pitt&sherry

Notice of Intent

MMG Rosebery

Bobadil TSF Stage 11 and 12
Embankment Raises

Prepared for

MMG Australia Limited

Client representative

Adam Pandelis

Date

12 October 2023

Rev05

Table of Contents

List of figures

List of tables

Appendices

Prepared by — David Lenel		**Date** — 12 October 2023
Reviewed by — Cath Ford		**Date** — 12 October 2023
Authorised by — David Lenel		**Date** — 12 October 2023

Revision History

Rev No.	Description	Prepared by	Reviewed by	Authorised by	Date
00	Final for EPA	DL	CF	DL	16/12/2022
01	Revised Final for EPA	DL	CF	DL	22/12/2022
02	Revised Final for EPA	DL	CF	DL	14/03/2023
03	Revised Final for EPA	DL	CF	DL	20/04/2023
04	Revised Final for EPA	DL	CF	DL	28/04/2023
05	Final for EPA, Stage 12 addition	DL	CF	DL	12/10/2023

1. The name and contact details of the person lodging the application

Applicant	MMG Australia Limited (MMG)
Applicant Representative	Adam Pandelis
Applicant Address	Hospital Road, Rosebery, Tasmania 7470 Australia
Applicant Phone	03 9288 0888
Applicant Representative Email	adam.pandelis@mmg.com
Consultant	pitt&sherry
Consultant Representative	David Lenel
Consultant Address	199 Macquarie St Hobart TAS 7000
Consultant Phone	03 6210 1400
Consultant Email	dlenel@pittsh.com.au

2. The name of the proposed project and its location

Project title	Bobadil TSF Stage 11 and 12 Embankment Raises
Location	Murchison Highway West Coast Tasmania 7467 PID: 3388012 (Raise on the TSF shown as in Figure 1 and as “The Land” in Attachment 1 of EPN 10504/1)

3. Background of the project proponent

Proponent	MMG Australia Limited
ABN	23 004 074 962
Address	Level 23, 28 Freshwater Place, Southbank, VIC, 3006
Phone	+61 3 6473 2119

Minerals and Metals Group was formed in June 2009, following China Minmetals Corporation (CMC)’s acquisition of the majority of OZ Minerals assets through CMC’s subsidiary, China Minmetals Non-ferrous Metals Co. Ltd (CMN). In December 2010, Minerals and Metals Group was acquired by MMG Limited (MMG), a subsidiary of CMC, and listed on the Hong Kong Stock Exchange.

The site has been operating continually since 1936. The Rosebery mine is an underground polymetallic base metal mine with a capacity to process up to 1,100,000 tonnes of ore per year. Rosebery produces zinc, copper and lead concentrates, as well as gold dore', through mechanical underground mining and processing (crushing, grinding and flotation processes).

4. A description of the proposed project, including its key physical components

This proposal includes the construction of two upstream embankment raises on the Bobadil Tailings Storage Facility (TSF).

Each raise will be in 2 metre (m) increments, ultimately reaching a final crest elevation of RL 205 m. The first raise, known as Stage 11 (RL 201 m to RL 203 m) would be scheduled for construction during Q4 of 2024 and is expected to take approximately six months to complete. The Stage 12 raise (RL 203 m to RL 205 m) would commence approximately 12 to 18 months after the Stage 11 construction has been completed. This time gap/period is necessary to allow for sufficient tailings material to be deposited within the TSF, and for these tailings to settle and consolidate by maintaining an adequate rate of raise, prior to additional construction material being placed on top.

MMG's dam engineers, ATC Williams, are currently preparing an updated Feasibility Study report for Stages 11 and 12, which is due for completion in November 2023. Key components of the proposal include the following:

- Stages 11 and 12 raises include the development of the emergency spillway to meet the increased height of the embankment, as identified in Figure 2
- Approximately 2,000 m^3 of clay material will be won from the existing Southern Borrow Pit to the south of the TSF (refer Figure 2) to construct the spillway for Stages 11 and 12. No vegetation will require clearing as the existing borrow pit will only involve vertical development
- Extraction of embankment construction material; an estimated 200,000 m^3 of rockfill will be required, comprising of approximately 90,000 m^3 and 110,000 m^3 for Stage 11 and 12, respectively. This will be sourced from an extension of the existing Northern Borrow Pit shown in Figure 3
- Approximately 1.3 ha of vegetation will require clearing for the extension to the Northern Borrow Pit for Stages 11 and 12, refer Figure 3. It should be noted that ground preparation, vegetation clearance and subsequent excavation of the Northern Borrow Pit will be undertaken in accordance with the updated Feasibility Study report for Stages 11 and 12 (ATC Williams)
- Both quarries lie within the MMG Mining Lease (ML 28M/1993)
- Overburden, such as topsoil and vegetation will be stockpiled within the existing operational footprint for future closure and rehabilitation activities associated with the entire facility
- The construction will be undertaken in four stages; Stage 11A, 11B, 12A and 12B, to provide flexibility for the ongoing operation of the facility
- The 'upstream' construction method will continue to be used, i.e. the embankment will be built within the existing TSF footprint, on top of the existing embankment and deposited tailings; and
- Following the completion of the Stage 11 embankment raise, tailings will need to be deposited for a period expected to be between 12 and 18 months before Stage 12 embankment works can commence. This period will be subject to the operation's tailings deposition strategy, which is dependent on the tailings production rates and its co-dependency to the 2/5 Dam TSF as the site's main repository for tailings material.

5. An outline of the proposed location of the project and a general site location map

An outline of the proposed location of the Stage 11 and 12 embankment raises and a general site location map is included in Figures 1 and 2.

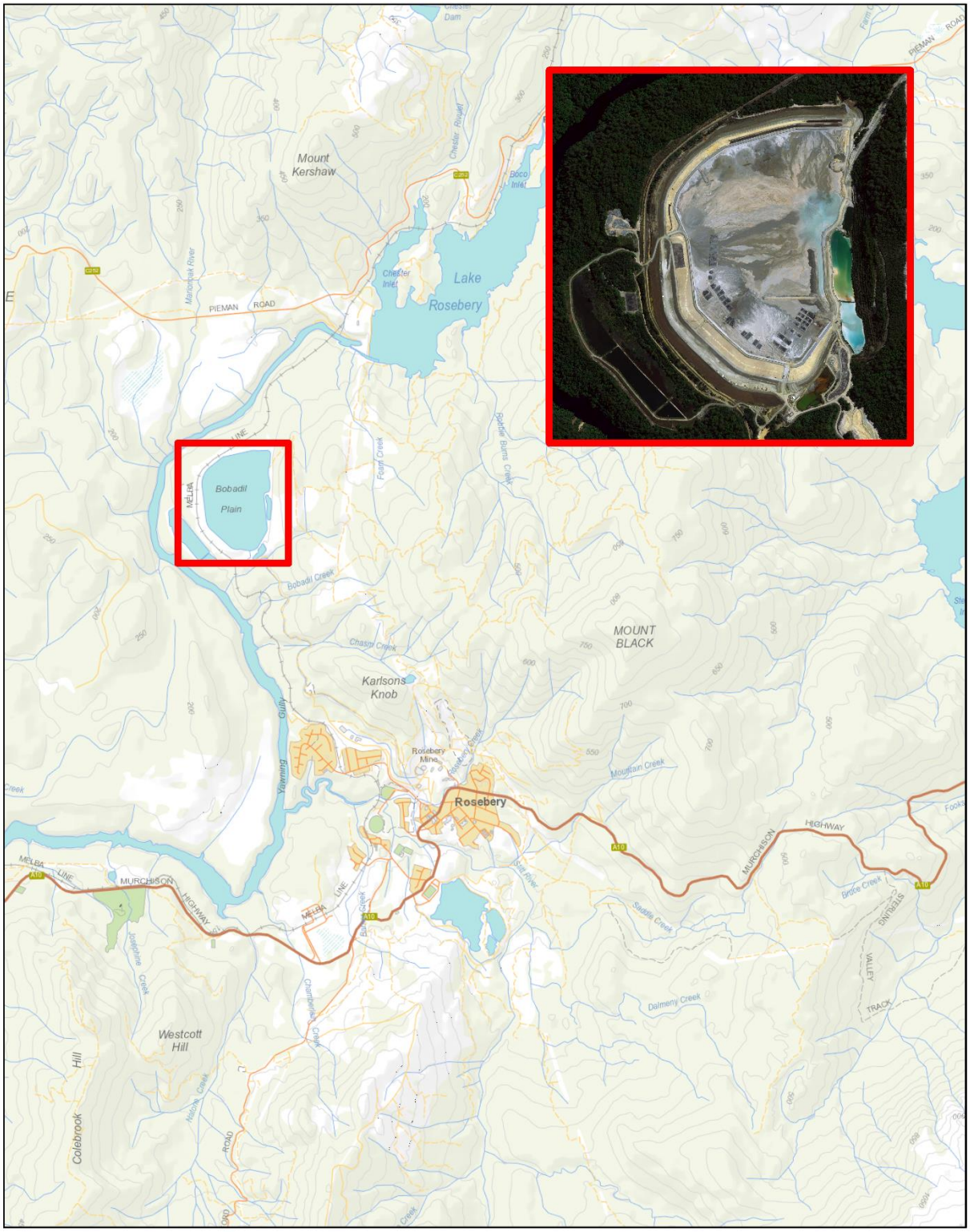


Figure 1: Rosebery and surrounds, with a small inset map highlighting the Bobadil TSF

Figure 2: The current (stage 10) Bobadil TSF, with its key components

6. An outline of the stakeholder consultation process undertaken or proposed to be undertaken

MMG understands the importance of best practice stakeholder and community engagement, and is committed to maintaining ongoing consultation with various stakeholders, including regulatory bodies. MMG values the input and engagement of a diverse range of community representative groups and local residents. By actively involving these stakeholders, we aim to ensure transparency, address concerns, and foster a collaborative approach throughout the project.

Pertaining to this proposal, MMG has held meetings with:

- The Tasmania Environment Protection Authority (EPA)
- Mineral Resources Tasmania (MRT); and
- The West Coast Council (WCC).

The community of Rosebery has been engaged by MMG on a number of occasions during the site's operation.

More recently, MMG provided members of the local community, specifically those residing within Rosebery with a briefing on the current activities being undertaken at the site. Future liaison with a broad range of key stakeholders will help inform decisions pertaining to the future operations of the site, including the modification proposed in this Notice of Intent.

MMG anticipates ongoing consultation with the following stakeholders:

- Regulatory stakeholders include the EPA, MRT and WCC; and
- A wide range of community representative groups and local residents.

7. A general description of the physical environment that may be affected by the Project

Geology

The Mineral Resources Tasmania (MRT) 1:250,000 scale Geological Map, entitled Geology of Southwest Tasmania indicates the Rosebery mine is located in the mineralised Cambrian Mount Read Volcanics (MRV). This map indicates that the MRV overlies the Precambrian Tyennan Block to the east and Precambrian Arthur Lineament to the west. The base metal mineralisation (mined at Rosebery) occurs within the central volcanic complex of the MRV.

The geological map indicates that much of the Bobadil site is covered by a varying thickness of Quaternary glacial and glacigene deposits. The Quaternary deposits are underlain by bedrock, which can be divided into two domains, separated by a major north-south regional fault, referred to as the Rosebery Fault.

To the east of the Rosebery Fault lies a predominantly sedimentary sequence that has been termed the 'Rosebery Group'. The Rosebery Group is understood to consist of late Cambrian deposits including a marine sandstone-siltstone-conglomerate sequence and shale, typically of siliciclastic to polymictic turbite.

To the west of the Rosebery Fault is a sequence of mafic greywacke and siltstone with minor tholeiitic basalt lavas, known as the early-Cambrian Cleveland-Waratah Association.

Geoconservation

To the southeast of the TSF is an area mapped as Western Tasmania Blanket Bogs. As this geoconservation feature has not been mapped, its distribution is defined on the LISTmap by identifying all areas covered by organosols and moorland vegetation in western Tasmania, extending from far northwest to far south Tasmania. This feature is described as the most extensive organosol terrain in Australia and the Southern Hemisphere, and the conservation values relate to the total extent and size of the site. There are numerous other areas of this site mapped in proximity to the project area. Blanket bogs can also contain other significant features including peat mounds and subfossils (Melaleuca).

Vegetation communities, flora and fauna habitat

A natural values assessment (NVA) survey was undertaken by North Barker Ecosystem Services (NBES) in September 2022. A follow-up visual inspection of the proposed Northern Borrow Pit extension, targeting orchid habitat and mature trees was undertaken in January and April 2023, respectively. The NVA is attached to this document at Appendix A. Within the NVA survey area, the findings can be summarised as follows:

- No vegetation communities or threatened flora species listed under either the Tasmanian *Threatened Species Protection Act 1995* or the Commonwealth *Environment Protection and Biodiversity Protection Act 1999* (EPBC Act) were recorded during the field assessment. The likelihood of State and/or Commonwealth listed flora being present in the survey area is considered very low
- Identified fauna habitats within the footprint are typical of west coast wet forests and scrubs. The landscape is not very productive in terms of nutrients or prey and the relative abundance of animals, particularly large predators is reflective of this. However, the following species have been described in the NVA as known, or having potential, to be present:
    - **Grey goshawk**

      A suspected grey goshawk nest was identified approximately 450 m west of the Southern Borrow Pit. No clearing of vegetation in the vicinity of the nest is envisaged
    - **Tasmanian devil**

      The productivity of the site for this species is generally particularly low, due to low-lying, wet ground conditions. The likely scale of impact to the habitat of the Tasmanian devil will not cause a significant impact in the context of the extent of habitat in the area and the character of the sub optimal denning habitat currently known to exist. While it remains possible that one or more natal dens may be present, no obvious preferred structure was identified during targeted surveys. A pre-clearance devil dens survey will be required for all areas of mapped sub-optimal denning habitat
    - **Wedge-tailed eagle**

      There is currently one eagle nest located to the southwest of the TSF, on the western side of Lake Pieman. This nest was confirmed during a previous eagle nest survey in 2021. The nest lies beyond the 1 km line of site from both the Southern and Northern Borrow Pits. As such, no specific management measures are recommended. During an aerial survey on 5 April 2023, no further raptor nests were identified.
    - **Spotted-tailed quoll**

      The proposed Northern Borrow Pit extension area does not occur within a key site or ‘important population’ as defined under the Commonwealth EPBC Act. While no signs of this species were identified during the survey (refer Appendix A), the site is likely to at least utilise the site for foraging.
    - **Masked owl**

      Limited suitable nesting habitat for this species is present within the proposed disturbance footprint. Five mature eucalypt trees in the northern end of the northern borrow pit area were assessed for hollow potential applying ground-based and aerial (drone) inspection methods. No large hollows (i.e. >15 cm diameter) were identified from these inspections and as such it was determined that trees do not currently support masked owl nesting habitat.

Aboriginal Heritage

An Aboriginal Heritage Assessment (AHT, 2011) reported that there are no Aboriginal heritage sites recorded within or close to the Bobadil TSF or surrounds, and that the borrow pit areas have a low probability of Aboriginal heritage values being present. In April 2023, Cultural Heritage Management Tasmania (CHMA) completed a follow-up field survey, during which no sites were recorded.

Traffic

There will be no changes to the frequency or types of traffic on the Murchison Highway associated with the proposal. Local contractors already undertaking work at the Rosebery Mine site will be utilised and movements will be localised to the area immediately surrounding the Bobadil TSF.

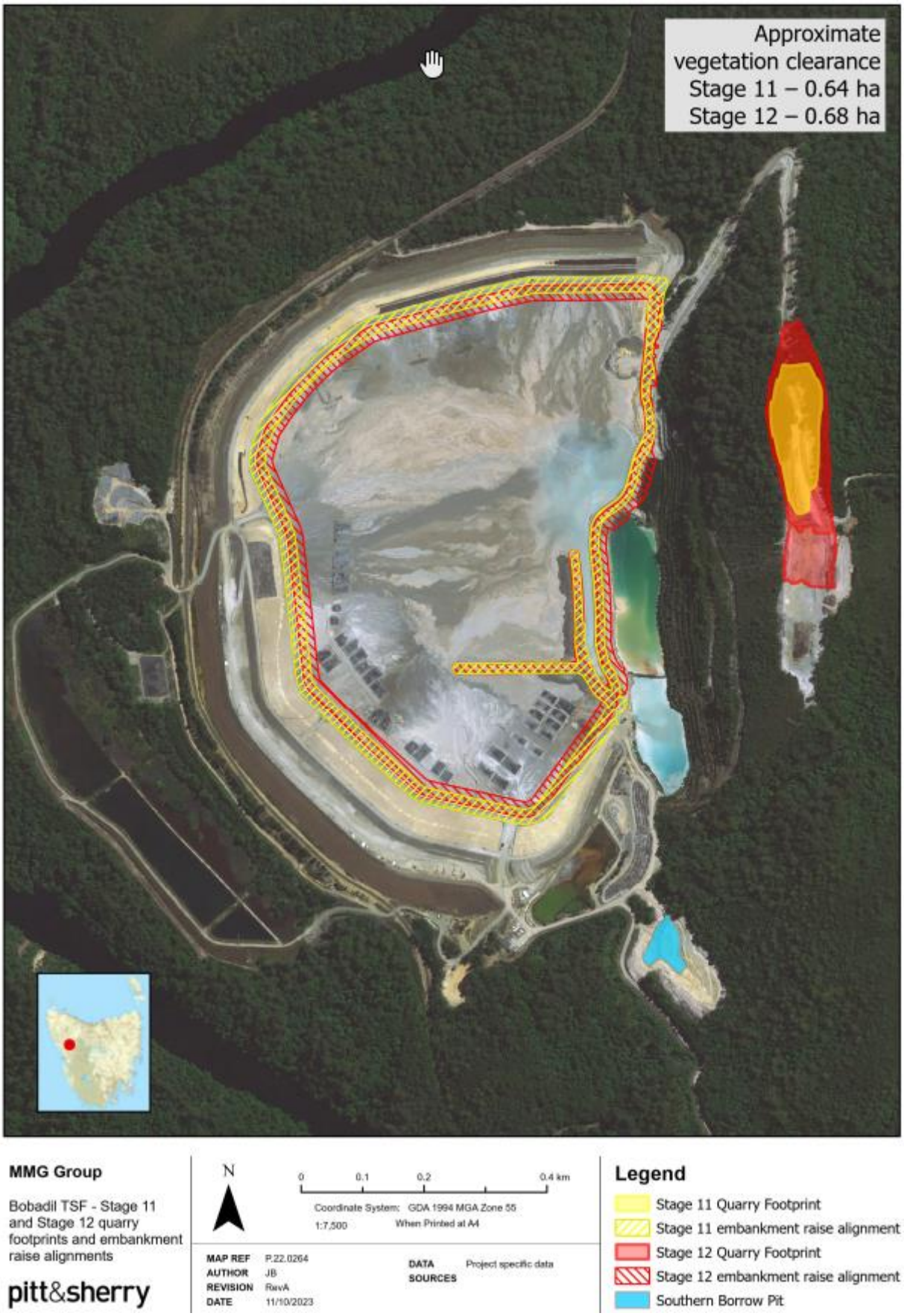


Figure 3: Project footprint and proposed Northern and Southern Borrow Pit.

8. The key environmental, health, economic and social issues identified for the project to date

8.1 Environmental

Impacts to the disturbance footprint for the proposed Stages 11 and 12 embankment raise construction works will be limited to development of the existing Northern and Southern borrow areas required for construction material as shown in Figure 3.

The existing access tracks will be utilised during the development and/or extraction of the borrow pits.

The proposed activity, specifically the extraction of construction material, will be undertaken in accordance with an updated Borrow Areas Management Plan that will be attached to the EIS.

In accordance with the Schedule 2 Conditions listed in the site's current Environment Protection Notice (EPN) 7153/3, the following potential issues have been identified:

Ecology

No vegetation communities or threatened flora species listed under either the Tasmanian *Threatened Species Protection Act 1995* or the Commonwealth *Environment Protection and Biodiversity Protection Act 1999* (EPBC Act) were recorded during the field assessment. The likelihood of State and/or Commonwealth listed flora being present in the survey area is considered very low.

To minimise vegetation clearance, the following strategy will be employed to:

- Excavate the quarry vertically as far as safely possible, to minimise the degree of vegetation clearance required to attain sufficient material; and
- Further develop the quarry area to the south of the existing quarry, which in fact, was approved during the Stage 10 embankment raise project, and underutilised.

Approximately 0.64 ha of vegetation will be cleared for Stage 11 quarry development, while 0.68 ha will be required for Stage 12. Therefore, a total of approximately 1.3 ha of vegetation will require clearing for the entire proposal. Refer Figure 3.

Atmospheric

Dust emissions from the surface of the TSF have the potential to marginally increase during the proposed construction activity, especially during dry, windy weather. While there are no sensitive receptors proximal to the proposed construction activity that may be impacted by dust emanating from the surface of the TSF, there is potential risk to the following:

- Construction workers
- Ecological communities; and
- Visual amenity.

A dust emission tracking network has recently been installed at the Bobadil TSF to measure and monitor emissions throughout a broad spectrum of environmental conditions. While the installation will collect data to inform air dispersion modelling to enable implementation of improved dust management measures at the 2/5 Dam TSF, the results will be used to enhance the entire site's dust mitigation strategy and more effectively manage dust at all the site's TSFs.

To minimise risk, the following impact mitigation strategies will be employed during the construction, and operation of the facility:

- Water carts will be used to douse the surface of all access tracks if dry, windy weather is forecast
- Cleared vegetation and soil will be stockpiled at locations less prone to direct wind, i.e. using the natural topography and existing vegetation to minimise exposure; and
- Water sprinklers will continue to be used to spray the surface of the tailings if dry, windy weather is forecast.

Upon completion of the Stage 11 and 12 embankment raises, dust emissions from the surface of the TSF are not anticipated to increase from current operating conditions.

Blasting

Blasting will be required to yield construction material for the proposed activity. While there are no sensitive receptors that would be impacted by these activities, all blasting will be undertaken in accordance with relevant health and safety legislation, and by approved specialised contractors.

Decommissioning and rehabilitation

Any soil or vegetation that is cleared as part of this proposal will be stockpiled according to EPN 7153/3 and used for rehabilitation activities. In support of the facility's ultimate closure design, the Stage 10 embankment raise included a trial cover system. Monitoring of the trial cover system will continue during the construction of the Stage 11 and 12 embankments.

Effluent disposal

Effluent from the site will continue to report to the environment via the site's only active discharge location at the Bobadil Outfall (BO). The operation's water quality monitoring program will continue to be undertaken at the Stitt River and Lake Pieman monitoring locations, even though effluent is currently discharged via the BO only.

Water quality and volume is not anticipated to vary during the proposed construction activity or subsequent to completion of the Stages 11 and 12 embankment raises, as tailings will continue to report to either the Bobadil or the 2/5 Dam TSFs.

It should be noted that comprehensive geochemical investigations have been undertaken using historical and contemporary tailings composites. Acid-base accounting of the tailings has changed over the last 10 years. Recent Net Acid Production Potential (NAPP) values indicate that the tailings are currently either potentially acid forming low capacity, or non-acid forming. Ongoing geochemical investigations will be undertaken, including Kinetic Leach Column (KLC) testing. BMC has been engaged to investigate contemporary tailings material, and its potential impacts pertaining to TSF's ability to manage this risk, that will report to the Bobadil TSF.

The following studies are being undertaken, as they relate to the embankment material characterisation:

- Mine Waste Management (MWM) and Blue Minerals Consulting (BMC) are currently investigating a Bobadil TSF site-specific material classification strategy, that will assess core samples from the proposed quarry extension geology investigations program and the existing Bobadil quarry
- The classification strategy will be updated to supersede the version proposed and approved in 2016, in consideration of contemporary material samples.
- MMG proposes to use the 2016 material classification process that was described in the 2/5 Dam TSF Borrow Area Management Plan (BAMP). However, MMG proposes an additional step of Column Leach testing to demonstrate that material blending of quarry material would result in appropriate AMD risk management; and
- The risk of AMD from the construction material will be discussed in the EIS and in the revised Borrow Area Management Plan (BAMP), that will be attached to the EIS.

The EIS will discuss the results of the investigation programs and demonstrate how MMG intends to manage and mitigate AMD risk using the existing facility's existing infrastructure.

Hazardous Substances

Any hazardous substances that will be brought to site for the purposes of supporting the proposed construction activity will be transported, stored, and managed in accordance with EPN 7153/3 and no amendments are anticipated to support operational activities once the proposed works are complete.

Water Quality Monitoring

All water quality monitoring locations will continue to be sampled in accordance with 7153/3 both during construction and subsequently. The proposed construction activity is not expected to impact the results of any sampling. However, in the unlikely event any exceedances are identified during the proposed construction activities, the procedures of investigating and remediating the root cause will be undertaken.

Noise Control

Noise will emanate from the Bobadil TSF during the proposed construction activity during the following:

- Blasting to yield construction material from the borrow pits
- Heavy plant operations, such as excavators, loaders and earth moving trucks; and
- Machinery operation such as crushers and screeners.

While noise emanating from the Bobadil TSF may increase during construction activities, it will be temporary in nature and highly unlikely to be perceivable to any sensitive receptors. Despite this, MMG will continue to monitor noise at locations within the Rosebery township and respond to any noise complaints, accordingly. Noise levels are not anticipated to change from current operating levels upon completion of the proposed works.

Tailings management

Tailings waste will continue to be managed in accordance with the conditions listed in EPN 7153/3 both during the construction phase and subsequently.

Other: Heritage

An Aboriginal Heritage Assessment (AHT, 2011) reported that there are no Aboriginal heritage sites recorded within or close to the Bobadil TSF or surrounds, and that the borrow pit areas have a low probability of Aboriginal heritage values being present. In April 2023, CHMA completed a follow-up field survey, during which no sites were recorded.

8.2 Health

Health and safety management systems will be implemented throughout the construction of the Stages 11 and 12 embankment raises, and thereafter, its operation, including compliance with relevant work health and safety legislation and codes of practice. Appropriate security measures will be implemented to ensure no unauthorised entry to the site occurs. Although no effects on health are anticipated to workers or the wider community, air quality will continue to be monitored.

8.3 Economic

Negative economic impacts resulting from this proposal are not anticipated. Conversely, it is crucial for the mine's ongoing operation to have Stages 11 and 12 embankment raise approved and commenced, in order to allow for continuous mining operation.

9. The surveys and studies proposed or underway in relation to the key issues for the project

Surveys and studies completed to date in relating to this proposal are as follows:

- Stage 10 (to RL 201 m) and Stage 11 (to RL 203 m) Embankment Raise Feasibility Study Report (ATC, 2019)
- Stage 10 (to RL 201 m) and Stage 11 (to RL 203 m) Embankment Raise Supplementary Reports (ATC, 2019)
- Eagle nest survey (April 2023); and
- Natural Values Assessment (NBES, 2023).

Additional surveys and study reports that will be undertaken in support of this proposal include:

- Stage 11 and 12 Embankment Raise Feasibility Study Report
- Tasmanian Devil den pre-clearance survey; and
- Tasmanian Masked Owl habitat assessment.

10. The proposed timetable for the project

Table 1 outlines a preliminary timeline for this project.

Table 1: Proposed timeframe for the project

Phase	Estimated timeline
Submission of an amended Notice of Intent	October 2023
Anticipated submission of DA/EIS	March 2024
Anticipated approval	October 2024
Construction commencement	Q4 of 2024
Operation commencement	Ongoing

11. For the purposes of section 27B(2)(k) of the EMPC Act, the Board has determined that a NoI is to contain the following additional details

a) Whether the project requires or is likely to require approval under the *Environment Protection and Biodiversity Conservation Act 1999* (which will be determined by the project's potential to impact upon matters of national environmental significance or upon Commonwealth land).

The project is not likely to require approval under the *Environment Protection and Biodiversity Conservation Act 1999;* and

b) Whether the proponent has or intends to refer the project to the Commonwealth Government for a determination on whether approval under the *Environment Protection and Biodiversity Conservation Act 1999* is required.

MMG does not intend to refer the project to the Commonwealth Government for a determination on whether approval under the *Environment Protection and Biodiversity Conservation Act 1999* is required.

12. For the purposes of section 27B(2)(k) of the EMPC Act, the Board has determined that a NoI is to contain the following additional details.

1. The status of the proposal under the Land Use Planning and Approvals Act 1993 (the LUPA Act). This must include:

a) Whether or not the relevant Council will require a LUPA Act permit application.

The WCC has advised that it is of the view that the proposed works demonstrate a substantial intensification to the existing use and development. Consequently, WCC will require a Development Application

b) Whether a single permit application or multiple applications will be required.

A single application will be required

c) The division of the LUPA Act under which the application will be made.

The application will be made under Division 2 of Part 4 of the LUPA Act – Development Control

d) Zoning of the proposal site(s), and whether or not rezoning will be required.

The land is zoned Rural which permits the use. No rezoning is required

e) If the proposal is for intensification or alteration of an existing activity, the status of the existing activity under the LUPA Act.

The existing activity is subject to a valid planning permit; and

f) If the proposal is for intensification or alteration of an existing activity, whether or not the council regards the proposal as a substantial intensification for the purposes of subsection 12(7) of the LUPA Act.

Yes, the WCC regards the proposal as a substantial intensification.

2. In the event that the proposal has a reasonable likelihood of requiring approval from the Commonwealth Government under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*, a statement is to be provided as to whether or not the proponent elects for the proposal to be assessed pursuant to the Bilateral Agreement made under section 45 of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* between Tasmania and the Australian Government (dated 22 October 2014).

MMG does not anticipate this proposal be referred to the Commonwealth Government under the *Environment Protection and Biodiversity Conservation Act 1999*.

3. Where the NOI relates to an activity that requires an Environmental Licence under the EMPC Act:

a) Whether the person (which includes any body of persons, corporate or unincorporated) who intends to submit the development application has contravened (which includes failed to comply with) the EMPC Act. This includes failure to comply with environmental conditions or restrictions imposed under the Act or subordinate regulations, including those contained in permits issued under the LUPA Act and Environment Protection Notices issued under the EMPC Act. If so, provide details of these contraventions including the date and relevant provision of the EMPC Act.

NA

b) Whether the person (which includes any body of persons, corporate or unincorporated) or an associate of the person has within the last 5 years been convicted of an offence against:

i. The EMPC Act.
NA

ii. Any other Tasmanian Act that relates to the protection of the environment; or
NA

iii. A law of another State, a Territory, or the Commonwealth, that relates to the protection of the environment.

NA

c) Where a natural person is intending to submit the development application (as opposed to a company or corporation), the person is over the age of 18.

The person(s) are over the age of 18.

MMG Rosebery Bobadil – TSF Stage 11 and 12 Quarry Developments Natural Values Assessment (NBES, 2023)

Appendix A

pitt&sherry

northbarker
ECOSYSTEM SERVICES

MMG Rosebery

Bobadil - Tailings Storage Facility

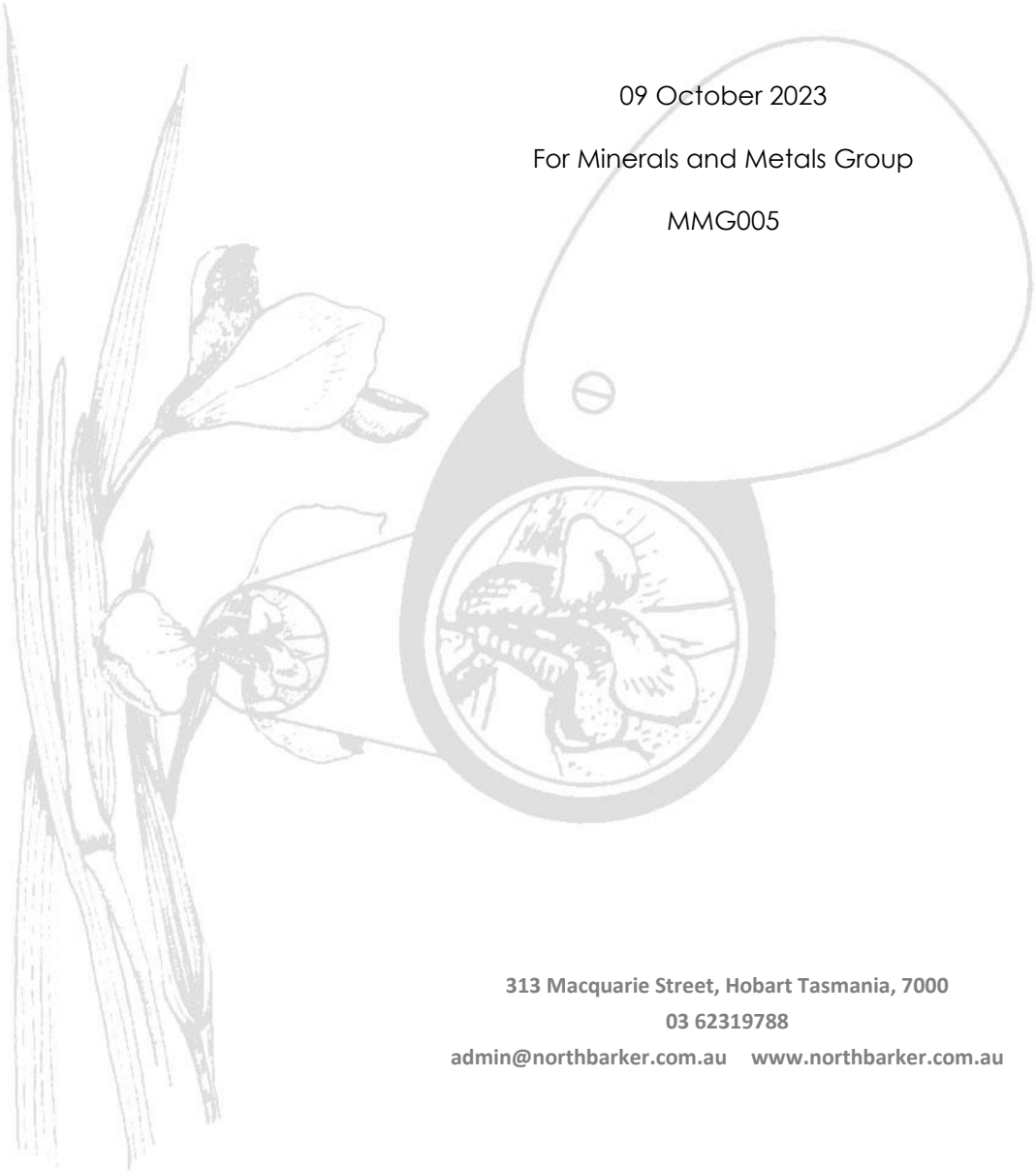
Stage 11 and 12 Quarry Developments

NATURAL VALUES ASSESSMENT

09 October 2023

For Minerals and Metals Group

MMG005



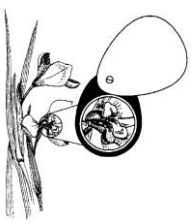
313 Macquarie Street, Hobart Tasmania, 7000
03 62319788
admin@northbarker.com.au www.northbarker.com.au

ACKNOWLEDGMENTS

Project	Bobadil TSF – Stage 11 and 12 Quarries
Location	Rosebery
Proponent	Minerals and Metal Group (MMG)
Project managers	Marty Viney, Adam Pandelis
NBES job code	MMG005
NBES project managers	Tim Leaman – 0429 009 220 tleaman@northbarker.com.au
Field inspections and photos	Cameron Geeves, Hayley Kingsley, Will De Angelis (September 2022) Tim Leaman, Tim Crawford (January 2023) Finn Environmental, MMG (April 2023)
Field dates	General flora and fauna survey: 13 – 15th September 2022 Targeted orchid survey: 30 – 31st January 2023 Mature tree survey (FINN Environmental): 14th April 2023
Reporting	Tim Leaman, Will De Angelis
Mapping	Eric Hong

DOCUMENT CONTROL

Version	Date	Author / Comment
0.1 Draft	3/3/2023	T. Leaman
0.2	17/4/2023	T. Leaman – updated design footprint
1.0	19/4/2023	T. Leaman – address MMG comments of 19/4/23
2.0	09/10/23	W. De Angelis – updated design footprint



SUMMARY

Minerals and Metals Group (MMG) operates an underground polymetallic base metal mine at Rosebery in western Tasmania. MMG are proposing works to their existing tailings storage facility known as "Bobadil", approximately 3 km north of the township of Rosebery. The works are associated with Stage 11 and 12 development of the site and entail the establishment of two quarry sites.

MMG have engaged North Barker Ecosystems Services (NBES) to survey the sites flora and fauna, and to document potential impacts to natural values, with reference to relevant environmental legislation. A summary of the relevant values identified within the project footprint are as follows:

Vegetation

The site is typical of western Tasmanian lowland vegetation and habitats on similar geologies. Of the vegetation communities identified, all are common vegetation types which are widespread and well-represented in reserves.

Threatened Flora

No threatened flora species have been identified within the site. Based on an assessment of habitat suitability and extent of occurrence, the likelihood of state and/or federally listed flora being present is considered very low within the project area.

Targeted survey for the horned orchid (*Orthoceras strictum*) in January 2023 did not detect any evidence of the species.

Threatened Fauna

Identified fauna habitats within the footprint are also typical of west coast wet forests and scrubs. The landscape is not very productive in terms of nutrients or prey and the relative abundance of animals, particularly large predators is reflective of this.

The following threatened fauna have suitable habitat within the project area:

Grey goshawk

A suspected grey goshawk nest was identified approximately 450 m west of the southern-most quarry area. This nest should remain unaffected by the proposed works in this case and does not require any specific additional management considerations or permits.

In the unlikely event that disturbance to this nest and the immediate surrounds (within 100 m) cannot be avoided, then a permit from the Department of NRE may be required prior to commencement of vegetation clearing works in this area.

Masked owl

Limited suitable nesting habitat for this species is present within the proposed disturbance footprint. Five (5) mature eucalypt trees in the northern end of the northern quarry area were assessed for hollow potential applying ground-based and aerial (drone) inspection methods. No large hollows (i.e. >15 cm diameter) were identified from these inspections and as such it was determined that trees do not currently support masked owl nesting habitat.

Tasmanian devil

The productivity of the site for this species is generally particularly low, due to low-lying, wet ground conditions. The likely scale of impact to the habitat of the Tasmanian devil will not cause a significant impact in the context of the extent of habitat in the area and the character of the sub optimal denning habitat currently known to exist. While it remains possible that one or more natal dens may be present no obvious preferred structure was identified during targeted surveys. A pre-clearance devil dens survey will be required for all areas of mapped sub-optimal denning habitat.

Wedge-tailed eagle

A known wedge-tailed eagle nest exists to the south of the proposed works area but it is beyond 1 km line of sight of the most-southern quarry. As such, no specific management constraints are required on account of this nest.

Further aerial surveys of suitable nesting habitat within 1 km of the project area were undertaken on 5 April 2023 and no new eagle nests were found within 1 km of the Bobadil TSF.

Weeds

One species listed as a declared weed under the *Biosecurity Act 2019* was identified in proximity of the project footprint (blackberry). A weed management plan will be required to avoid new introductions of weeds and to prevent further spread of this species.

Legislative implications

Any likely significant impact on a MNES requires referral for consideration by the Commonwealth Minister to determine if the proposal will be a Controlled Action requiring closer consideration. Where a project is referred for a significant impact on one MNES it is necessary to address all MNES that could conceivably be present to demonstrate the likelihood of a significant impact on each. However, no direct or indirect significant impacts to MNES are anticipated as a result of the proposed works in this case.

Permits to take threatened species or products of wildlife may also be warranted under the Tasmanian TSPA/NCA on account of the presence of a grey goshawk nest and mammal (devil or quoll) dens (subject to further survey and assessment).

Table of Contents i

1 INTRODUCTION

1.1 Background

Minerals and Metals Group (MMG) operate an underground polymetallic base metal mine at Rosebery in western Tasmania. MMG are proposing additional works to their "Bobadil" tailings storage facility which is located approximately 3 km north of the township of Rosebery.

MMG have engaged North Barker Ecosystems Services (NBES) to survey the sites flora and fauna, and to document potential impacts to natural values, with reference to relevant environmental legislation. This assessment was undertaken to document natural values across the Bobadil study area and to facilitate an assessment of the proposal by the EPA Tasmania.

1.2 Project area

The Bobadil tailings storage facility sits north of the Rosebery Township and east of Lake Pieman. The proposed works relate to Stage 11 and 12 developments of the existing facility and include the development of two quarry sites (Figure 1). For the purposes of mapping a 5 m buffer has been applied to project footprint data supplied by MMG.

The site is predominantly wet eucalypt forest with small areas of surrounding rainforest and scrub communities on lower lying ground and in drainage lines. The site is at approximately 110-380 m a.s.l. The site is accessed from two separate gravel roads from MMG's Rosebery Mine.

The geology is predominantly Pleistocene glacial deposits with a small area of Quartzwacke sandstone.

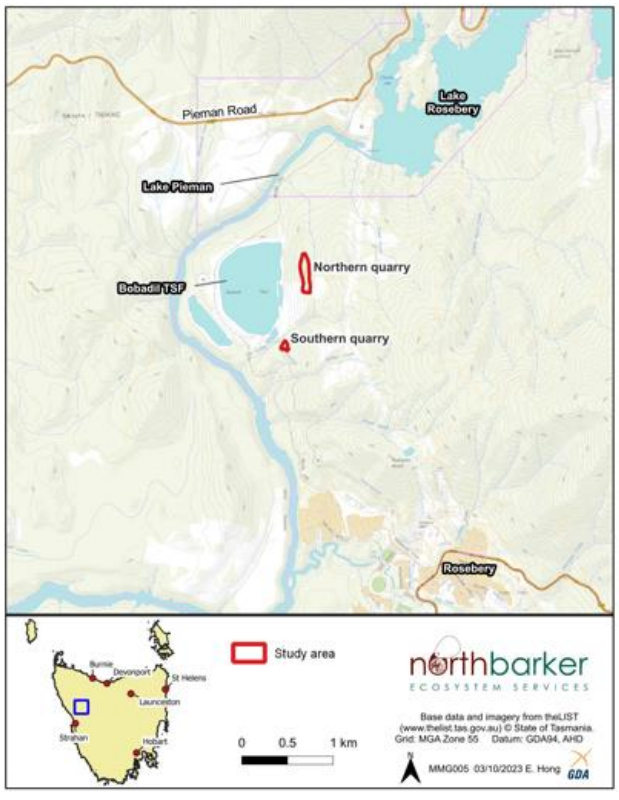


Figure 1: Location of the Bobadil TSF study areas (southern & northern proposed quarries)

2 BOTANICAL SURVEY AND FAUNA HABITAT ASSESSMENT

2.1 Background Research

The following sources were used for biological records from the region:

- Natural Values Atlas[1] - this Department NRE database includes biological records.
- EPBC Protected Matters Search Tool[2]
- TASVEG 4.0 Digital Data – this layer has been ground truthed.

2.2 Methods

2.2.1 Botanical Surveys

Fieldwork was undertaken on foot from 13th to the 15th of September 2022 by three ecologists from NBES. Areas of potential orchid habitat were surveyed again on the 30th and 31st of January 2023 by two NBES ecologists. Vegetation was mapped across the site consistent with TASVEG4[3]. Within each community type, a full vascular plant species list was taken from within representative plots (Appendix 1) using a form of the Timed Meander Search Procedure[4] . Outside of the plots, additional plant species were noted as encountered. This resulted in a collective species list for each community type (Appendix 3). Observations of habitat suitability for fauna were made concurrently across the area surveyed, with particular reference to suitability of habitat for dens (including natal dens) of the Tasmanian Devil (*Sarcophilus harrisii*). Criteria used to determine suitability for denning included relative elevation (higher being better for drainage), general drainage (wet soils being less preferable), proximity to drainage lines (used for dispersal), depth to water table, soil friability, penetrative light levels at ground level, structural complexity (opportunities for log shelters) and the presence of rock caves (Table 1).

Locations of critical habitat elements (e.g., dens and hollows), presence of threatened species (Tasmanian *Threatened Species Protection Act 1995* [TSPA] and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*[5] [EPBCA]), pathogens, and environmental and 'declared'[6] weeds were recorded with a handheld GPS.

Throughout the report, botanical nomenclature follows the current census of Tasmanian plants[7]. Bird species nomenclature follows the currently most widely accepted guide to avian systematics and taxonomy in Australia[8].

Horned Orchid *(Orthoceras strictum)* Surveys

Targeted surveys for the Horned Orchid (*Orthoceras strictum*) were undertaken throughout areas of suitable habitat during the 30th and 31st of January 2023. The surveys were undertaken by two field ecologists and constituted meandering transect based assessments over areas of open buttongrass moorland and scrub searching for any orchid species (specifically areas of mapped as NLM outside the study area which will not be impacted in this case).

[1] NVA report February 2023 (NRE)
[2] EPBC Act Protected Matters report, Commonwealth of Australia
[3] DPIPWE, 2013; Harris & Kitchener, 2005
[4] Goff *et al.*, 1982
[5] Tasmanian *Threatened Species Protection Act 1995;* Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*
[6] Tasmanian *Weed Management Act, 1999*
[7] Baker & de Salas, 2022
[8] Christidis and Boles, 2008

Given the identification difficulties which can be encountered with surveying for this species, known sites of the Horned Orchid were inspected in the Rosebery area prior to visiting the Bobadil site. This enabled the surveyors to determine what developmental stage the species was at when the formal surveys were undertaken and provided a high level of confidence with establishing the visual characters of the target species. A summary of the developmental observations of the species is provided in Appendix 4.

2.2.2 Fauna Habitat Assessment

Observations of habitat suitability for fauna (particularly threatened fauna) were made concurrently with the flora ground surveys across the site. Areas of potential habitat were marked using a handheld GPS and notes on the condition/status of the habitat were recorded. Reference and/or targeted searching was undertaken in relation to:

- Potential hollow bearing trees which may provide suitable habitat for the Tasmanian masked owl (*Tyto novaehollandiae* subsp. *castanops*).
- The suitability of habitat for, and the presence of dens (including natal dens) of the Tasmanian devil (*Sarcophilus harrisii*), the eastern quoll (*Dasyurus viverrinus*), and spotted-tailed quoll (*Dasyurus maculatus* subsp. *maculatus*).

Targeted surveys were considered and/or undertaken for the following species:

Tasmanian wedge-tailed eagle – *Aquila audax subsp. fleayi* (Endangered/Endangered) & white-bellied sea-eagle - *Haliaeetus leucogaster* (-/migratory)

Habitat suitability was assessed as per the FPA assessment guidelines for using the wedge-tailed eagle Habitat Model[9].

Tasmanian masked owl – *Tyto novaehollandiae subsp. castanops* (Endangered/Vulnerable)

Habitat Mapping

Potential hollow-bearing tree habitat was determined from desktop assessments prior to the subsequent field assessment. Remote assessment was conducted using the Forest Practices Authority (FPA) 'mature habitat availability map'[10]. Habitat is assessed using the FPA classifications[11], whereby: potential habitat is considered to be all areas with at least 20% mature eucalypt crown cover unless mapping indicated there is no senescence in the area and significant habitat is considered to be all areas of dry forest (TASVEG dry eucalypt forest and woodland) with at least 20% mature eucalypt crown cover.

To account for inaccuracies in desktop assessments (see limitations outlined in FPA 2011 and 2014), the results were ground-truthed during field assessments to the extent practical. Field assessments were conducted concurrently with flora and vegetation assessments by traversing the study area, noting the presence of trees greater than 1 m diameter at breast height[12] and/or trees supporting hollows with >15 cm diameter entrances. Ground surveys included examination of habitat for suitability in accordance with the Forest FPA guidelines, and examination of hollow-bearing trees for evidence of occupation (including pellets, scratching, white-wash, prey remains, etc.).

9 Forest Practices Authority (2014a)
10 Forest Practices Authority (2011)
11 Forest Practices Authority (2014b)
12 Forest Practices Authority (2014b)

Specific targeted assessments of potential masked owl habitat trees were undertaken by FINN Environmental on 14 April 2023. This included an assessment of hollow availability within five individual trees >1m DBH using ground-based ocular assessments and aerial inspection methods (photos taken from a camera-mounted drone).

Tasmanian devil - *Sarcophilus harrisii* (Endangered / Endangered) & spotted-tailed quoll – *Dasyurus maculatus subsp. maculatus* (Rare / Vulnerable)

The Tasmanian devil occupies a wide range of habitats across Tasmania and exploits landscapes with a mosaic of pasture and forest with elevated prey densities and is attracted to roadkill hotpots with concentrated scavenging resource. Populations have declined substantially since the first observations of the infectious cancer Devil Facial Tumour Disease (DFTD). DFTD has now spread across much of Tasmania. The reduced population is also likely to be more sensitive to additional threats such as death by roadkill, competition with cats and foxes, and loss or disturbance of areas surrounding traditional dens where young are raised. The protection of breeding opportunities is particularly important for the species due to the mortalities from demographic pressures.

The spotted-tailed quoll occurs throughout Tasmania and also in eastern Australia. On the mainland their 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 female quolls vary in size depending on site productivity[13].

Commonwealth guidelines for surveying Tasmanian devils and quolls[14] have a focus on detecting the presence of a species. The NRE Guidelines[15] are designed to assess impacts of development proposals and focus on potential denning opportunities, recognising the importance of limiting demographic pressures. This is particularly relevant to the Tasmanian devil in an era of increased mortality resulting from DFTD.

Regardless of the broad scale habitat suitability survey approach, presence/absence was surveyed concurrently with other survey efforts. For presence/absence[16], diurnal searching was undertaken for scats and prints, with particular attention to potential dispersal routes (e.g., tracks) and soft substrate. Scats in particular are often detectable in latrine sites such as at track junctions and creek crossings[17].

Characteristics of natal dens for these species include a dry, structurally stable inner chamber, a chamber that is sufficient size for the mother and litter but is not so large as to be un-defendable (which includes an entrance that is a tight fit for the mother), and the presence of nooks and crannies for the young to hide in[18]. Preferable habitat characteristics are considered to include direct sun near the den entrance, shelter from predators around the den mouth, a dearth of predators in the area (excluding other devils), an adequate prey base, habitat heterogeneity, complex shelter elements (such as cliffs, caves, earth banks and log piles), and friable soil for the burrows[19]. Some of these traits are fine scale habitat attributes, whereas others are landscape scale (or

13 Bryant & Jackson (1999)
14 DSEWPaC (2011)
15 DPIPWE (2015a)
16 DSEWPaC (2011); DPIPWE (2015a)
17 DSEWPaC (2011)
18 Mooney (unpublished data)
19 Mooney (unpublished data); DPIPWE (2015a)

have plausible proxies at the landscape scale). Thus, to determine the denning potential during surveys, observers considered the presence of burrows/potential den sites, as well as higher level traits such as hydrology, soil, vegetation structure, etc. Whilst it was not an aim of this assessment to undertake a systematic search for all possible den structures, our general survey coverage is in excess of the minimum of 30 % visual coverage recommended in the Department of NRE Guidelines[20].

The distribution of potential natal denning habitat was modelled on the basis of vegetation communities within the site and their likelihood of containing suitable habitat features as described above. A breakdown of this classification methodology and associated rationale is provided in Table 1. It should be stressed that this is a model only and is therefore indicative of the distribution of potentially viable habitat at a landscape scale and is not suited to identification of small, localised features.

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

Suitability class for devil maternal natal den	Rationale
Optimal	This category contains areas deemed optimal for denning opportunities based on field observations. Characteristics may include: • Areas containing observed burrows, dens, and/or latrines; • Areas with potential denning structures; • Areas of structurally complex wet and 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.
Sub-optimal	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: • Apparent lack of denning structures or opportunities; • Areas with some apparent denning opportunity but has poor drainage and/or may be prone to flooding.
Unsuitable	This class captures all areas that are deemed unsuitable for denning opportunities based on field observations. Characteristics of this class may include: • Vegetation that is typically prone to flooding or swampy; • Areas of relatively structurally simple, wet heathland and wet scrub; • Areas with no denning opportunities; • Areas of wetland or are entirely cleared where there is no chance of finding a natal den.

[20] DPIPWE (2015a)

2.3 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 1000 ha) or have suffered considerable loss (approaching 70 % for vulnerable and 90 % for endangered) qualify for listing as "threatened" on the *Nature Conservation Act*, 2002[21] (NCA).

For forests, reservation targets were set using the nationally agreed JANIS criteria as part of the Tasmanian Regional Forest Agreement (RFA). These aim to achieve a 15 % reservation level of 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.

The reservation at state and bioregional level has been calculated for all TASVEG2 communities[22]. 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 Agreement[23]. 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 level[24].

Vegetation matters of national environmental significance (MNES) are listed on the Commonwealth EPBCA. The conservation significance of individual species is determined at a state and federal level by the Tasmanian TSPA and Commonwealth EPBCA (Appendix 1), the implications of which are considered in light of relevant legislation (Section 5).

2.4 Limitations

In the current survey, due to seasonal variations in detectability and accurate discrimination (*i.e.,* identification of closely related species), there may be some herb, orchid and/or graminoid species present on the site that have been overlooked due to flowering at times of the year other than when the survey was undertaken. We have however applied our best endeavours to sample across multiple seasonal periods and particularly optimal flowering windows for ephemeral flowering species. To compensate for any potential limitations in specie detectability, field data from the present study were supplemented with data from the Tasmanian Natural Values Atlas (NRE, 2023). All threatened plant species known to occur in the local area (5 km) are considered in terms of habitat suitability on site.

[21] Schedule 3a NCA, 2002
[22] DPIPWE, 2010
[23] Knight, 2012
[24] Lowland Grassland Review Expert Group, 2008

3 BIOLOGICAL VALUES

3.1 Vegetation

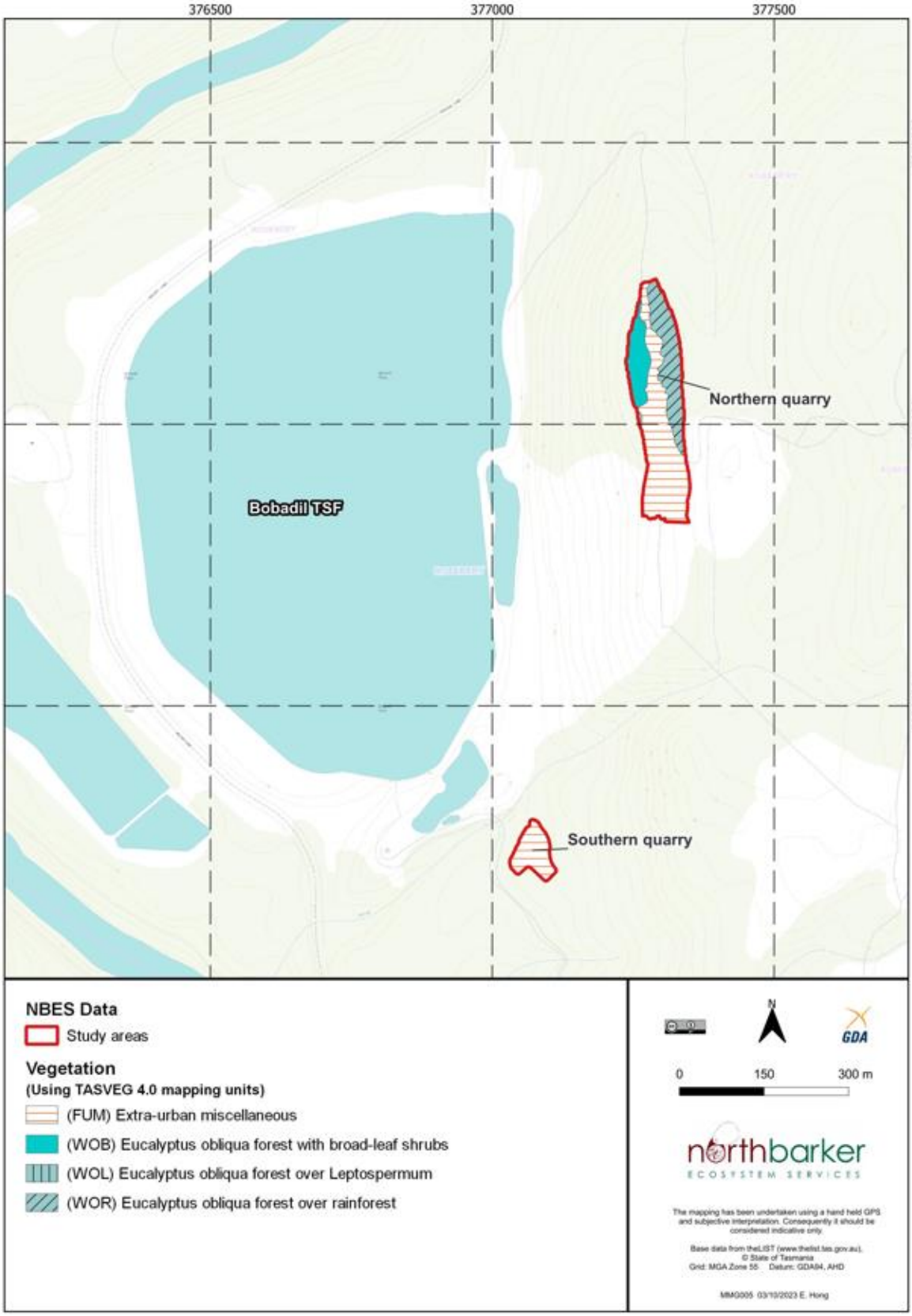


Figure 2 illustrates the distribution of the TASVEG vegetation mapping units recorded on

the site. Most of the site is dominated by wet eucalypt forest with areas of modified land where tracks and recent existing earth works have been undertaken. Occasional patches of non-eucalypt forest and rainforest were found restricted to lower lying areas nearby which will remain unaffected by these works.

Our field survey established that the project area is comprised of 3 native TASVEG communities/units as well as one modified land class as follows:

- *Eucalyptus obliqua* forest over leptospermum (WOL) – 0.17 ha
- *Eucalyptus obliqua* over rainforest (WOR) – 0.94 ha
- *Eucalyptus obliqua* forest with broad-leaf shrubs (WOB) – 0.52 ha
- Modified land - Extra-urban miscellaneous (FUM) – 2.33 ha

3.2 Community descriptions

***Eucalyptus obliqua* forest over Leptospermum (WOL)**

WOL occurs on rises and slopes with improved drainage in the northern quarry area (Plate 2).

This community is characterised by the dominance of *Eucalyptus obliqua* over a tall shrub layer of *Leptospermum scoparium* and *Melaleuca squarrosa*. Canopy heights reach up to 35 m+. Other common species found in the understorey of tall shrubs include but not limited to *Acacia mucronata*, *Cenarrhenes nitida*, *Monotoca glauca*, *Coprosma quadrifida* and *Nematolepis squamea*. The community is somewhat transitional into WOR in places as evidenced by the presence of rainforest trees species such as *Phyllocladus aspleniifolius, Eucryphia lucida* and *Atherosperma moschatum*. Ground layer vegetation is dominated by *Gahnia grandis and Bauera rubioides* with numerous fern species including *Gleichenia microphylla*, *Notogrammitis billardierei*, *Blechnum wattsii* , *B. nudum* and *Hymenophyllum rarum*.

This community is well reserved and not recognised as threatened under state or federal legislation.

***Eucalyptus obliqua* over rainforest (WOR)**

WOR occurs predominantly along the margins of Lake Pieman but also along the lower reaches of an unnamed stream immediately east of the footprint (Plate 3).

The community is characterised by a dominant canopy of *Eucalyptus obliqua*. These canopy trees were predominantly large, up to 40 m tall averaging 1 m DBH with occasional trees up to 3.5 m DBH. The understory was generally open, common species included *Atherosperma moschatum, Anopterus glandulosus, Eucryphia lucida, Nothofagus cunninghamii, Anodopetalum biglandulosum, Phyllocladus aspleniifolius* and *Acacia melanoxylon*. Ground ferns such as *Blechnum wattsii* and *Polystichum proliferum* were dense in patches but of low diversity, as were herbs.

This community is well reserved and not recognised as threatened under state or federal legislation.

Plate 1. WOL

Plate 2. WOR

***Eucalyptus obliqua* forest with broad-leaf shrubs (WOB)**

WOB is common throughout general area surrounding Bobadil and is present within the northern quarry site. It is characterised by a canopy dominated by *Eucalyptus obliqua* with a dense, broad-leaf wet sclerophyll understory. Canopy trees in this community reach a height of 30 – 35 m and can be considered a similar age class to trees found in WOR, with DBH averaging 1 m with occasional trees 2+ m. The understory in some areas is almost entirely dominated by *Nematolepis squamea,* while in other areas *Pomaderris apetala* is dominant. The shrub layer consists of species such as *Aristotelia peduncularis*, *Coprosma quadrifida, Pimelea drupacea, Monotoca glauca*, and *Zieria arborescens*. The ground layer is dominated by herb species such as *Gonocarpus teucrioides and Dichondra repens*. Ground and epiphytic fern species are diverse and include *Dicksonia antarctica, Blechnum wattsii, Histiopteris incisa, Rumohra adiantiformis, Microsorum pustulatum* and *Notogrammitis heterophylla.*

This community is well reserved and not recognised as threatened under state or federal legislation.

Plate 3. WOB

Extra-urban miscellaneous (FUM)

The tailings dam itself, a small area currently used for storage of drill cores and a cleared area have been mapped as Extra-urban miscellaneous (FUM). These areas are all highly modified and are not anticipated to recover to a native state in short-medium term.

These areas of identified FUM do not hold any conservation significance and have a very low likelihood of supporting rare and threatened species.

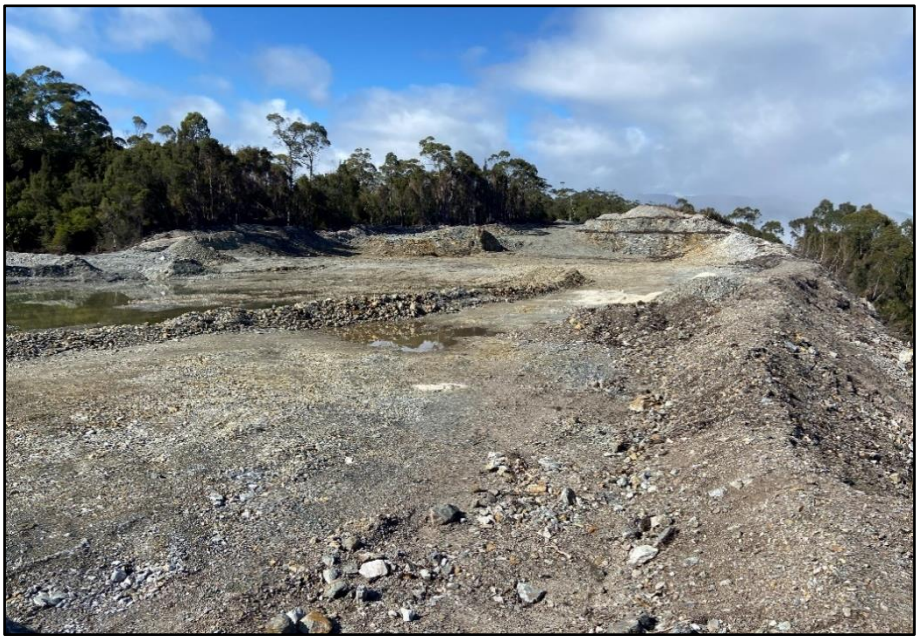


Plate 4. FUM

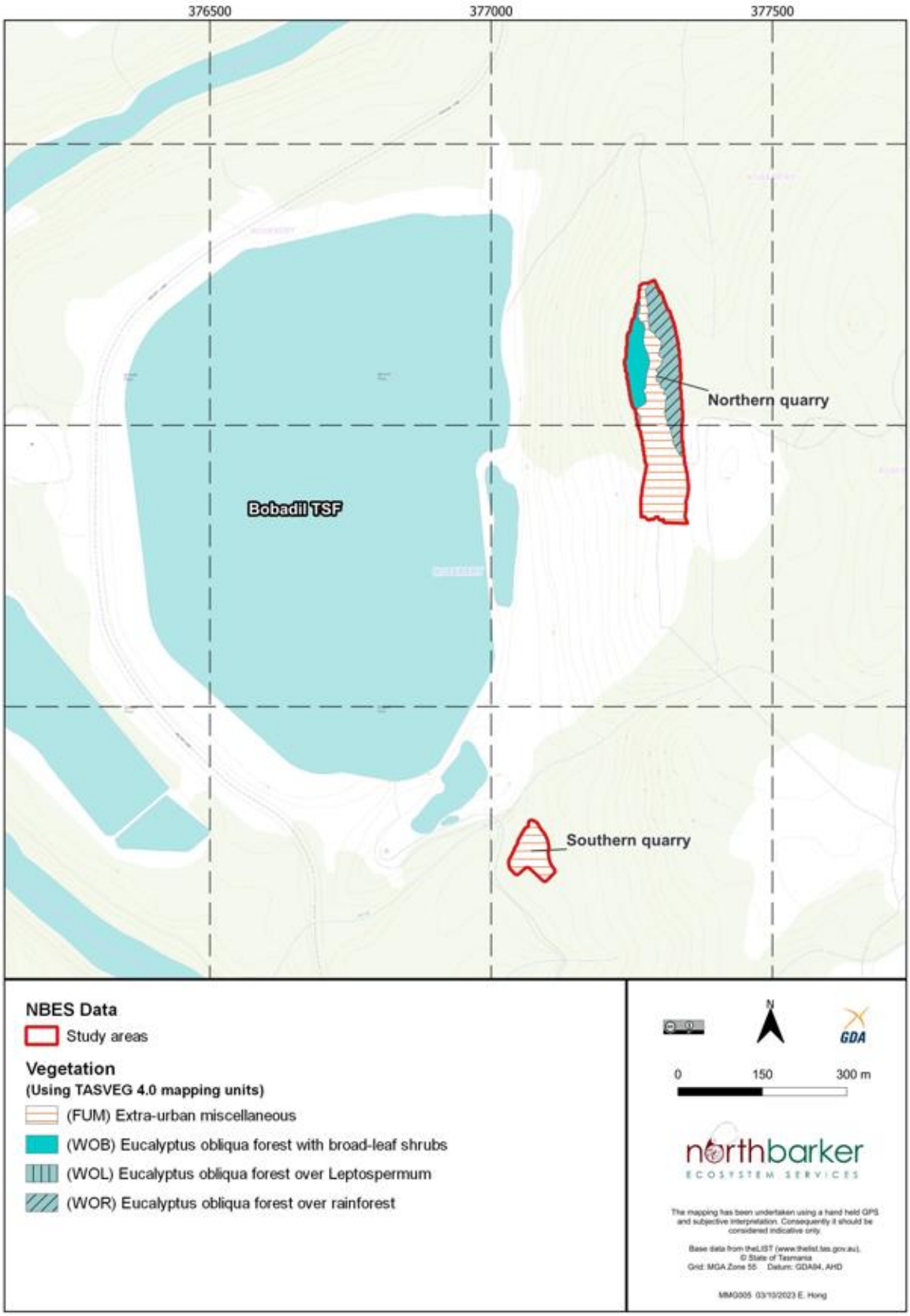


Figure 2: The distribution of TASVEG mapping units

Table 2: Extent and reservation status of the native vegetation communities recorded[25]

TASVEG community and extent in project area	**current ha**	**Reservation ha / %**	**current ha**	**Reservation ha / % ***	**Status** (JANIS)
	TAS	**TAS**	**West Coast**	**West Coast**	
Eucalyptus obliqua forest over *Leptospermum* (WOL)	441,000	141,400 / 24.4 %	53,300	33,900 / 61.9 %	Adequately reserved
Eucalyptus obliqua forest with broad-leaf shrubs (WOB)	120,200	53,200 / 44 %	100	100 / 100 %*	Adequately reserved
Eucalyptus obliqua forest over rainforest (WOR)	93,500	69,700 / 75 %	8,100	6,700 / 82 %	Adequately reserved

*Data obtained from analysis of TASVEG mapping (3 June 2020)

3.3 Flora of Conservation Significance

In total of 68 species of vascular plant were recorded on site (Appendix 2) including two introduced species, one of which is listed as a declared weed species.

No threatened vascular plant species listed under the schedules of the Tasmanian *Threatened Species Protection Act 1995*, or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded from within the project area. None are considered to have a high likelihood of occurrence.

A search of the Natural Values Atlas (NRE database[26]), registered two threatened flora species previously recorded within a 5 km radius of the project area. A further search of the EPBC Protected Matters Search Tool identified one species that has the potential to occur within the project area based on habitat mapping. Table 3 reviews the relevant species and considers the suitability of habitat and likelihood of occurrence.

[25] DPIPWE, 2014
[26] NVA report September 2022 (DPIPWE)

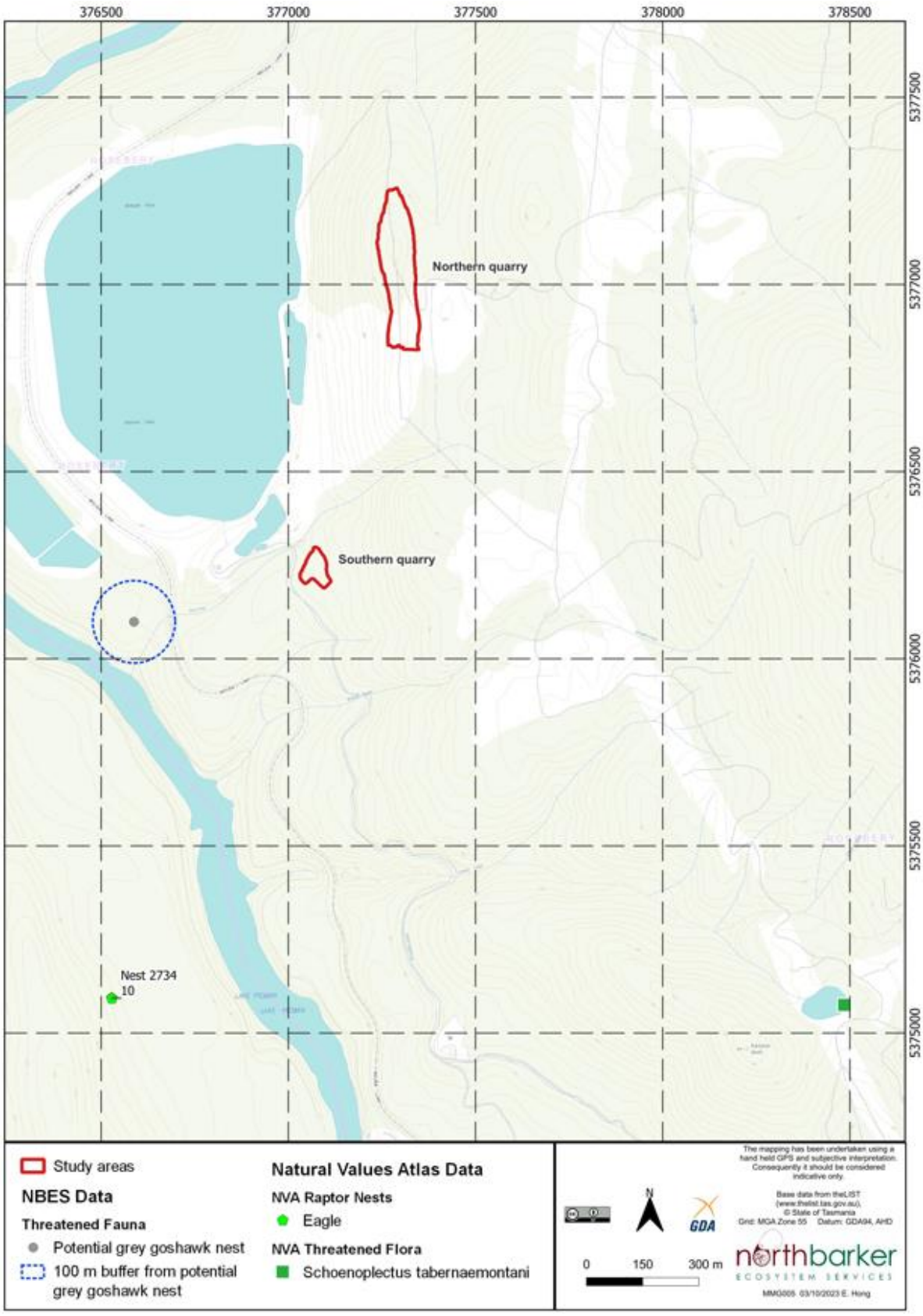


Figure 3 illustrates the location of records in the vicinity from the NVA.

Table 3: Flora species of conservation significance previously recorded within a 5 km radius of the site [27]

Species	Status[28] TSPA / EPBCA	Potential to occur	Observations and preferred habitat[29]
Known within 5000 m			
Orthoceras strictum horned orchid	Rare / -	Low-Moderate	Two records (one of which is from 1968) of this discreet grass-like orchid are known from within 5 km of the site. Suitable habitat for this species is generally associated with buttongrass moorland, sedgy heathland, and open sedgy woodland. Small pockets of vegetation adjacent to the northern quarry area provide potential habitat for this species (mapped NLM vegetation). These areas were subjected to a targeted orchid survey on 30th and 31st January 2023 and no evidence of the species was detected. Other know populations of horned orchid in western Tasmania were monitored by NBES during this time to determine its developmental timing in the region (Appendix 4). This has enabled a high degree of confidence in determining that this species is absent from the Bobadil site.
Schoenoplectus tabernaemontani river clubsedge	Rare / -	None	This species has a very disjunct distribution – and is most generally found in eastern Tasmania and on Bass Strait islands where it occurs on the margins of rivers or wetlands. It was recorded by North Barker at a separate tailings facility (2/5 Dam) in 2014 and was subsequently relocated to Karlsons Knob dam. A recent survey of the translocated plants found them to be in very low numbers at the site. Suitable wetland habitat is not present within the project area in this case.
Predicted by EPBC habitat mapping[30]			

[27] NVA report September 2022 (DPIPWE), EPBC Act Protected Matters report, Commonwealth of Australia
[28] Tasmanian *Threatened Species Protection Act 1995,* Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
[29] Lazarus *et al.* 2003; Jones *et al.* 1999
[30] EPBC Act Protected Matters report, Commonwealth of Australia

Hypolepis distans scrambling ground fern	Endangered / ENDANGERED	Low	*Hypolepis distans* is known only from the north-west and King Island in Tasmania. It occurs in wet scrubland bordering *Melaleuca ericifolia* swamp forest, disturbance induced *Baloskion tetraphyllum* rushland, and from disturbed areas in wet eucalypt forest dominated by *Eucalyptus brookeriana* and *Acacia melanoxylon* (blackwood). Soils tend to be high in organic matter with moderate to poor drainage, while all sites are in areas of moderate rainfall below 40 m elevation. Although known populations are sparse and confined to the far northwest and King Island, new subpopulations have been discovered in the past decade, suggesting that targeted surveys may uncover further populations, however there is a low likelihood that the species is present within the study area given the nearest known sites occur approximately 90 km north of the Bobadil TSF and no suitable habitat for this species (Brookers Gum, blackwood forest or paperbark swamp forest) will be impacted by the proposed works.

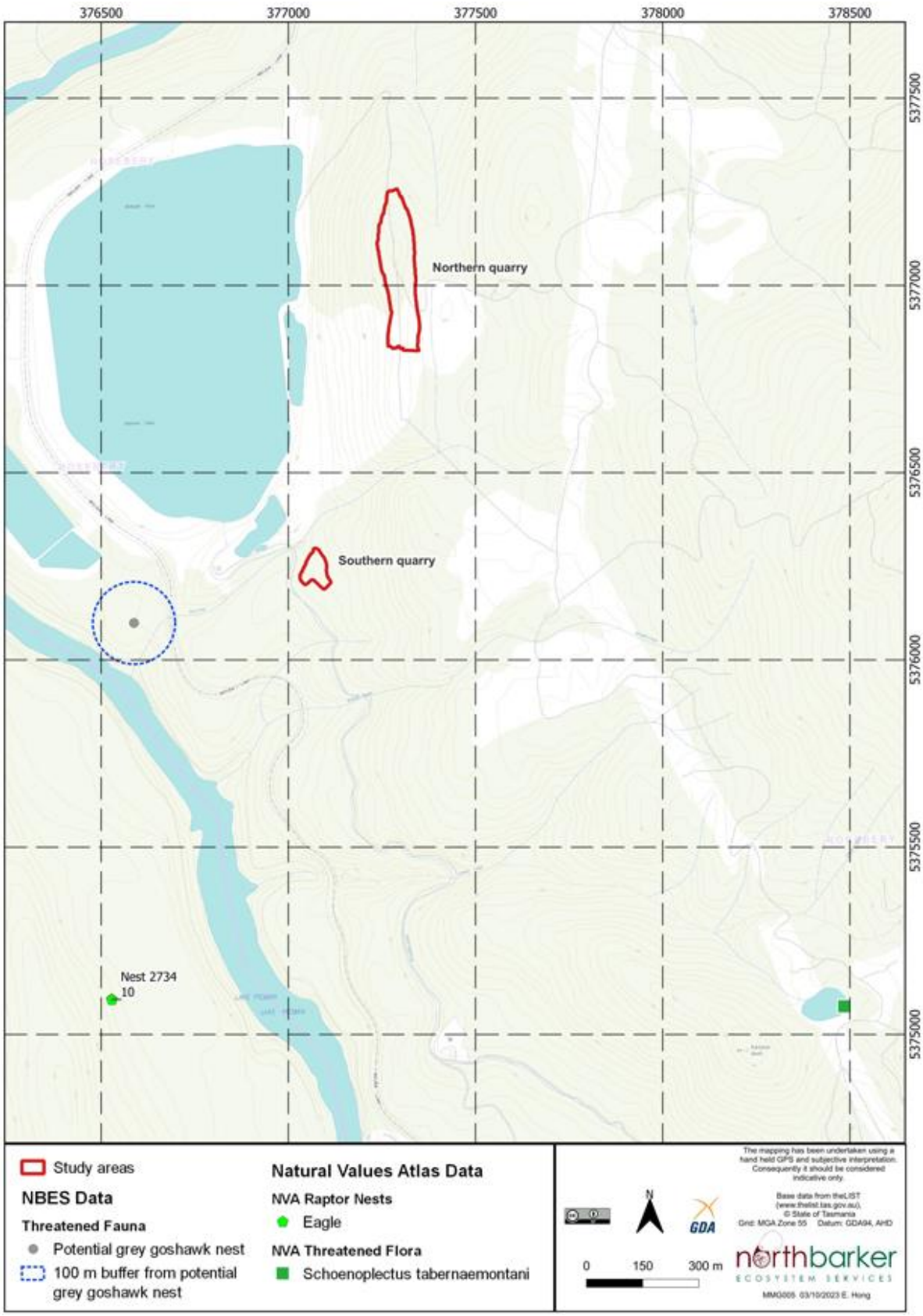


Figure 3. Threatened flora and fauna records (including NVA and NBES field data)

3.4 Fauna of Conservation Significance

The Bobadil study area contains limited habitat of optimal value for denning mammals but does include varying amounts of potential habitat for the wedge-tailed eagle/white-bellied sea eagle, masked owl and grey goshawk.

Tasmanian devil (*Sarcophilus harrisii)* [31] **e/EN**

This species was listed on the TSPA and EPBCA following the significant impact of Devil Facial Tumour disease (DFTD) on the population. It is primarily a carrion-eater and is generally nocturnal. During the day it will retire to a cave/den, hollow log, or thick scrub. At night it forages over a range of 10 to 20 hectares. The animals are solitary but not territorial and foraging ranges may overlap considerably. This species is proven to be tolerant of habitat modification by breeding successfully in human domestic environments such as under houses and sheds, *etc*.

As is generally the case with threatened fauna, rather than foraging habitats, greater importance is placed upon the protection of devil breeding habitats, in order to maximise reproductive opportunities and success. With this in mind, we have mapped the site in terms of suitability of habitat for devil denning (Figure 4). None of the site is considered to be optimal denning habitat. The areas mapped as suboptimal were given this level of rating due to their relatively dry slope position and forest type.

No suitable den structures were observed in the otherwise best quality albeit suboptimal habitat. This does not demonstrably rule out the potential for dens to occur elsewhere in this extensive habitat.

Spotted-tailed quoll *(Dasyurus maculatus)* r/VU

The spotted-tailed quoll occurs throughout Tasmania and also in eastern Australia. On the mainland their 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 productivity[32].

The core range for the spotted-tailed quoll is lowland forested areas of the north bounded by Wynyard, Gladstone and the central and north-eastern highlands. Lower densities of animals occur elsewhere in suitable habitat throughout Tasmania. They are solitary with home ranges that vary typically between 100 ha and 5000 ha with females tending to have smaller largely exclusive ranges and males ranges overlapping several female ranges[33].

The project area does not occur within a key site or important population (Figure 5) of this species and the native vegetation on site constitutes predominately foraging habitat. The area of mapped suboptimal habitat for Tasmanian devil is also moderately suitable for the dens of the spotted-tailed quoll *Dasyurus maculatus* ssp. *maculatus* (

[31] Information largely taken from Save The Tasmanian Devil website (www.tassiedevil.com.au) and DPIWE threatened species website

[32] Bryant & Jackson, 1999

[33] Long & Nelson 2010 cited in the spotted-tailed quoll (Tasmanian population) Species Profile and Threats Database http://www.environment.gov.au,

Figure). There were no signs of presence of the spotted-tailed quoll during our survey, but it is likely that quolls at least utilise the site for foraging, and the site may represent part of 1 or more female home ranges.

Figure 4. The extent of Tasmanian devil denning habitat

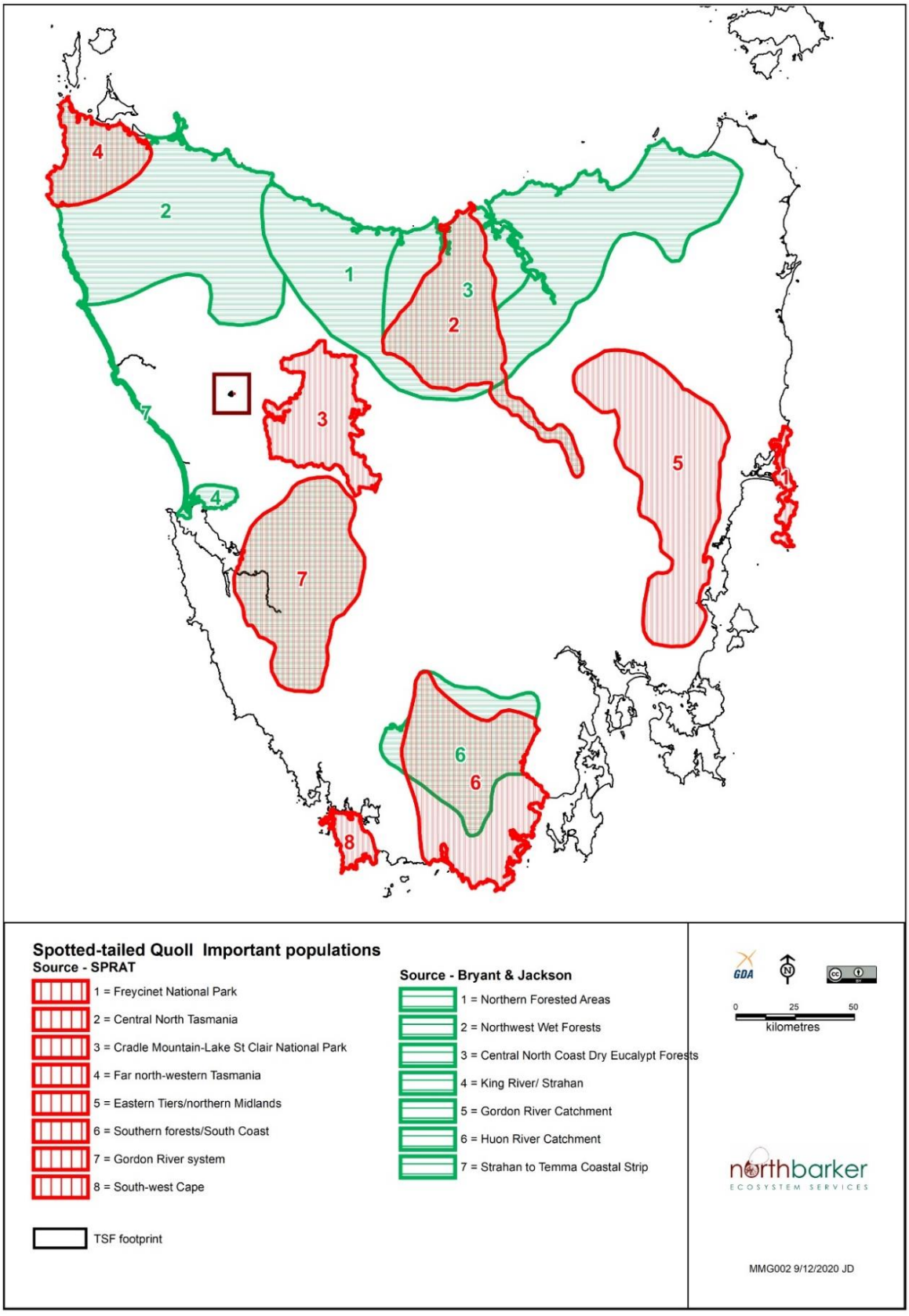


Figure 5. The distribution of important populations and key sites for spotted-tailed quoll

Grey goshawk *(Accipiter novaehollandiae)* e/-

Grey goshawks are a medium-sized bird of prey. They feed upon birds, small mammals, reptiles, and insects. This species nests in mature wet forests, usually in the vicinity of watercourses[34]. Nests are typically located in large blackwood, eucalypts, silver wattle, myrtle, or sassafras trees. Nests tend to be situated beneath the shady crown of the tree, being built in a fork. Nests are large (~50 cm) and made of sticks up to 20 mm thick, with leaves used to line the shallow cup[35].

The birds hunt from a perch in the canopy and require an open structure to fly beneath the tree canopy to capture animals in the subdominant, often tea tree canopy below. Grey goshawks will feed on ring-tailed possums as well as small birds, reptiles, and invertebrates.

The project area is within the core range of this species[36]. The grey goshawk has been recorded within 5 km of the project area and has the potential to occur within the project area based on habitat mapping according to the published ranges and the Natural Values Atlas report[37].

During surveys of the surrounding area a suspected grey goshawk nest was identified under the canopy of a blackwood tree. The tree was approximately 20 m high with the nest at about 18 m high. No whitewash (faeces) or other signs of goshawk activity were observed, suggesting the nest may currently be inactive. The nest was located approximately 500 m west of the southern quarry at 376587 mE / 5376099 mN as shown in Plate 8 (below) and Figure 3 (above).

Wedge-tailed eagle (*Aquila audax fleayi)* e/E and white-bellied sea-eagle (*Haliaeetus leucogaster)* -/migratory

One confirmed eagle nest (nest 2734) is known south of the existing Bobadil TSF on the western side of Lake Pieman. The nest is situated approximately 1.4 km from the nearest location of proposed embankment works and approximately 1.2 km from the proposed vehicle/machinery parking site. Given the location of this nest in relation to the proposed development no management constraints are required on account of this nest (Figure 6).

Given the prevalence of mature wet eucalypt forest vegetation throughout much of the surrounding landscape within 1 km of the project area, a targeted aerial eagle nest search was undertaken on 5 April 2023 (NBES report in prep). No additional nests were identified within 1 km of the proposed footprint in this case.

[34] Bryant and Jackson (1999)
[35] FPA (2010)
[36] Bryant and Jackson (1999)
[37] NVA report February 2023 (NRE)

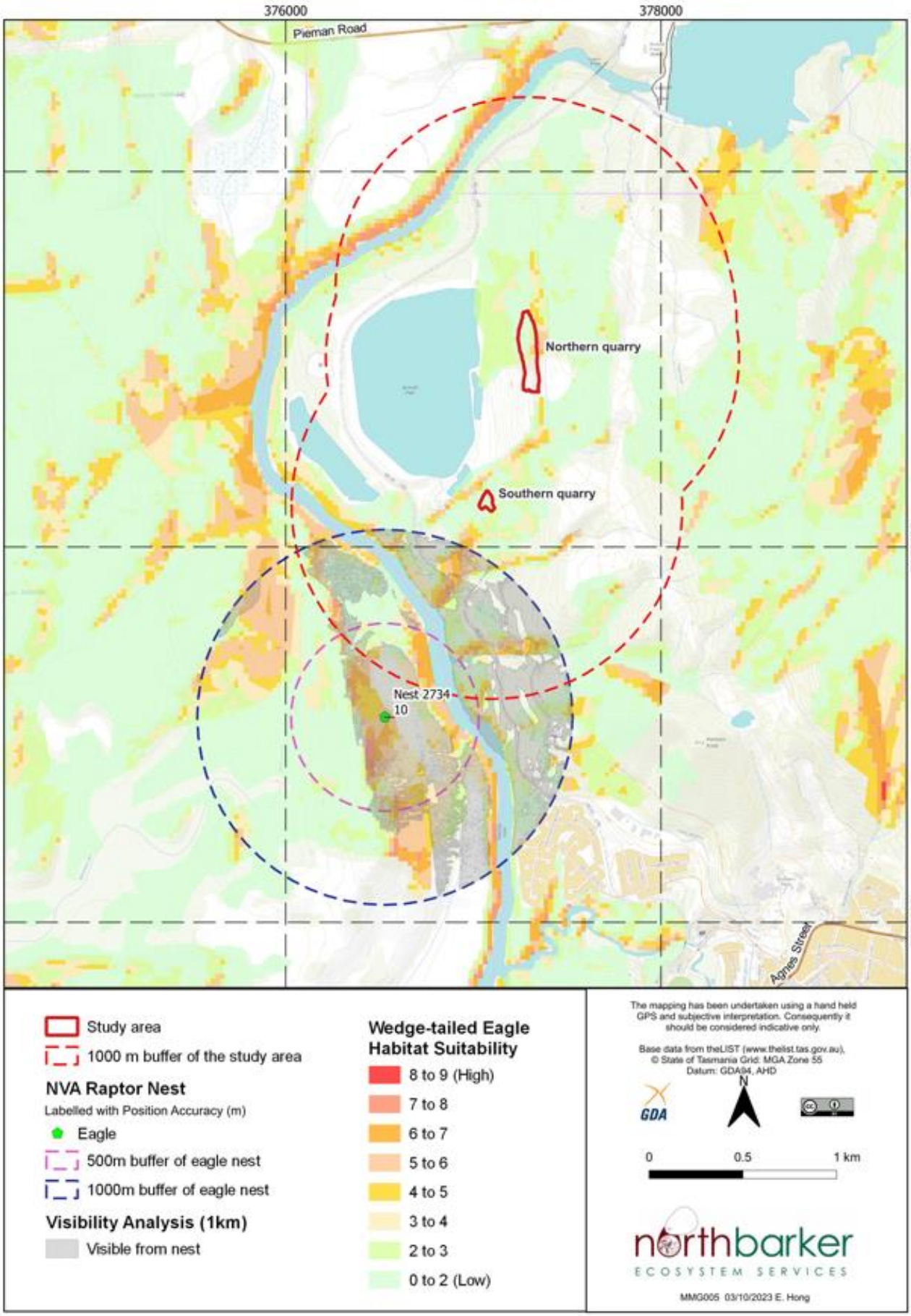


Figure 6. The distribution of modelled eagle nesting habitat and viewshed modelling for the existing nest location

Plate 8. Suspected grey goshawk nest in a blackwood tree

Tasmanian masked owl (*Tyto novaehollandiae castanops*) e/V

The Tasmanian subspecies 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 size[38]. 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 favoured[39]. The subspecies is generally found in territorial pairs, or as solitary individuals that are most likely juveniles[40]. Pair bonds are life-long, and pairs appear to occupy a permanent home range or territory[41]. Breeding is reported to be highly seasonal in Tasmania[42], with most females laying in mid-October to early November[43] though in May 2006 a nest was found containing a small chick (Bell, pers. comm.). Nesting occurs in large tree hollows of living or dead trees, but sometimes in vertical spouts or limbs[44]. Sexual maturity occurs at around 1 year of age, but age of first breeding is not reported [45]. The subspecies' generation length is unknown but is estimated to be 5 years[46].

[38] Green (1982), Green and Rainbird (1985), Mooney (1992), Mooney (1993)
[39] Debus (1993), Bell *et al* (1997), Higgins (1999)
[40] Higgins (1999)
[41] Hill (1955), Kavanagh and Murray (1996)
[42] Mooney (1997)
[43] Green (1982), Mooney (1997)
[44] Bell *et al.* (1997), Higgins (1999)
[45] Higgins (1999)
[46] Garnett and Crowley (2000)

The site falls within the core range of this species according to the published ranges[47], the Natural Values Atlas and EPBC protected matters report[48]. Records of the species were confirmed recently from song meter data captured by North Barker at South Marionoak approximately 1 km south of the Bobadil site (NBES, 2021), confirming that the species does occur in the local landscape.

Significant nesting habitat for the species includes large trees with suitably large hollows (>15 cm entrance diameter). Figure 5 depicts areas of wet eucalypt forest within the project area that contain trees of a suitable diameter (> 1 m DBH) that can be considered as having potential to bear hollows and thus support nesting and roosting. Trees in this area were specifically assessed for their current hollow condition and determined to be lacking any hollows suitable to support masked owl nesting (Plates 9 & 10).

Plate 9. Mature eucalypt trees (> 1m DBH) lacking any evidence of large hollows

Plate 10. Mature eucalypt tree (> 1m DBH) surveyed from the ground (left) and from above (right). Small hollows present, however, no suitably large masked owl nesting hollows present

[47] Todd (2012) and FPA (2014)
[48] NVA report February 2023 (NRE); EPBC Protected Matters Report, 29/09/2022

Figure 7. Potential masked owl habitat within the project area

Swift parrot (*Lathamus discolor*) e/CR

The swift parrot spends its winter in south-eastern mainland Australian before migrating to Tasmania in late winter/early spring to breed. During the breeding season, nectar from Tasmanian blue gum (*Eucalyptus globulus*) and black gum (*Eucalyptus ovata*) flowers are the primary food resource for the species. These eucalypts are patchily distributed throughout Tasmania, 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 and in most seasons, breeding activity is concentrated within the east and south-eastern parts of the State.

The nearest area recognised as important for swift parrot breeding in relation to the Bobadil TSF is what is referred to as the "North and West Potential Range", which is an area of approximately 400 km^2 situated north of Strahan and West of Zeehan. Bobadil is approximately 22 km east of this area, and as such, is currently recognised as outside the potential breeding range of this species according to published ranges[49].

It should be noted, however, that recent observations of swift parrots now appear on the Natural Values Atlas west of Lake Pieman in the South Marionoak area. These records constitute a total of 8 records within 5 km of Bobadil which report observations of swift parrot breeding (including chick begging calls) between approximately December 2022 and January 2023. Whilst these records could be considered atypical observations of such swift parrot activity, there is no biological limitation within the species that would prevent such an event in this area if a sufficient food resource was present in proximity of suitable nesting trees.

In this case of Bobadil there are numerous large trees in the surrounding landscape with the potential to support nest hollows for this species (assuming foraging habitat present also), however few such trees exist within the immediate impact footprint of the proposed works (same five (5) trees as considered for the masked owl). According to TASVEG4.0, no foraging habitat (ie *E. globulus* or *E. ovata* forest) has been mapped within 5 km of Bobadil. Given the overall lack of forest stands supporting foraging habitat within 5 km of Bobadil, there is a particularly low likelihood of any trees near Bobadil being considered for breeding by this species in any given breeding season.

A number of other threatened and/or migratory fauna were identified as having the potential to occur on site based on broad scale habitat mapping presented within the EPBC Protected Matters database. Table 3 provides a description of the preferred habitat of these species and an assessment of the likelihood of their occurrence on site. Despite suitable habitat being predicted by the EPBC database, no other species has been observed within 5 km of the site.

[49] FPA (2014) and NVA report February 2023 (NRE)

Table 4: Fauna species of conservation significance previously recorded within a 5 km radius of the site, or with the potential to occur based on EPBC habitat mapping [50]

Note: Migratory species are not included due to no suitable habitat being present within the project area.

Species	Status[51] TSPA / EPBCA	Potential to breed[52]	Observations and preferred habitat[53]
Known within 5000 m			
Dasyurus maculatus subsp. *maculatus* spotted-tailed quoll	Rare / VULNERABLE	Low - moderate	Two records of the species known from within 5 km – the most recent being made in 1994. Suitable habitat has been mapped within the site. No direct or indirect evidence of the species has been observed on site. However, it is highly likely that the quoll utilises the project area from time to time for hunting. The site is likely to be part of the home range of at least 1 female. Wet eucalypt forest throughout the site has been mapped as sub-optimal. The ground throughout this habitat was wet and generally lacked the structural features such as logs, rock outcrops and dry burrowing sites that the species utilises.
Sarcophilus harrisii Tasmanian devil	Endangered/ ENDANGERED	No optimal denning habitat	The NVA identifies 35 observations of the species within 5 km of the project area. No direct or indirect evidence of the species has been observed on site. No optimal denning habitat has been recorded within the project area; however, areas of suboptimal denning habitat has been mapped (Figure 4). Further targeted dens searches may be required if optimal den habitat is

[50] NVA report February 2023 (NRE), EPBC Act Protected Matters report, Commonwealth of Australia)
[51] Tasmanian *Threatened Species Protection Act 1995,* Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
[52] Potential for to occur based on the presence of suitable breeding habitat.
[53] Lazarus *et al.* 2003; Jones *et al.* 1999

			discovered. Prey availability throughout the footprint is likely to be low, however the species is likely to utilise the project area for foraging on occasion.
Potential to occur based on habitat mapping			
BIRDS			
Accipiter novaehollandiae grey goshawk	Endangered / -	Low nesting potential	The grey goshawk has been recorded from the nearby area with one observation of the species on the NVA within 5 km of the project area. A suspected grey goshawk nest was also found approximately 450 m west of the southern quarry area(GPS location 376587 E / 5376099 N) located approximately 18 high in a 20 m tall blackwood. Core habitat for this species is generally described as blackwood dominated forest however it is not uncommon for the species to nest in tree species other than blackwood including eucalypt and rainforest trees. Potential nesting and foraging opportunities for this species are relatively abundant within the project area and even more so in the surrounding landscape. No impacts to the suspected grey goshawk nest are anticipated as a result of the proposed works.
Aquila audax subsp. *fleayi* Tasmanian wedge-tailed eagle	Endangered/ ENDANGERED	Nesting: low Foraging: low	Requires large, sheltered trees for nesting and is highly sensitive to disturbance during the breeding season. Forested areas occur through the project; however, the vast majority of these areas have a westerly or south-westerly aspect and are thus exposed to prevailing westerly weather. No

			nest were located during the initial ground survey. Further surveying of nesting habitat within 1 km of the study area was undertaken in April 2023 and no new nests were located.
Ceyx azureus subsp. *diemenensis* Tasmanian azure kingfisher	Endangered/ ENDANGERED	Very low	Not known from within 5 km, but the site occurs within core range, with the species primarily utilising open riverine environments in western Tasmania. The project area does not contain rivers or large waterbodies – except for the tailings dam itself which is not considered as suitable habitat. Small densely vegetated streams are present which are also largely unsuitable habitat for this species.
Haliaeetus leucogaster white-bellied sea-eagle	Vulnerable/ Migratory	Nesting: low Foraging: none	Occurs in coastal habitats and large inland waterways. Terrestrial habitat on site suitable for very occasional foraging only, similar to the WTE, little viable nesting habitat exists within the project area however considerable areas of potential nesting habitat occur within 1 km. Further surveying of nesting habitat within 1 km of the study area was undertaken in April 2023 and no new nests were located.
Lathamus discolor swift parrot	Endangered/ ENDANGERED	None	Nesting this species requires tree hollows adjacent to food plants, which are blue gums (*E. globulus*) and black gums (*E. ovata*) and in some parts of the state brookers gum (*E. brookeriana)*. 8 confirmed records, and 5 unverified records of this species exist within 5 km of

			the project. The unverified records include observations of potential swift parrot nesting behaviour. The project area falls considerably outside any areas currently recognised as important for swift parrot breeding and sits approximately 22 km west of the 'North and West Potential Range' which is located north of Strahan and west of Zeehan. Limited foraging habitat availability in the local area.
Tyto novaehollandiae castanops Tasmanian masked owl	Endangered/ VULNERABLE	Moderate	Requires a mosaic of forest and open areas for foraging, and large old-growth hollow-bearing trees for nesting. Potential nesting habitat exists on site in mature wet eucalypt forest in areas adjacent to the proposed works (outside the proposed impact footprint).
FISH			
Prototroctes maraena Australian grayling	Vulnerable/ VULNERABLE	None	A diadromous species (*i.e.,* one that has both marine and freshwater stages of its lifecycle) that occurs in major rivers and unpolluted streams with large pools, particularly in low and mid-catchment areas where there are no barriers to the sea. Adults spawn in streams over gravel beds and the young migrate to sea for a period before moving back into rivers. No suitable habitat occurs within the project area or immediate surrounding area.

3.5 Introduced Plants and Plant Pathogens

Weeds

Records on the Tasmanian Natural Values Atlas document the occurrence of approximately 19 species within 5 km of the project area which are listed as declared weeds. During our field investigations one declared weed was identified as follows:

- Blackberry (*Rubus fruticosus*)

This record was from one location beneath the dam wall.

Cinnamon root-rot fungus (*Phytophthora cinnamomi*)

Symptoms of disease caused by *Phytophthora cinnamomi* (PC) were not observed on site, despite the site occurring within viable ecological range and supporting susceptible vegetation communities and species. The pathogen is known to occur within 5 km of the site[54].

4 ASSESSMENT OF IMPACT AND MITIGATION

The following assessment of impacts and mitigation considerations relate to the areas covering the two new quarry sites for the Stage 11 and 12 developments of the Bobadil site.

4.1 Native Vegetation Communities

The site supports typical west coast mosaic of rainforest, wet eucalypt forest and scrub communities. All TASVEG units are well reserved at the state and bioregional level and not considered to be threatened.

Table 4 below lists the extent of each TASVEG unit that occurs within each area.

Table 4. The extent (ha) of vegetation types in each area

TASVEG Unit	Southern Quarry	Northern Quarry	Total
(FUM) Extra-urban miscellaneous	0.52	1.83	2.33
(WOL) *Eucalyptus obliqua* forest over Leptospermum	-	0.17	0.17
(WOR) *Eucalyptus obliqua* forest over rainforest	-	0.94	0.94
(WOB) *Eucalyptus obliqua* forest with broad-leaf shrubs		0.52	0.52
Grand Total	**0.52**	**3.29**	**3.80**

4.2 Threatened Flora

The site has not been found to support any species of threatened flora and is not thought to have a high likelihood of doing so. Consequently, no mitigation regarding threatened flora species is required based on current knowledge.

[54] NVA report February 2023 (NRE), DPIPWE, 2020

4.3 Threatened Fauna

Devils and quolls

Although no scats were recorded during the survey, foraging presence of the Tasmanian devil, and spotted-tailed quoll is highly likely. Wet eucalypt forest within the project area has been mapped as containing sub-optimal habitat for these species.

Further pre-clearance surveys are recommended in accordance with the Department of NRE Survey and Advice Guidelines[55] to confirm that no active den sites are disturbed within 50 m of works areas. Such surveys should be done progressively ahead of the clearing works. For any potential den discovered at that time a den activity assessment will be required before decommissioning can occur once proven to be vacant.

It is unlikely that any impact within the area identified as unsuitable habitat would conflict with breeding individuals of these species.

Grey goshawk

A grey goshawk nest has been identified within 500 m of the project area as well as areas of potential goshawk nesting habitat within and surrounding the proposed development area. This includes gullies and creek lines supporting blackwood and rainforest trees that are suitably large enough for nesting.

Avoidance of this known nest with a minimum 100 m buffer should be readily achievable as part of the proposed works and as such no direct or indirect impacts to this nest site are anticipated.

If for whatever reason disturbance to a grey goshawk nest cannot be avoided due to physical developmental constraints it may be necessary to apply for a permit to take the nest under the *Threatened Species Protection Act* 1995.

No further targeted surveying for grey goshawk nests is warranted regarding the specific developmental areas proposed in this case.

Wedge-tailed eagle

Tasmanian wedge-tailed eagles are sensitive to disturbance around their nests, particularly during their breeding season. The eagle breeding season is accepted to be 1st July to 31st January inclusive, although it may be extended to end of February in late years (which is determined annually by the Forest Practices Authority [FPA] around November).

The known eagle nest southwest of the project area is beyond 1 km line of sight from any of the proposed development areas in this case and as such no operational constraints are required for management of the eagle breeding period on account of this nest.

Given the aerial eagle nest search undertaken in April 2023, no additional searches for nests are required in this case.

Masked owl

[55] Natural and Cultural Heritage Division (2015)

A total of five potential masked owl habitat trees are present within the footprint of the northern quarry area (as per Figure 5). The trees are large diameter eucalypts (>1m DBH) but do not support evidence of suitable masked owl nesting hollows from the ground-based and aerial assessments. As such, these trees are unlikely to support masked owl breeding habitat.

Swift parrot

The likelihood of swift parrots breeding at Bobadil is very low as the site is well outside any of the recognised important swift parrot breeding areas and is outside the current potential breeding range of this species. Mature trees on site could be considered potential nesting habitat for this species, however the apparent lack of foraging habitat for this species in the surrounding landscape suggests these trees are likely to be untenable for breeding. As such, removal of any large eucalypt trees is unlikely to result in any measurable deleterious impacts to habitat for this species.

4.4 Weeds and Pathogens

One declared weed (blackberry) has been identified on the existing Bobadil TSF site and numerous declared weed species have been recorded form the local area historically. Potential for further spread of these species exists through dispersal of vegetative material and seed during construction and earthworks.

A weed and hygiene management plan meeting the NRE guidelines for such plans should be developed. In particular the plan should identify how these issues will be managed during and post works and including long term monitoring and control.

5 LEGISLATIVE IMPLICATIONS

***Commonwealth Environment Protection and Biodiversity Conservation* Act 1999 (EPBCA)**

The EPBCA is structured for self-assessment; the proponent must determine whether or not the project is considered a 'controlled action' which if confirmed would require approval from the Commonwealth Minister.

Referral under the EPBC Act will be necessary if an action has, will have, or is likely to have a significant impact on any matter of national environmental significance (MNES), (amongst other things):

> *"modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species or ecological community is likely to decline."*

Where a project is referred for a significant impact on one MNES it is necessary to address all MNES that are present to demonstrate the likelihood of a significant impact on each. Targeted surveys are required on the natural values that are known or likely to occur within the project area before an assessment can be made on the likelihood of the projects potential to cause significant impacts to MNES.

Wedge-tailed eagle – e/EN

No known eagle nests will be impacted by the proposal, as confirmed by recent aerial surveys undertaken on 5 April 2023.

Vegetation clearance from the proposed works will result in the minor loss of foraging habitat for this species by way of loss of approximately 2.5 ha of intact native forest, however the clearance may also result in some level of habitat fragmentation which benefits their ability to perch and hunt within the proposed impact footprint.

Overall, no deleterious impacts to this species or its habitat are anticipated as a result of the proposed works and more specifically no significant impact is anticipated in the context of the EPBCA impact assessment criteria.

Spotted-tailed quoll – r/VU

The project will not have a significant impact on the 'vulnerable' spotted-tailed quoll under the significant impact criteria as the area does not support an 'important population' as defined under this legislation.

Tasmanian devil – e/EN

A targeted pre-clearance survey of all sub-optimal habitat within the site is recommended to mitigate the potential for impacts to dens and animals. If dens/burrows are found, a permit to take will be required under the *Nature Conservation Act* 2002.

Provided potential breeding sites for this species are identified and managed through a pre-clearance survey then no meaningful impacts to this species are anticipated. The removal of relatively small areas of sub-optimal and unsuitable denning habitat (non-critical habitat) for this species will in no way have an effect on populations of the species or result in any other deleterious impact that may cause the species to decline. Such habitat is common in the Bobadil area and more widely throughout western Tasmania. In the context of the MNES impact assessment criteria, these impacts are not considered to be significant and a referral under this Act on the basis of the Tasmanian Devil is unlikely to be warranted in this case.

Masked owl – e/VU

Habitat avoidance measures and pre-clearance assessments of potential nesting trees have been undertaken as the primary means of mitigating impacts to this species. As a 'Vulnerable' listed species, assessment considerations under the EPBCA centre around whether an action will have a deleterious affect on an 'important population' which includes populations defined as follows:

- *key source populations either for breeding or dispersal*
- *populations that are necessary for maintaining genetic diversity, and/or*
- *populations that are near the limit of the species range.*

The breeding history of masked owls near Bobadil is unknown, however based on observations of the species from various locations in the surrounding landscape in recent years we assume with a high degree of confidence that the forest at Bobadil is likely to constitute part of a masked owl home range, and may support, at most, a breeding pair of masked owls.

Productivity for masked owls at this site is somewhat speculative, however it is key to note that the Bobadil area is consistent in terms of vegetation structure, condition and density as much of the forest in western Tasmania. Given this, the success of potential masked owl breeding at Bobadil is likely to be comparable to the success of this species more widely in western Tasmania and as such this individual breeding pair/territory is unlikely to support any uniqueness in its breeding success to suggest it should be considered a 'key source population for breeding or dispersal.'

As mentioned previously, the Bobadil area is likely to support a single breeding pair of masked owls at most. With the number of breeding pairs in the State estimated at approximately 615[56], this single breeding pair on its own is unlikely to hold remarkable genetic traits which are considered necessary to maintaining the genetic diversity of masked owls throughout Tasmania.

The masked owl occurs throughout the State of Tasmania and is found in higher numbers in dry sclerophyll woodlands below 600 m a.s.l., which is considered its 'core breeding range'. In general, masked owls are observed less frequently in wetter forest types and at higher elevations with such environments being described as the 'potential range' for this species[57]. As there is no geographic limit to the species in Tasmania, the forested areas at Bobadil cannot be considered to support a population which is at 'the limit of the species range'.

On the basis of the above assessment, Bobadil does not support an 'important population' of masked owl and as such any potential impacts to habitat for this species cannot be considered significant in the context of the MNES impact assessment criteria. A referral under this Act on the basis of the masked owl is therefore not likely to be required.

Swift parrot – e/CR

Forested habitat within the proposed impact footprint in this case falls approximately 22 km outside the published breeding ranges of this species. Large trees within the impact footprint are also unlikely to be utilised for breeding due to the long distance to any substantial foraging resource (*E. globulus* and *E. ovata* trees and forest). As such, the forested areas proposed for clearance in this case are unlikely to constitute important habitat to this species and the proposed impacts and therefore unlikely to constitute a significant impact to the species in the context of the MNES Impact Assessment Guidelines. Therefore, a referral under this Act is not likely to be required on account of Swift Parrot.

***Threatened Species Protection Act* 1995 (TSPA)**

Under the TSPA, a person cannot knowingly without a permit 'take' a listed species. The definition of 'take' encompassing actions that kill, injure, catch, damage, destroy and/or collect threatened species or vegetation elements that support threatened species, e.g., nests and dens. Surveys to date have also confirmed the presence of a suspected grey goshawk nest near the project area and pre-clearance devil den surveys may reveal the presence of a den within the footprint. 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.

***Tasmanian Weed Management Act* 1999 (WMA)**

The site contains one species of declared weed and as such there are obligations under the *Weed Management Act* to prevent further spread of this species.

***Forest Practices Act* 1985 (FPAct)**

Under the *Forest Practices Act 1995*, a Forest Practices Plan 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 a Forest Practices Plan is not required. These circumstances include mineral exploration activities or mining activities that are authorised under:

[56] Garnett *et al* (2000)
[57] FPA & DPIPWE (2022)

(i) a permit granted under the Land Use Planning and Approvals Act 1993; or

(ii) an exploration licence within the meaning of the Mineral Resources Development Act 1995; or

(iii) a retention licence within the meaning of the Mineral Resources Development Act 1995; or

(iv) a mining lease within the meaning of the Mineral Resources Development Act 1995.

If the activity fits within one of the above points, a Forest Practices Plan is not required.

***Land Use Planning and Approvals Act* 1993 (LUPAA)**

LUPAA states that 'in determining an application for a permit, a planning authority must (amongst other things) seek out the objectives set out in Schedule 1[58].

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'[59].

6 SUMMARY AND RECOMMENDATIONS

Vegetation Communities

The site is typical of western Tasmanian lowland vegetation and habitats on similar geologies. It includes three distinct vegetation communities or mapping units (TASVEG v 4.0) all of which are common communities that are well represented in reserves.

Threatened Flora

No evidence of threatened flora has been found within the development footprint to date. A targeted survey for the horned orchid (*Orthoceras strictum*) was undertaken in January 2023 but no evidence of the species was found. The likelihood of additional threatened flora species being present within the proposed development areas is very low and as such no further surveys or specific permits for threatened flora are required in this case.

Threatened Fauna

Fauna habitats within the project area are also typical of west coast wet forests and scrubs. The landscape is not very productive in terms of nutrients and prey and the abundance of animals, particularly large predators reflects this. The following specific recommendations are provided for mitigation of potential impacts to threatened fauna species:

<u>Grey goshawk</u>

A suspected grey goshawk nest was identified approximately 450 m west of the southern-most quarry area. This nest should remain unaffected by the proposed works

[58] Section 51(2)(b) – Part 4 Enforcement of Planning Control – Division 2 Development Control (*LUPPA 1993*)
[59] page 56 – *LUPPA 1993*

in this case and does not require any specific additional management considerations or permits.

In the unlikely event that disturbance to this nest and the immediate surrounds (within 100 m) cannot be avoided, then a permit from the Department of NRE may be required prior to commencement of vegetation clearing works in this area

Masked owl

Avoidance of direct impacts to large diameter trees (>1m DBH) should be considered wherever possible as part of the future design and location of construction works, particularly avoidance of large trees in the northern end of the northern quarry area. The five large trees in this area that were assessed for their masked nesting potential have been deemed unsuitable for masked owl breeding and in the context of large tracts of better-quality mature forest surrounding the Bobadil area, the direct loss of these trees will not significantly impact upon the species.

Mammals (Tasmanian devil & spotted-tailed quoll)

- A pre-clearance survey for dens will be required prior to the commencement of any vegetation clearance and should be undertaken progressively ahead of any forest clearance plan.
- If a suspected den is found, then decommissioning of the den will be required in accordance with the Department of NRE Guidelines.[60]

Wedge-tailed eagle

No additional specific mitigation or management recommendations for this species are warranted in this case.

Weeds & Hygiene

- A weed and hygiene management plan meeting the NRE guidelines for such plans should be developed. In particular the plan should identify how these issues will be managed during and post construction and including long term monitoring and control.
- Before entering the site all machinery and all tools used to move earth including hand tools should be cleaned and be free of dirt. The cleaning process should comply with the Weed Management and Hygiene Guidelines set out in:
    - https://nre.tas.gov.au/invasive-species/weeds/weed-hygiene/weed-and-disease-planning-and-hygiene-guidelines

[60] Natural & Cultural Heritage Division (2015)

7 REFERENCES

Allan, K. & Gartenstein, S. (2010). Keeping it Clean – A Tasmanian field hygiene manual to prevent spread of freshwater pests and pathogens. Published by NRM South.

Baker M.L. & de Salas M.F. (2022). *A Census of the Vascular Plants of Tasmania & Index to the Student's Flora of Tasmania and Flora of Tasmania Online*. Tasmanian Herbarium, Tasmanian Museum and Art Gallery.

Barker, P.C.J. & Wardlaw, T.J. (1995). Susceptibility of selected Tasmanian rare plants to *Phytophthora cinnamomi*. Australian Journal of Botany, 43(4), pp. 379-386.

Bryant, S. & Jackson, J. (1999). *Tasmania's Threatened Fauna Handbook: what, where and how to protect.* Threatened Species Unit, Parks & Wildlife Service, Hobart.

Christidis, L. & Boles, W. (2008). Systematics and Taxonomy of Australian Birds. CSIRO Publishing, Victoria, Australia.

Commonwealth of Australia (1999). *Environment Protection and Biodiversity Conservation Act* 1999. No. 91, 1999.

DPIPWE (2020). Department of Primary Industries, Parks, Water and Environment. TASVEG 4.0, Released July 2020. Tasmanian Vegetation Monitoring and Mapping Program, Natural and Cultural Heritage Division.

DPIPWE (2010). TASVEG2. Vegetation communities in Tasmanian Reserve System.

DPIPWE (2004). Tasmanian Washdown Guidelines for Weed and Disease Control. Machinery, Vehicles & Equipment. Edition 1. Department of Primary Industries, Water & Environment, Forestry Tasmania, and Agricultural Contractors of Tasmania.

DPIPWE (2021). Department of Primary Industries, Parks, Water and Environment. TASVEG 4.0 area by VEGCODE. Tasmanian Vegetation Monitoring and Mapping Program, Resource Management and Conservation Division.

Forest Practices Authority & Threatened Species Section (DPIPWE) (2022). Review of Threatened Fauna Adviser. Background Report 2 Review of Information on Species and Management Approach. Forest Practices Authority, Hobart

Garnett, Stephen T. & Crowley, Gabriel M. (2000). The Action Plan for Australian Birds 200 (PDF). Canberra: Environment Australia. pp. 377–378. ISBN 0-642-54683-5.

Goff, F.G, Dawson, G.A. and Rochow, J.J. (1982). Site examination for threatened and endangered plant species. *Environmental Management 6 (4) pp 307-316*.

Harris , S & Kitchener, A. (2005). *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation*. Department of Primary Industries, Water and Environment, Printing Authority of Tasmania, Hobart.

Jones, D., Wapstra, H., Tonelli, P. and Harris, S. (1999). The Orchids of Tasmania. Melbourne University Press.

Knight, R.I. (2012). Analysis of comprehensiveness of existing conservation reserves and proposed additions to the Tasmanian forest reserves system. Report to the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement, February 2012. Natural Resource Planning, Hobart.

Lazarus, E., Lawrence, N. & Potts, W. (2003) *Threatened Flora of Tasmania CD*. Department of Primary Industries, Water & Environment, Hobart.

Long, K & J. Nelson (2010). *(Draft) National Recovery Plan for the Spotted-tailed Quoll* Dasyurus maculatus. Victorian Department of Sustainability and Environment.

Lowland Grassland Review Expert Group (2008). A Review of the Conservation Status of Lowland *Themeda* and *Poa* Grassland Native Vegetation Communities. An unpublished report to the Lowland Grassland Review Steering Committee, Resource Management and Conservation, Department of Primary Industries & Water, Hobart.

NRE(2023). Natural Values Report (27 February 2023), NRE, Natural Values Atlas, Threatened Species Section, Department of Primary Industries, Parks, Water and Environment, Hobart.

Peters, D. & Thackway, R. (1998) *A New Biogeographic Regionalisation for Tasmania.* Tasmanian Parks and Wildlife Service, Hobart.

Podger, F.D. & Brown, M.J. (1990). Vegetation damage caused by Phytophthora cinnamomi on disturbed sites in temperate rainforest in western Tasmania. Australian Journal of Botany, 37(6), pp. 443-480.

Podger, F.D., Mummery, D.C., Palzer, C.R. & Brown, M.J. (1990). Bioclimatic analysis of the distribution of damage to native plants in Tasmania by Phytophthora cinnamomi. Australian Journal of Ecology, 15(3), pp. 281-289.

Natural and Cultural Heritage Division (2015) Survey Guidelines and Management Advice for Development Proposals that may impact on the Tasmanian Devil (Sarcophilus harrisii). Department of Primary Industries, Parks, Water and Environment.

Tasmanian State Government (1993). *Land Use Planning and Approvals Act 1993.* No.70 of 1993. Government Printer, Hobart, Tasmania

Tasmanian State Government (1995). *Threatened Species Protection Act 1995.* No.83 of 1995. Government Printer, Hobart, Tasmania

Tasmanian State Government (1999). *Weed Management Act 1999.* No.105 of 1999. Government Printer, Hobart, Tasmania.

Tasmanian State Government (2002). *Nature Conservation Act 2002.* No.63 of 2002. Government Printer, Hobart, Tasmania.

Tasmanian State Government (2006). Nature Conservation Amendment (Threatened Native Vegetation Communities) Act 2006. Government Printer, Hobart, Tasmania.

Todd, M (2012). Calling behaviour of the Tasmanian Masked Owl *Tyto novaehollandiae castanops*. Australian Zoologist, 39, pp. 1-15

Wapstra, M., Roberts, N., Wapstra, H. & Wapstra, A. (2010). Flowering Times of Tasmanian Orchids: A Practical Guide for Field Botanists. Self-published by the authors (September 2010 version).

APPENDIX 1 - VEGETATION PLOT SAMPLE LOCATIONS

TASVEG Community	GPS	Eastings	Northings
WOL	123	376087	5376969
	240	377350	5376451
	186	377250	5377074
WOR	142	376792	5376146
	202	377321	5377567
	128	376067	5377052
	210	377205	5377716
WOB	154	377069	5375996
	199	377264	5377393
	203	377255	5377658
	212	377218	5377548
WNL	214	377739	5375921
	227	377716	5376253
	1030	377584	5377818
	1051	377481	5376804
	233	377528	5376083
RMT	1038	377429	5377293
	1097	376583	5376079
NLM	1052	377368	5376902

APPENDIX 2 – FLORA SPECIES LIST

Species list - project: MMG005

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	WOL - E414457, N1453033	13/09/2022 Hayley Kingsley
2	WOR - E414455, N1453032	13/09/2022 Hayley Kingsley
5	WOB - E414523, N1453111	15/09/2022 Hayley Kingsley

Site	Name	Common name	Status
	DICOTYLEDONAE		
	ASTERACEAE		
1 2	*Olearia argophylla*	musk daisybush	
	ATHEROSPERMATACEAE		
1 2 5	*Atherosperma moschatum subsp. moschatum*	sassafras	
	CONVOLVULACEAE		
5	*Dichondra repens*	kidneyweed	
	CUNONIACEAE		
2 5	*Anodopetalum biglandulosum*	horizontal	en
1 2 5	*Bauera rubioides*	wiry bauera	
	ELAEOCARPACEAE		
5	*Aristotelia peduncularis*	heartberry	en
	ERICACEAE		
1 5	*Epacris impressa*	common heath	
5	*Leptecophylla juniperina*	pink or crimson berry	
1	*Leptecophylla juniperina subsp. juniperina*	common pinkberry	t
1 2 5	*Monotoca glauca*	goldey wood	
1 2	*Trochocarpa cunninghamii*	straggling purpleberry	en
	ESCALLONIACEAE		
1 2 5	*Anopterus glandulosus*	tasmanian laurel	en
	EUCRYPHIACEAE		
1 5	*Eucryphia lucida*	leatherwood	en
	FABACEAE		
1 2	*Acacia dealbata subsp. dealbata*	silver wattle	
1 2 5	*Acacia melanoxylon*	blackwood	
1 2	*Acacia mucronata*	variable sallow wattle	
1 2 5	*Acacia verticillata*	prickly moses	
1	*Bossiaea cinerea*	showy bossiaea	
	FAGACEAE		
1 2 5	*Nothofagus cunninghamii*	myrtle beech	
	HALORAGACEAE		
5	*Gonocarpus micranthus subsp.*	creeping raspwort	
1 2 5	*Gonocarpus teucrioides*	forest raspwort	
	MYRTACEAE		
5	*Eucalyptus delegatensis subsp.*	gumtopped stringybark	en

	tasmaniensis		
1 2	*Eucalyptus nitida*	western peppermint	en
1 2 5	*Eucalyptus obliqua*	stringybark	
1 2	*Leptospermum scoparium*	common tea-tree	
1 5	*Melaleuca squarrosa*	scented paperbark	
	PITTOSPORACEAE		
2 5	*Pittosporum bicolor*	cheesewood	
	PROTEACEAE		
1 5	*Cenarrhenes nitida*	native plum	en
	RHAMNACEAE		
2 5	*Pomaderris apetala*	common dogwood	
	ROSACEAE		
5	*Rubus fruticosus*	blackberry	d
	RUBIACEAE		
1 2 5	*Coprosma quadrifida*	native currant	
	RUTACEAE		
1 2 5	*Nematolepis squamea*	satinwood	
1	*Philotheca verrucosa*	fairy waxflower	
1	*Philotheca virgata*	twiggy waxflower	
2 5	*Zieria arborescens*	stinkwood	
	THYMELAEACEAE		
1 2 5	*Pimelea drupacea*	cherry riceflower	
	WINTERACEAE		
1	*Tasmannia lanceolata*	mountain pepper	
	GYMNOSPERMAE		
	PHYLLOCLADACEAE		
1 2 5	*Phyllocladus aspleniifolius*	celerytop pine	en
	MONOCOTYLEDONAE		
	CYPERACEAE		
1	*Baumea tetragona*	square twigsedge	
1 2 5	*Gahnia grandis*	cutting grass	
1	*Gymnoschoenus sphaerocephalus*	buttongrass	
5	*Lepidosperma laterale*	variable swordsedge	
	HEMEROCALLIDACEAE		
1 2 5	*Dianella tasmanica*	forest flaxlily	
	LUZURIAGACEAE		
1 2 5	*Drymophila cyanocarpa*	turquoise berry	
	ORCHIDACEAE		
1 5	*Chiloglottis sp.*	bird orchid	
1 2	*Pterostylis melagramma*	blackstripe greenhood	
1 5	*Pterostylis nutans*	nodding greenhood	
1	*Pterostylis sp.*	greenhood	
	RESTIONACEAE		
1 2	*Baloskion tetraphyllum subsp. tetraphyllum*	tassel cordrush	
5	*Calorophus elongatus*	long roperush	
	PTERIDOPHYTA		
	ASPIDIACEAE		
1 2 5	*Polystichum proliferum*	mother shieldfern	
1 2 5	*Rumohra adiantiformis*	leathery shieldfern	
	BLECHNACEAE		
1 2 5	*Blechnum nudum*	fishbone waterfern	
1 2 5	*Blechnum wattsii*	hard waterfern	

	DENNSTAEDTIACEAE	
1 2 5	*Histiopteris incisa*	batswing fern
5	*Hypolepis rugosula*	ruddy groundfern
1 2 5	*Pteridium esculentum subsp. esculentum*	bracken
	DICKSONIACEAE	
1 2 5	*Dicksonia antarctica*	soft treefern
	GLEICHENIACEAE	
1	*Gleichenia dicarpa*	pouched coralfern
1 2	*Gleichenia microphylla*	scrambling coralfern
	GRAMMITIDACEAE	
1 2 5	*Notogrammitis billardierei*	common fingerfern
5	*Notogrammitis heterophylla*	gypsy fern
	HYMENOPHYLLACEAE	
2 5	*Hymenophyllum cupressiforme*	common filmyfern
2	*Hymenophyllum flabellatum*	shiny filmyfern
1 2 5	*Hymenophyllum rarum*	narrow filmyfern
	POLYPODIACEAE	
1 2 5	*Microsorum pustulatum subsp.*	kangaroo fern
	TMESIPTERIDACEAE	
2	*Tmesipteris elongata*	narrow forkfern
5	*Tmesipteris obliqua*	common forkfern

APPENDIX 3 – VEGETATION COMMUNITY COMPOSITION

WOL

Trees:	*Acacia melanoxylon, Atherosperma moschatum subsp. moschatum, Eucalyptus nitida, Eucalyptus obliqua, Eucryphia lucida, Nothofagus cunninghamii, Phyllocladus aspleniifolius*
Tall Shrubs:	*Acacia dealbata subsp. dealbata, Acacia mucronata, Acacia verticillata, Anopterus glandulosus, Leptospermum scoparium, Melaleuca squarrosa, Monotoca glauca, Nematolepis squamea, Olearia argophylla*
Shrubs:	*Bauera rubioides, Bossiaea cinerea, Cenarrhenes nitida, Coprosma quadrifida, Epacris impressa, Philotheca verrucosa, Philotheca virgata, Pimelea drupacea, Tasmannia lanceolata, Trochocarpa cunninghamii*
Herbs:	*Chiloglottis sp., Dianella tasmanica, Drymophila cyanocarpa, Gonocarpus teucrioides, Leptecophylla juniperina subsp. juniperina, Pterostylis melagramma, Pterostylis nutans, Pterostylis sp.*
Graminoids:	*Baloskion tetraphyllum subsp. tetraphyllum, Baumea tetragona, Gahnia grandis, Gymnoschoenus sphaerocephalus*
Ferns:	*Blechnum nudum, Blechnum wattsii, Dicksonia antarctica, Gleichenia dicarpa, Gleichenia microphylla, Histiopteris incisa, Hymenophyllum rarum, Microsorum pustulatum subsp. pustulatum, Notogrammitis billardierei, Polystichum proliferum, Pteridium esculentum subsp. esculentum, Rumohra adiantiformis*

WOR

Trees:	*Acacia melanoxylon, Atherosperma moschatum subsp. moschatum, Eucalyptus nitida, Eucalyptus obliqua, Nothofagus cunninghamii, Phyllocladus aspleniifolius*
Tall Shrubs:	*Acacia dealbata subsp. dealbata, Acacia mucronata, Acacia verticillata, Anodopetalum biglandulosum, Anopterus glandulosus, Leptospermum scoparium, Monotoca glauca, Nematolepis squamea, Olearia argophylla, Pittosporum bicolor, Pomaderris apetala, Zieria arborescens*
Shrubs:	*Bauera rubioides, Coprosma quadrifida, Pimelea drupacea, Trochocarpa cunninghamii*
Herbs:	*Dianella tasmanica, Drymophila cyanocarpa, Gonocarpus teucrioides, Pterostylis melagramma*
Graminoids:	*Baloskion tetraphyllum subsp. tetraphyllum, Gahnia grandis*
Ferns:	*Blechnum nudum, Blechnum wattsii, Dicksonia antarctica, Gleichenia microphylla, Histiopteris incisa, Hymenophyllum cupressiforme, Hymenophyllum flabellatum, Hymenophyllum rarum, Microsorum pustulatum subsp. pustulatum, Notogrammitis billardierei, Polystichum proliferum, Pteridium esculentum subsp. esculentum, Rumohra adiantiformis, Tmesipteris elongata*

WOB

Trees:	*Acacia melanoxylon, Atherosperma moschatum subsp. moschatum, Eucalyptus delegatensis subsp. tasmaniensis, Eucalyptus obliqua, Eucryphia lucida, Nothofagus cunninghamii, Phyllocladus aspleniifolius*
Tall Shrubs:	*Acacia verticillata, Anodopetalum biglandulosum, Anopterus glandulosus, Melaleuca squarrosa, Monotoca glauca, Nematolepis squamea, Pittosporum bicolor, Pomaderris apetala, Zieria arborescens*
Shrubs:	*Aristotelia peduncularis, Bauera rubioides, Cenarrhenes nitida, Coprosma quadrifida, Epacris impressa, Leptecophylla juniperina, Pimelea drupacea*
Herbs:	*Chiloglottis sp., Dianella tasmanica, Dichondra repens, Drymophila cyanocarpa, Gonocarpus micranthus subsp. micranthus, Gonocarpus teucrioides, Pterostylis nutans*
Graminoids:	*Calorophus elongatus, Gahnia grandis, Lepidosperma laterale*
Ferns:	*Blechnum nudum, Blechnum wattsii, Dicksonia antarctica, Histiopteris incisa, Hymenophyllum cupressiforme, Hymenophyllum rarum, Hypolepis rugosula, Microsorum pustulatum subsp. pustulatum, Notogrammitis billardierei, Notogrammitis heterophylla, Polystichum proliferum, Pteridium esculentum subsp. esculentum,* *Rumohra adiantiformis, Tmesipteris obliqua*
Weeds:	*Rubus fruticosus*

APPENDIX 4 – DEVELOPMENTAL STAGES OF THE HORNED ORCHID (*ORTHOCERAS STRICTUM*) IN WESTERN TASMANIA

Above - *Orthoceras strictum* 13/12/2022 (left – immature flower) and 30/01/2023 (right – peak flower) from the Murchison Highway near Melba Flats

Above - *Orthoceras strictum* 20/2/2023 from Trial Harbour Road (old flower)

pitt&sherry

Notice of Intent - MMG Bobadil TSF Stage 11 Embankment Raise

Pitt & Sherry (Operations) Pty Ltd
ABN 67 140 184 309

Phone 1300 748 874
info@pittsh.com.au
pittsh.com.au

Located nationally —
Melbourne
Sydney
Brisbane
Hobart
Launceston
Newcastle
Devonport