protect vegetation in the vicinity from inadvertent impacts, prior to the commencement of works, the development footprint should be marked (either in situ and/or clearly on construction plans) and all contractor agreements should specify that works, vehicles, and materials must be confined within the designated impact areas.
- Incorporate a revegetation plan post works or in the event the operations cease. The plan should outline suitable species for revegetation (sourced from the local environment, with example species in Appendix E), as well as revegetation specifics, such as seed application rates, use of established plants, specific planting details, etc.

6.2 THREATENED FLORA

- There is no evidence of threatened flora being impacts or at risk of disturbance. No specific measures are recommended.

6.3 WEEDS AND PATHOGENS

- A project specific Weed and Hygiene Management Plan (WHMP) in accordance with details specified in 4.4.1 will ensure best practice weed management and comply with relevant legislation. The WHMP must be referenced by civil contractor requirements within a Construction Environment Management Plan or similar. The WHMP should adhere to the principles of best practice guidelines and relevant legislation, and contain requirements and prescriptions for:
 - Weed removal and treatment prior to, during, and after operations – post works survey requirements should include sufficient buffer to limit the likelihood of new weeds establishing.
 - Requirements for wash-down and inspections of all site plant, including earth-moving machinery.
 - Specifications around the relocation, importation and reuse of soil, substrate, and plant material during works – critically, this will need to cover the debris from existing infestations following vegetation clearance, which is likely to require deep burial or an equivalent treatment.
- The facility should have in place a Weed Management Strategy for the lifetime of operations, covering weed control along access roads and the project area with adequate buffer.

6.4 THREATENED FAUNA

- To ensure no impacts to breeding success of tasmanian devils and quolls implement a pre-clearance burrow/den survey and den management protocol as discussed in section 4.3.1 (under permit) in accordance with the procedure provided in section 4.4.1.
- To ensure no impact to breeding masked owls or blue-winged parrots develop a hollow bearing tree management protocol if hollow bearing trees require removal. Although we do not consider it necessary, to comply with contemporary guidelines it may be a requirement to undertake audible surveys using song meters.

- To confirm there is no impact to breeding green and gold frog or striped marsh it would be necessary to undertake targeted surveys during the breeding season of wetland habitats in the season prior to the habitats being filled in or disturbed. It is our opinion that this is a very low possibility and is not recommended.

6.5 LEGISLATIVE REQUIREMENTS

- Application of the recommended den and hollow-bearing tree management protocols will require a permit under the *Nature Conservation Act 2002* for the removal of nests and burrows/dens (products of wildlife) for species protected under the schedules of the Tasmanian *Nature Conservation (Wildlife) Regulations 2021*.
- A permit to take products of wildlife (other than burrows/dens and hollow-bearing trees covered by the specific protocols) may also be required for the destruction of nests of species protected under the schedules of the Tasmanian *Nature Conservation (Wildlife) Regulations 2021*, particularly bush birds. This should be considered if works are being undertaken in spring or summer (when the relevant species may be nesting) – in this scenario, a pre-clearance survey of nesting birds will be required to inform the requirement for a permit.
- Few *Environment Protection and Biodiversity Conservation Act 1999 (EPBCA)* listed matters of national environmental significance are present or likely to be impacted and the likelihood of significant impact is remote. Referral under the EPBCA provides opportunity for the Department of Climate Change, Energy, the Environment and Water to confirm this assertion and determine that the project need not be a controlled action. Considering the scale and risk of impacts this is not recommended in this instance.

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APPENDIX A – FIELD DATA SHEET

Job Code:		Recorder(s):		Date:	
Location:		Veg Structure:		Rock %:	
Easting:		Geology:		Litter %:	
Northing:		Aspect:		Moss/Lichen %:	
Waypoint:		Slope:		Logs Cover:	
Veg Code:		Elevation:		Disturbance:	

LF	Ht	Cover	Species
C			
T			
S			
H			
G			
LSR			
MSR			
TF			
GF			
SCE			

(R)= regrowth (D)= dominant (X)= Dead (S)= Sampled* (P)= Photographed*

Height and cover given for each layer of Canopy Trees (C), other trees/tall shrubs >2m (T), shrubs <2m (S), and tree ferns (TF). Cover only given for large graminoids (LSR), small graminoids (MSR), ground ferns (GF) grasses (G), herbs (H). Climbers/scramblers/epiphytes (SCE).
*Include Waypoint/Photo number for all sampled and photographed specimens

Weeds:

Site Description & Fauna Habitat Values (ie Owl - Hollow, Devil/Quoll – Scat/Denning Habitat etc.):
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APPENDIX B – DEFINITIONS OF CONSERVATION VALUES OF FLORA AND FAUNA SPECIES

SPECIES OF NATIONAL SIGNIFICANCE

Listed in Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The EPBCA has six categories of threat status for species:

1. **Extinct** - If at a particular there is no reasonable doubt that the last member of the species has died
2. **Extinct in the wild** - If it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or If it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form
3. **Critically endangered** - If at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria
4. **Endangered** - If it is not critically endangered; and it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria
5. **Vulnerable** - If at a particular time it is not critically endangered or endangered; and it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
6. **Conservation dependent** - If, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years

SPECIES OF STATE SIGNIFICANCE

Listed in Tasmanian *Threatened Species Protection Act 1995* (TSPA)

Threatened flora and fauna species in Tasmania are listed in Schedules 3 (extinct or endangered), 4 (vulnerable) or 5 (rare). These three categories are defined in Section 15 of the Act.

1. **Extinct** - If no occurrence of the taxon in the wild can be confirmed during the past 50 years
2. **Endangered** - If it is in danger of extinction because long-term survival is unlikely while the factors causing it to be endangered continue operating.
3. **Vulnerable** - If it is likely to become an endangered taxon while the factors causing it to be vulnerable continue operating.
4. **Rare** - If it has a small population in Tasmania that is not endangered or vulnerable but is at risk."

Species that have been nominated and approved by the Scientific Advisory Committee for listing in the Act

APPENDIX C – LEGISLATIVE IMPLICATIONS OF THREATENED SPECIES

Tasmanian State Legislation Affecting Threatened Species

Tasmanian Threatened Species Protection Act 1995

Threatened flora and fauna species in Tasmania are listed in Schedules 3 (endangered) and 4 (vulnerable) of the Threatened Species Protection Act, 1995. Rare species that are considered to be 'at risk' are listed in Schedule 5 of the Act. These three categories are defined in Section 15 of the Act.

1. "An extant taxon of native flora or fauna may be listed as **endangered** if it is in danger of extinction because long-term survival is unlikely while the factors causing it to be endangered continue operating.
2. A taxon of native flora or fauna may be listed as **vulnerable** if it is likely to become an endangered taxon while the factors causing it to be vulnerable continue operating.
3. A taxon of native flora or fauna may be listed as **rare** if it has a small population in Tasmania that is not endangered or vulnerable but is at risk."

The Act provides mechanisms for protecting these species from threatening processes the implementation of 'recovery plans', 'threat abatement plans', 'land management plans', public authority agreements', and 'interim protection orders'.

Section 51 (a) of the TSPA states that: "A person must not knowingly, without a permit – take, trade in, keep or process any listed flora or fauna". The Act defines 'take' as including: "kill, injure, catch, damage, destroy and collect. A land manager is therefore required to obtain a permit from the Tasmanian Department of Department of Natural Resources and Environment (NRE) to carry out management that may adversely affect any of the species listed in the Act.

Commonwealth of Australia Legislation Affecting Threatened Species

Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The EPBCA establishes a process for assessing actions that are likely to have impacts of *national environmental significance*. Such impacts include World Heritage Areas, RAMSAR Wetland sites of international importance, migratory species protected under international agreements, nuclear actions, the Commonwealth marine environment and **nationally threatened species and communities**.

Threatened species are defined in several categories:

1. Extinct
 - If at a particular there is no reasonable doubt that the last member of the species has died
2. Extinct in the wild
 - If it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
 - If it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form
3. Critically endangered
 - If at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria
4. Endangered
 - If it is not critically endangered; and it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria

5. Vulnerable

- If at a particular time it is not critically endangered or endangered; and it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

6. Conservation dependent

- If, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years

An action that is likely to affect species that are listed in any of the above categories may require ministerial approval unless the Commonwealth Environment Minister has granted an exemption. The Act establishes a **referral process** to Environment Australia to determine whether an action requires a formal **approval** and thus would be required to proceed through the **assessment and approval process**.

A referral must provide sufficient information to allow the Minister to make a decision. The Minister is then required to make a decision within 20 business days of the referral. The Minister may decide an approval is not necessary if the action is taken in a specified manner. The action may not require approval but may require a **permit** if undertaken on Commonwealth land. If an approval is required then an **environmental assessment** must be carried out. In such instances the environmental assessment approach will be determined by the Minister and may vary from preliminary documentation to a full public inquiry depending on the scale and complexity of the impact.

APPENDIX D – VEGETATION COMMUNITY SPECIES COMPOSITION

DAC - *Eucalyptus amygdalina* coastal forest and woodland

Trees:	<i>Eucalyptus amygdalina</i>
Tall Shrubs:	<i>Acacia dealbata</i> subsp. <i>dealbata</i> , <i>Acacia mearnsii</i> , <i>Allocasuarina littoralis</i> , <i>Banksia marginata</i> , <i>Bursaria spinosa</i> subsp. <i>spinosa</i> , <i>Exocarpos cupressiformis</i> , <i>Kunzea ambigua</i> , <i>Leptospermum scoparium</i> , <i>Melaleuca squarrosa</i> , <i>Monotoca glauca</i> , <i>Notelaea ligustrina</i>
Shrubs:	<i>Amperea xiphoclada</i> var. <i>xiphoclada</i> , <i>Epacris impressa</i> , <i>Micrantheum hexandrum</i> , <i>Ozothamnus obcordatus</i> , <i>Dillwynia glaberrima</i> , <i>Leptomeria drupacea</i>
Low Shrubs:	<i>Acrotriche serrulata</i> , <i>Pimelea humilis</i>
Herbs:	<i>Caladenia vulgaris</i> , <i>Dianella tasmanica</i> , <i>Drosera peltata</i> , <i>Gonocarpus teucroides</i> , <i>Goodenia lanata</i> , <i>Poranthera microphylla</i> , <i>Stylidium graminifolium</i> , <i>Burchardia umbellata</i> , <i>Drosera pygmaea</i> , <i>Galium australe</i> , <i>Gonocarpus micranthus</i> subsp. <i>micranthus</i> , <i>Wahlenbergia</i> sp.
Graminoids:	<i>Gahnia radula</i> , <i>Gahnia sieberiana</i> , <i>Juncus pallidus</i> , <i>Juncus procerus</i> , <i>Leptocarpus tenax</i> , <i>Lomandra longifolia</i> , <i>Luzula flaccida</i> , <i>Patersonia fragilis</i> , <i>Lepidosperma longitudinale</i> , <i>Schoenus apogon</i> , <i>Cynnogeton alcockiae</i> , <i>Diplarrena moraea</i>
Grasses:	<i>Distichlis distichophylla</i> , <i>Microlaena stipoides</i>
Ferns:	<i>Blechnum nudum</i> , <i>Blechnum watsii</i> , <i>Dicksonia antarctica</i> , <i>Gleichenia microphylla</i> , <i>Gleichenia dicarpa</i> , <i>Hypolepis rugosula</i> , <i>Selaginella uliginosa</i> , <i>Microsorium pustulatum</i> subsp. <i>pustulatum</i> , <i>Pteridium esculentum</i> subsp. <i>esculentum</i>
Climbers:	<i>Billardiera longiflora</i> , <i>Clematis aristata</i> , <i>Comesperma volubile</i>
Weeds:	<i>Vellereophyton dealbatum</i> , <i>Hypochaeris radicata</i>

DOV - *Eucalyptus ovata* forest and woodland

Trees:	<i>Acacia melanoxylon</i> , <i>Eucalyptus ovata</i> var. <i>ovata</i>
Tall Shrubs:	<i>Acacia mucronata</i> , <i>Kunzea ambigua</i> , <i>Leptospermum lanigerum</i> , <i>Melaleuca</i>
Graminoids:	<i>Baumea tetragona</i> , <i>Carex appressa</i> , <i>Eleocharis sphacelata</i> , <i>Gahnia sieberiana</i> , <i>Isolepis fluitans</i> , <i>Juncus bassianus</i> , <i>Juncus procerus</i>
Ferns:	<i>Gleichenia microphylla</i>
Weeds:	<i>Cyperus eragrostis</i>

DOB - *Eucalyptus obliqua* dry forest

Trees:	<i>Acacia melanoxylon</i> , <i>Eucalyptus amygdalina</i> , <i>Eucalyptus obliqua</i> , <i>Eucalyptus viminalis</i> subsp. <i>viminalis</i>
Tall Shrubs:	<i>Acacia mucronata</i> , <i>Allocasuarina littoralis</i> , <i>Banksia marginata</i> , <i>Bursaria spinosa</i> subsp. <i>spinosa</i> , <i>Exocarpos cupressiformis</i> , <i>Kunzea ambigua</i> , <i>Melaleuca squarrosa</i> , <i>Monotoca glauca</i>
Shrubs:	<i>Lomatia tinctoria</i> , <i>Olearia lirata</i> , <i>Pimelea drupacea</i> , <i>Pomaderris pilifera</i>
Herbs:	<i>Acaena novae-zelandiae</i> , <i>Caladenia vulgaris</i> , <i>Calochilus platychila</i> , <i>Drymophila cyanocarpa</i> , <i>Epilobium</i> sp., <i>Geranium potentilloides</i> var. <i>potentilloides</i> , <i>Lobelia pedunculata</i> , <i>Oxalis perennans</i> , <i>Veronica calycina</i> , <i>Viola hederacea</i> , <i>Wahlenbergia</i> sp.
Graminoids:	<i>Gahnia sieberiana</i> , <i>Lomandra longifolia</i>
Grasses:	<i>Microlaena stipoides</i>
Ferns:	<i>Blechnum nudum</i> , <i>Microsorium pustulatum</i> subsp. <i>pustulatum</i> , <i>Pteridium esculentum</i> subsp. <i>esculentum</i>
Climbers:	<i>Clematis aristata</i>
Weeds:	<i>Cirsium vulgare</i> , <i>Erica lusitanica</i>

OAQ - Water (Riparian species)

Graminoids:	<i>Baumea tetragona</i> , <i>Carex appressa</i> , <i>Eleocharis sphacelata</i> , <i>Gahnia sieberiana</i> , <i>Isolepis fluitans</i> , <i>Juncus procerus</i> , <i>Luzula flaccida</i> , <i>Schoenus apogon</i>
Ferns:	<i>Blechnum minus</i> , <i>Gleichenia microphylla</i>
Weeds:	<i>Cyperus eragrostis</i> , <i>Typha latifolia</i>

APPENDIX E – VASCULAR PLANT SPECIES LIST

Status codes:

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

Sites:

1	FRG - Regenerating cleared land - E578235, N5452491	14/11/2023 Karen Ziegler
2	FRG - Regenerating cleared land - E578235, N5452491	14/11/2023 Karen Ziegler
3	DAC - Eucalyptus amygdalina coastal forest and woodland - E578218, N5452258	14/11/2023 Danah Leary
4	DAC - Eucalyptus amygdalina coastal forest and woodland - E578218, N5452258	14/11/2023 Danah Leary
5	DOV - Eucalyptus ovata forest and woodland - E578436, N5452676	15/11/2023 Karen Ziegler
6	DVG - Eucalyptus viminalis grassy forest and woodland - E578451, N5452773	15/11/2023 Karen Ziegler
7	DOB - Eucalyptus obliqua dry forest - E578267, N5452922	15/11/2023 Karen Ziegler
8	OAQ - Water (Riparian species) - E578456, N5452691	15/11/2023 Karen Ziegler
9	OAQ - Water (Riparian species) - E578456, N5452691	15/11/2023 Karen Ziegler
10	FRG - Regenerating cleared land - E578235, N5452492	15/11/2023 Karen Ziegler
11	DAC - Eucalyptus amygdalina coastal forest and woodland - E578526, N5452718	15/11/2023 Karen Ziegler

Site	Name	Common name	Status
	DICOTYLEDONAE		
	APIACEAE		
4	<i>Hydrocotyle hirta</i>	hairy pennywort	
	ASTERACEAE		
7	<i>Cirsium vulgare</i>	spear thistle	i
10 11	<i>Hypochaeris radicata</i>	rough catsear	i
7	<i>Olearia lirata</i>	forest daisybush	
2	<i>Olearia phlogopappa</i>	dusty daisy bush	
6	<i>Ozothamnus obcordatus</i>	yellow everlastingbush	
3	<i>Vellereophyton dealbatum</i>	white cudweed	i
	CAMPANULACEAE		
7	<i>Lobelia pedunculata</i>	matted lobelia	
7 11	<i>Wahlenbergia sp.</i>	bluebell	
	CASUARINACEAE		
1 3 7	<i>Allocasuarina littoralis</i>	black sheoak	
	CLUSIACEAE		
4	<i>Hypericum japonicum</i>	matted st johns-wort	
	DILLENIACEAE		
10	<i>Hibbertia procumbens</i>	spreading guineaflower	

DROSERACEAE

1 3 6	<i>Drosera peltata</i>	pale sundew
11	<i>Drosera pygmaea</i>	dwarf sundew

ERICACEAE

1 3	<i>Acrotriche serrulata</i>	ants delight	
1 3	<i>Epacris impressa</i>	common heath	
1	<i>Epacris lanuginosa</i>	swamp heath	
7	<i>Erica lusitanica</i>	spanish heath	d
3 7	<i>Monotoca glauca</i>	goldey wood	
1	<i>Styphelia adscendens</i>	golden heath	
1	<i>Styphelia ericoides</i>	pink beardheath	

EUPHORBIACEAE

1 3	<i>Amperea xiphoclada</i> var. <i>xiphoclada</i>	broom spurge
3	<i>Micrantheum hexandrum</i>	river tridentbush
3	<i>Poranthera microphylla</i>	small poranthera

FABACEAE

1 3	<i>Acacia dealbata</i> subsp. <i>dealbata</i>	silver wattle
10	<i>Acacia genistifolia</i>	spreading wattle
1 3	<i>Acacia mearnsii</i>	black wattle
2 5 6 7 8	<i>Acacia melanoxylon</i>	blackwood
1 5 7	<i>Acacia mucronata</i>	variable sallow wattle
1	<i>Aotus ericoides</i>	golden pea
11	<i>Dillwynia glaberrima</i>	smooth parrotpea
10	<i>Hovea heterophylla</i>	winter purplepea

GERANIACEAE

7	<i>Geranium potentilloides</i> var. <i>potentilloides</i>	mountain cranesbill
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GOODENIACEAE

3	<i>Goodenia lanata</i>	trailing native-primrose
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HALORAGACEAE

11	<i>Gonocarpus micranthus</i> subsp. <i>micranthus</i>	creeping raspwort
3	<i>Gonocarpus teucrioides</i>	forest raspwort

MYRTACEAE

1 3 6 7	<i>Eucalyptus amygdalina</i>	black peppermint	en
7	<i>Eucalyptus obliqua</i>	stringybark	
4 5 6 8	<i>Eucalyptus ovata</i> var. <i>ovata</i>	black gum	
2 6 7	<i>Eucalyptus viminalis</i> subsp. <i>viminalis</i>	white gum	
1 3 5 6 7	<i>Kunzea ambigua</i>	white kunzea	
4 5 8	<i>Leptospermum lanigerum</i>	woolly teatree	
1 3	<i>Leptospermum scoparium</i>	common tea-tree	
2 3 5 6 7	<i>Melaleuca squarrosa</i>	scented paperbark	
8			

OLEACEAE

3	<i>Notelaea ligustrina</i>	native olive
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ONAGRACEAE

7	<i>Epilobium</i> sp.	willowherb
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OXALIDACEAE

7	<i>Oxalis perennans</i>	grassland woodsorrel
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PITTOSPORACEAE			
1 2 3	<i>Billardiera longiflora</i>	purple appleberry	en
3 7	<i>Bursaria spinosa subsp. spinosa</i>	prickly box	
PLANTAGINACEAE			
7	<i>Veronica calycina</i>	hairy speedwell	
POLYGALACEAE			
11	<i>Comesperma volubile</i>	blue lovecreeper	
PROTEACEAE			
1 3 6 7	<i>Banksia marginata</i>	silver banksia	
7	<i>Lomatia tinctoria</i>	guitarplant	en
RANUNCULACEAE			
7 11	<i>Clematis aristata</i>	mountain clematis	
RHAMNACEAE			
7	<i>Pomaderris pilifera</i>	hairy dogwood	
ROSACEAE			
4 7	<i>Acaena novae-zelandiae</i>	common buzzy	
RUBIACEAE			
11	<i>Galium australe</i>	tangled bedstraw	
SANTALACEAE			
1 3 6 7	<i>Exocarpos cupressiformis</i>	common native-cherry	
11	<i>Leptomeria drupacea</i>	erect currantbush	
STYLIDIACEAE			
1 3	<i>Stylidium graminifolium</i>	narrowleaf triggerplant	
THYMELAEACEAE			
7	<i>Pimelea drupacea</i>	cherry riceflower	
11	<i>Pimelea humilis</i>	dwarf riceflower	
VIOLACEAE			
7	<i>Viola hederacea</i>	ivyleaf violet	
GYMNOSPERMAE			
PINACEAE			
1 10	<i>Pinus radiata</i>	radiata pine	i
MONOCOTYLEDONAE			
ASPARAGACEAE			
2 3 6 7	<i>Lomandra longifolia</i>	sagg	
COLCHICACEAE			
11	<i>Burchardia umbellata</i>	milkmaids	
CYPERACEAE			
4 5 8	<i>Baumea tetragona</i>	square twigsedge	
5 8	<i>Carex appressa</i>	tall sedge	
5 9	<i>Cyperus eragrostis</i>	drain flatsedge	i

4 5 8	<i>Eleocharis sphacelata</i>	tall spikesedge
1 3	<i>Gahnia radula</i>	thatch sawsedge
2 3 5 7 8	<i>Gahnia sieberiana</i>	redfruit sawsedge
11		
5 8	<i>Isolepis fluitans</i>	floating clubsedge
1	<i>Lepidosperma concavum</i>	sand swordsedge
11	<i>Lepidosperma longitudinale</i>	spreading swordsedge
8 11	<i>Schoenus apogon</i>	common bogsedge
3	<i>Schoenus sp.</i>	bogsedge

HEMEROCALLIDACEAE

3	<i>Dianella tasmanica</i>	forest flaxlily
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IRIDACEAE

11	<i>Diplarrena moraea</i>	white flag-iris
3	<i>Patersonia fragilis</i>	short purpleflag

JUNCACEAE

5	<i>Juncus bassianus</i>	forest rush
3	<i>Juncus pallidus</i>	pale rush
4	<i>Juncus planifolius</i>	broadleaf rush
3 5 8	<i>Juncus procerus</i>	tall rush
3 8	<i>Luzula flaccida</i>	pale woodrush

JUNCAGINACEAE

11	<i>Cycnogeton alcockiae</i>	southern waterribbons
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LUZURIAGACEAE

7	<i>Drymphila cyanocarpa</i>	turquoise berry
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ORCHIDACEAE

9	<i>Acianthus sp.</i>	mosquito orchid
3 6 7	<i>Caladenia vulgaris</i>	summer fingers
7	<i>Calochilus platychila</i>	purple beard-orchid
9	<i>Pterostylis sp.</i>	greenhood
1	<i>Thelymitra sp.</i>	sun-orchid

POACEAE

3	<i>Distichlis distichophylla</i>	australian saltgrass
3 7	<i>Microlaena stipoides</i>	weeping grass

RESTIONACEAE

3	<i>Leptocarpus tenax</i>	slender twinerush
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TYPHACEAE

9	<i>Typha latifolia</i>	great reedmace
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PTERIDOPHYTA

BLECHNACEAE

8	<i>Blechnum minus</i>	soft waterfern
2 3 7	<i>Blechnum nudum</i>	fishbone waterfern
2 3	<i>Blechnum wattsi</i>	hard waterfern

DENNSTAEDTIACEAE

11	<i>Hypolepis rugosula</i>	ruddy groundfern
2 3 6 7	<i>Pteridium esculentum subsp. esculentum</i>	bracken

DICKSONIACEAE		
3	<i>Dicksonia antarctica</i>	soft treefern
GLEICHENIACEAE		
11	<i>Gleichenia dicarpa</i>	pouched corallfern
3 5 8	<i>Gleichenia microphylla</i>	scrambling corallfern
POLYPODIACEAE		
3 7	<i>Microsorium pustulatum subsp.</i>	kangaroo fern
SCHIZAEACEAE		
10	<i>Schizaea bifida</i>	forked combfern
SELAGINELLACEAE		
11	<i>Selaginella uliginosa</i>	swamp spikemoss

APPENDIX F – RESERVATION STATUS OF THE NATIVE VEGETATION COMMUNITIES

TASVEG Community	Extent in Project Area (ha)	Tasmania			Ben Lomond Bioregion			Status (JANIS) Reservation Adequacy#
		Current Extent (ha)	Reserved (ha) [% of Current Extent in Reserves]	Pre-1750 Extent (ha) [% of Pre-1750 Extent in Reserves*]	Current Extent (ha)	Reserved (ha) [% of Current Extent in Reserves]	Pre-1750 Extent (ha) [% of Pre-1750 Extent in Reserves**]	
DAC	5.15	149,800	79,800 (53.27%)	258,238 (30.90%)	45,800	24,900 (54.37%)	71,455 (34.85%)	p (C) Adequately Reserved
DOB	0.87	182,700	82,300 (45.05%)	262,331 (31.37%)	28,700	12,200 (42.51%)	42,018 (29.04%)	p (C) Adequately Reserved
DOV	0.15	14,600	4,400 (30.14%)	186,618 (2.36%)	2,700	700 (25.93%)	18,096 (3.87%)	E Inadequately Reserved
SMR	0.66	24,200	16,900 (69.83%)	-	1,900	900 (47.37%)	-	p (C) Adequately Reserved

^ pre-1750 extents for SMR are not available; as such, present extent figures are utilised to determine reservation status.

* Knight (2012)

** The percentage of the pre-1750 extent within reserves is calculated using the most recent fcf-FOREST_CAR ANALYSIS_2023 TASVEG 4.0 reservation figures.

JANIS criterion: E = endangered, p(C) = not threatened

APPENDIX G – THREATENED FLORA IN VICINITY

Threatened flora either recorded from within 5,000 m of the study area or predicted to potentially occur based on habitat mapping⁹², or included in the EPBCA Protected Matters Search Tool⁹³

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Habitat ⁹⁴	Likelihood of Occurrence	Commentary
<i>Barbarea australis</i> native wintercress	Endangered / -	0 / 0	A riparian species found near river margins, creek beds and along flood channels adjacent to the river. It tends to favour the slower reaches and has not been found on steeper sections of rivers. It predominantly occurs in flood deposits of silt and gravel deposited as point bars and at the margins of base flows, or more occasionally between large cobbles on sites frequently disturbed by fluvial processes. Some of the sites are a considerable distance from the river, in flood channels scoured by previous flood action, exposing river pebbles. Most populations are in the Central Highlands, but other populations occur in the north-east and upland areas in the central north.	None	The nearest occurrence of this species is from the St Patricks and North Esk rivers (>40 km southwest of the project area). There is no suitable habitat in the project area and thus no chance of occurrence.
<i>Baumea gunnii</i> slender twigsedge	Rare / -	0 / 3	Widespread in wet moors, creeks and rivers including rocky sections. Can occur on the margins of poorly drained sedgy/grassy forest and woodland dominated by <i>E. ovata</i> or <i>E. rodwayi</i> .	Very Low	There are a few small patches of <i>Eucalyptus ovata</i> which surround watercourses and poorly drained sites. These areas could support <i>Baumea gunnii</i> ; however, the species was not recorded during field surveys and it is unlikely to have been overlooked.
<i>Caladenia caudata</i> tailed spider-orchid	Vulnerable / Vulnerable	0 / 0	Highly variable habitat on a range of substrates. Typically found in heathy forest.	None	There is marginal habitat for this species in the forests surrounding the project area but no suitable habitat within the project area. Flowering

⁹² Department of Natural Resources & Environment (2023); Department of Climate Change, Energy, the Environment & Water (2023)

⁹³ Department of Climate Change, Energy, the Environment & Water (2023)

⁹⁴ Habitat descriptions collated from Threatened Species Link Species Management Profiles (NRE Tasmania database) and relevant SPRAT profiles (EPBCA database)

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Habitat ⁹⁴	Likelihood of Occurrence	Commentary
					of this species in the north of Tasmania typically occurs in mid to late October and can extend to late November ⁹⁵ . Surveys were conducted during the peak flowering period of this species, and although there is some chance that if present it could have been overlooked, it is unlikely to occur in the project area based on habitat suitability. There are also no records from the vicinity.
<i>Epacris graniticola</i> granite heath	Vulnerable / Critically endangered	0 / 0	Occurs in peaty soils or undulating terrain in association with heathlands, graminoid heaths and buttongrass scrub. It occurs in altitudes below 300 m.	None	The substrate of the project area is unsuitable for this species; thus it has no chance of occurring.
<i>Eutaxia microphylla</i> spiny bushpea	Rare / -	0 / 1	Occurs in windswept coastal heathland on calcarenite on the mainland. In Tasmania, the species usually occurs in low open coastal shrubbery and on cliff edges.	None	There has been one record of <i>Eutaxia microphylla</i> within 5 km of the project area; however, no occurrences were recorded during field surveys. This species is known only from near-coastal sites. It has distinctive flowers, flowering between September and January. There is no chance of this species occurring in the project area.
<i>Glycine latrobeana</i> clover glycine	Vulnerable / Vulnerable	0 / 0	Various soil types and vegetation; mainly occurs in grassy/heathy forests and native grasslands, typically on fertile soils.	None	This species has not been recorded within 30 km of the project area, and habitat is largely unsuitable. Flowering occurs between November and February, and the species is unlikely to have been overlooked.

⁹⁵ Wapstra (2018)

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Habitat ⁹⁴	Likelihood of Occurrence	Commentary
<i>Pimelea flava</i> subsp. <i>flava</i> yellow riceflower	Delisted / -	0 / 2	Wet and dry sclerophyll forest and woodland, extending into hardwood and softwood plantations. It often occurs abundantly on disturbed sites such as in logged forest, firebreaks, powerline easements and road batters.	N/A	At the time of survey this species was listed as rare, however this species has since been delisted by the Minister. As such there are no legislative implications pertaining to this species.
<i>Pomaderris phyllicifolia</i> narrowleaf pomaderris	Rare / -	0 / 7	Often occurs along gullies and streams, in open forest and woodland. Associated with flood-prone rocky and densely shrubby riverbanks in northern and eastern Tasmania.	Very Low	This is the parent species of the two subspecies described below. Because it is a distinctive species, it is unlikely to have been overlooked.
<i>Pomaderris phyllicifolia</i> subsp. <i>ericoides</i> revolute narrowleaf dogwood	Rare / -	0 / 178	Often occurs along gullies and streams, in open forest and woodland. Associated with flood-prone rocky and densely shrubby riverbanks in northern and eastern Tasmania.	Very Low	<i>Pomaderris phyllicifolia</i> subsp. <i>ericoides</i> has been recorded 178 times within a 5 km radius of the project area. No occurrences were recorded during the field surveys, and because this is a distinctive species, it is unlikely to have been overlooked.
<i>Pomaderris phyllicifolia</i> subsp. <i>phyllicifolia</i> narrowleaf dogwood	Rare / -	0 / 26	Often occurs along gullies and streams, in open forest and woodland. Associated with flood-prone rocky and densely shrubby riverbanks in northern and eastern Tasmania.	Very Low	<i>Pomaderris phyllicifolia</i> subsp. <i>phyllicifolia</i> has been recorded 26 times within a 5 km radius of the project area. No occurrences were recorded during the field surveys, and as this is a distinctive species, it is unlikely to have been overlooked.
<i>Pseudocephalozia paludicola</i> alpine leafy liverwort	- / Vulnerable	0 / 0	Occurs on wet ground in subalpine grassland in the west of the State and on its central and eastern mountains. Species of <i>Pseudocephalozia</i> mostly occur on permanently damp mineral soil or over peat and are frequently found in moorland and sphagnum areas.	None	There is a no chance of <i>Pseudocephalozia paludicola</i> being present within the project area due to the low altitude of the site and lack of adequate habitat.

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Habitat ⁹⁴	Likelihood of Occurrence	Commentary
<i>Pterostylis atriola</i> snug greenhood	Rare / -	0 / 1	Occurs in the north and east of Tasmania on generally stony soil in dry to damp sclerophyll forest, typically with an open understorey. The species occurs at a range of elevations but is most strongly associated with winter cold sites, or areas receiving a moderately consistent rainfall.	Low	One record within a 5 km radius of the project area near Three Notch Road (~2.3 km southeast of the project area) in forest habitat similar to what is present within the project area. This species flowers between January and March ⁹⁶ , thus it is unlikely to have been apparent at the time of survey, if present. Given the limited extent of available habitat within the project area and the paucity of local records, targeted surveys are not warranted at this stage.
<i>Senecio psilocarpus</i> swamp fireweed	Vulnerable / Endangered	0 / 0	Known from six widely scattered sites in the northern half of the State, including King and Flinders islands. It occurs in swampy habitats including broad valley floors associated with rivers, edges of farm dams amongst low-lying grazing/cropping ground, herb-rich native grassland in a broad swale between stable sand dunes, adjacent to wetlands in native grassland, herbaceous marshland, and low-lying lagoon systems.	Very low	Suitable habitat for this species is limited to the margins of swampy areas within the project area. The habitat within the project area is marginal, and surveys were conducted during the peak flowering period for this species, thus it is unlikely to have been overlooked.
<i>Spyridium parvifolium</i> var. <i>molle</i> soft dustymiller	Rare / -	0 / 1	Occurs in a range of vegetation types, mainly shrubby dry sclerophyll forests and woodlands. It can proliferate from soil-stored seed after disturbance.	Very low	There has been one record of <i>Spyridium parvifolium</i> var. <i>molle</i> observed within a 5 km radius of the project area. The species is well suited to the habitat found on the site; however, no occurrences were recorded during the field surveys. As this is a highly distinctive species, it is unlikely to have been overlooked.

⁹⁶ Wapstra (2018)

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Habitat ⁹⁴	Likelihood of Occurrence	Commentary
<i>Utricularia australis</i> yellow bladderwort	Rare / -	0 / 1	Stationary or slow-moving water, including natural lakes, farm dams and reservoirs, where it has been reported as forming locally dense swards.	Very low	One occurrence has been recorded within a 5 km radius of the project area. Within the site there are several areas of stationary water that could support <i>Utricularia australis</i> . No specimens were found during the early November 2023 survey. Flowering occurs between November and April (although flowering is a rare occurrence for this species), and if present, the submerged material is unlikely to have been overlooked.
<i>Xanthorrhoea arenaria</i> sand grasstree	Vulnerable / Vulnerable	0 / 0	<i>Xanthorrhoea arenaria</i> is restricted to coastal areas from Bridport in the north-east to Coles Bay on the east coast, where it occurs in coastal sandy heath.	None	There is no chance of <i>Xanthorrhoea arenaria</i> being present within the project area. It is not likely to have been overlooked.
<i>Xanthorrhoea bracteata</i> shiny grasstree	Vulnerable / Endangered	0 / 0	<i>Xanthorrhoea bracteata</i> is restricted to coastal areas from the Asbestos Range to Waterhouse Point in the north-east, where it occurs in sandy soils, often acidic and waterlogged, in coastal heathland.	None	There is no chance of <i>Xanthorrhoea bracteata</i> being present within the project area. It is not likely to have been overlooked.
<i>Xerochrysum palustre</i> swamp everlasting	Vulnerable / Vulnerable	0 / 0	Grows in swampy habitats such as sedgy-heathy wetlands, heathlands, and woodlands.	None	The project area has limited area of suitable habitat around the margins of SMR which could support this species. The flowering period of this distinctive species is November to March and therefore it is unlikely to have been overlooked.

APPENDIX H – THREATENED FAUNA IN VICINITY

Threatened fauna either recorded from within 5,000 m of the study area or predicted to potentially occur based on habitat mapping⁹⁷. (Note that migratory, coastal, wetland and marine species have been omitted from this list as they have no chance of occurring)

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
MAMMALS					
<i>Dasyurus maculatus maculatus</i> spotted-tailed quoll	Rare / Vulnerable	0 / 4	Denning: Low Foraging: High	This naturally rare forest-dweller most commonly inhabits wet forest but also occurs in dry forest. It forages and hunts on farmland and pasture, travelling up to 20 km at night, and shelters in logs, rocks or thick vegetation. Important habitat includes large patches of forest containing adequate denning sites and high densities of mammalian prey.	This is a wide ranging species that may well utilise habitat on site as part of its home range. No direct evidence of occupancy was found. No site specific features were identified to suggest the species is resident or denning within the site and surrounding forest although the site supports some optimal denning habitat.
<i>Dasyurus viverrinus</i> eastern quoll	Endangered / Endangered	0 / 8	Denning: High Foraging: High	Occurs in most parts of Tasmania and is recorded frequently in the northern and eastern part of the state. This species' distribution is associated with areas of low rainfall and cold winter minimum temperatures. It is found in a range of vegetation types including open grassland (including farmland), tussock grassland, grassy woodland, dry eucalypt forest, coastal scrub and alpine heathland, but is typically absent from large tracts of wet eucalypt forest and rainforest.	A potential den was found within the project area showing signs of use, evidenced by the presence of a quoll scat. There was an additional scat found with many insect carapaces which further indicated the presence of quolls within the site. Further investigation of this den site through camera trap monitoring would be required to confirm its occupancy.

⁹⁷ Department of Natural Resources and Environment (2023); Department of Climate Change, Energy, the Environment and Water (2023)

⁹⁸ Habitat descriptions collated from Threatened Species Link Species Management Profiles (NRE Tasmania database) and relevant SPRAT profiles (EPBCA database)

⁹⁹ Core and Potential Ranges are taken from (FPA Biodiversity Database) <https://fpa.tas.gov.au/planning/biodiversity/biodiversity-values-database>

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
<i>Perameles gunnii</i> eastern barred bandicoot	- / Vulnerable	0 / 0	Very Low	Occurs in Victoria and Tasmania. In Victoria the bandicoot is restricted to a small number of sites. In Tasmania it is relatively widespread although it has declined throughout the Midlands. It is listed nationally as vulnerable and although not listed in Tasmania, it is regarded as requiring monitoring. The eastern barred bandicoot is most often found in open areas such as woodlands and open grassy sites, where it forages for food. Its native habitat is grassland and grassy woodland dominated by tussocks, reeds, and grasses. It requires thicker ground cover for nesting and shelter.	The project area is quite open with regenerating native vegetation on a former waste dump. The soil is skeletal and is unlikely to provide good foraging for eastern barred bandicoot. The project area does not constitute critical habitat for this species, and it is not expected to be at risk of impacts from the proposed development. The site is within the potential range of the species.
<i>Pseudomys novaehollandiae</i> New Holland mouse	Endangered / Vulnerable	0 / 0	None	The habitat of this species is restricted to near-coastal areas that support suitable heaths and heathy woodlands from Beaconsfield in the north of Tasmania to Coles Bay (and Flinders Island). Habitat across the species' known range includes open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. On mainland Australia the species has been found to peak in abundance during the early to mid-stages of vegetation succession, which is typically 2–3 years post-fire. However, there are populations known in Tasmania that have been found in vegetation 16 years post-fire.	The New Holland mouse has been recorded in areas north and east of the project area at a distance greater than 5 km radius. While there are some heathy elements to the understorey, the habitat within the study area is of marginal suitability for this species. Most of the floral indicator species for preferred habitat are absent or at low abundance. Given the lack of optimal habitat, combined with the distance from the coast (over 23 km), it is highly unlikely that this species is present within the project area. The potential range is limited to 15 km from the coast.
<i>Sarcophilus harrisii</i> Tasmanian devil	Endangered / Endangered	1 / 18	Denning: Low	This species occupies a wide range of habitats across Tasmania and exploits landscapes with a mosaic of pasture and forest with elevated prey	The Tasmanian devil recorded within 500 m was seen 9 March 2017, and a total of 18 recorded sightings were within a 5 km radius from the project area. There

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
			Foraging: High	densities. It is attracted to roadkill hotspots 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 to the mortalities from these pressures.	is a possibility that Tasmanian devils will utilise the project area for foraging and potentially for denning as animals have been known to burrow into coarse sediments. No evidence of Tasmanian devils was observed, either scats pad marks or denning structures.
BIRDS					
<i>Accipiter novaehollandiae</i> grey goshawk	Endangered / -	0 / 0	Nesting: Very Low Foraging: Low	Inhabits large tracts of wet forest and swamp forest, particularly patches with closed canopies above an open understorey. The species prefers mature trees in riparian areas as nesting sites. Most nests have been recorded in blackwoods and occasionally myrtle beech.	Although there are some blackwood and mature eucalyptus trees that may support nests of this species, none were observed during field surveys. It is unlikely that grey goshawks nest in the project area; however, the project area may provide a viable foraging resource. The project area is outside the core range for the grey goshawk although dispersing non breeding birds can turn up anywhere in Tasmania and so may be sighted from time to time.
<i>Aquila audax</i> subsp. <i>fleayi</i> Tasmanian	Endangered / Endangered	0 / 18	Nesting: None	This species nests in a range of old-growth native forests and is dependent on forest for nesting. Territories can contain up to five alternative nests that are usually close by but can be up to 1 km apart	There are a few mature trees suitable for nesting for wedge-tailed eagles, and no nests were observed in the project area. There is some low-suitability habitat within 1 km of the project area and no moderate or

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
wedge-tailed eagle			Foraging: Moderate	where habitat is locally restricted. This eagle preys and scavenges on a wide variety of fauna including fish, reptiles, birds and mammals.	high suitable habitat suggesting likelihood of nesting with 1 km is very low. The project area could potentially provide a foraging resource.
<i>Botaurus poiciloptilus</i> Australasian bittern	- / Endangered	0 / 1	Very Low	A highly cryptic species inhabiting wetlands and lakes with a dense cover of vegetation. There is a record for the species within 1 km of the site on the Ringarooma River.	This species has been recorded from within 1 km of the project area; however, suitable habitat for this species is largely absent from the project area, with only a small wetland area present within SMR vegetation. If present on the site, it is likely to be transient.
<i>Ceyx azurea</i> subsp. <i>diemenensis</i> Tasmanian azure kingfisher	Endangered / Endangered	0 / 0	None	The azure kingfisher is found along rivers in the south, west, north and northwest of Tasmania with outlying occurrences in the northeast, east, centre and on Bass Strait islands. This species occurs in the forested margins of major river systems where it perches on branches overhanging rivers waiting for prey items such as small fish, insects, and freshwater crayfish to come down the river.	There are no waterways with habitat suitable for this species to nest in within the project area. It has no chance of breeding in the project area.
<i>Hirundapus caudacutus</i> white-throated needletail	- / Vulnerable	0 / 1	Very Low	This migratory species breeds in central and north-eastern Asia in Siberia, Mongolia, northern-eastern China and northern Japan. It migrates south through eastern China, Korea and Japan spending its non-breeding season in eastern and south-eastern Australia including Tasmania. This species is almost exclusively aerial, occurring over most types of habitats with a preference for wooded areas, open forests, heathlands and rainforests.	The white-throated needletail is almost exclusively aerial and while it may fly over the site, there is no chance of impacts to this species as it is entirely aerial whilst in Tasmania.

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
<i>Lathamus discolor</i> swift parrot	Endangered / Critically Endangered	0 / 0	Nesting: None Foraging: Low	This species spends its winter in south-eastern mainland Australia before migrating to Tasmania in late winter to early spring to breed. During the breeding season, nectar from Tasmanian blue gum (<i>Eucalyptus globulus</i>) and black gum (<i>Eucalyptus ovata</i>) flowers is the primary food source for the species. These eucalypts are patchily distributed and their flowering patterns are erratic and unpredictable, often leading to only a small proportion of swift parrot habitat being available for breeding in any one year. Swift parrots breed in tree hollows in mature eucalypts within foraging range of a flower source.	There are trees which may contain hollows that could support swift parrots; however, these are mainly found within the 150 m buffer zone outside of the project area, and no impact to these trees is expected. They may forage within the site, with scattered <i>Eucalyptus ovata</i> trees present in the project area. The loss of a small number of foraging trees does not present a significant risk to this species. The project area is outside any important or potential breeding areas.
<i>Neophema chrysostoma</i> blue-winged parrot	- / Vulnerable	0 / 0	Nesting: Very low Foraging: Moderate	The blue-winged parrot inhabits a range of habitats from coastal, subcoastal and inland areas, through to semi-arid zones. Throughout the species' range, it favours grasslands and grassy woodlands. Blue-winged parrots are often found near wetlands both near the coast and in semi-arid zones. They can also be seen in altered environments such as airfields, golf courses and paddocks.	There are trees which may contain hollows that could support the blue-winged parrot; however, these are mainly found within the 150 m buffer zone outside of the project area, and no impact to these trees is expected. They may forage within the site; however, the loss of potential foraging habitat is only minor when considering the availability of foraging habitat more broadly in the region.
<i>Tyto novaehollandiae</i> subsp. <i>castanops</i> Tasmanian masked owl	Endangered / Vulnerable	0 / 0	Nesting: Low Foraging: Low	Found in a range of habitats which contain some mature hollow-bearing forest, usually below 600 m altitude. This includes native forests and woodlands as well as agricultural areas with a mosaic of native vegetation and pasture. Significant habitat is limited to large eucalypts within dry eucalypt forest in the core range.	Four trees that may contain hollows suitable for the Tasmanian masked owl were recorded in the northernmost extent of the project area. A further 22 trees that may contain hollows, or have structural traits that may lead to the formation of hollows, were recorded within 150 m of the project area. The likelihood of owls utilising the project area for nesting is considered to be low, although there are nesting

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
					opportunities in the surrounding area. The entire project area may provide foraging habitat for owls.
REPTILES					
<i>Pseudemoia pagenstecheri</i> tussock skink	Vulnerable / -	0 / 0	None	A ground-dwelling lizard occurring in tussock grassland and grassy woodland habitats at a range of elevations. Records in Tasmania are from a few disconnected patches of habitat in the Midlands, on the inland Cradle Coast, and eastern Bass Strait islands.	There is no habitat suitable for this species within the project area; thus, there is no chance of it occurring.
AMPHIBIANS					
<i>Limnodynastes peronii</i> striped marsh frog	Endangered / -	0 / 0	Low- Moderate	Limited in Tasmania to the far northeast around Waterhouse (where it co-exists with the green and gold frog), the northwest and King Island. It can respond to shorter periods of inundation than the green and gold frog to breed successfully, so it is also known from less permanent waterbodies. Potential habitats for the striped marsh frog are natural and artificial coastal and near-coastal wetlands, lagoons, marshes, swamps and ponds (including dams), with permanent freshwater and abundant marginal, emergent and submerged aquatic vegetation.	The margins of Pioneer Lake and localised impounded watercourses on the edge of Pioneer Lake support sufficient emergent vegetation which could support the striped marsh frog. The species has not been recorded within a 5 km radius but the project area is included within the potential range of the species.
<i>Litoria raniformis</i> green and gold frog	Vulnerable / Vulnerable	0 / 0	Moderate	In Tasmania, this species is found in lowland areas, primarily coastal. It requires permanent or temporary waterbodies for survival and tends to inhabit ones containing emergent plants such as	The margins of Pioneer Lake and localised impounded watercourses on the edge of Pioneer Lake support

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
				<i>Cycnogeton procera</i> or species of <i>Juncus</i> or <i>Eleocharis</i> . Green and gold frogs are rarely seen in open water and spend most of their time in vegetation at the water's edges. They depend upon permanent freshwater for breeding, which occurs in spring and summer.	sufficient emergent vegetation which could support the green and gold frog. The nearest documented record is over 7 km to the west near Winnaleah. The project area is included within the potential range of the species.
FISH					
<i>Galaxiella pusilla</i> eastern dwarf galaxias	Vulnerable / Vulnerable	0 / 0	None	Confined to lowland swampy areas where it shelters amongst aquatic vegetation in shallows of slow-flowing water in backwaters of creeks and drainage ditches in the far northeast and northwest parts of Tasmania and Flinders Island.	This species has been recorded northeast of the project area at Pig and Whistle Lagoon and Creek, a tributary of the Ringarooma River. The species is unlikely to occur within the project area which is mid-catchment rather than upper catchment. Swampy areas are limited to the margins of the Pioneer Dam. Streams observed in the project area are not considered suitable for this species.
<i>Prototroctes maraena</i> Australian grayling	Vulnerable / Vulnerable	0 / 0	None	In Tasmania, the Australian grayling has been found in northern, eastern and western rivers. Little is known of the population size. The major threat to the species is the construction of barriers that prevent adult fish moving upstream and juveniles downstream.	The Australian grayling has been recorded in the Ringarooma catchment. In both cases these recordings have been in the lower part of the catchment. The existing records of the fish would suggest that the project area may be too far inland with streams that might not be of a sufficient size and flow. As water quality, including increasing temperature and turbidity, could impact known downstream populations, controlling water quality below the proposed reworking of the tailings will determine the likelihood of any downstream impacts.

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
INVERTEBRATES					
<i>Antipodia chaostola leucophaea</i> chaostola skipper	Endangered / Endangered	0 / 0	Very Low	This species is restricted to dry forest and woodland supporting the sedge <i>Gahnia radula</i> , and occurs in isolated populations in south-eastern and eastern Tasmania.	Field surveys identified isolated occurrences of the host plant, <i>Gahnia radula</i> , in very low densities within the project area. The project area is on the edge of the potential range of this species, and given the sparse cover of <i>Gahnia radula</i> , the project area is highly unlikely to support this species.
<i>Beddomeia fromensis</i> hydrobiid snail (Frome River)	Endangered / -	0 / 2	None	Hydrobiid snails live in sheltered habitats such as under rock slabs in streams, and each species has an extremely limited distribution, often being found in only one stream system. This freshwater snail occurs in tributaries of the Frome River, itself a tributary of the Ringarooma River. The species has a very narrow range and is known only from six locations.	<p>This hydrobiid snail has been recorded in the Frome River, which is located approximately 7.5 km south of the project area. The core and potential range at its nearest is 5km upstream of the confluence of Racecourse Creek and the Ringarooma River.</p> <p>Hydrobiid snails typically have very small ranges, often confined to a single stream.</p> <p>It is unlikely any species of Hydrobiid snails occur within the project area, especially as past mining has resulted in heavy siltation of the streams. The majority of streams have been alluvially mined and although well revegetated, they have high silt loads.</p>
<i>Astacopsis gouldi</i> giant freshwater crayfish	Vulnerable / Vulnerable	0 / 2	Habitat: Very Low Breeding: Very Low	The known range of the giant freshwater crayfish includes rivers and streams in the Arthur River catchment and all rivers and streams flowing into Bass Strait except those of the Tamar River catchment and rivers east of Gladstone. The potential range of the species is not likely to extend outside this known range.	This species has the potential to be found within streams and creeks nearby. The Ringarooma River and many of its tributaries are within the very eastern core range for the species. However, juveniles are unlikely to be found within the site or immediately adjacent to the study area as there is a high silt load within the waterways as a result of past mining and almost no larger rocks partly submerged with crevices. Only one

Species	Status TSPA / EPBCA	Records within 500 m / 5 km	Potential to Occur	Preferred Habitat ⁹⁸	Commentary ⁹⁹
					location was seen with some rock rubble associated with the silt and coarse sands. As water quality, including increasing temperature and turbidity, could impact known downstream populations, controlling water quality below the proposed reworking of the tailings will determine the likelihood of any downstream impacts.
<i>Hoplogonus simsoni</i> Simson's stag beetle	Vulnerable / Vulnerable	0 / 0	None	The known range of Simson's stag beetle includes a small area of native forest in north-eastern Tasmania centred on the Blue Tier. The habitat of the beetle is leaf litter on the floor of mature wet eucalypt forest, mixed forest, rainforest and damp forest. The potential range of the species is unlikely to extend more than a few kilometres beyond its known range, as much of its known range is surrounded by unsuitable habitat (e.g. dry eucalypt forest, altitudinal barriers).	There is no suitable habitat for the Simson's stag beetle within the project area due to the lack of suitable habitat. The forest is dry and lacks a deep accumulation of litter on the forest floor.