# FLORA AND FAUNA ASSESSMENT

## Mount Glen Rock - Esk

**For Somerset Regional Council**


**Native Foresters**

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All work conducted as part of this survey was conducted under the DERM Scientific Purposes Permit number WQA0035991 and DEEDI Animal Ethics Committee number CA 2020/08/1398 and in accordance with the relevant regulations.

## STUDY TEAM

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## DOCUMENT CONTROL

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- James Bonner, Jagera Daran - Cultural Heritage advisor provided a cultural induction for the survey team working on Jagera Daran country.
- University Sunshine Coast – Provision of information on Koala presence at Mt Glen Rock.

# EXECUTIVE SUMMARY

Somerset Regional Council (Council) is undertaking a master plan process for a multi-use recreational area encompassing mountain bike trails, walking trails and associated infrastructure on and around Mount Glen Rock. Native Foresters has been engaged to conduct ecological assessments of the site to inform this master planning process. The field surveys have been conducted with results presented in this report. The key findings of the surveys are as follows:

FLORA:

- Vegetation communities across the site are generally intact and are consistent with the mapped regional ecosystems for the site.
- Vegetation within the lower elevation riparian areas has good canopy cover with large trees occurring although weed species are present and dominant in some areas in the lower and groundcover stratums. Some of the understorey weeds, particularly Lantana, have been reduced in a burn off which occurred subsequent to the initial survey.
- Vegetation in the upper parts of the Mount Glen Rock has been impacted by hot bushfires in recent years with a resulting absence of large trees and a dense regenerating understorey affecting the integrity of the vegetation community.
- Eight specimens of Lloyd's Native Olive (*Notelaea lloydii*) were identified by Native Foresters and Council within the works footprint or within the site's clearing impact area. This species is listed as Vulnerable under the *Nature Conservation Act 1992.*
- None of the EPBC listed Threatened Ecological Communities identified in the desktop assessment were identified as occurring onsite during the site surveys.
- It is noted that the Bushfire Hazard Overlay Mapping is considered accurate for the site and the site is subject to a Very High Potential Bushfire Hazard with the observed impacts of wildfire on the elevated western slopes considered to be severe and habit changing.

FAUNA:

- The range of habitats in the survey area support the breeding and habitation requirements of a diversity of native fauna, including but not limited to 60 native bird species, 29 native mammals, 13 native reptiles and three native amphibians.
- The upper rocky slopes provide important habitat areas for a range of adapted species while the lower slopes and riparian areas have increased vegetal cover and areas of coarse woody debris and associated habitat features including the presence of ephemeral waterways that provide important habitat functions onsite.
- The survey area contains mapped Essential Habitat for the Endangered Koala and the Vulnerable Brush-tailed Rock-wallaby and both species were confirmed as occurring onsite. Several additional records for both species from local naturalist groups and a study conducted by the University of the Sunshine Coast have been included in the results of this report.
- The collation of relevant ecological data including the presence of CREVNT listed flora and fauna species across the site informs an understanding of the potential environmental impact of any proposed development works so that appropriate avoidance and mitigation strategies can be enacted in order to preserve the ecological integrity of the area.

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# Glossary & Abbreviations

| | |
|---|---|
| ASL | Above sea level |
| Council | Somerset Regional Council |
| CREVNT | Listed species under the Nature Conservation Act 1992, CR – Critically Endangered, E – Endangered, V – Vulnerable, NT – Near Threatened |
| DBH | Diameter at breast height |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water (Commonwealth) |
| DES | Department of Environment and Science (State) |
| EPBC Act | Environment Protection and Biodiversity Conservation Act 1999 |
| KHA | Koala Habitat Area (Core) |
| KPA | Koala Priority Area |
| MNES | Matters of National Environmental Significance as per the EPBC Act 1999 |
| MSES | Matters of State Environmental Significance as per the QLD State Planning Policy |
| NCA | Nature Conservation Act 1992 |
| PMST | Protected Matters Search Tool |
| RE | Regional Ecosystem as defined under the VMA 1999 |
| SL | Special Least Concern under the NCA 1992 |
| TEC | Threatened Ecological Community |
| TPZ | Tree Protection Zone as per AS497—2009 Protection of trees on development sites |
| VMA | Vegetation Management Act 1999 |

# 1.0 INTRODUCTION

Native Foresters has been commissioned by Somerset Regional Council (Council) to conduct a flora and fauna survey and habitat assessment of the Mount Glen Rock area. Council is proposing a multi-use recreational area encompassing a mountain bike trail network as well as walking trails and associated infrastructure on and around Mount Glen Rock, adjacent to the town of Esk. A preliminary survey was undertaken in March 2023, with a follow-up survey occurring in October 2023 to ensure that that flora and fauna with differing peak flowering and activity periods were captured in order to provide a more comprehensive understanding of the environment values present. The field surveys focused on the local Fauna and Flora assemblages and the general ecological condition of the site.

## *1.1 Background*

Council has undertaken a draft master plan process for the development of Mount Glen Rock reserve which includes the development of 28km of trails across the site, including mountain bike trails, walking trails and associated infrastructure. Various reports have been developed through this master planning process. Native Foresters reviewed the following reports and undertook a further desktop analysis to inform the field based ecological surveys:

- Mount Glen Rock Master Plan – Background Research Report by Otium Planning Group Pty Ltd. in October 2021, (Otium, 2021).
- Preliminary Ecological Constraints Assessment – Mount Glen Rock Mountain Bike Trails Project by Trend Ecology in January 2022, (Trend Ecology, 2022).
- Mount Glen Rock Mountain Bike Trails Concept Report by World Trails in January 2022 (World Trails, 2022).

## *1.2 Objectives of the report*

The objectives of this flora and fauna assessment are to investigate and report on the ecosystems, vegetation communities, and flora and fauna species occurring, or likely to occur, at the proposed project site. The objectives of the report are as follows:

- To provide the results of the March and October 2023 flora surveys undertaken in accordance with the *Nature Conservation Act 1992* (*NCA*) and the Flora Survey Guidelines – Protected Plants (DES, 2020a).
- To provide the results of the March and October 2023 fauna surveys and breeding places assessments undertaken in accordance with the *Species Management Program Requirements for tampering with a protected animal breeding place in Queensland* (DES, 2020b), the *NCA* and *Nature Conservation (Animals) Regulation 2020*.
- To comment on the potential impacts of any proposed works on native flora and fauna, including State and/or Commonwealth listed species and their breeding habitat.

This ecological report encompasses the desktop analysis and the results of all fieldwork completed in order to assess how the construction and operation of the proposed trail network may impact on the environmental values identified onsite and assess potential mitigation and avoidance strategies to reduce the impacts on those identified values.

## *1.3 Site description*

The proposed bike trails are planned across Mount Glen Rock which includes one freehold Council parcel (Lot 2 RP156580) and four parcels of Council reserve (Lots 141, 242, 243 on CSH2097 and Lot 239 CA31444) across an area of 208.1 hectares. The site is located within the Somerset Regional Council, adjacent to the eastern edge of the town of Esk. There is one constructed trail, known as Sandy Creek Fire Break Trail, and other informal tracks are in existence across the site associated with historical land uses. Refer to **Figure 1** for the site location and survey area.

Mount Glen Rock is a rocky mountainous area with two main peaks that rise to approximately 320 metres above sea level (ASL). Summit cliffs occur in parts of the mountain, particularly on the western and southern sides, and the upper slopes are steep and littered with scree. The lower slopes gradually decrease in steepness before meeting the fire trail near Sandy Creek on the western side of the reserve at approximately 110 metres elevation ASL. Esk Creek forms part of the eastern boundary of the reserve (i.e., Lot 141 CSH2097) and is approximately 95 metres ASL.

Underlying geology across most of the site has been described by Wilson and Taylor (2012) as Land Zone 12 - Mesozoic to Proterozoic igneous rocks, forming ranges, hills, and lowlands. Land Zone 3 - recent Quaternary alluvial systems, occurs around Sandy and Esk Creeks.

Existing impacts on the site include:

i) Historical logging on the lower slopes.
ii) The presence of feral predators including Red Fox (*Vulpes vulpes*) and Dingo/wild dog (*Canis* sp.) which prey on native mammals and reptiles, and Black Rat (*Rattus rattus*) which competes with native terrestrial mammals.
iii) Impacts to vegetation and native fauna through intense fires in recent seasons, including the loss of larger trees in higher parts of the mountain and changes to understorey composition and density.
iv) Climate change impacts including increased likelihood of extreme wildfire and drought, leading to habitat decline and drought-stressed trees.
v) Moderate to dense infestations of environmental weeds, including Lantana (*Lantana camara*) and Prickly Pear (*Opuntia stricta*) which outcompete native woodland species in some areas.
vi) Presence of erosion on some steeper sections of the informal tracks on the mountain.
vii) Surrounding rural properties, including the presence of domesticated animals such as cats and dogs.
viii) Edge effects (e.g., increased dust, pollution and noise) from adjacent major roadways (e.g., Brisbane Valley Highway).

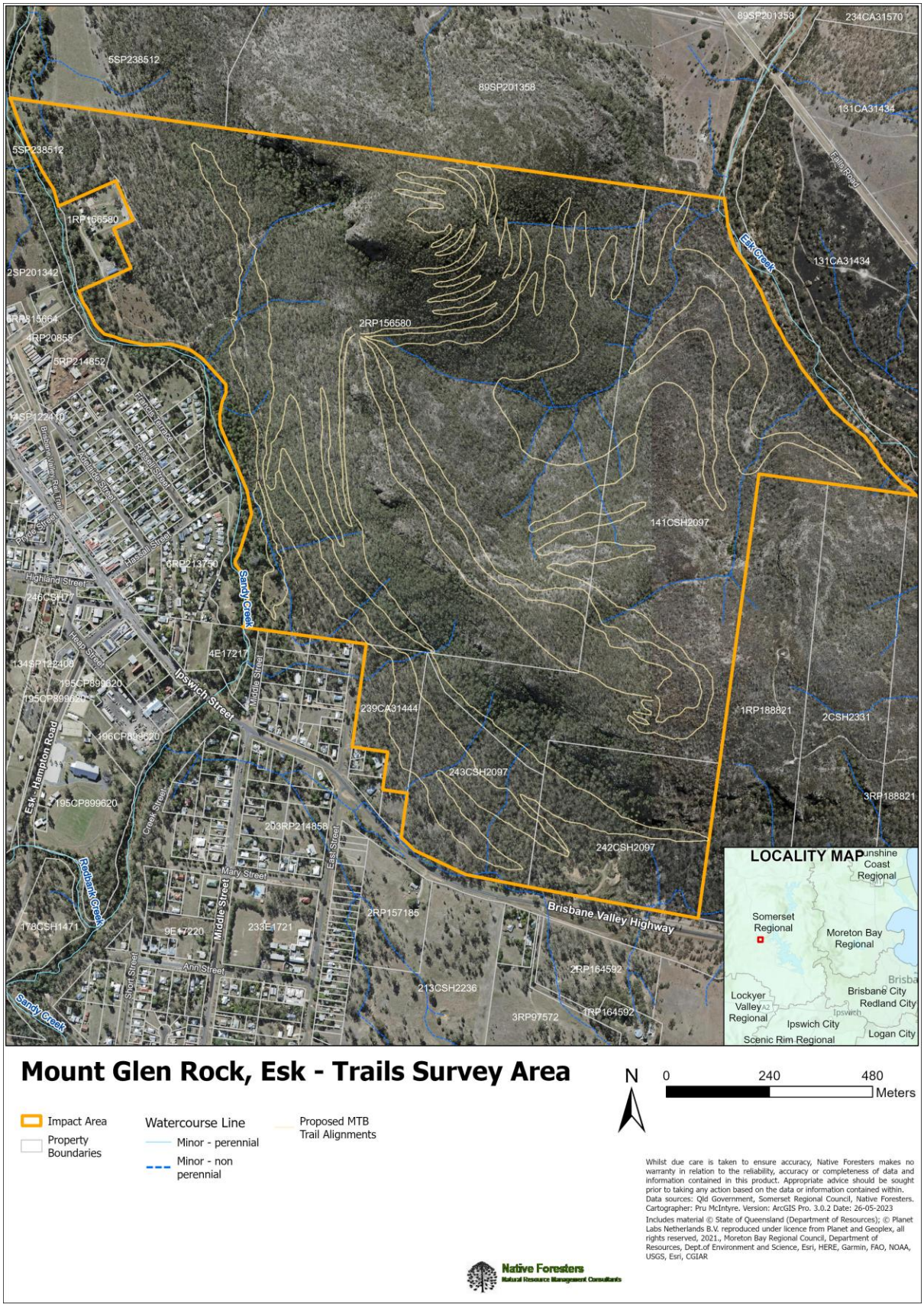


**FIGURE 1: Survey area**

## 1.4 Applicable Legislation

The following legislation was reviewed to evaluate the habitat values on the site for State and Commonwealth listed flora and fauna species. **Section 4** addresses the potential legislative requirements associated with the project.

Commonwealth Legislation:

- *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*)

State Legislation:

- *Biosecurity Act 2016* and *Biosecurity Regulation 2016*
- *Environmental Offsets Act 2014* and *Environmental Offsets Regulation 2014*
- *Fisheries Act 1994* and *Fisheries Regulation 2008*
- *Nature Conservation Act 1992* (*NCA*)
    - *Nature Conservation (Animals) Regulation 2020*
    - *Nature Conservation (Plants) Regulation 2020*
- *Nature Conservation (Koala) Conservation Plan 2017*
    - *Nature Conservation and Other Legislation (Koala Protection) Amendment Regulation 2020*
- *Planning Act 2016 and Planning Regulation 2017*
- *Vegetation Management Act 1999* (VMA)

Local Legislation:

- Somerset Region Planning Scheme 2016

## 1.5 Proposed works

Based on the preliminary design the proposed works involve the construction of a mountain bike trail network approximately 28 km in length, encompassing up to 12 mountain bike trails, walking trails and associated trail head infrastructure including signage, bike racks and shelters within the 208.1ha site. The clearing impact area, defined under section 249 of the *Nature Conservation (Wildlife Management) Regulation 2006*, is the area to be cleared together with a buffer zone – an additional area 100m in width around the development footprint. Therefore, for this project the 100m Protected Plants buffer around the existing works footprint, gives a clearing impact area of approximately 214 hectares. **Figure 2** shows this area as well as providing the layout for the preliminary track design.

The following notes are relevant to trail construction and the extent of impacts resulting from works:

- Vegetation clearing required to construct the trails will involve a 0.6 to 0.9m-wide corridor for mountain bike trails, and 1.5m to 3.0m wide corridor for shared use trails, with minor clearing at existing trailhead locations. Clearing of mature trees will generally be avoided by winding through forest openings.
- Excavation of soil and other material for track construction including the use of site rock for track stabilisation and rock armouring where required.
- Where bike trails cross tree roots that are raised above ground level, soil and fill generated during construction will be used to elevate the trail across the roots. Some sections will require downslope rock walling to facilitate the elevation of the trails across tree roots.

- Works as proposed will include trail crossing over a number of ephemeral drainage lines and waterways and will be constructed to recognised international mountain bike standards for water management, with armoured gully and creek crossings that can withstand flowing water.
- The current trail network does not include crossings of Sandy Creek or Esk Creek, both mapped as Major (Purple) Risk Waterways under Fisheries mapping with both are defined as a “watercourse” under the *Water Act 2000*.

## *1.6 Impacts on site ecological values*

Potential direct and indirect impacts to existing flora and fauna habitat from the proposed works may include:

- Sedimentation and erosion of soil from disturbed areas following rain events impacting water quality of downstream waterways.
- The extent of vegetation clearing is to be determined following the completion of a detailed design. Based on the preliminary design, the works impact area includes up to 8 different mapped Regional Ecosystems (remnant and regrowth areas) that may be impacted by works,
- Potential impact to culturally significant features occurring through the site.
- There is potential removal of native trees with a diameter at breast height (dbh) of over 200mm, including habitat trees for Koala (*Phascolarctos cinereus*). These trees occur in close proximity of the proposed tracks, and some may have to be removed to allow for construction, trailhead infrastructure and/or machinery access.
- Potential disturbance to the Tree-root Protection Zones (TPZs) of additional native trees during construction.
- Disturbance to understorey vegetation, holes, cracks and crevices that provide cover and foraging and breeding habitat for small reptiles and mammals.
- Removal of stumps, logs, and associated disturbance to soil, leaf litter and debris, causing loss and/or disturbance of habitat, including breeding habitat, for reptiles, amphibians and mammals.
- Potential for dispersal and introduction of weeds by machinery/works.
- Compaction of soil and destruction of depressions/burrows used by native fauna.
- Disturbance of habitat within the laydown area for the site through stockpiling of cleared vegetation, soil and construction materials.
- Potential for construction phase and ongoing disturbance of brush-tailed rock wallaby daytime shelter sites
- Potential for increased predation risks to rock wallabies by providing greater access by dingoes, wild dogs and foxes.

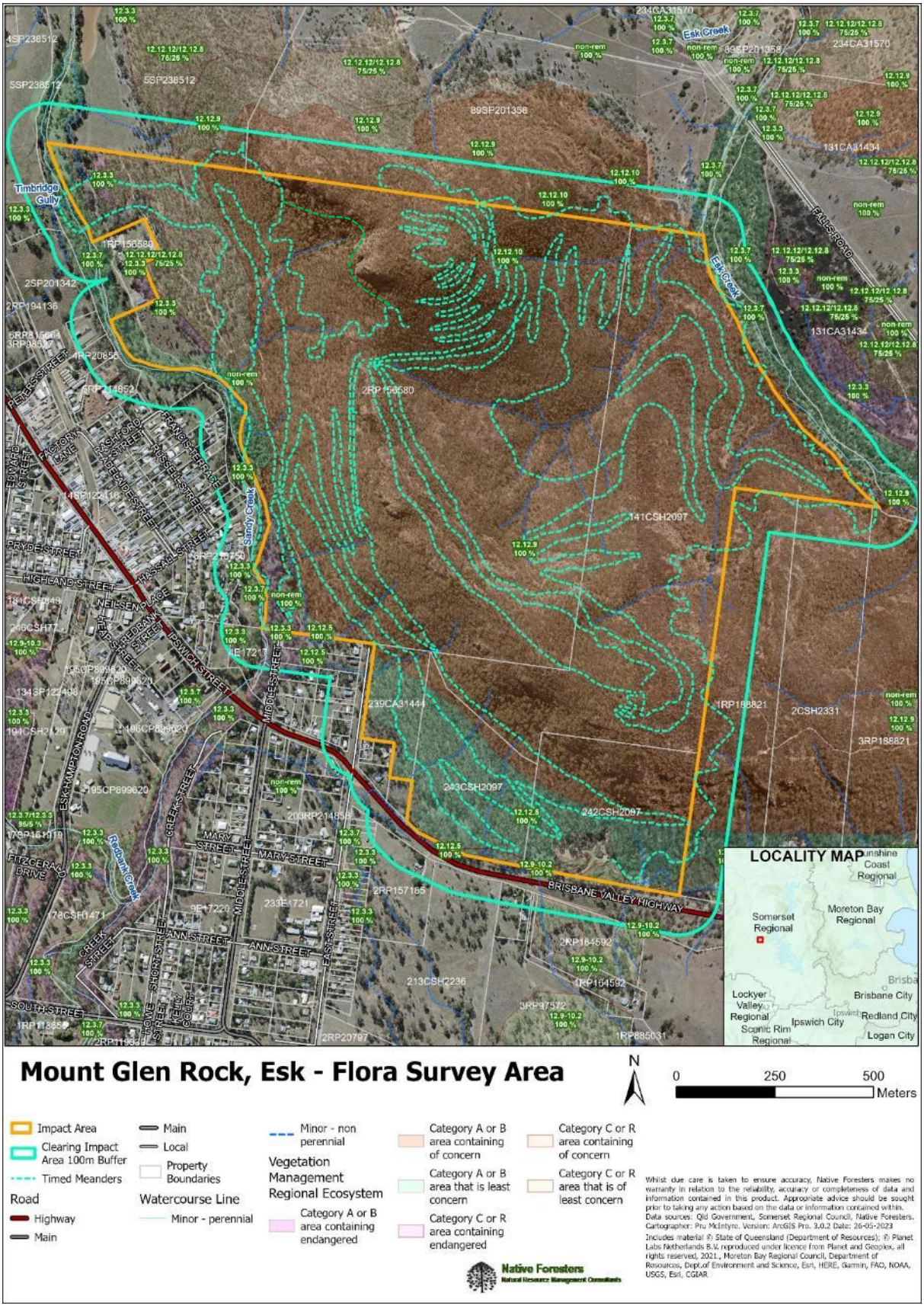


**FIGURE 2: Flora Survey area and location of timed meanders**

# 2.0 METHODOLOGY

## *2.1 Desktop review*

The desktop review consisted of searches of local, state and commonwealth government planning instruments and databases, as well as relevant academic literature. Multiple databases were utilised to determine species, communities, and areas of conservation significance with potential relevance to the works impact area (2km radius around central coordinates, -27.2345° S, 152.4304° E or Lot on Plan, dependent on database). Sources of information are listed below and further described in **Appendix A**.

*Commonwealth:*

a) EPBC Protected Matters Search Tool (DCCEEW, 2023), which includes:
    - Matters of National Environmental Significance (MNES)
    - Other matters protected by the *EPBC Act*

*State:*

a) Vegetation Management Property Report (Queensland Government, 2023a), which includes:
    - Regulated Vegetation Management Map,
    - Vegetation Management Supporting Map,
    - Essential Habitat table and map,
    - Protected Plants Flora Survey Trigger Map, and
    - Koala Priority Area, Koala Habitat Area and Koala broad-hectare area map.
b) WildNet Report (Queensland Government, 2023b).
c) Matters of State Environmental Significance (Queensland Government, 2023c), which includes:
    - State conservation areas,
    - Wetlands and waterways,
    - Threatened wildlife and special least concern species,
    - Koala habitat area, and
    - Regulated vegetation.
d) Queensland Waterways for Waterway Barrier Works spatial data layer and guideline (Queensland Globe, 2023 and DAF, 2021).

*Non-government:*

*a)* Trend Ecology (2022), Mount Glen Rock Mountain Bike Trails Project – Preliminary Ecological Constraints Assessment.

## *2.2 Flora survey*

An experienced botanist undertook systematic botanical analyses on 5th – 8th March, 23rd – 24th March and 10th – 11th October 2023 to assess the vegetation communities occurring within and around the survey area. The survey was consistent with the *Flora Survey Guideline – Protected Plants (NCA 1992*), and particular attention was given to searching for Critically Endangered, Endangered, Vulnerable or Near Threatened (CREVNT) listed flora species in the works impact area. Certification of the suitably qualified person who led the survey is provided in **Appendix B**.

Timed meander surveys were undertaken in alignment with the *Flora Survey Guidelines* (DES, 2020a), in each determined habitat type (or Regional Ecosystem) within the CIA. The guidelines require the following in relation to timed meander surveys:

- Each habitat type must be surveyed with a timed meander to maximise coverage of habitat and the encounter rate of different species.
- Identities of any threatened plants or near threatened plants (listed CREVNT species) and associated locational data must be recorded;
- Record the time every 2 – 5 minutes and pause the timed meander if the survey needs to be interrupted;
- Search habitat types until no new threatened or near threatened plants have been observed for 30 minutes, OR when the entire habitat type has been surveyed;
- Meanders must be undertaken (at a minimum) at the following rate per area of habitat type:
    - <2ha, requires one (1) meander;
    - between 2ha and 10ha, requires two (2) meanders;
    - between 10ha and 100ha, requires four (4) meanders;
    - >100ha, six meanders

A minimum of 10 hours of active survey was undertaken in the CIA as eight habitat types were determined to occur in an areas varying in size from <1ha to over 100ha.

In the event that an CREVNT-listed plant was identified during the timed meander surveys, a more comprehensive and systematic assessment to determine the species extent and density was conducted using a population survey.

The population survey methodology follows that described in section 6.2.6 of the *Flora Survey Guidelines* (DES, 2020a), and involved capturing GPS points of the population extent by traversing the periphery of the population and recording the total number of individuals present to determine the species population density.

### *2.2.1 Vegetation in the Protected Plant 100 metre buffer*

A population survey was undertaken within the 100m buffer surrounding the located Vulnerable species to record the extent and density of the *N. lloydii* population. Further information relating to population survey and the CREVNT flora species recorded within the 100m buffer is shown below in **Section 3.2.2**.

## *2.3 Fauna survey*

An appropriate survey regime was devised based on results of the desktop survey, initial site visit and identification of habitat features suitable for listed species. Two surveys were conducted, with the first from 5th - 8th March 2023 (Field Trip 1) and the second from 9th – 12th October 2023 (Field Trip 2). The survey methodology used was consistent with the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (DSITIA, 2012). The survey team was comprised of three members with specific skills in ecology, fauna identification, fauna survey and trapping, and was led by Dr Scott Burnett, with the certification of the suitably qualified person provided in **Appendix C**. The survey methods employed are described below.

### 2.3.1 Fauna trapping transects

Transect-based monitoring (including fauna trapping) was undertaken during Field Trip 1 only. Three fauna survey transects were established and trapping was undertaken on the lower western and southern flanks of Mount Glen Rock and operated for three nights from the 5th – 8th March 2023. Each transect consisted of fifteen Elliot type A live-traps baited with a mixture of peanut butter, rolled oats and golden syrup. Traps were spaced approximately 10 metres apart on each transect. The transect line was then checked each morning and evening. Captured individuals were released and each trap was rebaited, until day 4 of the survey when the traps were removed.

Herptile funnel traps with a drift fence were deployed in each transect to target small reptiles. A 500mm high wire mesh drift fence was deployed along a contour line, 15m long, in habitat suitable for the target species. Six funnel traps (rectangular mesh covered frame with a funnel shaped entry point at each end) were deployed at either end of the midpoint of each drift fence. The trap line was established and GPS marked on day 1 of the survey and then checked each morning and evening with any animals released, until day 4 of the survey when the traps were removed.

Trapping transect sites were chosen to sample the dominant Regional Ecosystems which were accessible from highways and roads on the western side of the site. Each was located in the vicinity of proposed trails. See **Appendix D** for an overview of habitat and locations at each of the trapping transects.

### 2.3.2 Remote camera traps

Remote camera trapping was undertaken during both Field Trips. During Trip 1 ten trail cameras (Reconnyx HC500 and HC550) were established at 12 points on the western aspect of Mount Glen Rock between 5th and 24th March 2023. A pair of camera traps were also established at either end of each of the three fauna trapping transects with one of each pair baited with peanut butter, and the second pair baited with four uncooked chicken necks. The remaining six cameras were set opportunistically across the western slopes of Mount Glen Rock. Due to planned burns in the riparian area, the two camera traps at Site 3 were moved after two nights and redeployed further up the slopes of Mount Glen Rock, out of the planned burn zone.

During Trip 2, ten trail cameras (Reconnyx HF2 Pro White flash) were deployed at 10 points on the eastern aspect of Mt Glen Rock. Each trail camera was baited with peanut butter and a slice of fresh apple. Trail cameras were retrieved after the fourth night of deployment due to a forecast extreme fire danger at the site. Site locations are provided in **Appendix D**.

### 2.3.3 Microbat surveying

Microbat species were surveyed using live capture and ultrasonic detection techniques during both Field Trips. Live -trapping was undertaken during the first field trip only.

During Trip 1, five ultrasonic bat detectors, (Anabat Swift, Titley Electronics) were placed at five sites (Table 2) where they were deployed for two nights, with the exception of sampling Station AS05 which was set for one night only. Three detectors were established at each of the three fauna trapping transects and the remaining detectors were deployed at opportunistic sites on the western flanks of Mount Glen Rock.

Live trapping utilised a harp trap on the night of the 7th March 2023. This harp trap site was established at the junction of an unnamed gully and Sandy Creek. Harp trapping is an intercept trapping technique which requires the positioning of the harp trap in a natural bat flyway where bat activity is concentrated towards the trap. This requires positioning of the trap across road or trackways through dense vegetation, or across narrow water bodies or gullies.

During Field Trip 2, five ultrasonic bat detectors, (Anabat Swift, Titley Electronics) were utilised for between one and four nights at six sites. Bat detectors were located opportunistically so as to provide broad coverage of parts of the study area not surveyed during Trip 1, with particular emphasis on sampling cliff lines and pools of water in drainage lines on the eastern side of the mountain. Refer **Appendix D** for the locations of the detectors.

### 2.3.4 Opportunistic and targeted observation surveys

Direct observation surveys were undertaken during both field sessions, during day and night time traverses of the site. Daytime traverses included targeted traverses of rock wallaby and koala habitat and included searches for reptiles and amphibians. Opportunistic surveys were undertaken while traversing the site during the course of other activities such as deploying trail cameras and bat detectors and undertaking flora assessments. Night time traverses generally targeted nocturnal mammals, birds, reptiles and amphibians. These searches utilised the following methods:

- Active search – for all fauna under in accessible hollows, logs, rocks, leaf litter, and decorticating bark.
- Night-time spotlighting using hand held torches assisted by an infra-red (IR) imaging device (Hikmicro Lynx LH19 monocular).
- Passive search – identifying species both visually and aurally while undertaking other activities.
- Tracks, scats and traces – opportunistic searches for signs of an animal's presence, such as scats, tracks, feeding traces or skeletal remains.
- Aural survey – listening for frogs and birds.

## *2.4 Breeding places and fauna habitat assessment*

A fauna habitat assessment was undertaken during the field investigations. This assessment was based on the habitats present, the listed threatened species known to occur or potentially occurring within the locality, and the occurrence of specific breeding places or breeding habitat for these species.

This report follows the definition of “breeding places” provided in s332 of the *Nature Conservation (Wildlife Management) Regulation 2006*. For species such as Koala and frogs, who do not use a habitual breeding place, the term ‘breeding habitat’ is used in lieu of ‘breeding place’. The fauna habitat assessment is important in determining undetected species that may occur in the area. Habitat features that were considered included:

i. *Presence of hollow-bearing trees:* These may be used by birds, reptiles or arboreal mammals to incubate or rear offspring;
ii. *Presence of bowers, nests, dreys:* These structures are commonly used by birds or mammals to incubate or rear offspring;

iii. *Presence of caves, mounds, burrows, ground hollows and/or coarse woody debris:* These structures are commonly used by birds, mammals, reptiles or amphibians to incubate or rear offspring;
iv. *Presence of permanent water, ephemeral ponding, depressions and/or, seasonally inundated areas:* Waterbodies may be used for breeding by aquatic species or amphibians, or may provide intermittent breeding habitat for opportunistic species;
v. *Presence of large trees*: Large trees can be a dominant feature of native vegetation and are difficult to replace once lost. Their influence for wide-ranging species can extend over a considerable distance from their location.
vi. *Canopy cover*: The uppermost stratum of woody vegetation that forms the canopy functions as habitat for birds and arboreal mammals, provides food and resources, and determines the degree of light penetration and heat reaching the lower strata and ground detrital layer.
vii. *Weed cover*: Weeds can dominate and suppress native plant growth which affects the diversity of food sources; they can change the fuel or litter characteristics of a site, thereby altering the fire regime, and also prevent recruitment and succession of native vegetation.
viii. *Understorey components*: The shrub and herb strata generally contain the greatest plant species richness and can be an indicator of disturbance and changes in condition.
ix. *Organic litter, fallen timber and rocks*: Litter cover can be indicative of the degree of disturbance of a site, and can be an important determinant of species recruitment. It will influence soil microclimates, structure and composition, and provide refugia for invertebrates, reptiles, amphibians and ground dwelling mammals.
x. *Recruitment*: Recruitment of plant species, particularly woody perennials, within all strata reflects the site's long-term viability.
xi. *Landscape context:* Patch size, connectivity and distance to a core area of vegetation (i.e., > 50ha) can affect regenerative capacity and long-term viability.

Features that were able to be effectively assessed are described in **Section 3.4**. For each listed species that was identified in Essential Habitat mapping or Wildlife Online and likely species from Protected Matters Search Tool (PMST) search, a likelihood of occurrence rating was assigned based on the following:

- Known - species positively recorded by this survey or other survey by qualified ecologists during past 30 years;
- Likely - based on the presence of suitable habitat and recent database records from study area or proximity;
- Possible - suitable habitat present for the species, but no recent database records from the study area or proximity; and
- Unlikely - based on a lack of suitable habitat and lack of proximate records.

## 2.5 Justification of survey timing and weather conditions

The initial flora and fauna surveys were conducted in mid-autumn in fine, hot conditions with temperatures ranging from 23 - 33 °C, relative humidity of 56 - 75%. Approximately 10mm of rain fell in the area in the week prior to the survey**.** The follow-up survey occurred in warm spring conditions in temperatures of 13 – 30 °C and relative humidity of 28 – 57%, with approximately 1mm of rain falling at the site in the preceding week.

The timing of the survey is considered suitable for detecting the target CREVNT-listed plant species, *Notolaea lloydii* (Lloyds Olive) which is not deciduous.

The timing of the survey is also considered suitable for detecting Brush-tailed Rock-wallaby (*Petrogale penicillata*), Koala (*Phascolarctos cinereus*) and Squatter Pigeon (*Geophaps scripta scripta*) which are active year-round. Survey timing is optimal for detecting the spring-time territorial bellows of male koalas.

## *2.6 Survey limitations*

Emphasis is placed on surveying listed threatened ecological communities, populations and/or species that are considered likely to occur within the survey area. With respect to opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to:

- Seasonal inactivity during field surveys;
- Species present within microhabitats not surveyed;
- Species that occur at very low abundance or in very small populations;
- Cryptic species able to avoid detection;
- Transient wide-ranging species not present during survey periods;
- Absence of reproductive material for flora identification; or
- Drought induced leaf fall or senescence.

The lack of observational data on some species should therefore not be taken as necessarily indicating that a species is absent from the site.

The precautionary principle was applied in estimating the likelihood of Commonwealth and State listed species based on habitats identified within the subject site.

# 3.0 RESULTS

## *3.1 Desktop review*

Results of the desktop review of the relevant databases and mapping are presented in **Table 1.**

**TABLE 1: Desktop review of environmental values**

| DATABASE SEARCH OR MAP PRODUCT NAME | SUMMARY OF RESULTS |
|---|---|
| **Regulated Vegetation** | The Mount Glen Rock clearing works impact area contains mapped regulated vegetation including one Endangered Regional Ecosystem (RE), four Of Concern REs and three Least Concern REs, as shown in **Table 2**. The Vegetation Management Supporting map is provided in **Appendix E**. |
| **Protected Plants** | Most of the works impact area is mapped as a high-risk of containing CREVNT plant species, and as such the flora survey is subject to the provisions of the Queensland *Flora Survey Guidelines – Protected Plants* (*NCA 1992*). The Flora Survey Trigger map is provided in **Appendix F**. |
| **Essential Habitat** | The works impact area contains mapped Essential Habitat for two CREVNT fauna species - the Endangered Koala (*Phascolarctos cinereus*) and the Brush-tailed rock-wallaby (*Petrogale penicillata*); and one CREVNT flora species – Lloyd's Native Olive (*Notelaea lloydii*) as shown on the Vegetation Management Supporting Map. |
| **WildNet** | Four CREVNT fauna species, one CREVNT flora species, one Special Least Concern (SL) fauna species and eight SL flora species have been recorded within a two-kilometre radius of proposed works as shown in **Table 3**. |
| **EPBC Protected Matters** | There is potential for 48 Threatened Species and 16 Migratory Species to occur within 1 – 2 kilometres of the proposed works. There is also potential for three listed Ecological Communities to occur:<br>• Lowland Rainforest of Subtropical Australia (Critically Endangered).<br>• Grey box-grey gum wet forest of subtropical eastern Australia<br>• Poplar Box Grassy Woodland on alluvial plains (Endangered).<br>• Subtropical eucalypt floodplain forest and woodland of the NSW north coast and SE Queensland bioregions (Endangered). |
| **Koala Habitat** | The site is mapped as Core Koala Habitat, however it is not a designated Koala Priority Area. Refer to Section 4.2 for koala legislation and definitions and **Appendix G** for maps. |

| DATABASE SEARCH OR MAP PRODUCT NAME | SUMMARY OF RESULTS |
|---|---|
| **Matters of State Environmental Significance (MSES)** | The following MSES are mapped as occurring within or adjacent to the area of interest (**Appendix G**):<br><br>i) MSES Species<br>o Threatened (Endangered or Vulnerable) wildlife<br>o Special Least Concern animals<br>o Koala Habitat Area (SEQ) (Core)<br><br>ii) MSES Regulated Vegetation<br>o Regulated Vegetation - Endangered/Of concern in Category B (remnant) & category C (regrowth)<br>o Regulated Vegetation - Essential habitat<br>o Regulated Vegetation – Intersecting a watercourse<br><br>Under the *Environmental Offsets Act 2014* and *Environmental Offsets Regulation 2014*, offset requirements may apply to assessable developments where it has been determined that there will be a significant residual impact on a prescribed environmental matter. |

**TABLE 2: Mapped REs in clearing impact area and associated EVNT flora species**

| RE | VMA status | Description | Category | Area (ha) | Target EVNT Flora species |
|---|---|---|---|---|---|
| 12.12.9 | Of Concern | *Eucalyptus dura* woodland usually on rocky peaks on Mesozoic to Proterozoic igneous rocks | Remnant/regrowth | 154.11/3.95 | *Cassinia collina, Notelaea lloydii, Acacia pubicosta, Comesperma breviflorum* |
| 12.12.5 | Least Concern | *Corymbia citriodora* subsp. *variegata, Eucalyptus crebra* woodland on Mesozoic to Proterozoic igneous rocks | Remnant/regrowth | 16.08/0.59 | *Cycas megacarpa, Notelaea lloydii* |
| 12.12.10 | Of Concern | Shrubland of rocky peaks on Mesozoic to Proterozoic igneous rocks | Remnant | 9.29 | *Cassinia collina, Melaleuca Formosa* |
| 12.12.12 | Of Concern | *Eucalyptus tereticornis, Corymbia intermedia, E. crebra +/- Lophostemon suaveolens* woodland on Mesozoic to Proterozoic igneous rocks | Regrowth | 4.10 | *Coleus omissus, Cycas megacarpa, Notelaea lloydii, Paspaladium grandispiculatum.* |
| 12.3.7 | Least Concern | *Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca* spp. fringing woodland | Remnant/regrowth | 3.69/0.18 | *Notelaea lloydii* |
| 12.3.3 | Endangered | *Eucalyptus tereticornis* woodland on Quaternary alluvium | Regrowth | 2.14 | *Notelaea lloydii, Rhaponticum australis* |
| 12.12.8 | Of Concern | *Eucalyptus melanophloia* woodland on Mesozoic to Proterozoic igneous rocks | Regrowth | 1.37 | *Coleus omissus* |
| 12.9-10.2 | Least Concern | *Corymbia citriodora* subsp. *variegata +/- Eucalyptus crebra* open forest on sedimentary rock | Regrowth | 0.97 | *Notelaea lloydii, Grevillea quadricauda* |

**TABLE 3: Listed species in WildNet/RVMM within 2km of site**

| SCIENTIFIC NAME | COMMON NAME | NCA STATUS | EPBC STATUS | SOURCE |
|---|---|---|---|---|
| ***EVNT FAUNA*** | | | | |
| *Geophaps scripta* | Squatter Pigeon (southern subspecies) | V | V | WildNet |
| *Petrogale pencillata* | Brush-tailed Rock-wallaby | V | V | RVMM, WildNet |
| *Phascolarctos cinereus* | Koala | E | E | RVMM, WildNet |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | C | V | WildNet |
| ***EVNT FLORA*** | | | | |
| *Notelaea lloydii* | Lloyd's Native Olive | V | V | RVMM, WildNet |
| ***SL FAUNA*** | | | | |
| *Tachyglossus aculeatus* | Short-beaked Echidna | SL | - | WildNet |
| ***SL FLORA*** | | | | |
| *Acianthus fornicatus* | Pixie Caps | SL | - | WildNet |
| *Caladenia catenata* | White Fingers | SL | - | WildNet |
| *Cyanicula caerulea* | Blue Fairy | SL | - | WildNet |
| *Dendrobium kingianum* | Pink Rock Orchid | SL | - | WildNet |
| *Drosera lunata* | Tall Sundew | SL | - | WildNet |
| *Pterostylis nutans* | Nodding Greenhood | SL | - | WildNet |
| *Pterostylis ophioglossa* | Snake-tongue Greenhood | SL | - | WildNet |
| *Wahlenbergia gracilis* | Sprawling blurbell | SL | - | WildNet |

## *3.2 Flora assessment*

### 3.2.1 Vegetation within the proposed clearing area

The Mount Glen Rock survey area includes a diversity of soil types, including alluvium around Sandy Creek, sandstone on the lower slopes at the southern end of the site and volcanics on upper parts of the mountain. Combined with other variables, such as aspect and soil depth, this has resulted in a diverse range of vegetation communities in the survey area, and eight REs are mapped for the site. Shallow, rocky, volcanic soils dominate much of the site, and RE 12.12.9 *Eucalyptus dura* woodland usually on rocky peaks on Mesozoic to Proterozoic igneous rocks, is mapped over approximately 80% of the survey area. The flora survey confirmed the mapped extent of this community, however the dominant species vary across the site associated with slope, aspect, soil conditions and the impact of fire events, with some areas having been severely impacted by fire in recent seasons. **Figure 3** shows a number of the vegetation communities described below. **Appendix H** provides an ecological communities description including a list of species identified.

On the western lower slopes of Mount Glen Rock, the RE 12.12.9 canopy is dominated by Brown Bloodwood (*Corymbia trachyphloia*), with Swamp Box (*Lophostemon suaveolens*) also common and the occasional Spotted Gum (*Corymbia citriodora*), particularly at lower elevations nearer the creeklines. In general, the understorey is relatively sparse with the occasional Red Ash (*Alphitonia excelsa*) and wattles (*Acacia nerifolia, A. sp. cretata*), with sedges, *Lomandras* and grasses (e.g. *Themeda triandra*) at ground level. Weeds are present with Corky Passionfruit (*Passiflora suberosa*) relatively common and Lantana (*Lantana camara*) mostly present at lower elevations.

At higher elevations the terrain becomes steeper and rocky outcrops and small cliffs become prevalent. In these shallower soils, the composition of RE 12.12.9 changes. In the saddle between the main two peaks of Mount Glen Rock, Gum-topped Ironbark (*Eucalyptus dura*) and Queensland Peppermint (*E. exserta*) become the dominant trees, along with the occasional Silver-leaved Ironbark (*E. melanophloia*). In addition the elevated western slopes there are a number of small unmapped areas of dry rainforest within the top sections of the drainage line.

From the saddle, the route to the northern peak passes through areas recovering from severe bushfires, with most of the larger trees killed and the understorey very dense. The most common species include whipstick Brush Box (*Lophostemon confertus*), wattles (*Acacia nerifolia and A. sp cretata*), Pink Hibiscus *(Hibiscus splendens*) and tea-trees (*Leptospermum* sp.). Weeds are relatively sparse although scattered large Pricky Pear (*Opuntia spp.)* are present.

Most of the eastern tracks and elevated southern tracks pass through a mix of dense, shrubby, fire-affected areas and *Eucalyptus dura / E. melanophloia* woodland. The lower eastern slopes towards Esk Creek become more open and grassy, with Brown Bloodwood the dominant canopy species.

At the western edge of the survey area near Sandy Creek, the proposed trails traverse riparian habitat including Of Concern RE 12.3.7 *Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca spp.* fringing woodland. However, the community is mapped as regrowth and the flora survey found it was highly disturbed.

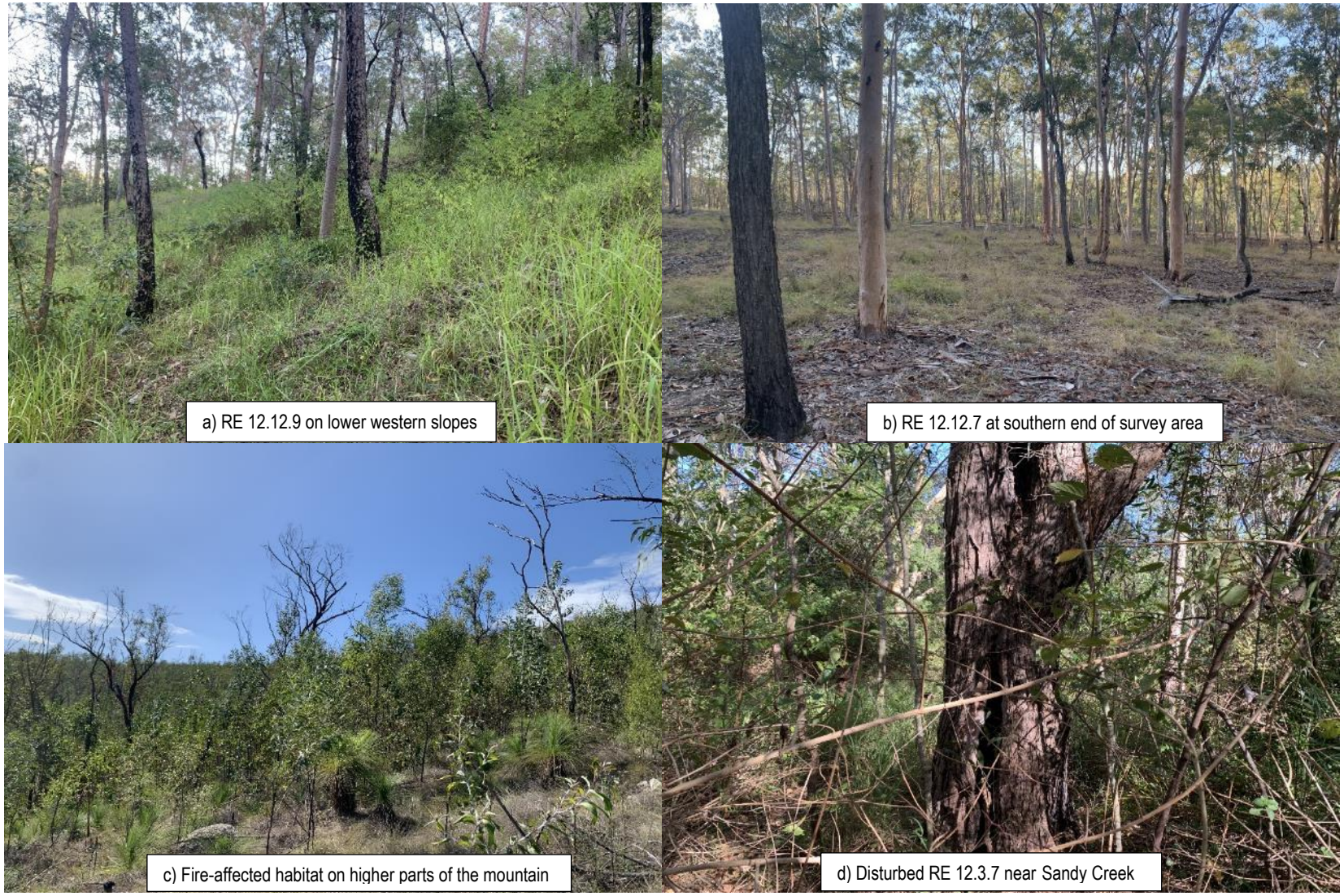


**FIGURE 3: Vegetation communities on Mount Glen Rock site**

While canopy species consistent with the RE type were present, including large Queensland Blue Gum (*Eucalyptus tereticornis*), the understorey was weed dominated, with dense infestations of Lantana, Chinese Celtis (*Celtis sinensis*) and Madeira Vine (*Anredera cordifolia*), which are all Restricted Invasive Plants.

The lowland sections at the southern end of the survey area are mapped as RE 12.12.5, which was confirmed during the flora survey. Spotted Gum was the dominant canopy species, with Narrow-leaved Ironbark (*Eucalyptus crebra*) and large Gum-topped Box (*Eucalyptus moluccana*) also present. The rocky areas had several Pink Rock Orchids (*Dendrobium kingianum*), and one greenhood orchid (*Pterostylis* sp.) was also detected in the area, both SL species. Weeds were prevalent around the green waste dump at the southern edge of the site, and there was extensive rubbish dumping in some of the gullies, however the understorey across most of the survey area was generally open and grassy with minimal weed incursion. The shrub layer is denser further up the slope towards the base of the cliffs where the community transitions into RE 12.12.9.

### 3.2.2 Vegetation in the 100-metre buffer

The 100-metre buffer surrounding the proposed trail network is a continuation of the REs described above. Weed incursions were prevalent in the riparian regrowth, however a burn off that was conducted between the surveys had reduced the weeds in the understorey, particularly the previously dense thickets of Lantana. Native species were dominant in the upper parts although significant areas were fire-affected. Four timed meander surveys were conducted within the 100-metre buffer. The location of the timed meander flora surveys is shown in **Figure 2** and the results are summarised in **Table 4**.

**TABLE 4: Results of Timed Meander surveys**

| | |
|---|---|
| Survey 1 Regional Ecosystem 12.12.9 - Target species: *Cassinia collina, Notelaea lloydii*<br>Starting point GPS coordinates: -27.231944°S 152.425833°E | |
| Time | Species recorded |
| 10.00am<br>11.00am | *Notelaea lloydii* |
| Survey 2 Regional Ecosystem 12.12.5 - Target species: *Cycas megacarpa, Notelaea lloydii*<br>Starting point GPS coordinates: -27.24578°S, 152.43194°E | |
| Time | Species recorded |
| 12.00am<br>1.00pm | *Nil* |
| Survey 3 Regional Ecosystem 12.12.10 - Target species: *Cassinia collina, Melaleuca formosa*<br>Starting point GPS coordinates: -27.23319°S, 152.43112°E | |
| Time | Species recorded |
| 2.00pm<br>3.00pm | *Nil* |
| Survey 4 Regional Ecosystem 12.3.7 - Target species: *Notelaea lloydii*<br>Starting point GPS coordinates: -27.23699°S, 152.42485°E, -27.23297°S, 152.43643°E | |
| Time | Species recorded |
| 4.00pm<br>5.00pm | *Notelaea lloydii* |

### 3.2.3 Threatened Plants Population Survey

The threatened plant population survey identified and mapped a total of eight Lloyd's Native Olive plants as shown in **Figure 4**. The results of the threatened plants population survey are presented in **Appendix I**. The population extent and density were assessed as per the *Flora Survey Guidelines- Protected Plants* (DES, 2020a).

The detected individuals were relatively sparsely scattered. The plants were mostly in riparian vegetation mapped as RE 12.3.7 aside from the two specimens located high on the western escarpment within a narrow microclimate of dry rainforest species too limited in extent to appear in the mapping. Further information on the species is provided in **Section 3.2.5.** No other CREVNT listed flora species were identified during the surveys conducted of the proposed trail alignments.

### 3.2.4 Threatened Ecological Communities

There are four threatened ecological communities (TEC) listed under the EPBC Act that are mapped as occurring at Mount Glen Rock. Their status in the survey area are as follows:

*Lowland Rainforest of Subtropical Australia – Critically Endangered*
While scattered native rainforest species occur around Sandy Creek, the community lacks the structure, extent and species composition to meet the criteria of this community.

*Grey box-grey gum wet forest of subtropical eastern Australia*
None of the REs mapped in the survey area are included as being indicative of the above community. However, the RE 12.9-10.2 occurring at the southern end of the site is mapped as potentially occurring nearby and may be present within the 1km buffer. Further detailed flora surveys will be undertaken in this area to determine whether this TEC is present onsite.

*Subtropical eucalypt floodplain forest and woodland of the New South Wales*
REs 12.3.3 and 12.3.7 are mapped as occurring in the riparian zone along Sandy Creek. While large canopy species typical of the communities are present, particularly large Queensland Blue Gums, the understorey is weed dominated and includes dense infestations of Restricted Invasive Plants such as Lantana and Madeira Vine, compromising the integrity of the communities and it is not considered that vegetation onsite meets the criteria for this TEC.

*Poplar Box grassy woodland on alluvial plains*
Poplar Box was not recorded on Mount Glen Rock, and none of the REs regarded as indicative of the community occur in the survey area. This community is most appropriately regarded as transitional between the Brigalow Belt and coastal forests, and while it may occur to the west of the survey area, it is not represented at Mount Glen Rock.

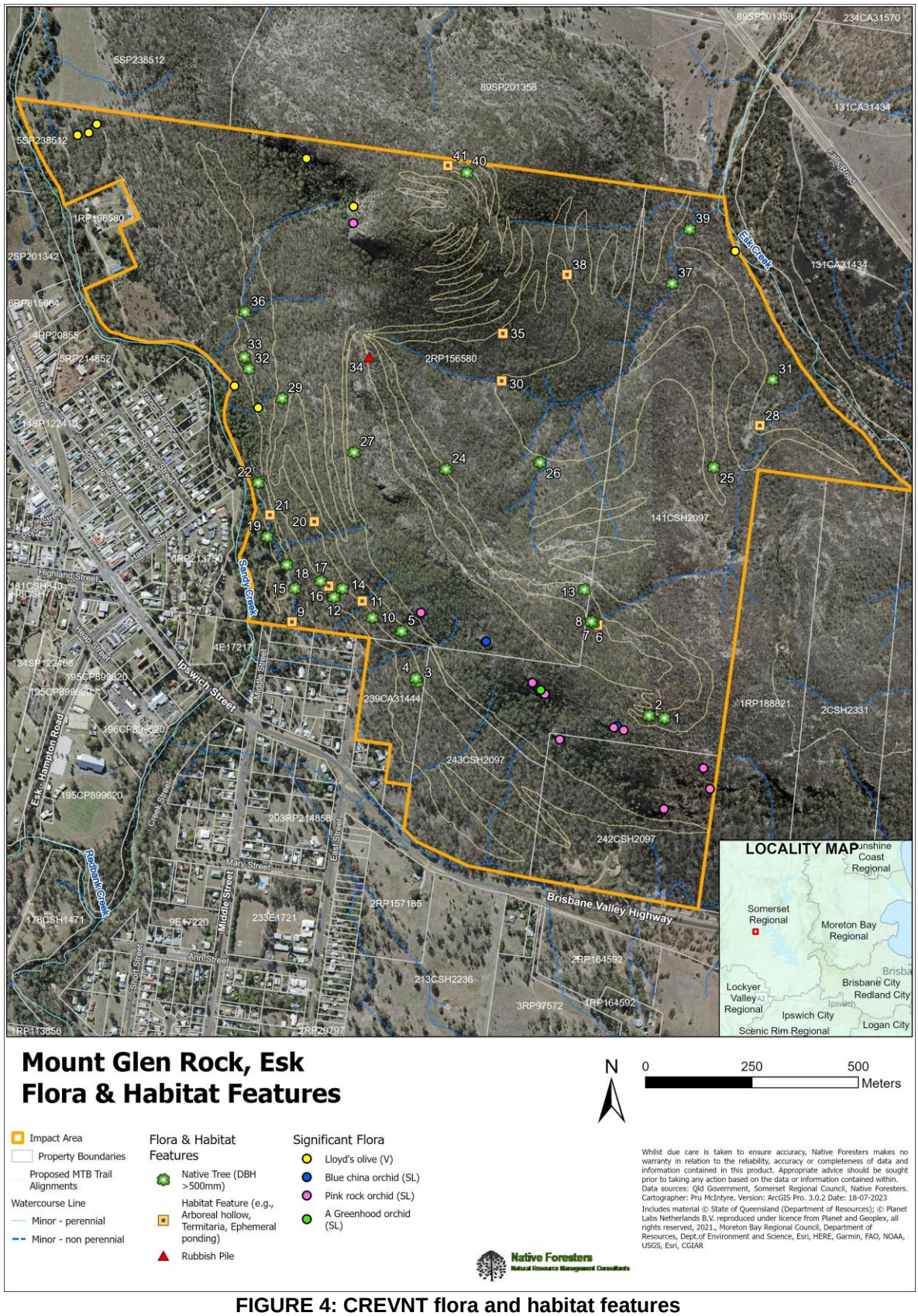


**FIGURE 4: CREVNT flora and habitat features**

### 3.2.5 Lloyd's Native Olive

Lloyd's Olive is a shrub, growing to 1–4 m in height with many smooth, pale grey barked stems arising from the base. Stems are approximately 2–4 cm in diameter. The hairless leathery leaves are linear or slightly sickle-shaped, 7–14 cm long and 2–5.5 mm wide with the main veins clearly visible, and slightly raised on the upper leaf surface. Up to 20 flowers grow in groups in leaf axils (upper angle between leaf stalk and stem). Flowers are pale yellow or cream, up to 2 mm in diameter, and on stalks that are 3–5 mm long. The fruits are spherical to ovoid, 5–8 mm in diameter and consist of a hard woody nut with a thin, dark blue skin. It is distinguished by its long, narrow leaves with pinnate venation and translucent oil dots. Lloyd's Olive is found in the ecotone between eucalypt open forests and vine thickets at 80-480 m above sea level (asl) (Guymer 1987). Notelaea lloydii is listed as Vulnerable under the NCA 1992 and the EPBC *Act 1999*.

Eight specimens of Lloyd's Native Olive were observed within the survey area. Three of these are in close proximity to the proposed trails - two are adjacent to the proposed alignment along Sandy Creek and one is near the proposed trail near Esk Creek on the eastern edge of the survey area. There were another two specimens located high on the western escarpment of the site growing at the head of rocky catchments amongst a small section of dry rainforest species. The location of each specimen and associated growth habit, size and habitat notes are included in **Appendix I** and a photo of the plant growing onsite is shown in **Figure 5**.

**FIGURE 5: Lloyd's Native Olive at Mount Glen Rock**

## *3.3 Fauna Assessment*

The range of habitats in the survey area support the breeding and habitation requirements of a diversity of native fauna, including but not limited to 60 native bird species, 29 native mammals, 13 native reptiles and three native amphibians. **Appendix J** provides a list of fauna species identified during the conduct of surveys. The various survey methods employed are summarised below.

### 3.3.1 Camera trap results

Brush-tailed Rock-wallabies (*Petrogale pencillata)* was captured at two trail camera stations; one on a remote camera trap near the base of the northern peak of Mount Glen Rock and a second on a remote minor outcrop on the eastern flanks of Mt Glen Rock as shown in **Figure 6**.

Special Least Concern Echidna (*Tachyglossus aculeatus*) was identified by camera trapping as well as several Least Concern arboreal mammals including Common Brush-tailed Possum (*Trichosurus vulpecula*) and Brush-tailed Phascogale (*Phascogale tapoatafa*). In addition to rock wallabies, Swamp Wallaby (*Wallabia bicolor*), and Red-necked Wallaby (*Notamacropus rufogriseus)* were amongst the macropods identified. Both south-east Queensland bandicoot species, Northern Brown and Southern Long-nosed Bandicoots (*Isoodon macrourus* & *Perameles nasuta* respectively) were also detected as shown in **Figure 7.** Four species of introduced mammal were identified, including Black rat (*Rattus rattus*), Red Fox (*Vulpes vulpes*) and Red Deer (*Cervus elaphus*). Refer to **Appendix K** for details on camera trap results.

The presence of Brush-tailed Phascogale at multiple sites during the October survey suggests that Mt Glen Rock is an important breeding area for this species. Like the closely related Antechinus, Phascogales are semelparous, with all males dying after mating in June/July, and all remaining adults being females with pouch young or young in dens.

### 3.3.2 Reptile trapping

Open-litter Rainbow Skink (*Carlia pectoralis*), Yellow-faced Whip-snake (*Demansia psammophis*), Eastern stone gecko (*Diplodactylus vittatus*) were caught in the herptile traps which were located in the eastern part of the site. Active search across the survey area provided additional reptile records as described in **Section 3.3.5**. Day and nighttime searches failed to detect any small elapid snakes or arboreal/rock dwelling gecko species at Mt Glen Rock.


**FIGURE 5: Brush-tailed Rock-wallabies from two sites at Mount Glen Rock**


**FIGURE 6: Fauna captured in remote camera traps**

### 3.3.3 Small mammal trapping

Two small mammal species, the native Pale Field-rat (*Rattus tunneyi*) (**Figure 8**) and the introduced house mouse, *Mus musculus* were captured in Elliot traps. At least four individual *R. tunneyi* and a single *M. musculus*. The dry grassy habitats of Mount Glen Rock are typical habitat of *R. tunneyi* and *M. musculus*. These two species do not represent the entire small mammal community of the entire site. For example, camera trapping detected Brush-tailed Phascogale (*Phascogale tapoatafa*), and Black Rat (*Rattus rattus*) on the trapping grids, although neither species was detected in live traps. This isn't unusual as these species are renowned as being trap shy. A pair of skulls of the eastern chestnut mouse, *Pseudomys gracilicaudatus* were retrieved from an owl pellet on-site, however this species wasn't detected on trail cameras or in elliot traps.

Other small dasyurid and rodent species not detected by us which have a reasonable likelihood of occurring on the site include; Yellow-footed Antechinus (*Antechinus flavipes*), Common Dunnart (*Sminthopsis murina*), Common Planigale (*Planigale maculata*), Grassland Melomys (*Melomys burtoni*), Fawn-footed Melomys (*Melomys cervinipes*), and Water Rat (*Hydromys chrysogaster*).

**FIGURE 7: Pale Field-rat**

### 3.3.4 Microbat survey results

Ten thousand three hundred and nine discrete microbat call sequences were recorded during the two surveys and can be attributed to at least 19 microbat species/species groups from 9403 identifiable calls. **Appendix L** provides further detailed information on the identification of microbat species onsite. During both field trips Gould's Wattled-bat (*Chalinolobus gouldii*) (40% of all identified call sequences) dominated the bat fauna. Ride's Free-tailed Bat (*Ozimops ridei*) (16.5 % of all identified call sequences from Trip 1) and the 40kHz species complex of up to three species (28% of all identified call sequences from Trip 1) were also very commonly recorded across the site during the first field trip in March. During the second field trip, the white-striped free-tailed bat (*Austronomus australis*) (18% of all identified call sequences from Trip 2) replaced these as the co-dominant species with Gould's wattled bat. None of the microbat species detected during this survey are listed under Queensland or Commonwealth threatened species legislation.

High bat activity was noted during thermal imaging surveillance of Mt Glen Rock peak for rock wallabies on the evening of 7th March 2023. These bats were not identified but it seems likely that they were emerging from and foraging around this feature.

Two dead or dying Gould's wattled bats were observed on separate nights on the Sandy Creek fire trail on the lower western flank of Mt Glen Rock during spotlighting in March 2023. There was no clear cause of death visible from field observations and the bodies were left in the field. It is rare to find a dead microbat away from a roost site, let alone finding two so close to one another over a matter of days. Gould's wattled bats typically roost in tree hollows and roof spaces in buildings, and it is possible that some human action to exclude or remove bats from one of these roosts resulted in them perishing during the very hot conditions experienced at the site that day. The heat may also have caused bats occupying a substandard roost to become dehydrated or overheated and die without needing to invoke any human agency.

No microbats were detected utilising the harp trap.

### 3.3.5 Active search field fauna survey results

Among mammals, diurnal and nocturnal active searching revealed koalas, brush-tailed rock wallabies, brush-tailed phascogales and red-necked wallabies. One Koala was spotted during the field assessments in a large Queensland Blue Gum near Sandy Creek during survey 1, and a koala was heard vocalising in the same area during survey 2. Large Koala habitat trees are common on the lower slopes of Mount Glen Rock. The lack of substantial habitat trees in the fire-affected areas that dominate most of the upper sections of Mount Glen Rock impacts the potential for Koala habitation however regeneration of the Ironbark and Queensland Peppermint trees in these parts are likely to re-establish suitable Koala habitat in these areas in the future. The presence of a number of Koalas detected by USC across these elevated slopes as well as in the western section of the site indicates that the species are active across the entire area.

Brush-tailed rock wallabies and their scats were observed during daytime traverses along the bases of cliff lines on the north-western side of Mt Glen Rock and along the base of cliffs in the south-eastern part of the study area.

A single brush-tailed phascogale (*Phascogale tapoatafa*) was observed while spotlighting along the Sandy Creek Management trail behind the township of Esk. Red-necked wallabies (*Notamacropus rufogriseus*) were observed on the footslopes of Mt Glen Rock and Swamp Wallabies (*Wallabia bicolor*) were flushed from thick undergrowth and screes on the slopes and upper areas throughout the study area.

A regurgitated pellet of a *Tyto* species (likely Barn Owl *T. alba* or Masked Owl *T. novaehollandiae*) was recovered from an unnamed dry stream channel on the eastern side of Mt Glen Rock and contained the remains of two Eastern Chestnut Mice, (*Pseudomys gracilicaudatus*) which was not otherwise detected by us at the site, despite suitable habitat.

Grey Headed Flying Fox was identified flying through the site during crepuscular surveys and there is a known roost site for the species located next to Sandy Creek in the northwestern section of the site although this was not occupied during the periods when surveys were conducted.

Thirteen native reptile species were recorded during the survey. Numerous reptiles were observed during active searching of the study area including Eastern Bearded Dragon (*Pogona barbata*), a number of skink species (Carlia, Cryptoblepharus, Ctenotus and Morethia spp), ]Keelback (*Tropidonophis mairii*) and eastern brown snake (Pseudonaja texilis) were observed during the daily survey effort. A large shed skin of a Carpet Python (*Morelia spilota*) on the eastern side of the mountain provided evidence of this species on the site. No CREVNT reptile species were recorded during surveys onsite.

Three native frog species were observed during the survey, including Ornate Burrowing Frog (*Platyplectrum ornatum*) and Broad-palmed Rocket-frog (*Litoria latopalmata*). Drought conditions during 2023 when this survey was undertaken limited the activity of frogs, and hence our results however it is likely that seasonal soaks and ephemeral creeks on the site provide habitat for a community of arboreal and terrestrial frogs which we did not detect.

Native birds were abundant across the varied habitats within the survey area, including ducks (Pacific Black Duck, *Anas superciliosa*) on the streams that bound the site, raptorial birds (Wedge-tailed Eagle (*Aquila audax*), owls (*Tyto* sp. And *Ninox boobook*)), megapodes (Australian Brush Turkey, *Alectura lathami*), quails and button-quails (Brown Quail, *Synoicus ypsilophorus* and Painted Button-quail (*Turnix varius*) , pigeons and doves (Common Bronzewing *Phaps chalcoptera*, Crested Pigeon *Ocyphaps lophotes,* Brown Cuckoo-Dove *Macropygia phasianella*), parrots and cockatoos (Galah, *Eolophus roseicapilla*, Rainbow Lorikeet, *Trichoglossus haematodus*), honeyeaters (Blue-faced Honeyeater *Coracina novaehollandiae*, Brown Honeyeater *Lichmera indisdincta*, Lewins Honeyeater, *Meliphaga lewinii*, White-throated Honeyeater, *Melithreptus albogularis*), cuckoos (Shining Bronze Cuckoo *Chrysococcyx lucidus*, ) and a variety of passerines e.g., Eastern whip bird *Psophodes olivaceus*, Golden Whistler *Pachycephala pectoralis*, Variegated Fairy-Wren, *Malurus lambertii*, White-browed Scrub Wren, *Sericornis frontalis*, Varied Sitella *Daphoenositta chrysoptera,* White-throated Treecreeper, *Cormobates leucophaea*).

See **Figure 9** for photos of some of the fauna observed at Mount Glen Rock, and **Appendix J** for a full list of fauna species recorded during the survey. **Section 3.4** provides more information about CREVNT listed species occurring onsite and **Figure 10** shows their location across the survey area.

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**FIGURE 8: Fauna observed during field surveys**

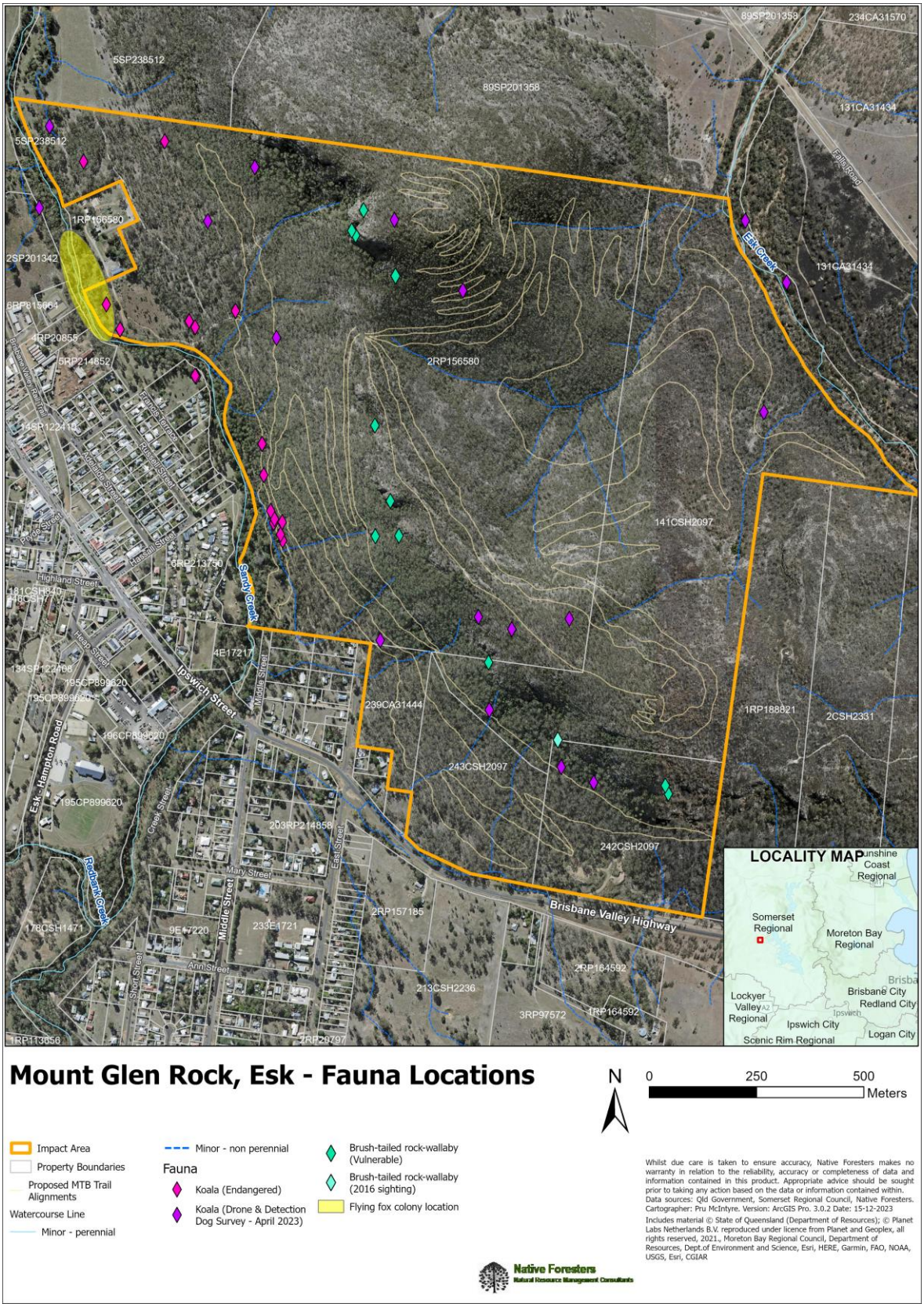


**FIGURE 9: Habitat features and CREVNT fauna locations**

## *3.4 CREVNT species profiles*

### 3.4.1 Brush-tailed Rock-wallaby

While the species is likely to have been impacted by the recent intense fires, it is evident from this stud and observations of local naturalists that a population remains on Mount Glen Rock and is distributed across the rocky landscapes of the study area. The Mt Glen Rock population is at the very north (if not the most northerly) population of the species, and its loss couls well represent a contraction of the extent of occurrence of the species.

The Brush-tailed Rock-wallaby (*Petrogale pencillata*) is a macropod that inhabits rocky outcrops and cliff faces in south-eastern Australia. It grows up to 1.3 metres in length and 7.9 kilograms, with males generally larger than females. Adults are brown to rufous above with a long, dark, bushy tail and a pale facial stripe.

The Brush-tailed Rock-wallaby is listed as Vulnerable under the *EPBC Act 1999* and the *NC Act 1992*. The species was once abundant and widespread in a range of habitats, including rainforest, wet and dry sclerophyll forest and open woodland, however it has suffered extensive declines, particularly in southern parts of its range. Populations are now fragmented and isolated and largely limited to suitable habitat within reserves. The Mount Glen Rock population represents one of these isolated populations, separated from the nearest groups by large expanses of cultivated land.

Brush-tailed Rock-wallabies shelter or bask during the day in rock crevices, caves and overhangs and are most active at night when they forage on grasses, forbs foliage and fruits. They are highly territorial with an average home range of around 15 hectares, consisting of a refuge area and a foraging range linked by habitually used commuting routes. Breeding occurs throughout the year, with a peak between February and May.

Brush-tailed Rock-wallaby is the only rock-wallaby in the Esk region. Whilst there is insufficient data to estimate the size of the Mount Glen Rock population, all populations should be considered important as the species future is insecure. Threats to the species include habitat destruction and fragmentation and predation by feral carnivores.

### 3.4.2 Koala

Koalas are arboreal herbivorous marsupials and the only members of the Phascolarctidae family. They are distinguished by their stout, tailless bodies, large heads and fluffy ears, growing up to 80 centimetres long and weighing up to 15 kilograms. They inhabit eucalypt forests and woodland and feed predominantly on eucalypt leaves, with certain local species favoured in any given area.

Koalas are generally solitary animals that live a largely sedentary existence, sleeping up to 20 hours per day. Adult males communicate with raucous grunting sounds, however these are heard relatively infrequently and the animals are generally silent and inconspicuous. They usually breed from October to May.

Koalas are listed as Endangered under the *NCA* and the *EPBC Act* and have suffered large declines. Threats to the species include habitat loss and fragmentation, predation by domestic animals and increasing frequency and intensity of bushfires driven by climate change. They have also been impacted by disease, particularly Chlamydia.

Most of Mount Glen Rock is mapped as core Koala habitat, although it is not mapped as a Koala Priority Area (KPA). Suitable eucalypts for Koala are largely limited to the lower slopes, as the eucalypts on most higher parts of the mountain have been badly fire-affected and many of the larger trees have been killed although it is noted that a number of individuals have been located on the eastern area of the site.

Sunshine Coast University undertook targeted Koala surveys at Mt Glen Rock utilising thermal imaging drone surveys, Detection dog surveys, Scat surveys and active search for the species on the 17th and 18th April 2023.
The surveys identified 17 individual Koalas across Mt Glen Rock area over the two day search period. The majority of the records (12 individuals) were located on the western side of Mt Glen Rock where habitat type is considered to be more suitable. The identification of a number of individuals on the eastern side of the site in more marginal habitat areas was also noted. **Figure 11** shows a Koala located by onsite.

**FIGURE 10: Koala located onsite (Source: USC/Care4Esk)**

## *3.5 Grey headed flying fox (Pteropus poliocephalus)*

The largest of the flying-foxes the Grey headed flying fox ranges from about Townsville in the tropical north, south along the east coast, and into southern Victoria. The species roosts communally, often in the thousands, in gullies with dense vegetation canopy, and feeds on rainforest fruits, blossom from eucalypts, angophoras, banksias and tea-trees (Tideman, 1996). As with other species of flying foxes in the region, the species is threatened by destruction of roosting areas and the clearing and development of feeding habitat. Flying-foxes are essential pollinators and seed dispersers for native forests, making a significant contribution to maintaining healthy ecosystems. Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Least Concern under the *NCA 1992* and Vulnerable under the *EPBC Act 1999*.

**Figure 12** shows a photo of the species during roosting. Flying fox individuals were identified flying over the site during the conduct of crepuscular surveys. Information from local residents indicates that there was a Flying Fox roost located in the riparian area on Sandy Creek as shown in **Figure 10**. This roost relocated in the beginning of 2023 and is not currently active.

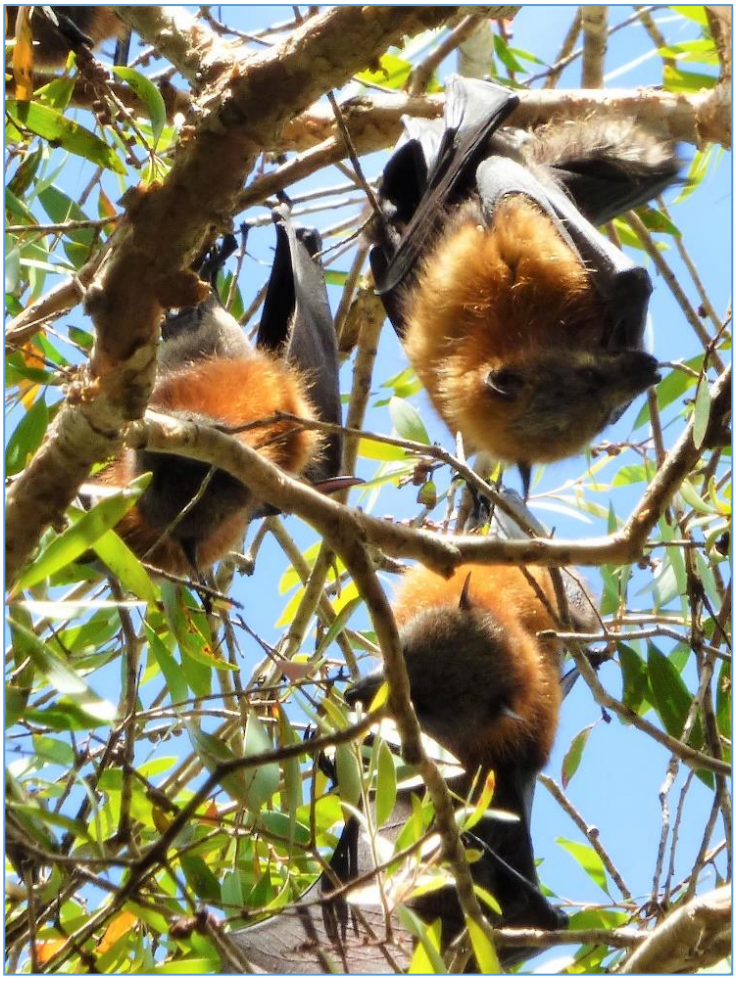

**FIGURE 11: Grey headed flying fox**

## *3.6 Assessment of breeding places and fauna habitat quality*

The overall condition of the native vegetation on Mount Glen Rock was considered good, due to the presence of large trees in lowland parts, some with arboreal hollows and/or termitaria, providing canopy cover over a mostly native understorey. The fire-affected areas are in moderate ecological condition, consisting of mostly native species but lacking in large trees or canopy cover. The locations of trees over 500mm dbh and other habitat features and CREVNT fauna locations are shown in **Figure 10**. The following animal breeding places were identified on the site:

i. *Hollow-bearing trees* – Arboreal hollows were observed in several of the larger trees in the lowlands, providing vital breeding or roosting habitat for birds and arboreal mammals or reptiles (**Figure 13a**).
ii. *Nests or dreys* – No active nests were observed on the site, however disused kingfisher nests were recorded in arboreal termitaria (see **Figure 13b**). It is considered that Possums will be utilising dreys in appropriate habitat areas through the site.
iii. *Permanent water* – No permanent water exists on the site, apart from the creeks fringing the mountain on the western and eastern sides. Small ephemeral pools were observed in some of the gullies on the mountain. (**Figure 13c**).
iv. *Burrows, cracks, crevices* – Numerous potential refuge and breeding sites were identified across the site, suitable for snakes, skinks, dragons and small mammals (**Figure 13d**).
v. *Large trees* – The large remnant eucalypts on the lower slopes of Mount Glen Rock provide potential breeding, roosting and foraging habitat for a range of birds, reptiles and arboreal mammals including Koala.
vi. *Canopy cover* – The canopy cover present on the lower slopes provides foraging and breeding habitat for understorey species such as echidnas, bandicoots and other small mammals and reptiles.
vii. *Weed cover* – Weeds were prevalent around Sandy Creek to the west of the mountain, particularly Lantana, and around the green waste dump at the southern end of the survey area. Away from these sites, Mount Glen Rock area was relatively weed free.
viii. *Understorey components* – Outside the weedy areas, native shrubs, vines and groundcovers in the understorey provide cover, breeding and foraging habitat for a range of native fauna.
ix. *Organic litter, fallen timber and rocks* – These components are common on the lower slopes, including large stumps and fallen logs that provide breeding habitat for reptiles and small mammals. In the upper parts, much of the fallen timber has been consumed by fire.
x. *Recruitment* – recruitment of native species is evident across most of the site, with little competition from weed incursions.
**xi.** *Landscape context* – The surrounds of Mount Glen Rock are highly fragmented, and include the town of Esk, large rural properties, major roads and Somerset Dam two kilometres to the east. However substantial areas of habitat also occur including Deongwar State Forest located to the east of the site providing some connectivity and dispersal opportunities for more mobile native fauna.

**Table 5** provides an analysis of the potential presence of threatened species as listed in WildNet and the RVMM based on a field habitat suitability assessment of the area, and comments on the likelihood of those species occurring in or around the site.

d


**FIGURE 12: Habitat features across the Mount Glen Rock site**

**TABLE 5: Breeding habitat assessment and likelihood of occurrence for listed species**

| Scientific Name | Common Name | NCA status | EPBC status | Likelihood of Occurrence | Habitat Preferences | Presence of breeding places/ habitat |
|---|---|---|---|---|---|---|
| *Geophaps scripta scripta* | Squatter Pigeon (southern subspecies) | V | V | Possible | Grassy woodlands and plains, usually near water | More suitable habitat in surrounding lowlands |
| *Petrogale pencillata* | Brush-tailed Rock-wallaby | V | V | Known | Rocky outcrops and cliff faces in a range of habitats, including rainforest, wet and dry sclerophyll and woodland. | Present |
| *Phascolarctos cinereus* | Koala | E | E | Known | Locally-preferred food and habitat trees in forested areas with minimal urban disturbance (e.g., dogs). | Present |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | C | V | Known | Forms large camps and roosting colonies, usually near water. Disperses widely to forage in a range of forests. May form smaller maternity camps following breeding. | Present on western edge of survey area - colony known from Sandy Creek. |
| *Tachyglossus aculeatus* | Short-beaked Echidna | SL | - | Known | Habitat generalist often found among rocks, in hollow logs, under vegetation or piles of debris. | Present |

# 4.0 FIRE MANAGEMENT

Wollemi Eco-Logical has attended the site and provided advice and recommendations for Fire Management and Fire Intervals to support ongoing management of the ecological values for the Mt Glen Rock Site, for this report.

A review of State Bushfire Hazard Overlay Mapping, as maintained by the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) revealed the site is within a potential bushfire hazard area as shown in **Figure 15**.

Wollemi undertook a preliminary inspection of the site for the purpose of understanding the key drivers for bushfire, including vegetation communities, slope and fuel load accumulation potential resulting in a determination that the Bushfire Hazard Overlay Mapping is considered accurate for the site. That is, the majority of the site is subject to a Very High Potential Bushfire Hazard. This is also supported with the observed impacts of fire on sensitive ecological values of the site particularly on the elevated western slopes where the impacts of uncontrolled fire are considered to be severe and habit changing.

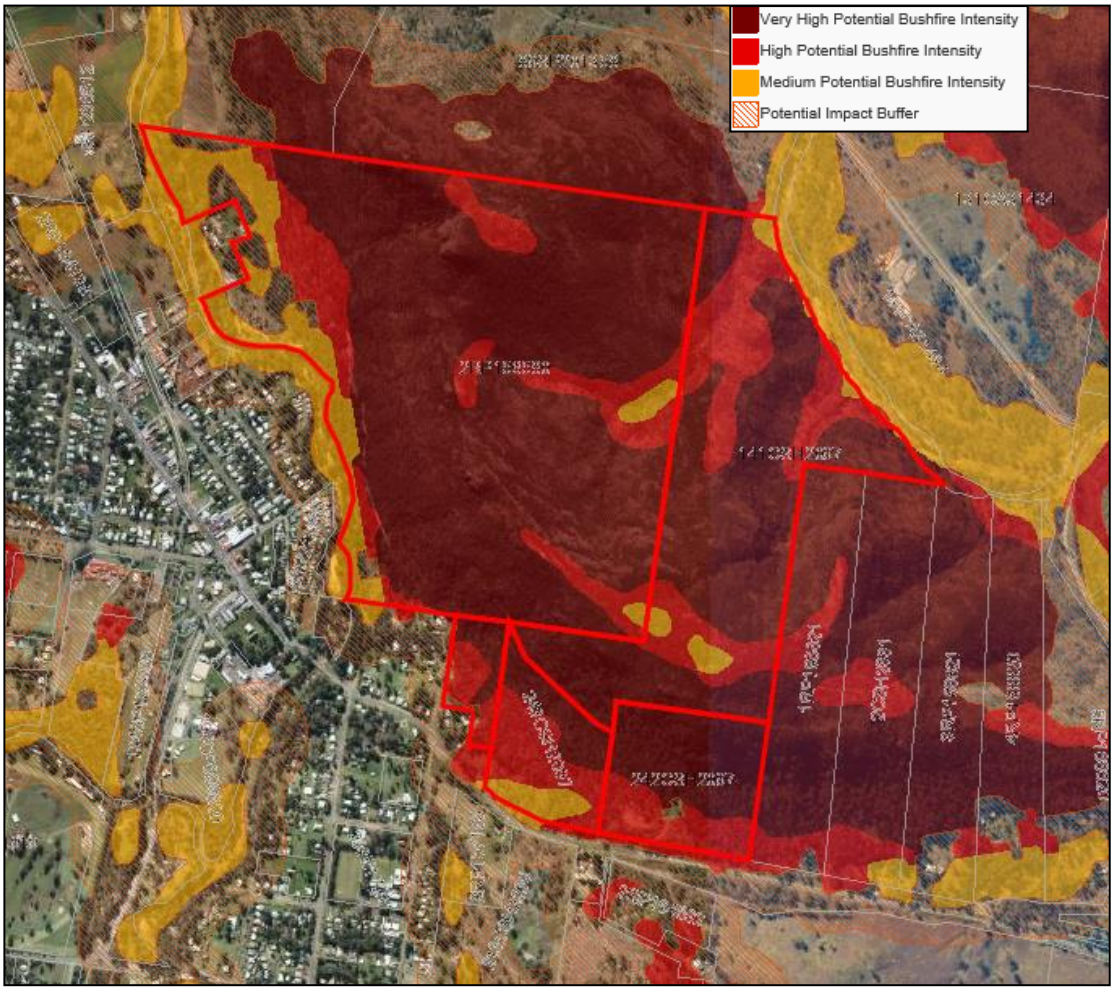


**FIGURE 13: Bushfire Hazard Overlay Mapping**

It is understood, unplanned/uncontrolled fires have been a regular occurrence on the site, apparently starting from the southern border adjacent Brisbane Valley Highway and/or adjacent the Esk Township to the west of the site. Given the topography, these fires can rapidly spread upslope onto the site, and threaten ecological values within and adjacent to the area.

Uncontrolled burns/bushfires and burn frequencies higher and more intense than those able to be sustained by the regional ecosystems present, have the potential to modify and degrade ecological values on site. Any degradation of ecological values, and modification of ecosystem function has the potential to impact fauna and flora on site, and in turn increase susceptibility to bushfires over time. Subsequently, 'uncontrolled' fire, and over burning is considered a threatening process to site ecological values and functions.

Fragmentation of ecological values and functions by land uses not consistent with the requirements to protect ecological values, is also considered a threatening process. To this end, fragmentation by way of extensive potentially high impact uses such as mountain bike trails, introduces 'edges' in otherwise relatively in-tact vegetation communities. These edges, and the trails themselves, can support exotic weed invasion, such as grasses, and act as vectors of spread for weed species throughout disturbed areas.

Based on the review of the available documentation, and consideration of the implications of land use on ecological values, bushfire hazard and risk mitigation, it is recommended to prepare a detailed Bushfire Management Plan for the site, to inform ongoing management, and land use considerations with a focus on mitigating the impacts of bushfire on the sensitive ecological values of the site, particularly given the considerable adverse impacts of fire on these values observed. **Table 6** details preliminary fire guidelines for the site based on RE mapping.

**TABLE 6: Draft Preliminary Prescribed Burn Guidelines**

| Primary Regional Ecosystems (RE) | RE Description | *Preliminary* Fire Guidelines | | | |
|---|---|---|---|---|---|
| | | Intensity | Interval | Issues | Site Specific Considerations |
| RE:12.12.10 | Shrubland of rocky peaks on Mesozoic to Proterozoic igneous rocks | Low to moderate | >20 & <50 years | Rare and threatened plants (e.g., *Kunzea flavescens*) require long intervals between fires. | Effectively manage site to mitigate bushfire threat, with focus on cool burns in >20 year intervals. To be confirmed in Bushfire & Prescribed Burn Plan. |
| RE:12.12.9 | (Upper elevations of Site) *Eucalyptus dura* woodland usually on rocky peaks on Mesozoic to Proterozoic igneous rocks | Low to moderate. Aim for 40-60% mosaic burn | >10 to 25 years | The fire regime should maintain a mosaic of grassy and shrubby understoreys. Control of weeds is a major focus of planned burning in most areas. Careful thought should be given to maintaining ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas. | Effectively manage site to mitigate bushfire threat, with focus on cool mosaic burns in ~20-year intervals. To be confirmed in Bushfire & Prescribed Burn Plan. |
| RE:12.12.5 | *Corymbia citriodora* subsp. *variegata*, *Eucalyptus crebra* woodland on Mesozoic to Proterozoic igneous rocks | Low intensity. | >3-6 years Aim to burn 40-60% of any given area. | Control of weeds is a major focus of planned burning in most areas. Maintain ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas. | Adjacent town and highway land uses. Cool mosaic burns in ~6 year intervals, burn in conjunction with 12.9-10.2, with clear exclusion from RE's 12.12.10 & 12.12.9. To be confirmed in Bushfire & Prescribed Burn Plan. |

| Primary Regional Ecosystems (RE) | RE Description | *Preliminary* Fire Guidelines | | | |
|---|---|---|---|---|---|
| | | **Intensity** | **Interval** | **Issues** | **Site Specific Considerations** |
| RE12.9-10.2 | *Corymbia citriodora subsp. variegata* +/- *Eucalyptus crebra* open forest on sedimentary rocks | Low to moderate | >4-25 years. Aim for 40-60% mosaic burn | The fire regime should maintain a mosaic of grassy and shrubby understoreys. Control of weeds is a major focus of planned burning in most areas. Careful thought should be given to maintaining ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas. There is evidence that the spiral leaf Macrozamias (e.g., *M. parcifolia*) decline in health if fire interval is greater than 6 years. | Adjacent town and highway land uses. Cool mosaic burns in ~6 year intervals, burn in conjunction with 12.12.5, with clear exclusion from RE's 12.12.10 & 12.12.9. To be confirmed in Bushfire & Prescribed Burn Plan. |
| RE12.12.8 | *Eucalyptus melanophloia* woodland on Mesozoic to Proterozoic igneous rocks | Low intensity | >3-6 years. Aim for 40-60% mosaic burn | Control of weeds is a major focus of planned burning in most areas. Maintain ground litter and fallen timber habitats by burning only with sufficient soil moisture. Burning should aim to produce fine scale mosaics of unburnt areas. | Adjacent town and highway land uses. Cool mosaic burns in ~5 year intervals, with clear exclusion from RE's 12.12.10 & 12.12.9. To be confirmed in Bushfire & Prescribed Burn Plan. |

***N.B.*** *Provided as preliminary summary only, specific recommendations to be informed by detailed Bushfire Management Plan for the site.*

# 5.0 LEGISLATIVE REQUIREMENTS

## *5.1 Somerset Regional Council Planning Scheme*

Council's planning scheme details for site are as follows:

Zoning:

- Rural Zone, with
- Lot 239 CA31444 being Recreation and Open Space Zone

Overlays:

- Agricultural Land Overlay – north-western corner of Lot 2 RP156580 being Class A Agricultural Land
- Biodiversity Overlay – Regulated Vegetation and Wildlife Habitat areas
- Koala Conservation Overlay – Bushland Koala Habitat – Primary and Secondary Habitat Areas
- Bushfire Hazard Overlay – Very High, High and Medium Potential Bushfire Intensity Areas
- Catchment Management Overlay – Higher Risk Catchment Area (Water Supply Buffer Area) and 100m buffer to a watercourse
- Flood Hazard Levels Overlay – Extreme and High Flood Hazard
- High Impact Activities Management Area Overlay
- Infrastructure Overlay – Sewage Treatment Plant Buffer
- Landslide Hazard Area Overlay – slope is equal to or greater than 15%
- Scenic Amenity Overlay – High Scenic Amenity Area

The works may trigger an application for Operational Works for Clearing and / or Filling and Excavation (as per Table 5.8.1 of the Planning Scheme); dependent on the level of works required to achieve the proposed mountain bike trails. It is considered a pre-lodgement meeting with the Somerset Regional Council's planning department would be beneficial, to determine requirements under the Planning Scheme.

## *5.2 Vegetation Clearing Requirements*

*Nature Conservation Act 1992*

The works impact area is mapped as Protected Plants High-risk area, and as such the works are subject to the provisions of the *NC Act*. As the listed species Loyd's native Olive has been confirmed as occurring onsite a Protected Plants Clearing Permit will be required that occurs within 100 metres of a individual of this Vulnerable flora species. This permit will require preparation of a DES-approved Impact Management Plan (IMP) under the *Nature Conservation Act 1992*. If no listed flora species are present within 100 metres of the works area clearing can occur under Section 45 of the *Nature Conservation (Plants) Regulation 2020*. In this case, an exempt clearing notification is required to be submitted to DES with a current Flora Survey in accordance with the protected plants survey guidelines, prior to works. The final design for any works onsite will allow determination of the legislative requirements for any flora clearing under the NC Act (1992).

Pursuant to *Section 88* of the *Nature Conservation Act (NC Act) 1992* and *Section 335* of the *Nature Conservation (Animals) Regulation 2020*, any works that have the potential to impact the breeding places of listed species are required to be undertaken in accordance with a SMP approved by DES. The Brush Tailed Rock Wallaby (*Petrogale penicillata*) is confirmed as occurring onsite with breeding habitat for the species present. The species is listed as Vulnerable under the *NCA 1992* and an approved Species Management Program (SMP) – High Risk Impact, would need to be submitted to DES for approval, under the *Nature Conservation (Animals) Regulation 2020.*

*Vegetation Management Act 1999 (VMA)*

The construction of the bike trails will require clearing of Category B vegetation. As such, assessment under the *Planning Regulation 2017* and the *VMA 1999* will be required. The proposed clearing works are located within Council managed lands:

- Lot 2 RP156580 – Council owned – Freehold.
- Lots 141, 242, 243 CSH2097 and Lot 239 CA31444 – State owned, Council managed – Reserve.

The proposed bike trails are not considered "infrastructure" under the *Planning Regulation 2017* and cannot be undertaken under the Clearing for Infrastructure Accepted Development Vegetation Clearing Code (DNRME, 2020). The works also does not fall under the definition of a road or vehicle track, and therefore the works are not defined as exempt clearing work (DNRME, 2019).

Therefore, an Operational Works application for the Native Vegetation Clearing will be required under the *Planning Regulation 2017*, Schedule 10 Part 3, Division 2. Following completion of design drawings, which detail the extent of clearing required for the works, confirmation of the above trigger is required. This application will be submitted to SARA as the assessment manager and will require an assessment against State Code 16: Native Vegetation Clearing.

## *5.3 Koala Legislation*

State – Planning Regulation 2017:

The Queensland government released regulatory Koala habitat maps for South East Queensland (SEQ) in 2020. These maps show core Koala Habitat Areas (KHA's) which represent the best quality koala habitat areas, based on modelling of biophysical measures including climate, suitable vegetation for both food and shelter, and koala sightings. Koala priority areas (KPA's) are large, connected areas that have the highest potential for supporting the long-term survival of koalas. They include koala habitat areas and areas suitable for restoration, and will provide a focus for koala conservation efforts (DES, 2023). The clearing works are within Koala Habitat Area (core) but are not mapped as a KPA.

Under the *Planning Regulation 2017* (Schedule 10, Part 10, Division 3, Subdivision 1) works are considered assessable development unless it is covered by an exemption. Exempted development is defined in Schedule 24 of the Regulation, and for the purposes of the proposed works at Mount Glen Rock no exemptions currently apply. Therefore, the works can be considered assessable development and will require assessment against State Code 25 – Development in South-East Queensland Koala Habitat Areas.

The application for native vegetation clearing will also include assessment against State Code 25 and referral to DES.

State - Nature Conservation (Koala) Conservation Plan 2017:

The *Nature Conservation (Koala) Conservation Plan 2017* requirements are in place to prevent koalas being injured or killed during clearing works for projects. The mountain bike trails project will need to avoid, mitigate and offset impacts to koala habitat as a result of the works and design the works such that the safe movement of koalas is considered.

The *State Government Supported Infrastructure Koala Conservation Policy 2023*, applies to the planning and delivery of all Queensland Government supported infrastructure projects, identified as infrastructure under Schedule 5 of the *Planning Regulation 2017*.

## *5.4 Commonwealth Legislation– EPBC Act 1999:*

Under the *EPBC Act 1999*, a person who proposes to take an action that will have, or is likely to have, a significant impact on a matter of national environmental significance (MNES) must undertake an objective 'self-assessment' process to determine whether or not the action is likely to have a significant impact on a MNES.

According to the *Matters of National Environmental Significance Significant Impact Guidelines version 1.1 (*Australian Government, 2013), a 'significant impact' is one which is important or of consequence, in terms of its context or intensity. The sensitivity, value, and quality of the environment being impacted, and the intensity, duration, magnitude and geographic extent of the impacts must be considered when determining 'significance' of an impact.

For impacts to Matters of National Environmental Significance (MNES), there are nationally threatened species confirmed as occurring onsite including Koala, Brush-tailed Rock-wallaby Grey headed Flying-fox and Lloyd's native which are all federally listed.

## *5.5 MSES Requirements*

Matters of state environmental significance (MSES) are defined in Schedule 2 of the *Environmental Offsets Regulation 2014.* MSES are defined under the *NCA 1992*, *Marine Parks Act 2004*, *Fisheries Regulation 2008*, *VMA 1999*, Map of Queensland Wetland Environmental Values, and *Environmental Protection (Water) Policy 2009*. The site contains MSES that are detailed in **Section 3**.

## *5.6 MNES summary*

The result of the self-assessment process of the Significant Impact Criteria for CREVNT listed fauna and flora species confirmed as occurring onsite is outlined in **Table 7.** It is noted that this assessment is based on the preliminary design plan for the project which involves 28km of tracks located throughout each of the 8 regional ecosystems identified onsite.

If there is any scientific uncertainty about the impacts of an action and potential impacts are serious or irreversible, the precautionary principle must be applied. If adequate measures to avoid or reduce impacts on MNES are proposed, further assessment and approval under the *EPBC Act 1999* may not be required.

**Table 7: Summary of MNES in Mt Glen Rock survey area**

| Scientific Name | Common Name | NCA status | EPBC status | Total Habitat area onsite | Scale and area of impact | Likelihood of Significant Impact |
|---|---|---|---|---|---|---|
| *Petrogale pencillata* | Brush-tailed Rock-wallaby | V | V | 58 ha | Medium scale risk 1.1ha | Likely |
| *Phascolarctos cinereus* | Koala | E | E | 208 ha Core (SEQ) | Medium scale risk 2.8ha | Possible |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | C | V | 1 ha (historical colony area) | Low scale risk 0ha | Unlikely |
| *Notelaea lloydii* | Loyds Native Olive | V | V | 108 ha | Low scale risk 0.1 ha | Unlikely |

### 5.6.1 Impact Avoidance measures

Given that the existing draft master plan will result in a likely Significant Impact for Brush-tailed Rock wallaby and a possible Significant Impact for Koalao populations occurring onsite there are a number of impact avoidance and mitigation measures that can be considered to reduce potential impacts on these species and the ecological values of the site. Potential strategies are outlined below:

Design Phase

- The current design includes 28km of trail network and associated infrastructure which are located throughout all the RE types present across the site. A reduction in the size of the trail network and the exclusion of new trails from key habitat areas for Koala and Brush tailed Rock wallaby would likely reduce the medium risk level of impacts to these species and avert the likelihood of a Significant Impact to the species.
- For Koala it is recommended that the density of trails on the western part of the site where the habitat conditions for the species are more suitable be reduced from the current number of 7 trails down to 3-4 trails which include low intensity walking trails as well as the existing dual purpose fire trail.
- For Brush-tailed Rock wallaby it is recommended that trails are kept away from the steep cliff escarpment areas onsite that are the preferred habitat for the species as disturbance by humans may precipitate movements away from their refuge or foraging sites (NSW NPWS 2003a). Habitat modification continues due to rural, residential and tourist developments adjacent to some colonies, and there is an apparent trend to locate these developments near some escarpments and cliff lines to maximise scenic opportunities. These sites are often core Brush-tailed Rock-wallaby habitat and development increases the risk of colony fragmentation, permanent changes to potential dispersal corridors, an increase in the numbers of domestic animals and the removal of tree cover (DEC 2005c).
- It is noted that the eastern area (east of the Mt Glen Rock escarpment) of the site has reduced vegetation cover and has been more impacted by fire. **Figures 3** and **10** show that the majority of CREVNT listed flora and fauna records are located along the western extent of the site. Given the spatial constraints resulting from this it is considered that the eastern area of Mt Glen Rock may be more suitable for the construction of mountain bike trails with a reduced trail network coming from the Eastern sector to access the area.

Construction Phase

- Clearing of mature trees and Koala Habitat trees to be avoided by winding through forest openings. All trails should be raised above tree roots to avoid damage to root structures.
- Erosion and Sediment Control Plan will be developed by contractor outlining how construction of trails will not disrupt natural drainage patterns or influence species patterning on the balds. ESC plan should be compliant with *IECA Best Practice Erosion and Sediment Control Manual* (IECA, 2008) and certified.
- Trail design to include armoured gully and creek crossings that can withstand flowing water to prevent erosion and elevated trail sections over exposed surface tree roots to avoid damage to mature trees.
- Weed Management and Fire Management Plans should be implemented for the site to reduce the impacts of these habit changing factors.

# 6.0 SUMMARY

Findings following the work conducted on site to date are outlined below.

- Somerset Regional Council has undertaken a draft master plan process for the development of Mount Glen Rock reserve which includes the development of 28km of trails across the 208ha site, including mountain bike trails, walking trails and associated infrastructure.
- The site at Mount Glen Rock is a rocky mountainous area with two main peaks and associated summit cliffs occurring on the western and southern sides with the upper slopes being steep and littered with scree. The lower slopes gradually decrease in steepness before levelling out into riparian areas adjoining Sandy Creek to the west and Esk Creek to the east.
- The survey area includes a diversity of soil types, including alluvium around Sandy Creek, sandstone on the lower slopes at the southern end of the site and volcanics on upper parts of the mountain. Combined with other variables such as aspect, soil depth and fire impacts this has resulted in a range of both remnant and regrowth vegetation communities occurring over the site.

FLORA:

- The Mount Glen Rock clearing impact area contains mapped regulated vegetation under the *Vegetation Management Act 1999* including one Endangered regional ecosystem (RE), four Of Concern RE's and three Least Concern RE's.
- The flora survey confirmed that the mapped regulated vegetation communities are generally correct across the site, and the following was noted in relation to the RE's onsite:
    - The dominant mapped RE (approximately 80% of the site) is 12.12.9 *Eucalyptus dura* woodland. This community is generally intact and in good condition across the lower and middle elevations however much of the vegetation in the upper parts of the mountain has been impacted by recent hot bushfires with a resulting absence of large trees and a dense regenerating understorey affecting the integrity of the vegetation community.
    - The patch of RE 12.12.10 mapped on the upper eastern slopes was impacted by fire to the extent that it was not able to be verified.
    - A small area of Endangered RE 12.3.3 *Eucalyptus tereticornis* woodland is mapped as regrowth on the site along Sandy Creek, however the survey found that it was in poor ecological condition and severely impacted by weeds.
- Most of the works impact area is mapped under the *Nature Conservation Act 1992*, as potentially containing protected plant species, and as such the flora survey is subject to the relevant provisions of the Queensland *Flora Survey Guidelines*.
- Eight specimens of the Vulnerable-listed Lloyd's Native Olive have been found within the survey area, including three within close proximity of the proposed trail network. No additional CREVNT flora species were recorded.
- The woodland around Sandy Creek is in moderate ecological condition, with large eucalypts over a weed-dominated understorey.

- The lower slopes of Mount Glen Rock are in good ecological condition, with a canopy of mature eucalypts over a largely native understorey. The upper parts of the mountain are in moderate ecological condition, with mostly native species that have been severely fire-affected, lacking in mature canopy trees.

FAUNA:

- The site is utilised by at least 60 species of native bird, 14 reptile species, 29 native mammals and three native amphibians.
- In general, the site has good habitat values spread across the varying elevations and vegetation communities. The upper rocky slopes provide important habitat areas for a range of adapted species including mammals (notably Brush-tailed Rock-wallaby), microbats, reptiles and raptors.
- The lower slopes and riparian areas have increased vegetal cover and areas of coarse woody debris and associated habitat features including the presence of ephemeral waterways that provide important habitat functions onsite.
- The survey area contains mapped Essential Habitat for the Endangered Koala and the Vulnerable Brush-tailed Rock-wallaby and both species were confirmed as occurring onsite during the conduct of surveys.
- The entire site is mapped as Core Koala Habitat and it is considered that Koalas will favour the lower slopes where there are abundant Koala food trees and suitable habitat with a degree of habitat linkage to suitable habitat areas to the east of the site.
- Several eucalypts with dbh > 500mm, including recognised Koala habitat trees, occur in close proximity to the proposed trails and may be impacted by works based on the preliminary design plans provided. Some of these large trees have arboreal hollows and/or termitaria which provides important habitat functions for arboreal fauna species.

MSES & MNES:

- Matters of State Environmental Significance (MSES) mapped as likely to occur in or adjacent to the survey area include:
    - Threatened (Endangered or Vulnerable) wildlife;
    - Special Least Concern wildlife;
    - Core Koala habitat area;
    - Category B and C Regulated Vegetation – Endangered or Of Concern; Regulated Vegetation – Intersecting a watercourse; and Essential Habitat.
- Matters of National Environmental Significance (MNES) potentially occurring on the site include 48 threatened species, 16 migratory species and four listed Threatened Ecological Communities. 2 fauna species; Koala and Brush-tailed Rock wallaby and one flora species; Lloyd's Native Olive are confirmed as occurring onsite and are MNES matters that require consideration.
- The result of the self-assessment process of the Significant Impact Criteria for CREVNT listed fauna and flora species confirmed that the current draft master plan is likely to have a Significant Impact on Brush-tailed Rock wallaby and a possible Significant Impact on Koala.
- If adequate measures to avoid or mitigate impacts on MNES matters are proposed, further assessment and approval under the *EPBC Act 1999* may not be required.

# 7.0 RECOMMENDATIONS

Recommendations following the work conducted on site to date are included below.

Vegetation Management:

- The existing track design has areas that interact closely with native trees over 200mm DBH (diameter at breast height). Proposed trail alignments should be designed to avoid clearing of large trees particularly those with arboreal hollows, as they possess significant conservation values.
- Track alignments should be adjusted or revised to avoid the supporting habitat of the identified populations of Lloyd's Native Olive to allow regeneration of the species. Any tracks that are planned within 100 metres of the plants will require a protected plants clearing permit.
- It is recommended that the alignment of trails on the lower western slopes be located through weed infested areas and should include a wider dedicated program of woody and understorey weed removal, which can act to improve the environmental values of these areas.
- Preparation of a Weed Management Plan for the site is recommended to address restricted invasive plants, ecological weeds and other local weeds to ensure ecological values are maintained over the site.
- Preparation of a detailed Bushfire Management Plan to inform ongoing management, and land use considerations with a focus on mitigating the impacts of bushfire on the sensitive ecological values of the site, particularly given the considerable adverse impacts of fire on these values observed. This is particularly relevant on the upper western slopes of the site where the flora and fauna communities have been severely impacted by fire.

Fauna Management:

- It is recommended for track alignments to avoid the bases of cliff lines as these provide rock wallaby shelter sites due to the surrounding thick vegetation, given the poor development of caves/overhangs generally. In hot weather it is critical that rock wallabies remain undisturbed in these shady retreat sites
- Foxes (*Vulpes vulpes*) occur across the landscape. It is recommended to minimise trails which provide silent hunting access to rock wallaby habitat.

Trail Alignment and Design:

- The current design includes 28km of trail network and associated infrastructure which are located throughout all the RE types present across the site. A reduction in the size of the trail network and the exclusion of new trails from key habitat areas for Koala and Brush tailed Rock wallaby would likely reduce the impacts to these species and avert the likelihood of a Significant Impact to the species.
- For Koala it is recommended that the density of trails on the western part of the site be reduced from the current number of 7 trails down to 3-4 trails which include low intensity walking trails as well as the existing dual purpose fire trail.
- For Brush-tailed Rock wallaby it is recommended that trails are kept away from the steep cliff escarpment areas onsite that are the preferred habitat for the species.

- It is noted that the area east of the Mt Glen Rock escarpment of the site has reduced vegetation cover and reduced occurrence of CREVNT listed Flora and fauna species. Given the spatial constraints resulting from this it is considered that the eastern area of Mt Glen Rock may be more suitable for the construction of mountain bike trails.
- Consultation between project stakeholders including Council, the Project Ecologist and the Trail Designer should be undertaken to ensure that the principle of impact avoidance through design is employed prior to the finalisation of the proposed design.

Legislative Requirements:

- Following finalisation of trail location and works required i.e., extent of clearing it will be required to determine approval requirements under the *Planning Regulation* 2017, *Nature Conservation Act 1992*, *Environmental Offset Act 2014*, and *EPBC Act 1999*.
- Dependent upon the potential impact of works a DES-approved Species Management Plan (SMP) for Brush-tailed Rock-wallaby may be required under the *Queensland Nature Conservation (Animals) Regulation 2020.*
- The *State Government Supported Infrastructure Koala Conservation Policy 2023* should be considered in the planning and delivery of this project.
- If impacts to Brush-tailed Rock-wallaby and Koala are not able to be avoided, a self-assessment process for Matters of National Environmental Significance (MNES) – Threatened Species, as outlined in the Significant impact guidelines 1.1 *EPBC Act 1999* (DOE, 2013) should be completed to determine whether the prescribed activity is likely to have a 'significant impact' on an EPBC-listed species. A Referral to the federal government Department of Climate Change, Energy, the Environment and Water (DCCEEW) may be required if it is determined that the proposed action triggers the significant impact criteria in the guidelines.
- A self-assessment to determine if MSES are impacted as a result of proposed works will be required following the preparation of a detailed design for the project.
- The works may trigger an application for Operational Works for Clearing and / or Filling and Excavation dependent on the level of works required to achieve the proposed mountain bike trails. It is considered a pre-lodgement meeting with the Somerset Regional Council's planning department would be beneficial, to determine requirements under the Planning Scheme.

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# APPENDIX A – DATABASE & MAP SEARCHES USED IN DESKTOP REVIEW OF SITE ENVIRONMENTAL VALUES

| DATABASE / MAP PRODUCT | SOURCE | DESCRIPTION |
|---|---|---|
| **Regulated Vegetation Management Map** | DR, 2023 | Regulated Vegetation mapping shows vegetation categories that determine clearing requirements as gazetted under the Qld *Vegetation Management Act 1999*. The Regulated Vegetation Supporting map provides information on regional ecosystems, wetlands, watercourses, and essential habitat and factors. |
| **Protected Plants Flora Survey Trigger Map**) | DES, 2023 | This tool identifies whether a proposed clearing area lies within a high risk area that may contain EVNT plant species. It is used to determine when a flora survey needs to meet the requirements of the Queensland *Flora Survey Guidelines – Protected Plants* (NCA, 1992). |
| **Essential Habitat Map** | DR, 2023 | Essential Habitat is a vegetation ecotype that is considered by DES to form potential habitat for an EVNT species that is listed under the *Nature Conservation Regulations (2020)*. Essential Habitat mapping is provided in conjunction with Regulated Vegetation Management mapping as gazetted under the VMA (1999). |
| **WildNet Database** | DES/DSITIA, 2023 | Wildlife sightings and listings for all flora and fauna species within a designated area. |
| **EPBC Protected Matters Search Tool** | DoE, 2023 | This tool generates a report that indicates whether matters of national environmental significance or other matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* that are likely to occur in your area of interest – Indicative only. |
| **Map of Referable Wetlands** | DES, 2023 | A statewide regulatory map under the *Environmental Protection Regulation 2008* which identifies wetlands of high ecological significance (HES) and general ecological significance (GES). HES wetlands are considered MSES under the Planning and Environmental Offsets legislation. |
| **Nature Conservation (Koala) Conservation Plan 2017 and maps** | Qld Government, 2023 | These maps identify Koala Habitat Areas (core and locally refined) and Koala Priority Areas that contain Koala habitat which is essential for the conservation of a viable population in the wild in South East Queensland |
| **Queensland Waterways for Waterway Barrier Works spatial data layer and guideline** | Development Assessment Mapping System, DSDMIP 2023 | This spatial data layer guides the determination of whether operational work that is constructing or raising waterway barrier works i.e., works that may inhibit the free movement of fish along waterways and onto floodplains, complies with the accepted development requirements or is assessable development requiring a development approval under the *Planning Act 2016*. |
| **Matters of State Environmental Significance (MSES)** | DES, 2023 | This report identifies MSES as referenced in the biodiversity state interest under the State Planning Policy (SPP). MSES encompass environmental values protected under Queensland legislation including:<br>• Protected areas under the NCA 1992 |

| | | |
|---|---|---|
| | | • Marine pakrs and lands defined under the Marine Parks Act 2004<br>• Declared fish habitat areas – management areas A and B under the Fisheries Regulation 2008<br>• Threatened wildlife under the Nature Conservation Act 1992 and SL animals under the Nature Conservation (Wildlife) Regulation 2006<br>• Regulated vegetation under the VMA 1999, that is:<br>  o Category B, that are endangered or of concern RE's<br>  o Category C, that are endangered or of concern RE's<br>  o Category R, that are endangered or of concern RE's<br>  o RE's that intersect watercourses identified on the map,<br>  o RE's that intersect wetlands identified on the map<br>• Strategic Environmental Areas under the Regional Planning Interests Act 2014 |
| **Matters of National Environmental Significance (MNES)** | DAWE, 2023 | Under the EPBC Act, an action will require approval from the minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance. |

# APPENDIX B – CERTIFICATION OF SUITABLY QUALIFIED PERSON FOR FLORA SURVEY

Tim O'Reilly (BASc) conducts botanical surveys for Native Foresters. Tim is an ecological consultant and professional ornithologist with 30 years' experience in the following:

- Conducting environmental education, ecological research, fauna and flora surveys;
- Habitat restoration and revegetation; and
- Fauna spotter-catching.

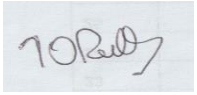
Since 2016, Tim has been conducting flora surveys in the Sunshine Coast region. These have included:

- Flora and Fauna Assessment and Plot Survey of *Rhodamnia rubescens* at 745 Black Mountain Road, Black Mountain (2023).
- Flora and Fauna Assessment – Image Flat Quarry Expansion (2022).
- Flora and Fauna Assessment and Plot Survey of *Mallotus megadontus* and *Pararistolochia praevenosa* at Paynters Creek bridge on Old Palmwoods Road, Woombye (2021).
- Population survey of *Bothriochloa bunyensis* at Russell Park, Bunya Mountains (2021)
- Flora and Fauna Assessment and Plot Survey of *Macadamia ternifolia* at Amamoor Creek Road (2020)
- Offset Habitat Assessments – Nambour Landfill Expansion (2018)
- Flora and Fauna Assessment and Plot survey of *Mallotus megadontus* at Petrie Park Road bridge upgrade project (2017)
- Flora and Fauna Assessment – Old Nambour Cemetery (2017)

The following statement is provided in certification of the suitably qualified person who conducted the flora survey.

(1) "I certify that:

a) I have adhered to all statutory requirements and flora survey guideline requirements; and
b) In the area surveyed I have not found any plants that are currently listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable or near threatened in the *Nature Conservation (Plants) Regulation 2020*; and
c) The flora survey report is an accurate and full account of the flora survey.

**Name:** **Tim O'Reilly** **Signature:** 

**Date:** 31/05/2023

# APPENDIX C – JUSTIFICATION OF SUITABLY QUALIFIED AND EXPERIENCED PERSON FOR FAUNA BREEDING PLACE SURVEY

Native Foresters fauna surveys and breeding habitat assessments are coordinated and led by Simon McVerry and assisted by Dr Scott Burnett and Tony Bright.

Simon has worked in resource management for 20 years across South-east Queensland, focusing on native flora and fauna management and assessment. He has extensive experience in field research for native fauna species and is the holder of a Scientific Purposes Permit for Research Purposes and an Animal Ethics Permit.

Scott Burnett is a wildlife ecologist with over 30 years' experience undertaking fauna surveys and targeted species research in Queensland and Asia. He has worked in government, academia and the private sector. Scott has authored and co-authored over 30 scientific papers in Australian wildlife ecology and is a contributing author to the *Mammals of Australia* and *Threatened Species of Queensland*, published by the CSIRO, and isa former member of the Australian Mammal Society.

Tony Bright is a native fauna and flora specialist with over 40 years' experience in the field. He has spent ten years as a guide working in the Fraser Island region and 30 years doing field–based research in Australia and overseas. Tony is a professional wildlife keeper and a licensed Wildlife spotter catcher (Fauna rehabilitation permit holder) specialising in reptile, mammal and amphibian species.

Simon McVerry and Tony Bright are assisted in the field by Pru McIntyre and Tim O'Reilly.

Tim O'Reilly (BA/BSc-Botany) is an ecological consultant, qualified spotter catcher and professional ornithologist with 30 years' experience in environmental research and education. He has led bird surveys for QPWS, developed accredited field ecology course content for the University of New South Wales and has run staff training workshops at Mary Cairncross Scenic Reserve.

# APPENDIX D – SURVEY TRAPPING LOCATIONS

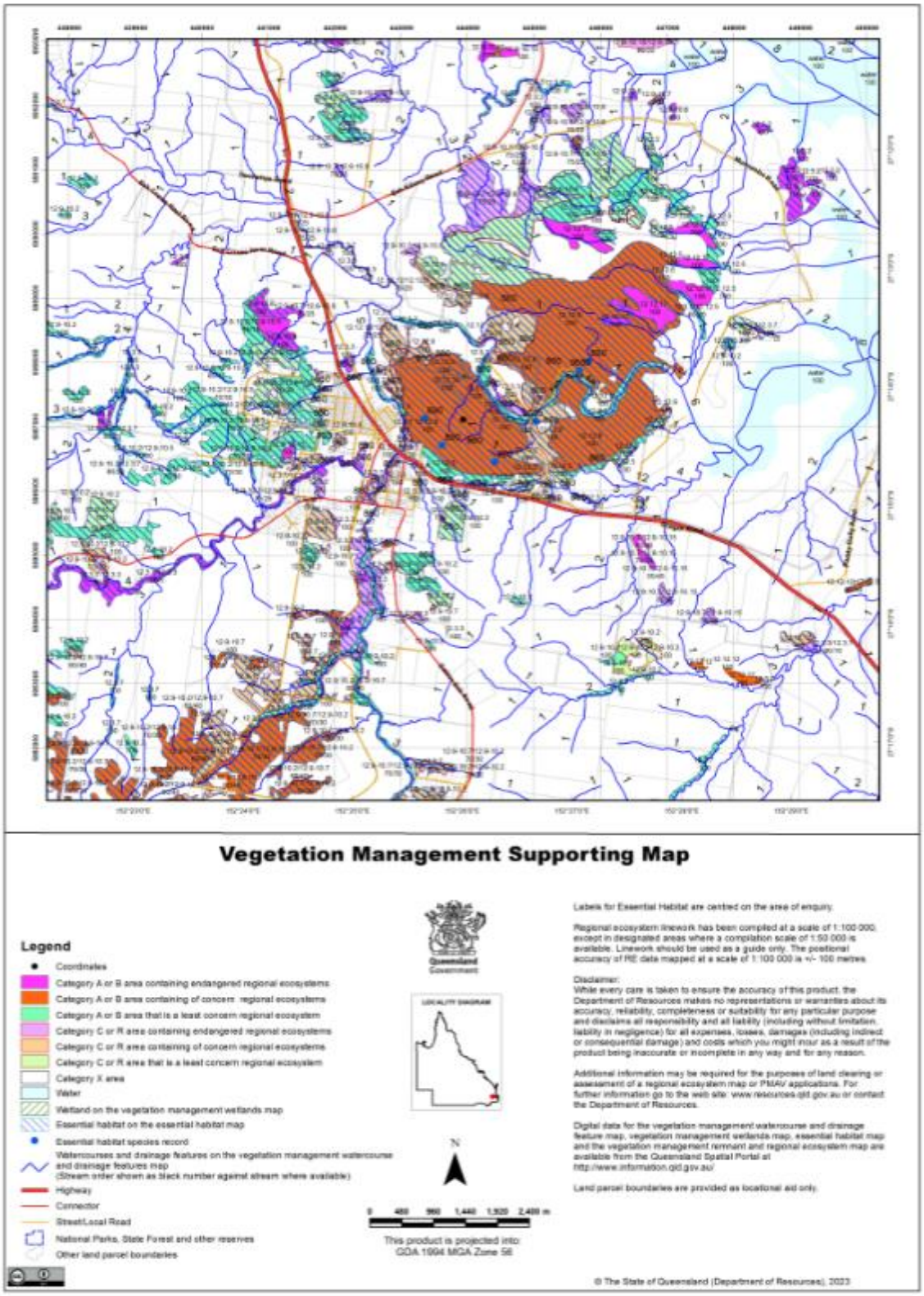
### Summary of transect locations at Mount Glen Rock during Field Trip 1.

| Site no. | Regional Ecosystem | Central coordinates | Site description |
|---|---|---|---|
| 1 | 12.3.7 | -27.2366 152.4262 | Riparian forest, *Eucalyptus tereticornis, Lophostemon suaveolens* canopy, Lantana and other weeds and native shrubs in understorey |
| 2 | 12.12.9 | -27.2445 152.4318 | Dry sclerophyll forest on gentle slope, *Corymbia trachyphloia, Lophostemon suaveolens* canopy, grassy/shrubby understorey. |
| 3 | 12.12.5 | -27.2356 152.4242 | Open forest to woodland of *Corymbia citriodora* subsp. *variegata*, *Eucalyptus crebra*., moderate shrub layer, floor of grasses/sedges on rocky substrate. |

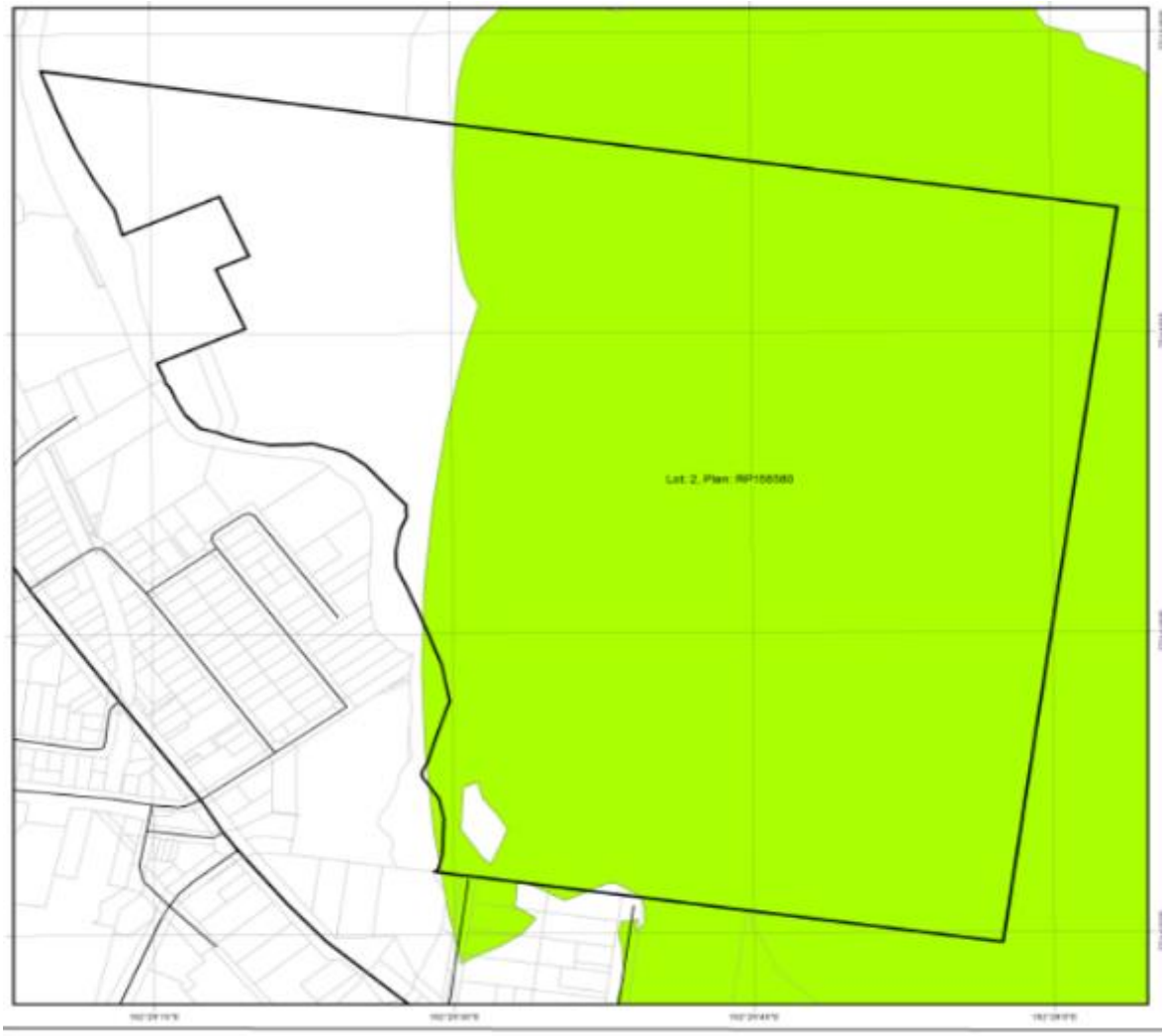
### Summary of Anabat survey locations at Mount Glen Rock

| Site | Lat | Long | Site description | Transect no. | Date set | Date collected |
|---|---|---|---|---|---|---|
| 1 | -27.236 | 152.4258 | Hillside open forest, midslope | 1 | 6/03/2023 | 8/03/2023 |
| 2 | -27.2363 | 152.4273 | Hillside scree, upper slope | N/A | 6/03/2023 | 8/03/2023 |
| 3 | -27.2452 | 152.4324 | Open grassy forest, lower slope | 2 | 6/03/2023 | 8/03/2023 |
| 4 | -27.2355 | 152.4239 | Footslope riparian forest | 3 | 6/03/2023 | 8/03/2023 |
| 5 | -27.2355 | 152.4238 | Creekside near Site 3 | N/A | 7/03/2023 | 8/03/2023 |
| Harp Trap | -27.2353 | 152.424 | In entrance to unnamed gully off Sandy Creek | N/A | 7/3/2023 | 8/3/2023 |
| 6 | -27.2326 | 152.436 | Overlooking waterhole in Esk Ck | N/A | 9/10/2023 | 10/10/2023 |
| 7 | -27.2331 | 152.425 | Base of scree slope, western side | N/A | 10/10/2023 | 13/10/2023 |
| 8 | -27.2366 | 152.4351 | Eastern hillside | N/A | 9/10/2023 | 13/10/2023 |
| 9 | -27.2387 | 152.4353 | Mid-way up cliffs | N/A | 9/10/2023 | 13/10/2023 |
| 10 | -27.2392 | 152.4323 | Overlooking eastern catchment | N/A | 9/10/2023 | 13/10/2023 |
| 11 | -27.2358 | 152.431 | Secret Ck at pooled water | N/A | 9/10/2023 | 13/10/2023 |
| 12 | -27.2326 | 152.436 | Overlooking waterhole in Esk Ck | N/A | 9/10/2023 | 10/10/2023 |

# APPENDIX E – REGULATED VEGETATION SUPPORTING MAP



# APPENDIX F – PROTECTED PLANTS FLORA SURVEY TRIGGER MAP




**Protected Plants Flora Survey Trigger Map**

**Legend**

- Selected Lot and Plan
- High risk area
- Other land parcel boundaries
- Freeways / motorways / highways
- Secondary roads / streets

LOCALITY DIAGRAM

N

0 50 100 150 200 250 m

This product is projected into: GDA 1994 MGA Zone 56

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

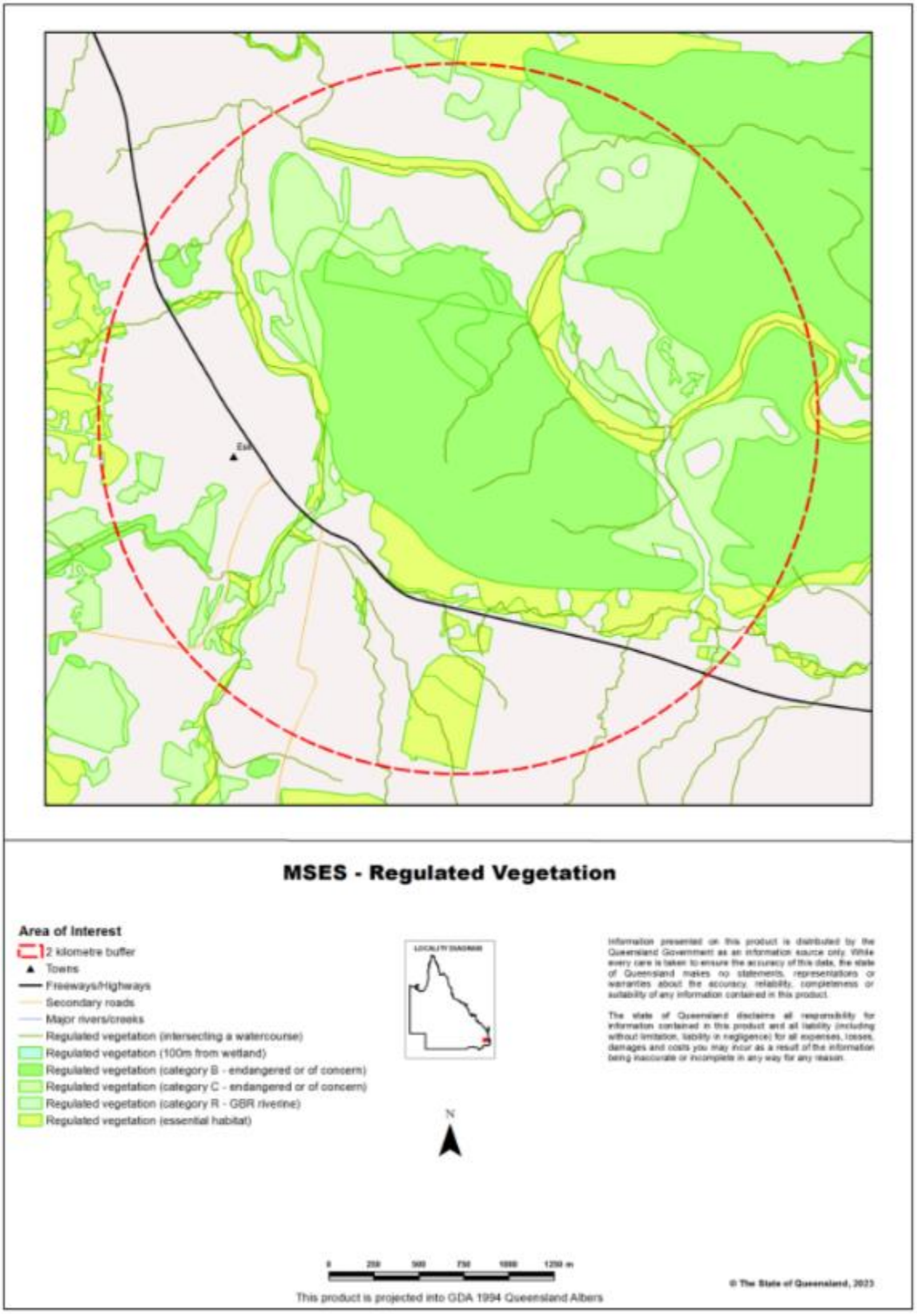
Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

Disclaimer:
While every care is taken to ensure the accuracy of the data used to generate this product, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damages) and costs which might be incurred as a consequence of reliance on the data, or as a result of the data being inaccurate or incomplete in any way and for any reason.

# APPENDIX G – MSES MAPPING



## MSES - Species
## Threatened (endangered or vulnerable) wildlife and special least concern animals

**Area of Interest**

- 2 kilometre buffer
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)

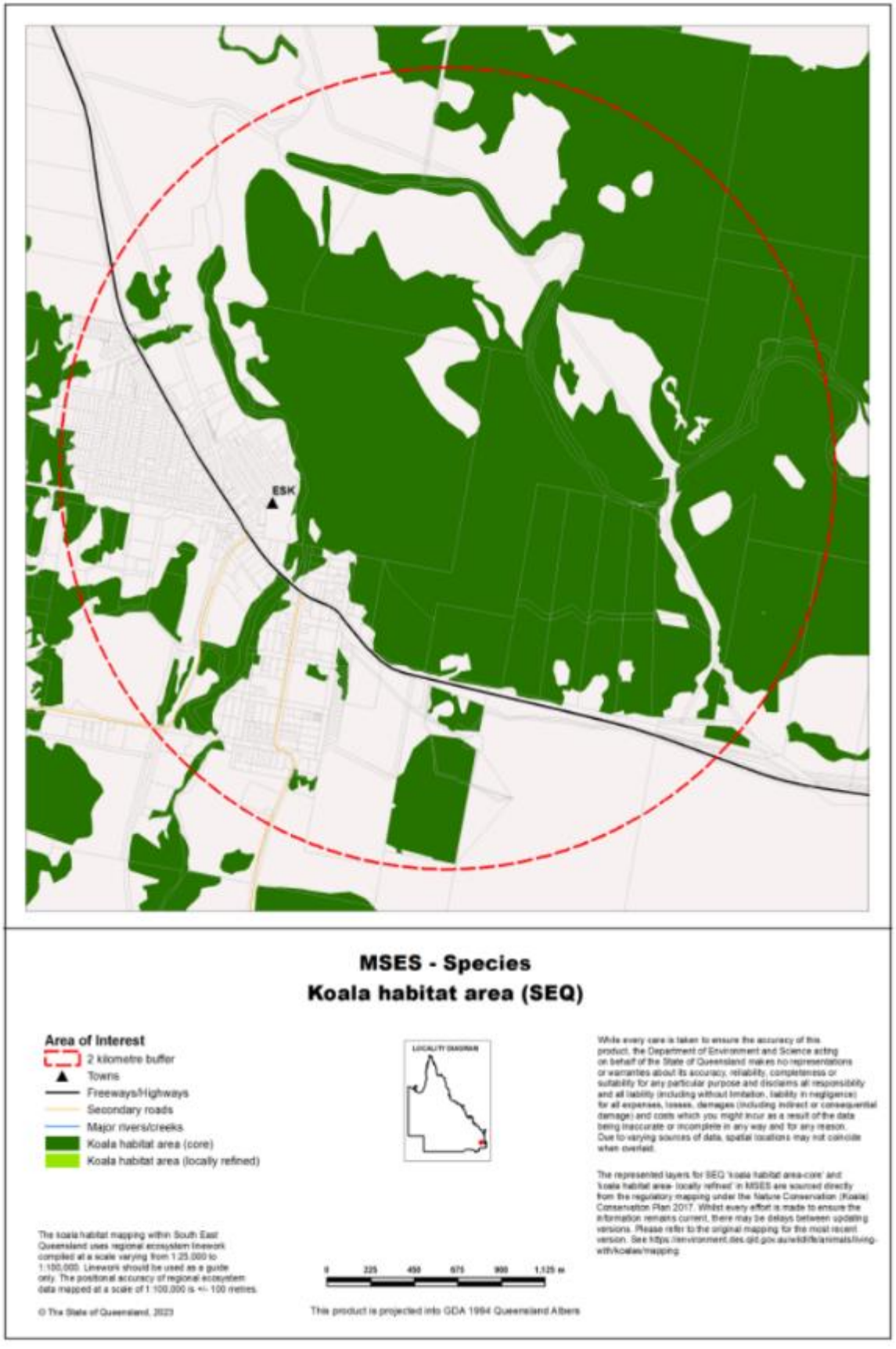
LOCALITY DIAGRAM



N

0 250 500 750 1000 1250 m

This product is projected into GDA 1994 Queensland Albers


ESK
MSES - Species
Koala habitat area (SEQ)
Area of Interest
2 kilometre buffer
Towns
Freeways/Highways
Secondary roads
Major rivers/creeks
Koala habitat area (core)
Koala habitat area (locally refined)
LOCALITY DIAGRAM
While every care is taken to ensure the accuracy of this product, the Department of Environment and Science acting on behalf of the State of Queensland makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the data being inaccurate or incomplete in any way and for any reason. Due to varying sources of data, spatial locations may not coincide when overlaid.
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping
The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.
© The State of Queensland, 2023
0 225 450 675 900 1,125 m
This product is projected into GDA 1994 Queensland Albers

# APPENDIX H – ECOLOGICAL COMMUNITY ASSESSMENT

| | |
|---|---|
| **Regional Ecosystem Descriptions** | RE 12.12.9 dominant; 12.12.15; 12.12.10; 12.3.7 |
| **Canopy structure and condition** | 12.12.9: Canopy trees to 20m, in good ecological condition on lower slopes with large canopy trees, moderate to poor ecological condition in upper parts that are badly fire-affected and lacking in large trees.<br>12.12.5: Canopy trees to 25m in good ecological condition.<br>12.12.10: Typically, low canopy with occasional emergents, however community badly fire-affected and in poor ecological condition.<br>12.3.7: Large trees present but relatively sparse, non-native trees common. |
| **Understorey structure and condition** | 12.12.9: good condition on lower slopes, regenerating and dense in upper fire-affected parts.<br>12.12.5: Mostly good ecological condition but weedy near the green waste dump.<br>12.12.10: Mostly very dense and fire-affected<br>12.3.7: Very weedy with occasional native species |
| **Species composition Native : Introduced** | 60:18 |

**Species present:**

| *SCIENTIFIC NAME* | FAMILY | COMMON NAME | ABUNDANCE |
|---|---|---|---|
| *CANOPY* | | | |
| *Corymbia citriodora* | Myrtaceae | Spotted Gum | Common |
| *Corymbia intermedia* | Myrtaceae | Pink Bloodwood | Occasional |
| *Corymbia trachyphloia* | Myrtaceae | Brown Bloodwood | Common |
| *Eucalyptus crebra* | Myrtaceae | Narrow-leaved Ironbark | Common |
| *Eucalyptus dura* | Myrtaceae | Gum-topped Ironbark | Common |
| *Eucalyptus exserta* | Myratceae | Queensland Peppermint | Common |
| *Eucalyptus melanophloia* | Myrtaceae | Silver-leaved Ironbark | Common |
| *Eucalyptus moluccana* | Myrtaceae | Gum-topped Box | Occasional |
| *Eucalyptus tereticornis* | Myrtaceae | Queensland Blue Gum | Occasional |
| *Lophostemon suaveolens* | Myrtaceae | Swamp Box | Occasional |
| MID STOREY | | | |
| *Acacia leiocalyx* | Mimosaceae | Early-flowering Black Wattle | Occasional |
| *Acacia sp. cretata* | Mimosaceae | Silver-stemmed Wattle | Common |
| *Alphitonia excelsa* | Rhamnaceae | Red Ash | Common |
| *Casuarina torulosa* | Casuarinaceae | Forest Oak | Occasional |
| *Cissus hypoglauca* | Vitaceae | Water Vine | Occasional |
| *Clerodendrum floribundum* | Lamiaceae | Lolly Bush | Occasional |
| *Dodonaea viscosa* | Sapindaceae | Hop Bush | Occasional |
| *Eustrephus latifolius* | Asparagaceae | Wombat Berry | Common |
| *Ficus coronata* | Moraceae | Creek Sandpaper Fig | Common |
| *Glochidion ferdinandii* | Phyllanthaceae | Cheese Tree | Common |
| *Guoia semiglauca* | Sapindaceae | Wild Quince | Occasional |

| SCIENTIFIC NAME | FAMILY | COMMON NAME | ABUNDANCE |
|---|---|---|---|
| *Hibiscus splendens* | Malvaceae | Pink Hibiscus | Common |
| *Lophostemon confertus* | Myrtaceae | Brush Box | Common |
| *Mallotus phillippinensis* | Euphorbiaceae | Red Kamala | Common |
| *Strebulus brunonianus* | Moraceae | Whalebone Tree | Occasional |
| *Trema tomentosa* | Cannabaceae | Poison Peach | Common |
| LOWER STRATUM | | | |
| *Adiantum hispidulum* | Pteridaceae | Rough Maidenhair Fern | Common |
| *Dianella caerulea* | Hemerocallidaceae | Blue Flax-lily | Occasional |
| *Imperata cylindrica* | Poaceae | Blady Grass | Occasional |
| *Lomandra sp.* | Lomandraceae | Mat-rush | Occasional |
| *Pteridium esculentum* | Dennstaedtiaceae | Bracken | Occasional |
| *Smilax australis* | Smilacaceae | Barbed-wire Vine | Common |
| *Smilax glyciphylla* | Smilacaceae | Sweet Sarsaparilla | Occasional |
| *Themeda triandra* | Poaceae | Kangaroo Grass | Common |
| *Xanthorrhoea sp.* | Xanthorrhoeaceae | Grass-tree | Common |
| NON-NATIVE | | | |
| *Ageratum houstonianum* | Asteraceae | Blue-top | Common |
| *Asparagus aethiopicus*[RIP] | Asparagaceae | Ground Asparagus Fern | Common |
| *Bidens pillosa* | Asteraceae | Cobblers Peg | Common |
| *Bryophyllum pinnatum* | Crassulaceae | Resurrection Plant | Occasional |
| *Celtis sinensis*[RIP] | Ulmaceae | Chinese Celtis | Common |
| *Chloris gayana* | Poaceae | Rhodes Grass | Occasional |
| *Conyza sumatrensis* | Asteraceae | Tall Fleabane | Common |
| *Cinnamomum camphora*[RIP] | Lauraceae | Camphor Laurel | Common |
| *Dolichandra unguis-cati*[RIP] | Bignoniaceae | Cat's-claw Creeper | Common |
| *Ipomoea cairica* | Convolvulaceae | Mile-a-minute | Occasional |
| *Jacaranda mimosifolia* | Bignoniaceae | Jacaranda | Occasional |
| *Lantana camara*[RIP] | Verbenaceae | Lantana | Common |
| *Megathyrsus maximus var. maximus* | Poaceae | Green Panic | Common |
| *Ochna serrulate* | Ochnaceae | Ochna | Common |
| *Paspalum mandiocanum* | Poaceae | Broad-leaf Paspalum | Occasional |
| *Passiflora suberosa* | Passifloraceae | Corky Passionfruit | Occasional |
| *Solanum mauritianum* | Solanaceae | Wild Tobacco | Common |

RIP = Restricted Invasive Plant

# APPENDIX I: LOCATION AND SUPPORTING HABITAT OF CREVNT FLORA SPECIES

| PLANT ID | LATITUDE | LONGITUDE | NO OF STEMS | HEIGHT (m) | DBH (mm) | SUPPORTING VEGETATION | DISTURBANCE LEVEL | NOTES |
|---|---|---|---|---|---|---|---|---|
| 1 | -27.23770 | 152.42488 | 1 | 5 | 40 | *Eucalyptus tereticornis, Lophostemon suaveolens, Alphitonia excelsa, Acacia nerifolia, A. leiocalyx, Lantana cámara, Celtis sinsensis* | High | Regrowth near Sandy Creek. Was in dense Lantana thicket during initial survey, has since been burnt. |
| 2 | -27.23763 | 152.42477 | 2 | 3 | 30 | *Lophostemon suaveolens, Alphitonia excelsa, Acacia nerifolia, Lantana cámara, Celtis sinensis* | High | Regrowth near Sandy Creek. Was in dense Lantana thicket during initial survey, has since been burnt. |
| 3 | -27.23306 | 152.43642 | Multi | 2.5 | 20 | *Acacia nerifolia, Callistemon viminalis, Lophostemon sualeolens, Leptospermum sp., grasses.* | Moderate | Adjacent to Esk Ck and a large rock face, open grassy understorey. |
| 4 | -27.23158 | 152.42717 | Multi | 1 | 20 | Dry rainforest matrix | Low to moderate | Located at the head of a gully below the cliffs on the western side of the mountain |
| 5 | -27.23195 | 152.42743 | 1 | 1.5 | 30 | Exposed on dry rocky cliff | Low to moderate | Located at the head of a gully below the cliffs on the western side of the mountain. Bushy shrub |
| 5 - 8 | -27.23021 | 152.42057 | TBD | TBD | TBD | Riparian | Moderate to high | Record from SRC, not in close proximity to trail network. |

# APPENDIX J - FAUNA SPECIES LIST

| SCIENTIFIC NAME | COMMON NAME |
|---|---|
| **MAMMALS** | |
| *Austronomus australis* | White-striped Freetail Bat |
| *Canis lupus dingo* | Dingo |
| **Cervus elaphus* | Red Deer |
| *Chalinolobus gouldii* | Gould's Wattled Bat |
| *Chalinolobus morio* | Chocolate wattled bat |
| *Chalinolobus nigrogriseus* | Hoary wattled bat |
| *Isoodon macrourus* | Northern Brown Bandicoot |
| *Miniopterus australis* | Little bent-winged bat |
| *Miniopterus orianae* | Common bent-winged bat |
| *Notamacropus parryi* | Whiptail Wallaby |
| *Notamacropus rufogriseus* | Red-necked Wallaby |
| *Nyctophilus sp. (bifax, geoffroyi and/or gouldii)* | |
| *Ozimops lumsdenae* | |
| *Ozimops ridei* | Rides freetailed bat |
| *Petaurus norfolcensis* | Squirrel Glider |
| *Perameles nasuta* | Southern long-nosed bandicoot |
| *Pseudomys gracilicaudatus* | Eastern chestnut mouse |
| [V]*Petrogale penicillata* | Brush-tailed Rock-wallaby |
| *Phascogale tapoatafa* | Brush-tailed Phascogale |
| [E]*Phascolarctos cinereus* | Koala |
| *Pteropus sp.* | a flying fox |
| **Rattus rattus* | Black Rat |
| *Rattus tunneyi* | Pale Field Rat |
| *Rhinolophus megaphyllus* | Eastern horseshoe bat |
| *Saccolaimus flaviventrus* | Yellow-bellied sheath-tailed bat |
| *Scoteanax rueppellii* | Greater broad-nosed bat |
| *Scotorepens orion* | Eastern Broad-nosed Bat |
| [SL]*Tachyglossus aculeatus* | Short-beaked Echidna |

| SCIENTIFIC NAME | COMMON NAME |
|---|---|
| *Trichosurus vulpecula* | Common Brushtail Possum |
| *Vespedelus troughtoni* | Eastern cave bat |
| **Vulpes vulpes* | Red Fox |
| *Wallabia bicolor* | Swamp Wallaby |
| **BIRDS** | |
| *Alectura lathami* | Australian Brush-turkey |
| *Alisterus scapularis* | Australian King-Parrot |
| *Anas superciliosa* | Pacific Black Duck |
| *Aquila audax* | Wedge-tailed Eagle |
| *Cacatua galerita* | Sulphur-crested Cockatoo |
| *Cacomantis flabelliformis* | Fan-tailed Cuckoo |
| *Chrysococcyx lucidus* | Shining Bronze-Cuckoo |
| *Colluricincla harmonica* | Grey Shrike-thrush |
| *Coracina novaehollandiae* | Black-faced Cuckoo-shrike |
| *Cormobates leucophaea* | White-throated Treecreeper |
| *Corvus orru* | Torresian Crow |
| *Cracticus nigrogularis* | Pied Butcherbird |
| *Cracticus torquatus* | Grey Butcherbird |
| *Dacelo novaeguineae* | Laughing Kookaburra |
| *Daphoenositta chrysoptera* | Varied Sitella |
| *Dicaeum hirundinaceum* | Mistletoebird |
| *Dicrurus bracteatus* | Spangled Drongo |
| *Edolisoma tenuirostre* | Common Cicadabird |
| *Entomyzon cyanotis* | Blue-faced Honeyeater |
| *Eolophus roseicapilla* | Galah |
| *Eopsaltria australis* | Eastern Yellow Robin |
| *Eurystomus orientalis* | Dollarbird |
| *Geopelia humeralis* | Bar-shouldered Dove |
| *Geopelia placida* | Peaceful Dove |
| *Grallina cyanoleuca* | Magpie-lark |
| *Gymnorhina tibicen* | Australian Magpie |
| *Lichmera indisdincta* | Brown Honeyeater |
| *Macropygia phasianella* | Brown Cuckoo-Dove |

| SCIENTIFIC NAME | COMMON NAME |
|---|---|
| *Merops ornatus* | Rainbow Bee-eater |
| *Malurus lamberti* | Variegated Fairy-wren |
| *Malurus melanocephalus* | Red-backed Fairy-wren |
| *Meliphaga lewinii* | Lewin's Honeyeater |
| *Melithreptus albogularis* | White-throated Honeyeater |
| *Merops ornatus* | Rainbow Bee-eater |
| *Manorina melanocephala* | Noisy Miner |
| *Myiagra rubecula* | Leaden Flycatcher |
| *Neochmia temporalis* | Red-browed Finch |
| *Ninox boobook* | Southern Boobook |
| *Ocyphaps lophotes* | Crested Pigeon |
| *Pachycephala pectoralis* | Golden Whistler |
| *Pardalotus striatus* | Striated Pardalote |
| *Podargus strigoides* | Tawny Frogmouth |
| *Phaps chalcoptera* | Common Bronzewing |
| *Philemon citreogularis* | Little Friarbird |
| *Philemon corniculatus* | Noisy Friarbird |
| *Psophodes olivaceus* | Eastern Whipbird |
| *Rhipidura albiscapa* | Grey Fantail |
| *Rhipidura leucophrys* | Willie Wagtail |
| *Sericornis frontalis* | White-browed Scrubwren |
| *Sphecotheres vieilloti* | Australasian Figbird |
| **Spilopelia chinensis* | Spotted Dove |
| *Stizoptera bichenovii* | Double-barred Finch |
| *Strepera graculina* | Pied Currawong |
| *Synoicus ypsilophorus* | Brown Quail |
| *Trichoglossus chlorolepidotus* | Scaly-breasted Lorikeet |
| *Trichoglossus haematodus* | Rainbow Lorikeet |
| *Turnix varius* | Painted Button-quail |
| *Tyto alba/novaehollandiae* | Barn owl or Masked owl |
| *Zosterops lateralis* | Silvereye |
| *Carlia pectoralis* | Open-litter Rainbow Skink |
| **REPTILES** | |
| *Carlia schmeltzii* | |
| *Cryptoblepharus pulcher* | Elegant snake-eyed Skink |
| *Ctenotus robustus* | Eastern Striped Skink |
| *Ctenotus taeniolatus* | Copper-tailed Skink |
| *Demansia psammophis* | Yellow-faced Whipsnake |

| SCIENTIFIC NAME | COMMON NAME |
|---|---|
| *Diplodactylus villatus* | Eastern Stone Gecko |
| *Intellagama lesueurii* | Eastern Water Dragon |
| *Morelia spilota* | Carpet Python |
| *Morethia taeniopleura* | Fire-tailed Skink |
| *Pogona barbata* | Eastern Bearded Dragon |
| *Pseudonaja textilis* | Eastern Brown Snake |
| *Tropidonophis mairii* | Keelback |
| **AMPHIBIANS** | |
| *Limnodynastes peronii* | Striped Marsh Frog |
| *Litoria latopalmata* | Broad-palmed Rocket-frog |
| *Platyplectrum ornatum* | Ornate Burrowing Frog |
| **Rhinella marina* | Cane Toad |

Key – V Vulnerable E - Endangered SL – Special Least concern * Pest species

# APPENDIX K – CAMERA TRAP RESULTS

| Site | Field Trip | Station | Lat | Lon | Site description | Species |
|---|---|---|---|---|---|---|
| 1 | 1 | 1_1 | -27.236 | 152.4258 | Western hillside | Brush-tailed Phascogale, Red-necked Wallaby, Common Brushtail Possum |
| 1 | 1 | 1_2 | -27.2372 | 152.4263 | Western hillside | Nil |
| 2 | 1 | 2_1 | -27.245 | 152.432 | Green waste dump | Swamp Wallaby, Common Brushtail Possum, Red Fox |
| 2 | 1 | 2_2 | -27.2443 | 152.4316 | Green waste dump | Northern Brown Bandicoot, Common Brushtail Possum, Laughing Kookaburra |
| 3 | 1 | 3_1 | -27.236 | 152.4246 | Creekside | Black Rat, Australian Brush-turkey |
| 3 | 1 | 3_2 | -27.2351 | 152.4241 | Creekside adjacent to Site 3 | Nil |
| opportunistic | 1 | 4 | -27.2359 | 152.4272 | Glen Rock Saddle Trail | Nil |
| opportunistic | 1 | 5 | -27.2363 | 152.4273 | Glen Rock Saddle Trail | Red-necked Wallaby |
| opportunistic | 1 | 6 | -27.2437 | 152.4328 | Green waste dump | Swamp Wallaby, Black Rat |
| opportunistic | 1 | 7 | -27.234 | 152.4271 | Glen Rock Saddle Trail | Swamp Wallaby, Short-beaked Echidna |
| opportunistic | 1 | 8 | -27.2356 | 152.4246 | Glen Rock Saddle Trail | Australian Brush-turkey |
| opportunistic | 1 | 9 | -27.2333 | 152.4282 | Glen Rock Saddle Trail | **Brush-tailed Rock-wallaby**, Black Rat, Australian Brush-turkey |
| opportunistic | 2 | 10 | -27.2348 | 152.434 | Eastern hillside | Brush-tailed Phascogale, Red Fox, Torresian Crow |
| opportunistic | 2 | 11 | -27.2358 | 152.431 | Eastern hillside | Long-nosed Bandicoot, Brush-tailed Phascogale, Black Rat, Red Fox, Australian Brush-turkey, Grey Shrike-thrush, Pied Currawong |
| opportunistic | 2 | 12 | -27.2387 | 152.435 | Eastern hillside | Swamp Wallaby |

| Site | Field Trip | Station | Lat | Lon | Site description | Species |
|---|---|---|---|---|---|---|
| opportunistic | 2 | 13 | -27.2331 | 152.425 | Eastern hillside | Nil |
| opportunistic | 2 | 14 | -27.2392 | 152.4323 | Eastern hillside | Nil |
| opportunistic | 2 | 15 | -27.2323 | 152.4314 | Eastern hillside | Brush-tailed Phascogale |
| opportunistic | 2 | 16 | -27.2387 | 152.4353 | Eastern hillside | Black Rat |
| opportunistic | 2 | 17 | -27.2366 | 152.4351 | Eastern hillside | **Brush-tailed Rock-wallaby**, Long-nosed Bandicoot, Pale Field Rat |
| opportunistic | 2 | 18 | -27.2324 | 152.4336 | Eastern hillside | Red-necked Wallaby, Brush-tailed Phascogale |
| opportunistic | 2 | 19 | -27.2326 | 152.436 | western hillside | nil |

# APPENDIX L – Notes - Microbat identification

The identification of microbats from their ultrasonic calls includes several uncertainties. Uncertainties pertaining to the data collected during this study include;

- Bats calling at 35kHz could potentially include either or both *Scotorepens orion* or *Scoteanax rueppellii*, the Eastern or Greater broad-nosed bats, respectively. Both species are possible from the site. These have been identified to species where possible however short sequences, poor recording quality (due to bat location or environemtnal conditions) or ambiguous call parameters mean that a significant number of calls recorded at this frequency can not be ascribed to either one of these species, and are thus retained as 35kHz.
- Bats calling at 40kHz could potentially include three species *Scotorepens* sp (Parnaby), Parnaby's broad-nosed bat, *S. greyii* Little broad-nosed bat or *C. nigrogriseus* Hoary wattled bat. It is very likely that *Scotorepens* sp. (Parnaby) occurs at the site (this is one of the most common bats across south-east Queensland), and some calls were identified as *C. nigrogriseus* due to the alternating frequency of pulses within some calls (see reference call below).
- Three of the detected species (*Micronomus norfolkensis*, *Chalinolobus morio*, *Vespadelus pumilus*) were identified from a very small number of low-quality calls which may possibly be unusual calls of more common bats (*M. norfolkensis* could be confused with atypical calls of *C. gouldii, C. morio* could be confused with poor quality calls of *V. troughtoni*, *V. pumilus* could be confused with atypical calls of either *M. australis* or *V. troughtoni*) And thus these identifications from the site should be treated as possible identifications only.
- Three species of Long-eared bats, Nyctophilus sp. Potentially occur in the study area, however these species are not currently distinguishable by their echolocation calls. The three candidate species (*N. bifax*, *N. gouldii*, and *N. geoffroyi)* can only distinguished in the hand. Further harp trapping on the eastern areas of Mt Glen Rock (if suitable sites can be accessed) may resolve the species identification of *Nyctophilus* on the site.

- **Species abundance matrix of microbat species detected during the Mt Glen Rock microbat survey, October 2023**.
- Refer to **Appendix D** for locations of sites. Four letter species codes as follows: **AUAU**, *Austronomus australis*, white-striped free-tailed bat; **CGOR**, either *Chalinolobus gouldlii*, Gould's wattled bat **or** *O. ridei*, Ride's free-tailed bat; **CHGO**, *Chalinolobus gouldlii*, Gould's wattled bat; **CHMO**, *C. morio*, Chocolate wattled bat; **CHNI**, *C. nigrogriseus*, Hoary wattled bat; **MINO**, *Micronomus norfolkensis*, east coast free-tail bat; **MIAU**, *Miniopterus australis*, Little bentwing bat; **MIOC**, *M. orianae oceanensis*, Common bentwing bat; **MYMA**, *Myotis macropus*, Large footed myotis; **NYSP**, *Nyctophilus* sp, long-eared bat species; **OZLU**, *Ozimops lumsdenae*, Northern free-tailed bat; **OZRI**, *O. ridei*, Ride's free-tailed bat; **Q35** either *Scotorepens orion*, *Scotorepens greyii* or *Scoteanax rueppellii*, Eastern, little or greater broad-nosed bats respectively; **Q40**, calls at this frequency may represent *Scotorepens* sp (Parnaby), Parnaby's broad-nosed bat, *S. greyii* Little broad-nosed bat or *C. nigrogriseus* Hoary wattled bat; **RHME**, *Rhinolophus megaphyllus*, eastern horseshoe bat; **SAFL**, *Saccolaimus flaviventrus*, yellow-bellied sheath-tail bat; **SCOR**, Scotorepens orion, eastern broad-nosed bat; **SCRU**, *Scoteanax rueppellii*, greater broad-nosed bat; **VECM**, either *V. troughtoni* or *C. morio*; **VEPU**, *Vespadelus pumilus*, eastern forest bat; **VETR**, *V. troughtoni*, eastern cave bat.
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-

| SITE | AUAU | CGOR | CHGO | CHMO | CHNI | MINO | MIAU | MIOC | MYMA | NYSP | OZLU | OZRI | Q35 | Q40 | RHME | SAFL | SCOR | SCRU | VECM | VEPU | VETR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 34 | 0 | 0 | 0 | 1 | 4 | 0 | 4 | 2 | 20 | 10 | 59 | 1 | 4 | 0 | 0 | 0 | 0 | 1 |
| 2 | 1 | 0 | 235 | 0 | 4 | 0 | 20 | 8 | 0 | 0 | 0 | 101 | 0 | 261 | 2 | 1 | 0 | 0 | 0 | 1 | 4 |
| 3 | 3 | 0 | 292 | 0 | 0 | 4 | 8 | 3 | 0 | 4 | 0 | 37 | 24 | 139 | 0 | 3 | 0 | 0 | 0 | 0 | 6 |
| 4 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 5 | 145 | 10 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0 | 0 | 192 | 9 | 1 | 0 | 9 | 25 | 93 | 0 | 1 | 33 | 21 | 104 | 0 | 2 | 0 | 0 | 0 | 0 | 25 |
| Survey 1 TOTAL | 4 | 0 | 790 | 9 | 5 | 4 | 38 | 40 | 93 | 21 | 8 | 336 | 65 | 563 | 3 | 21 | 0 | 0 | 0 | 1 | 36 |
| 6 | 124 | 725 | 205 | 0 | 9 | 0 | 2 | 2 | 0 | 0 | 5 | 119 | 8 | 21 | 0 | 14 | 18 | 6 | 0 | 0 | 0 |
| 7 | 22 | 35 | 2 | 0 | 4 | 0 | 2 | 0 | 0 | 8 | 3 | 10 | 0 | 19 | 0 | 15 | 1 | 0 | 0 | 0 | 1 |
| 8 | 89 | 110 | 961 | 0 | 7 | 0 | 3 | 28 | 0 | 2 | 0 | 2 | 6 | 3 | 0 | 18 | 39 | 5 | 0 | 0 | 0 |
| 9 | 505 | 492 | 1775 | 26 | 0 | 0 | 27 | 31 | 0 | 2 | 0 | 2 | 69 | 9 | 0 | 118 | 362 | 117 | 33 | 0 | 69 |
| 10 | 139 | 34 | 10 | 1 | 0 | 0 | 15 | 59 | 0 | 6 | 0 | 4 | 0 | 4 | 0 | 13 | 0 | 0 | 0 | 0 | 11 |
| 11 | 468 | 100 | 5 | 0 | 1 | 0 | 87 | 50 | 0 | 20 | 2 | 1 | 1 | 19 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Survey 2 TOTAL | 1347 | 1496 | 2958 | 27 | 21 | 0 | 136 | 188 | 0 | 38 | 10 | 138 | 84 | 81 | 1 | 179 | 420 | 128 | 33 | 0 | 81 |
| **Grand TOTAL** | 1351 | 1496 | 3748 | 36 | 26 | 4 | 174 | 228 | 93 | 59 | 18 | 474 | 149 | 644 | 4 | 200 | 420 | 128 | 33 | 1 | 117 |