Appendix K
Terrestrial ecology technical reports

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BRIEFING NOTE

To: Manager, Environment and Approvals, Queensland Hydro

Email:

From: Principal Ecologist, Umwelt

Date: 5 September 2024

Subject: **Changes to Ground-truthed Vegetation Mapping for the Borumba Pumped Hydro Energy Storage (PHES) Project (V4-V10)**

1.0 Introduction

This briefing note has been prepared by Umwelt on behalf of Queensland Hydro to provide a brief background on the vegetation mapping process in Queensland and the progressive changes that have occurred to the ground-truthed vegetation mapping prepared by Umwelt for the Borumba Pumped Hydro Energy Storage (PHES) Project (the Project) since the submission of the Exploratory Works (EW) Referral (EPBC Act Referral #2023/09461) in March 2023.

2.0 State Vegetation Mapping in Queensland

In Queensland, remnant vegetation is mapped as Regional Ecosystems (REs), which are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Sattler and Williams 1999[1], *Vegetation Management Act 1999*). The Queensland Herbarium is the lead government agency for surveying, mapping and monitoring of the State's vegetation and REs.

The State RE mapping product (i.e., the *Vegetation Management Regional Ecosystem Map)* is based on a combination of field survey data, analysis of aerial photographs and satellite imagery, and assessment of other data such as geology and soil mapping and historical survey plans. This mapping product is prepared for most parts of Queensland at a scale of 1:100,000, with some areas, including parts of South-east Queensland and the Wet Tropics bioregions mapped at finer scales 1:50,000 or 1:25,000. Mapping at a scale of 1:100,000 means the smallest mappable size of an RE polygon is about 4 ha and 100 m for linear features.

[1] Sattler P.S. and Williams R.D. (eds) (1999), The Conservation Status of Queensland Bioregional Ecosystems. Environmental Protection Agency, Brisbane.

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Details of each RE (species composition and land zones) are maintained in the Regional Ecosystem Description Database (REDD) (https://apps.des.qld.gov.au/regional-ecosystems/) as well as additional information available through the RE technical descriptions (https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions) and BioCondition Benchmarks (https://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks).

3.0 Ground-Truthed Vegetation Mapping for the Project

The State RE mapping product (*Vegetation Management Regional Ecosystem Map, Version 13*) was used by Umwelt as an indicative starting point (base layer) for developing the vegetation mapping for the proposed Project boundary.

Prior to starting any ground-truthed vegetation mapping for the Project, a desktop exercise was undertaken to select indicative survey sites for the Project using the *Vegetation Management Regional Ecosystem Map* as a base and incorporating aerial imagery to identify vegetation photo-patterns. The indicative survey sites, which included Quaternary, Secondary, BioCondition and Observation points, were located to provide a representative spread of sites within each mapped RE polygon (i.e. spatial coverage and replication within each polygon) and to capture changes in structure, species composition and condition across the Project boundary.

Field surveys and mapping were then subsequently undertaken in accordance with the Queensland Herbarium's mapping methodology – *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Version 6.0) (Neldner et al. 2022[2]) to confirm the RE types. The indicative survey site locations were adjusted in the field to reflect the on-ground distribution of REs, and additional sites were completed to further capture on-ground conditions. Other factors including accessibility, topography and land access contributed to the placement of sites in the field.

Vegetation mapping within the Project boundary utilised geographic information system (GIS) software QGIS (V3.34.3) at a scale of 1:10,000. The vegetation communities were classified into REs using the Quaternary, Secondary, BioCondition and Observation points that were overlain on aerial imagery. The RE polygon boundaries were delineated through interpolation of the field survey points (flora sites and boundary points), and interpretation of photo patterns on the aerial imagery. Supporting datasets including topographic contours (2-m lidar derived contours), detailed surface geology mapping, and the State's RE pre-clearance mapping product (*Biocondition status of pre-clearance regional ecosystems – Queensland V13.1*) were also used to aid in defining boundaries and assigning REs.

As field surveys progressed, the vegetation mapping was updated and revised. At each iteration of this mapping, data and coverage gaps were reviewed spatially to inform site selection for each subsequent survey.

[2] Neldner et al. (2022), Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 6.0. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

4.0 Changes to the Ground-Truthed Vegetation Mapping

Since the EW referral was completed in March 2023, the vegetation mapping has been refined by Umwelt and has undergone multiple mapping revisions. The mapping product submitted as part of the initial EW referral used Umwelt's V4 of the mapping. Since that time, the mapping has undergone various iterations, and is now at V10, the timing with which each version of Umwelt's mapping was provided to Queensland Hydro is provided in **Table 1**.

Table 1 Vegetation mapping versions and date supplied to Queensland Hydro

Mapping version	Date supplied to Queensland Hydro
V4	January 2023
V5	February 2023
V6	October 2023
V8	April 2024
V9	June 2024
V10	August 2024

The changes to the vegetation mapping across this time cover two main changes, which are described below.

Changes to RE Boundaries, Type or Status

Changes to RE boundaries, type and status (e.g. remnant or regrowth) have occurred at each iteration of the vegetation mapping in response to additional data inputs provided by Queensland Hydro as the Project has progressed. These data inputs include:

- High-resolution aerial imagery for the Project was provided by Queensland Hydro, which allowed the refinement of RE boundaries and better interpretation of aerial photo-patterns, particularly for rainforest patches.
- Data from the various field surveys undertaken across the last two years of the Project have been incorporated into the vegetation mapping which has allowed better spatial resolution of RE extents and boundaries. Details of field surveys undertaken across the Project are provided in **Table 2** and illustrated on **Figure 1.**
- The vegetation mapping has been peer reviewed by other ecologists working on the Project, including SMEC and Attexo, who are familiar with the site and are also undertaking ecology fieldwork for other components of the Project. Based on discussions and additional field data from those ecologists, this has led to refinements and changes in RE boundaries, type and status of some polygons.
- Some RE determinations can be difficult, especially when the species composition of the REs are similar (e.g. RE 12.12.15 and 12.12.23) or where the REDD descriptions lack detail or limited technical descriptions are available (not all REs have published technical descriptions). In these cases, discussions with the Queensland Herbarium have led to clarification on REs and in some cases, changes to the field-determined REs.

Iterative changes to the RE boundaries, type and status across V4 through to V10 of the ground-truthed vegetation mapping are shown on **Figure 2** to **Figure 5.**

Table 2 Field Surveys undertaken to inform the ground-truthed vegetation mapping

Field Survey Details	Survey Length	Timing	Broad Location
Flora surveys comprising of vegetation community (RE) and Threatened Ecological Community (TEC) identification, classification and mapping based on Quaternary, Secondary and BioCondition plots	5 days	29 May – 2 June 2022	Lower reservoir
	3 days	21 – 22 June, 18 July 2022	Upper reservoir
	5 days	7 – 11 November 2022	Upper and lower reservoir
	4 days	5 – 8 December 2022	Lower reservoir
	4 days	18 – 20, 24 January 2023	Upper and lower reservoir
	3 days	19 – 21 July 2023	Upper and lower reservoir
	3 days	21 – 23 November 2023	Lower reservoir
	4 days	11 – 14 December 2023	Upper reservoir
	10 days	5 – 9, 12-16 February 2024	Lower reservoir
	1 day	1 March 2024	Lower reservoir
	3 days	12 – 14 March 2024	Upper reservoir
	2 days	20 – 21 June 2024	Lower reservoir

Changes to Extent of Mapping Area

The V4 mapping was based on a survey area comprising the proposed upper and lower reservoir's Full Supply Level (FSL) footprint, a 2 km downstream area from the Borumba Dam Wall, and the EW footprint. This mapping extent has increased as the exploratory works footprint was changed or amended as the EW project details were refined. The mapping boundary was further increased to cover the proposed footprint for the Project. The mapping boundary changes are shown across **Figures 2** to **5**.

5.0 Changes to Threatened Ecological Community Boundaries and Status

As with the ground-truthed vegetation mapping, the TEC boundaries and status have been refined and updated with each iteration of the mapping, both in response to the inputs described in **Section 4.0** and based on progressive assessment against the key diagnostic criteria and condition thresholds specified within the conservation and listing advice of the associated TECs . It should be noted that as the extent of TECs mapped is restricted to the vegetation mapping boundary (See V10 boundary on Figure 1), if a TEC patch extends beyond this boundary, it has not been ground-truthed or mapped.

Two TECs have been confirmed within the Project boundary, these being:

- Lowland Rainforest of Subtropical Australia TEC
- Subtropical Eucalyptus Floodplain Forest TEC.

The Lowland Rainforest of Subtropical Australia TEC within the Project Boundary is associated with REs 12.11.10, 12.12.16 and 12.3.1, and the Subtropical Eucalyptus Floodplain TEC is associated with REs 12.3.7 and 12.3.11.

Prior to assessment against the key diagnostic criteria and condition thresholds specified within the conservation and listing advice of these TECs, all associated REs were considered as potentially being the TEC and annotated with 'not verified' within the vegetation mapping attributes. As these patches were progressively assessed and field verified, the status was updated to either 'Verified' or 'Not TEC' within the vegetation mapping attributes and the boundaries altered in response to the key diagnostic criteria. As an example, much of RE 12.3.7, which is an RE associated with the Subtropical Eucalypt Floodplain Forest TEC, has not been identified as meeting the key diagnostic criteria of this community due to the absence of a canopy dominated by one or a combination of *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon* and/or *Syncarpia* trees species. Much of 12.3.7 is dominated by *Casuarina cunninghamiana* and *Melaleuca* spp., and as such, only the portions of this RE that are dominated by *Eucalyptus* and *Corymbia* spp. have been delineated and further assessed against the remaining diagnostic criteria and condition thresholds.

Figure 6 illustrates an example of the changes that have occurred to the TEC boundaries and status (i.e. Verified TEC vs. Not TEC) as the project evolved, the sampling effort increased, and changes to RE and TEC boundaries were captured based on updated field data. The example area shown on **Figure 6** is downstream of the current Borumba dam wall, and includes REs that are associated with both TECs, and which has been a focus area of the EW referral.

Changes to TEC Condition Status

Two patches of vegetation initially classified as the Subtropical Eucalyptus Floodplain TEC (SEFFW_003 and SEFFW_004, **Figure 6**), have changed status from 'Verified TEC' in the V4 and V5 mapping, to 'Not TEC' in the V10 mapping. Both patches were initially assigned to the lowest condition class for this TEC, namely 'C2', based on the field data collected at that time. Additional sample sites were subsequently completed within these patches which captured the variation across the patch. The additional field data reduced the overall condition quality of the patch, and they were re-assessed as not meeting the lowest condition class 'C2' for the TEC. The data associated with these two patches is provided in **Table 3.**

Table 3 SEFFW 003 and SEFFW 004 TEC Assessment

TEC_ID	Patch type	Site	Trees / ha		Ground cover species richness	Understorey cover		Proportion (%) of native understorey cover	Condition class
			Large	Very large		Native	Exotic		
SEFFW_003	Small contiguous (1.1 ha, but within larger patch)	S19	14	**18**	**4**	5	85	6	**C2**
		B20	14	6	1	5	75	6	Not TEC
		003_01	6	**12**	**5**	5	120	4	**C2**
		003_02	6	**12**	3	5	120	4	Not TEC
		Average:	**10**	**12**	**3.3**	**5**	**100**	**5**	**Not TEC**
SEFFW_004	Small contiguous (1.7 ha, but within larger patch)	S23	18	**16**	1	16.2	50	24.5	Not TEC
		B17	6	-	4	9.5	75	11.2	Not TEC
		004_001	14	**8**	**5**	10	70	12.5	**C2**
		004_002	14	**8**	2	10	70	12.5	Not TEC
		Average:	**13**	**11**	**3**	**11.4**	**66.3**	**15.2**	**Not TEC**
Required values to meet Moderate Condition 'Class C2'	Large patch (≥ 2 ha) or Small contiguous patch (≥ 0.5 ha, within larger patch of native vegetation (≥ 5 ha)		-	**≥6***	**≥4***	-	-	**≥30%***	**C2**

**For a patch to meet the Moderate Condition 'Class C2', the patch must meet the "Ground cover species richness" condition, and at least one of the values for "Very large trees/ha" and "Proportion (%) of native understorey cover".*

6.0 Conclusions

As the project progresses and with additional field surveys, the ground-truthed vegetation mapping for the Project will be further refined, including verification of additional patches of the TECs, increases or changes in the Project Boundary, and increased spatial coverage and/or detail of field data.

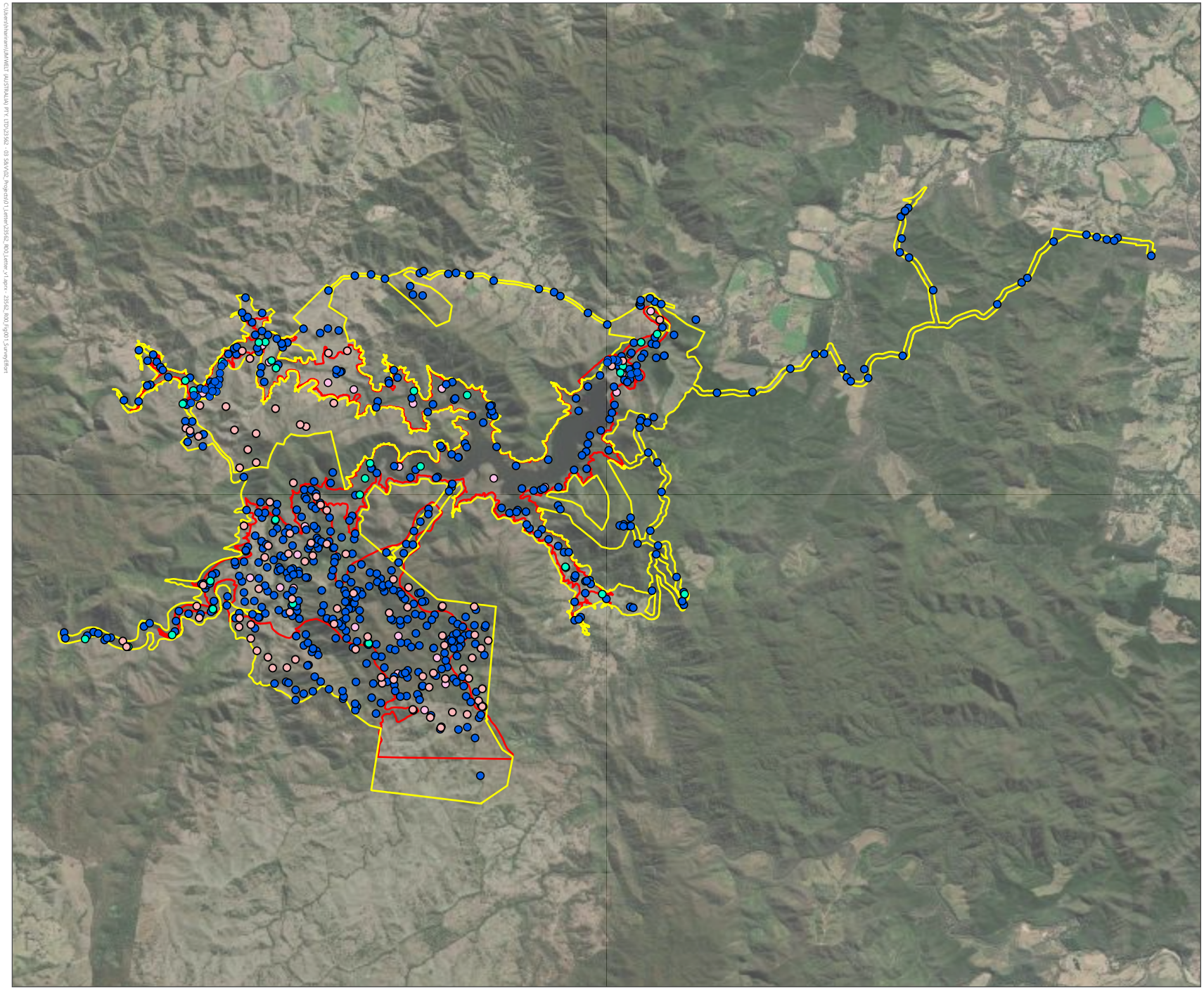


FIGURE 1
Survey Effort

Legend

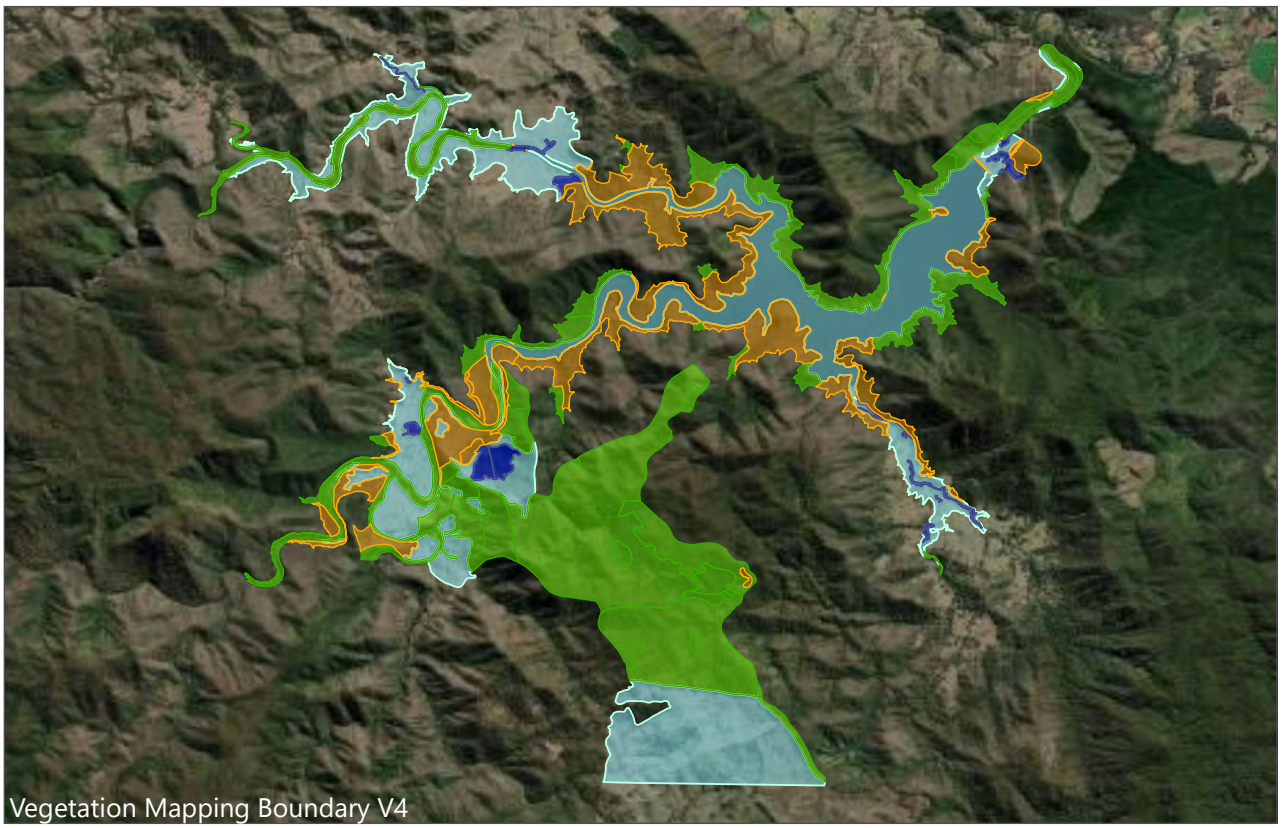
- Secondary Survey
- Quaternary Survey
- Biocondition Survey
- Habitat Quality Assessment Survey (Attexo)
- GTRE Mapping Boundary V10
- GTRE Mapping Boundary V4

0 2 4

Kilometres

Scale: 1:0 at A4
GDA2020

Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)



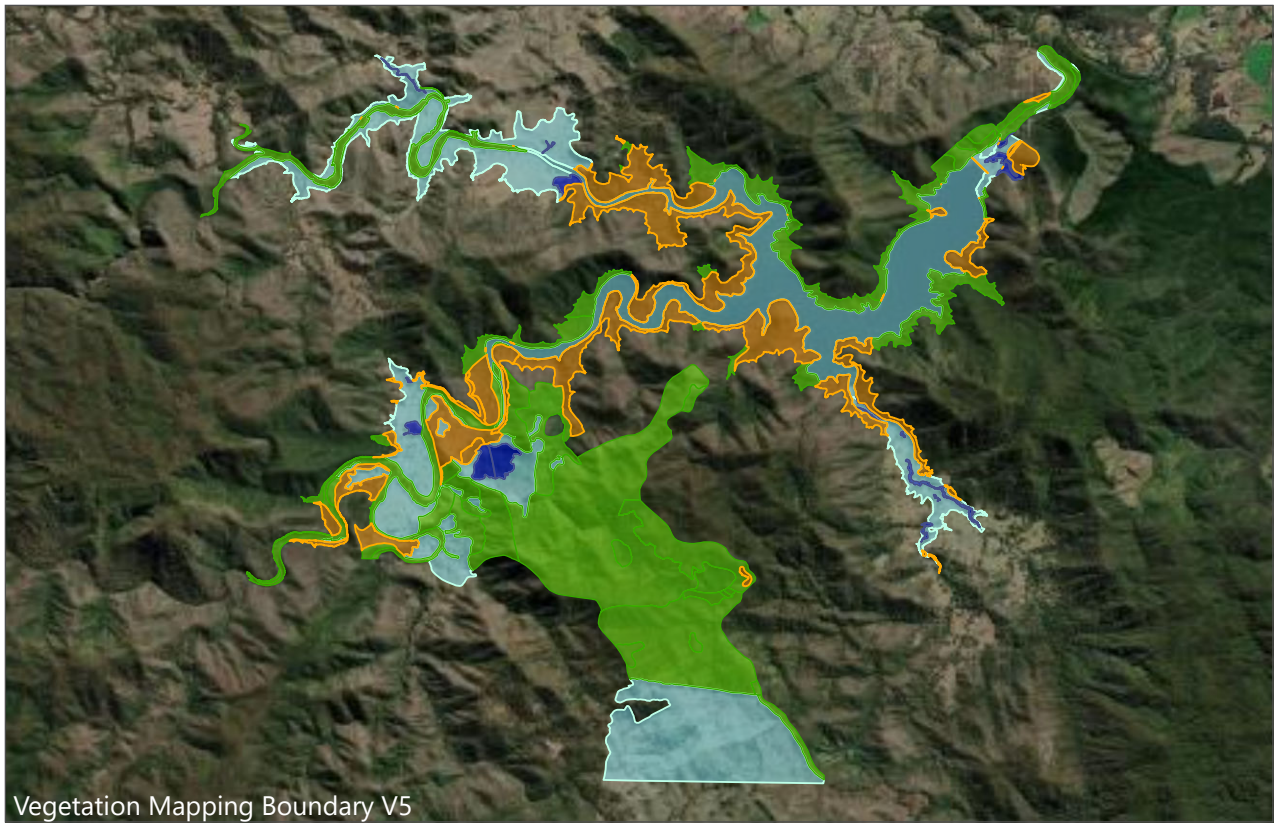


FIGURE 2

RE and Boundary Changes - Version 4 and Version 5

Legend

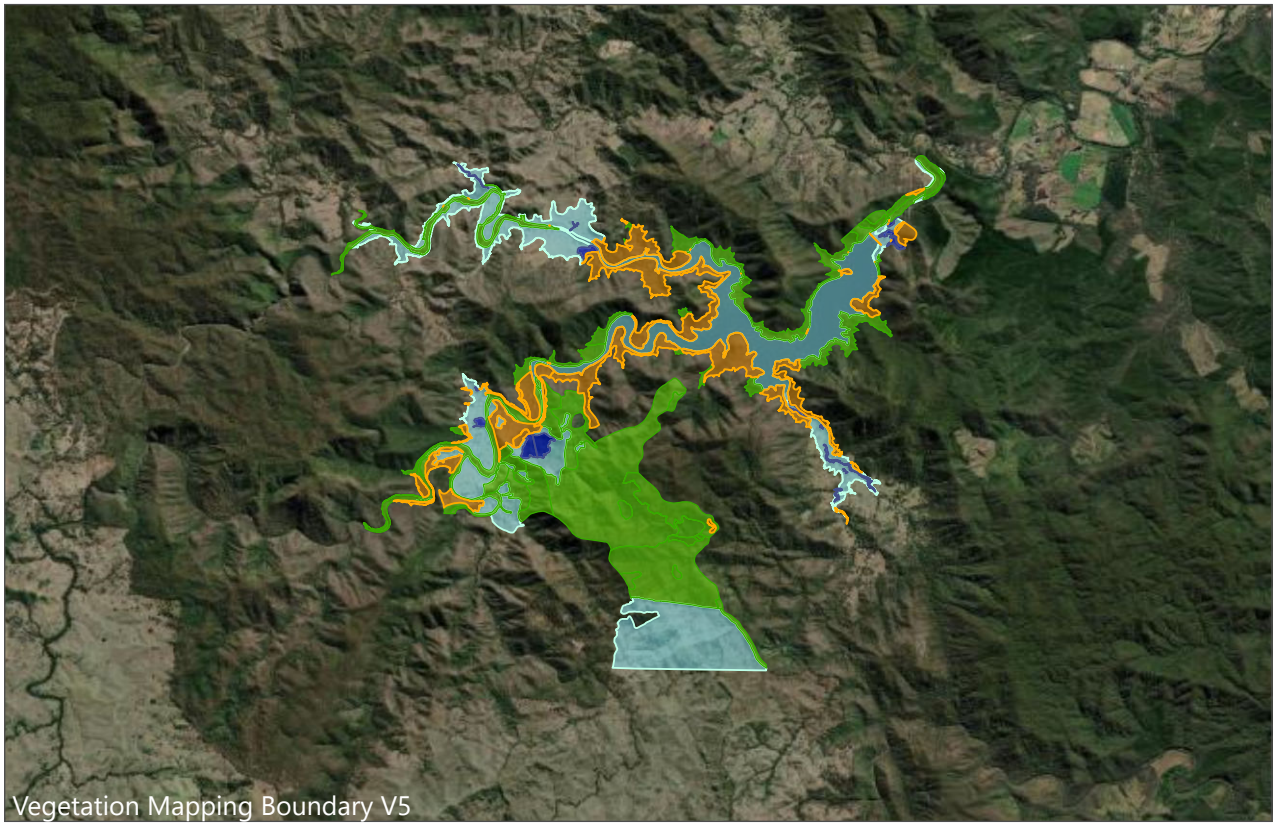
- Non-remnant
- Regrowth
- Remnant - Least Concern
- Remnant - Of Concern

0 2 4

Kilometres

Scale 1:104,173 at A4
GDA2020

Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)



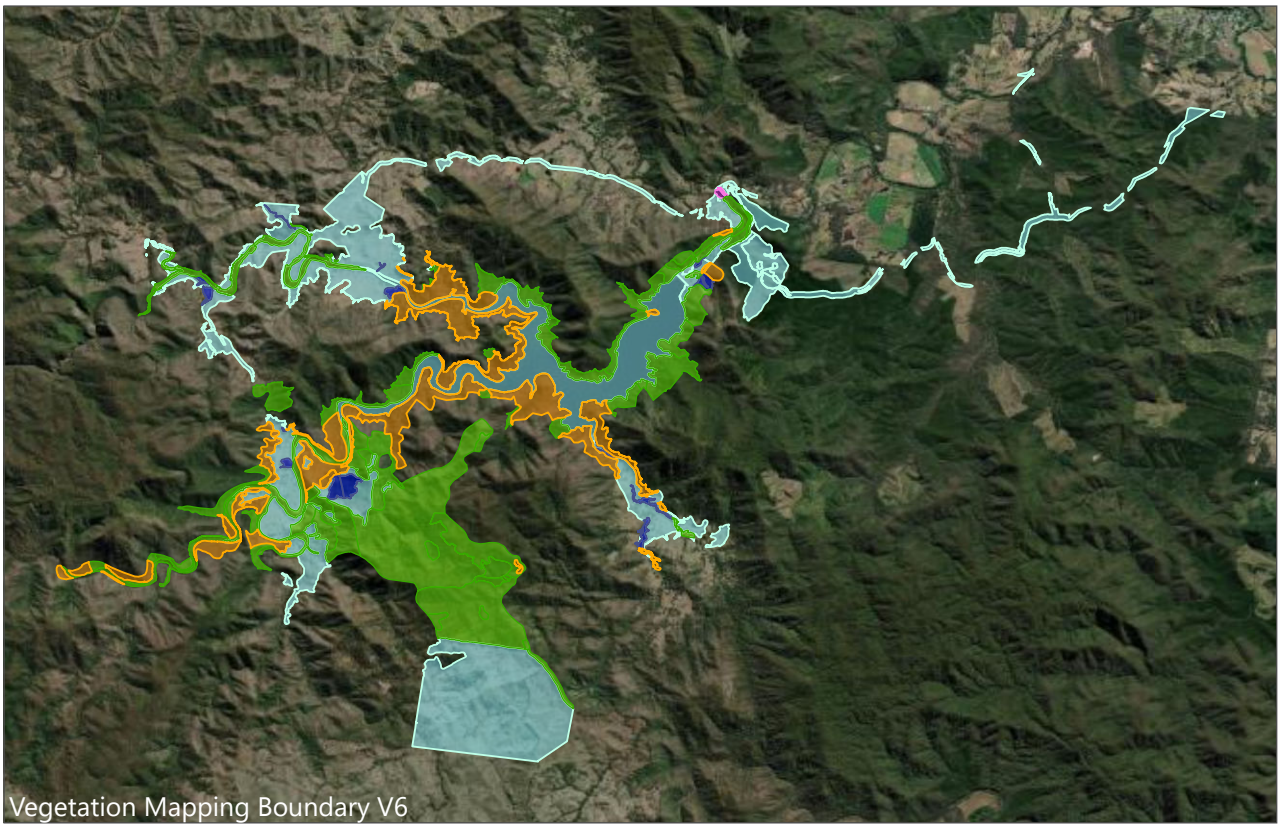


FIGURE 3

RE and Boundary Changes - Version 5 and Version 6

Legend

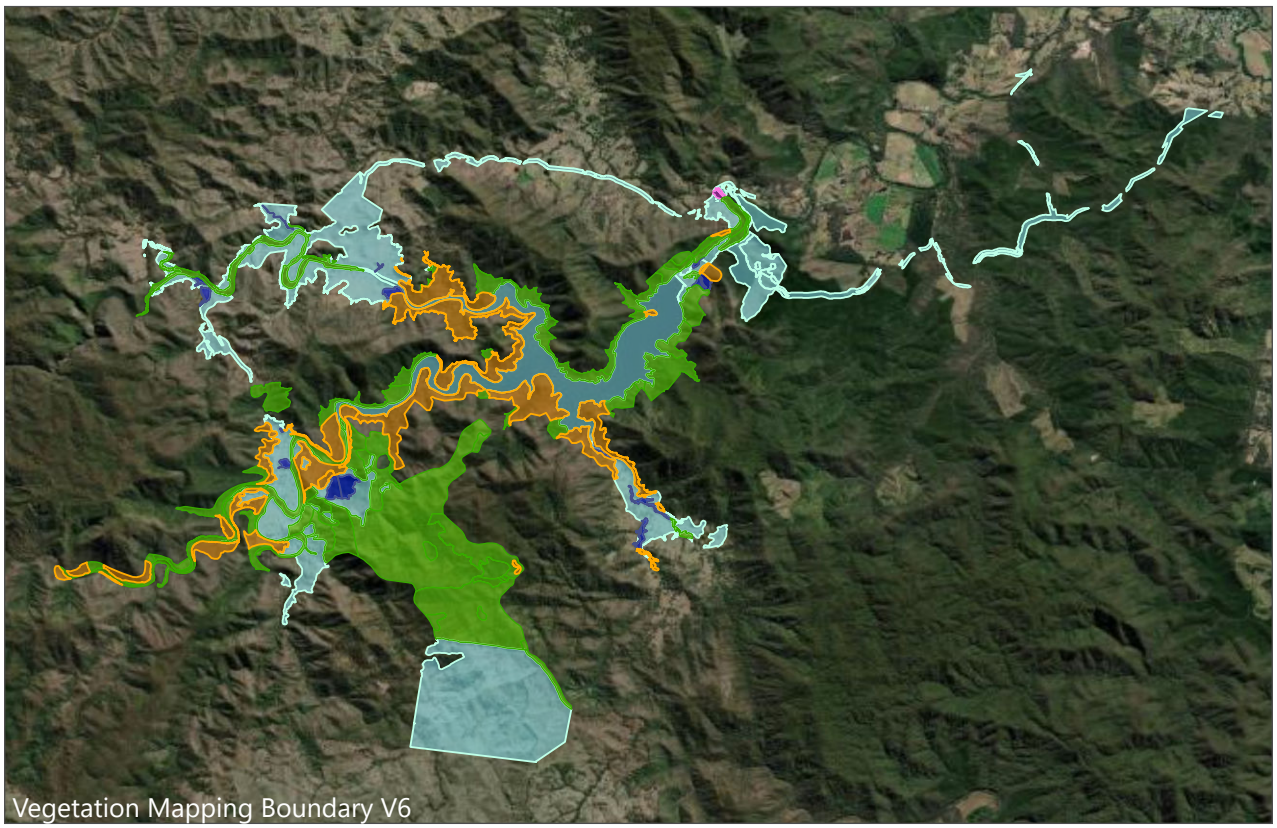
- Non-remnant
- Regrowth
- Remnant - Endangered
- Remnant - Least Concern
- Remnant - Of Concern

0 2 4

Kilometres

Scale 1:150,000 at A4
GDA2020

Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)



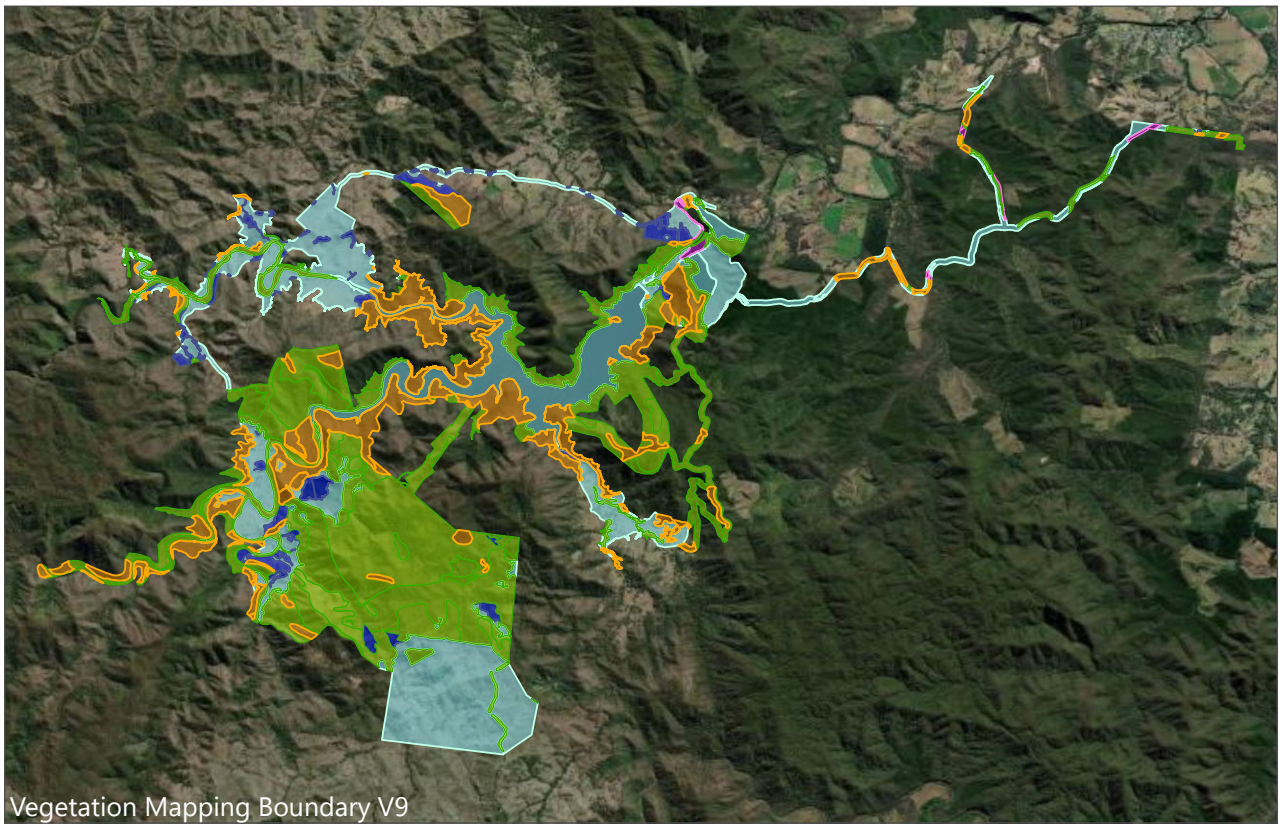


FIGURE 4

RE and Boundary Changes - Version 6 and Version 9

Legend

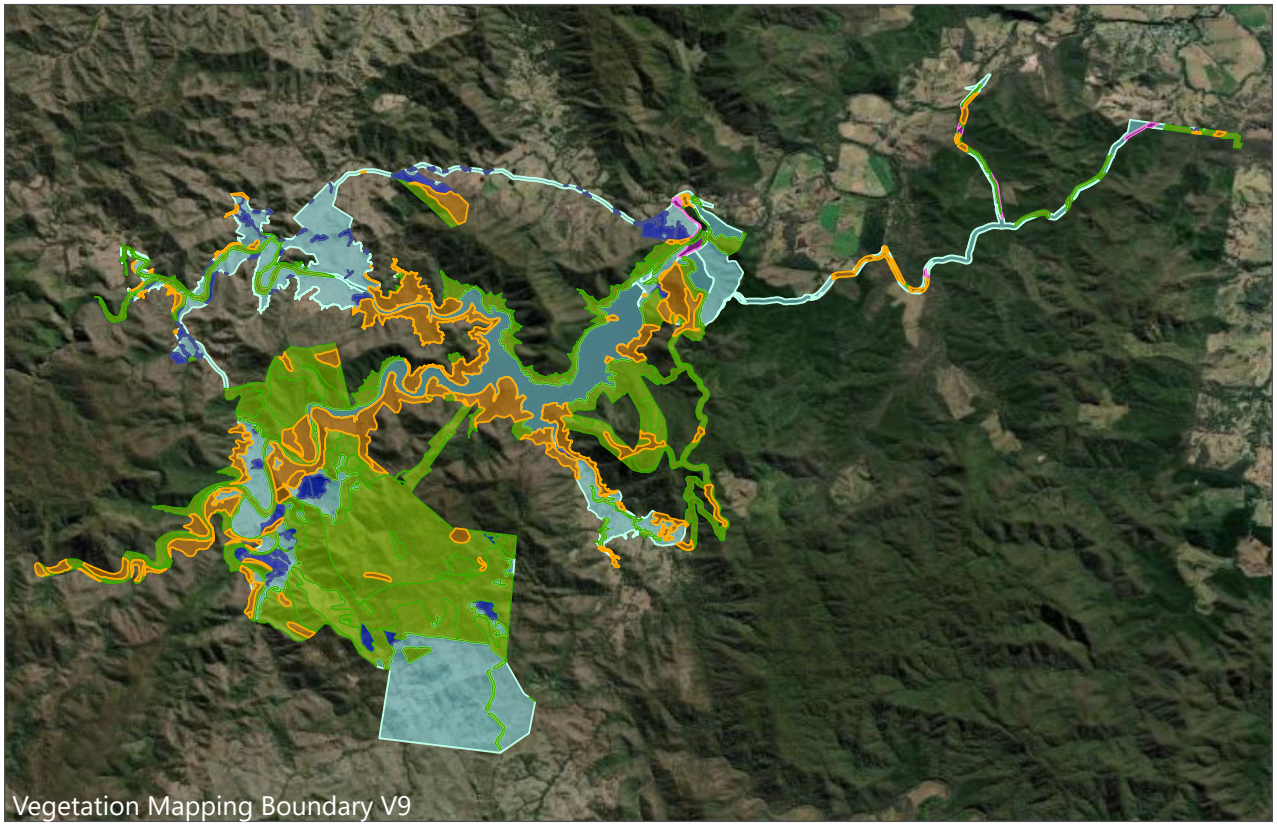
- Non-remnant
- Regrowth
- Remnant - Endangered
- Remnant - Least Concern
- Remnant - Of Concern

0 2 4

Kilometres

Scale 1:155,000 at A4
GDA2020

Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)



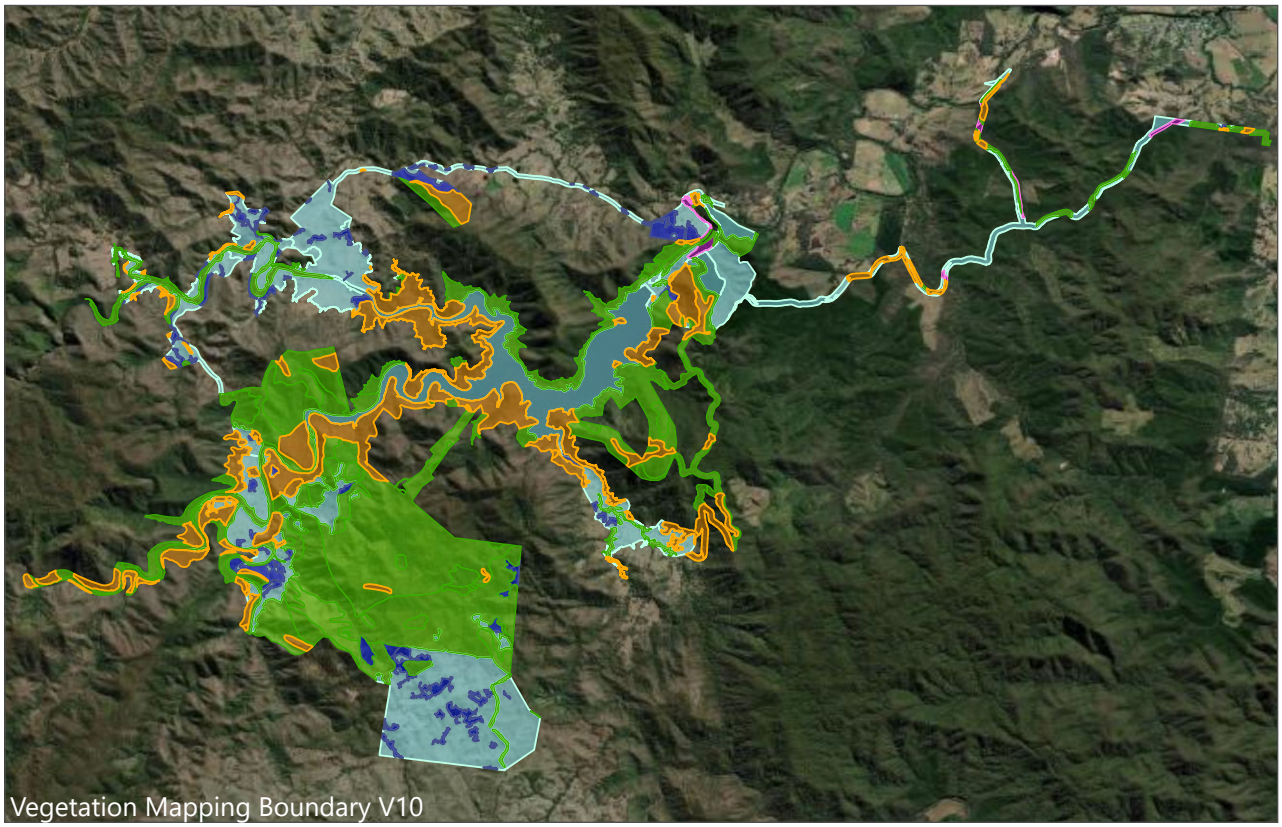


FIGURE 5

RE and Boundary Changes - Version 9 and Version 10

Legend

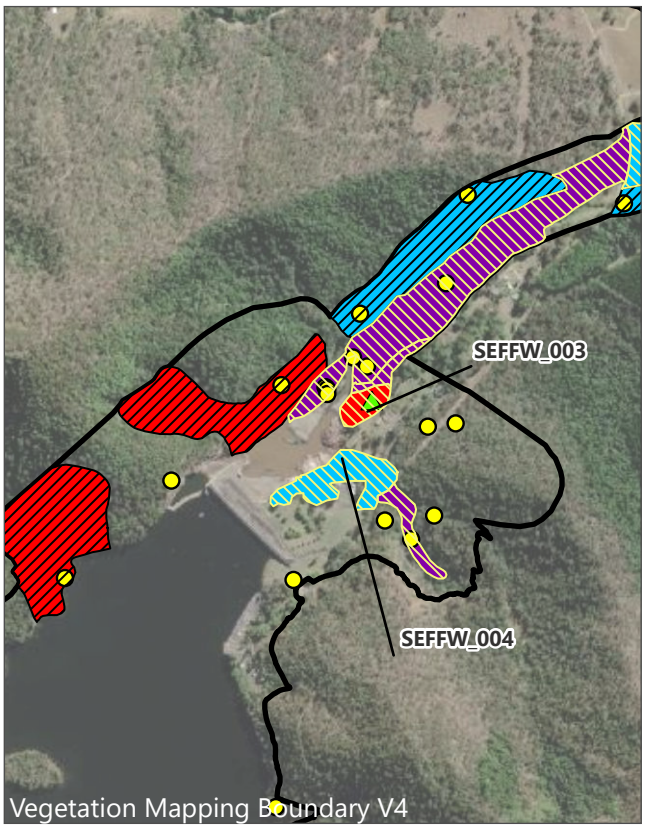
- Non-remnant
- Regrowth
- Remnant - Endangered
- Remnant - Least Concern
- Remnant - Of Concern

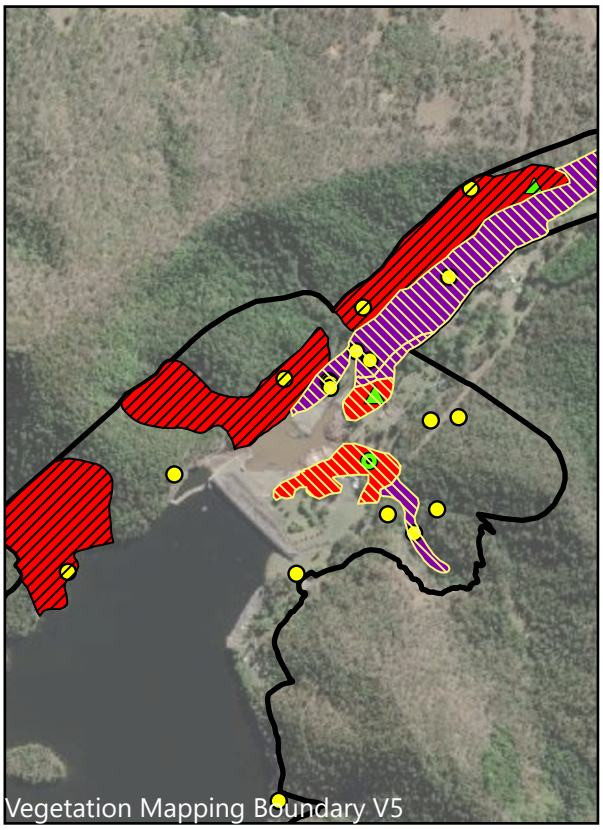
0 2 4

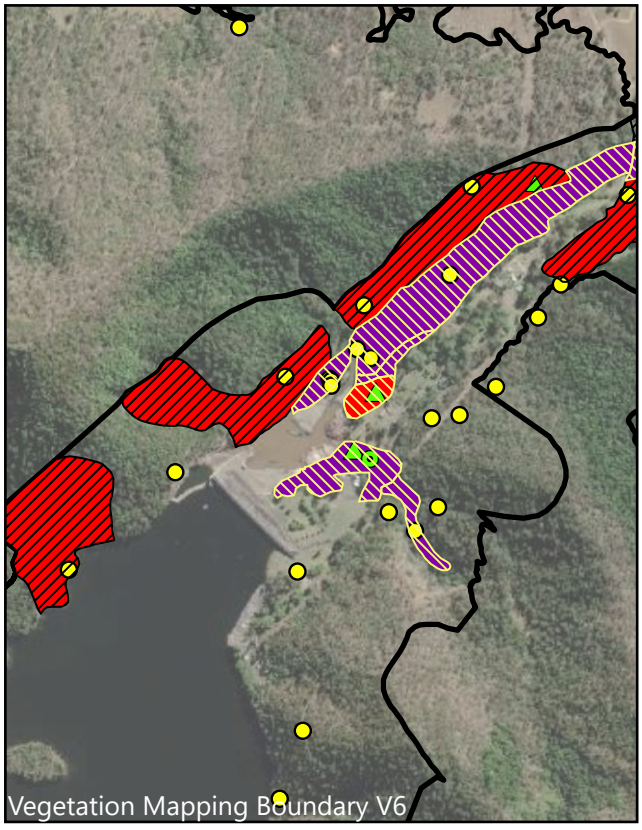
Kilometres

Scale 1:150,000 at A4
GDA2020

Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)







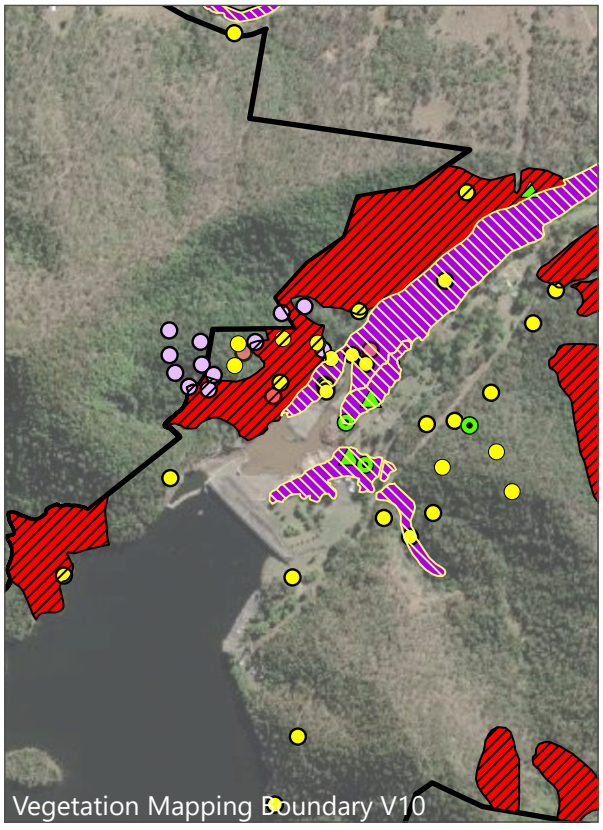


FIGURE 6

TEC Mapping

Legend

- Biocondition Survey
- Quaternary Survey
- Secondary Survey
- Quaternary assessments (Attexo)
- Habitat Quality Assessment Survey (Attexo)
- GTRE Mapping Boundary

TEC Verification

- Not TEC
- Not verified
- Verified

TEC

- Lowland Rainforest of Subtropical Australia
- Subtropical eucalypt floodplain forest and woodland

0 250 500

Metres

Scale 1:19,500 at A4
GDA2020

Image Source: ESRI Basemap (2023) | **Data Source:** NSW DFSI (2023)

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Quality outcomes

Powerlink QUEENSLAND

BORUMBA PUMPED HYDRO PROJECT

Terrestrial Ecology Technical Report

FINAL

November 2022

BORUMBA PUMPED HYDRO PROJECT

Terrestrial Ecology Technical Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Powerlink Queensland

Project Director: David Gatfield
Project Manager: Gillian Turner
Report No. 22257/R02
Date: November 2022

Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	David Gatfield	19 August 2022	David Gatfield	19 August 2022
V2	David Gatfield	2 November 2022	David Gatfield	2 November 2022

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Tables

Appendices

1.0 Introduction

Umwelt (Australia) Pty Ltd (Umwelt) was commissioned by Queensland Electricity Transmission Corporation Limited (Powerlink) to undertake an assessment of terrestrial ecology values, including field surveys, for the Borumba Pumped Hydro Project (BPHP, the Project). This report presents the findings of a desktop assessment and field work conducted between May–July 2022. Further field work is scheduled for September / October 2022, after which this report will be updated.

The purpose of this terrestrial ecology report is to describe the existing ecological values of the Study Area (defined in **Section 1.3**) to satisfy the 'Terrestrial Flora and Fauna' section of the environmental component of the detailed analytical report (DAR) for the Project. This terrestrial ecology assessment also provides a preliminary analysis of potential impacts and biodiversity offset requirements and will contribute to the suite of baseline studies for a potential future statutory environmental impact statement (EIS).

1.1 Project Description

In June 2021, Powerlink Queensland (PQ) was engaged by the Queensland Government to prepare a DAR and front-end engineering design (FEED) for the BPHP proposed to be based at the existing Lake Borumba. The primary objective of the BPHP is to provide long duration, high-capacity dispatchable energy to the Queensland grid which can be used to increase system stability and reliability of supply.

In September 2022, the Project was transferred from PQ to Queensland Hydro (QH). Queensland Hydro is responsible for the design, delivery, operation and maintenance of Queensland's long duration pumped hydro energy storage assets.

The purpose of the DAR is to assess the commercial, technical, and environmental feasibility of the Project to a standard consistent with the Queensland Government Business Case Development Framework (2021). The DAR will be completed in early-2023 and will be provided to the Queensland Government for review.

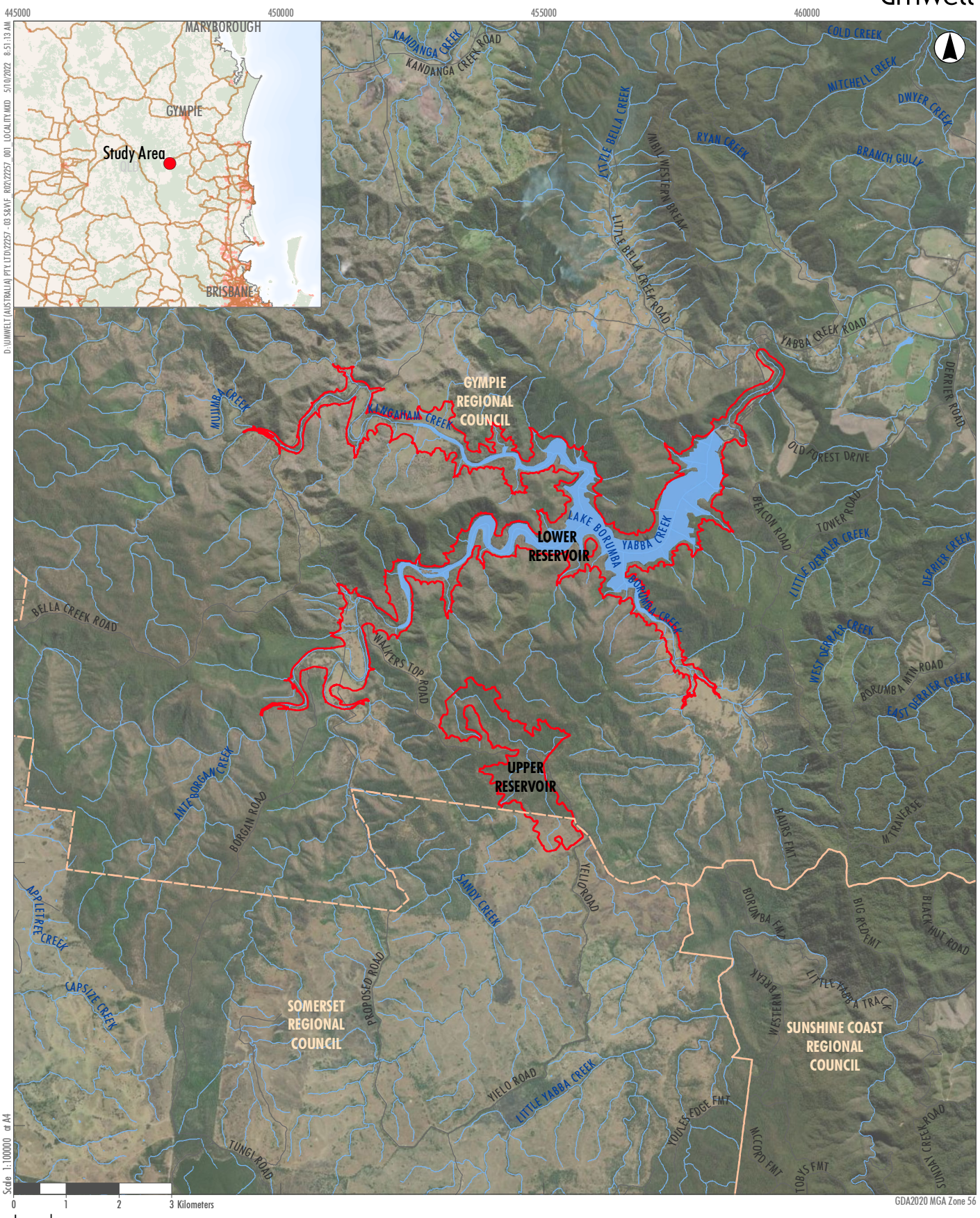
A number of technical reports will provide input to the DAR.

The Project proposal assessed in the technical reports is based on a preliminary Reference Design which will be further developed as part of the DAR/FEED process. As such, the assessments are preliminary and will be updated when further information becomes available.

The Project is located within the Gympie and Somerset Regional Council local government areas, some 13 km southwest of Imbil, 48 km south west of Gympie, and 180 km north west of Brisbane (**Figure 1.1**).

Built across Yabba Creek, the existing Borumba Dam was constructed in 1963, and was upgraded to increase flood storage in 1997. It forms Lake Borumba and is owned and operated by Seqwater. Stored water is currently used within the Mary Valley Water Supply Scheme for drinking water and for irrigation purposes. Lake Borumba is a popular recreation area including for camping, fishing and water sports (including power boating).

Borumba Dam is at 31.1 km AMTD (Adopted Middle Thread Distance) on Yabba Creek and Yabba Creek joins Mary River 226.7 km AMTD from the mouth of the river (and 167.4 km upstream of the tidal barrage).



Legend

- Study Area
- Local Government Area
- Reservoirs
- Roads
- Watercourse

FIGURE 1.1

Study Area

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

The key components of the current design for BPHP comprise:

- New Borumba Dam and (lower) reservoir (Lake Borumba):
    - Raising the full supply level of Lake Borumba through the construction of a new dam wall immediately downstream of the existing dam wall
    - Partial demolition of existing Borumba Dam
    - Installation of fish and turtle passage and transfer devices.
- New upper dams and reservoir:
    - Installation of a main dam wall, saddle dam and minor saddle dams to form an upper reservoir.
- Underground works to support power generation:
    - Water transfer (headrace and tailrace) tunnels (from 260 m to 2,400 m long) to transfer water between the upper and lower reservoirs (each comprising of 2 x 10.5 m internal diameter tunnels)
    - Underground power station and pump turbines
    - Access to the surface would be via a 1,520 m long, 10.4 m wide main access tunnel (MAT), and a 1,480 m long, 8.5 m wide emergency, cable and ventilation tunnel (ECVT). The portals would be located near the switchyard.
- Electrical switchyard (approximately 5 ha in area).
- Transmission lines: two sets of transmission lines to connect the switchyard to substations at Tarong and Woolooga substations (being assessed separately by PQ).
- Ancillary infrastructure (both temporary and permanent) including quarry sites and other resource extraction areas, access roads and bridges, maintenance buildings, construction camps with associated water and wastewater treatment plants, spoil dumps and laydown areas.

Key elements of the dams and the associated reservoirs are identified in Table 1, along with a comparison with the existing Borumba Dam and Lake Borumba. It should be noted that the design is still under development, and some features may be subject to change based on development of the FEED.

Table 1.1 Key Statistics of Existing and Proposed Water Storage Infrastructure

	Existing Borumba Dam and Lake Borumba	New Borumba Dam and Lower Reservoir	New Upper Dams and Reservoir
Full Supply Level (m AHD)	135	155	492
Dam wall height (m)	43	69.2	102 (main dam)
Max depth at FSL (m)	30	50	96
Surface area at FSL (ha)	482	1,241	308
Capacity at FSL (GL)	46.1	260	73.1

The new Borumba Dam would be constructed approximately 300 m downstream from the present dam. The existing Borumba Dam is to remain in place but requires partial demolition after the construction of the new dam to allow greater water flow downstream.

The new Borumba Dam would be ungated with a crest level (set at a height yet to be fixed) above FSL to provide a level of flood surcharge across the spillway. Specifications for dam outlet works are still under development, however these would incorporate sufficient capacity to provide for water delivery, environmental flows and emergency drawdown. A multi-level offtake would be used and would replace the current single level offtake. The dam would also allow for safe fish and turtle passage and transfer which the current dam does not. An assessment is underway to determine the most suitable transfer and passage devices.

The new upper reservoir would be constructed on an un-named tributary which enters Lake Borumba. The storage would require a number of saddle dams in addition to the main dam. The main dam would be designed to only overtop in the event of accidental overfilling during water transfer from the lower storage. It is not planned to have outlet works or fish transfer devices. Its sole purpose would be to support the generation of electricity. As such it would not be accessible to the public.

The water transfer intake structures would be located below the waterline of the upper and lower reservoirs at a sufficient depth to avoid air entrainment and vortex formation. The intakes would be screened by trash racks, and diffuser sections would be provided to avoid high jet velocities and minimise the entrainment of fauna and sediment.

The scheme would operate in two cycles:

- A **generation cycle** during which water is released from the upper reservoir to the lower reservoir, thereby generating electricity by powering the turbines in the underground power station cavern.
- A **pumping cycle** during which the turbines would be used on a reverse cycle to pump water from the lower reservoir to the upper reservoir to replenish storage.

The process uses little water as it is essentially a recirculating system.

The upper storage is generally kept full so that it can quickly enter the generation cycle on demand. The length of each cycle would be determined by the electricity demand at the time, but the system would have the capacity to generate for up to 24 hours and produce 2000 megawatts (MW) of electricity.

The water level in the upper storage could vary by up to 47 m in a single operational cycle. The water level variation within Lake Borumba would be significantly less because of its much larger volume but could be many metres in a single cycle and would vary with the level of water in storage.

Raising Borumba Dam will meet the necessary flood capacity handling requirements, which it currently does not.

The lower reservoir will retain its current water supply and environmental flow capabilities. Integrated management would be required to balance demand for hydropower generation with downstream water demand and environmental flows.

Despite the changes to operability of Lake Borumba, the Project is being designed with the intent of maintaining existing recreational values.

The Project would take several years to construct and would employ a large on-site workforce. Detailed estimates will be developed as planning progresses.

1.2 Study Area

For the purposes of this report and as defined by Powerlink in the Terrestrial Ecology Services Brief (30032677-ENV-SOW-006 Rev A) the Study Area is based on:

- an upper reservoir with a FSL of 492 m AHD
- a lower reservoir (Lake Borumba) with a FSL of 155 m AHD
- a 2 km downstream component from the Borumba Dam wall, including the riparian zone, up to 50 m from the high bank.

The Study Area encompasses 1,588.9 ha and is depicted in **Figure 1.1.**

1.3 Scope of Works

The aims of this terrestrial ecology assessment are to describe the existing ecological values of the Study Area and to provide a preliminary analysis of potential impacts and offset requirements associated with the Project. In accomplishing this aim, the following scope of works was completed:

- Undertake desktop analysis and compilation of existing relevant terrestrial ecology data (including flora and both vertebrate and invertebrate fauna) from publicly available sources and previous studies.
- Characterise, via field survey, terrestrial ecological values within the Study area, including species diversity (native, introduced, threatened and migratory species), vegetation communities and habitat types, employing standard survey techniques in accordance with the relevant survey guidelines, namely:
    - *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre *et al.*, 2018)
    - *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland Assessment Manual* (Eyre *et al.*, 2015)
    - *Methodology for the Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner *et al.*, 2022)
    - Relevant Commonwealth survey guidelines.
- Preparation of preliminary impact assessment and offset analyses as they relate to terrestrial ecology.

For the purposes of this assessment, aquatic ecological values are excluded and captured as part of a separate technical study undertaken by Hydrobiology Pty Ltd (Hydrobiology).

2.0 Methodology

2.1 Desktop Assessment

A desktop assessment was undertaken to identify terrestrial ecological values that occur, or may occur, within the Study Area. The assessment specifically targeted Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES). The sources that were interpreted to complete the desktop assessment are identified in **Table 2.1**. The outcomes of the desktop assessment were used to guide field survey efforts (**Section 2.2**) and inform the likelihood of occurrence assessment (**Section 2.3**).

Table 2.1 Desktop Assessment Sources

Source	Comment on Suitability and Reliability
Department of Climate Change, Energy, the Environment and Water (DCCEEW) (2022a) Protected Matters Search Tool (PMST) (10 km buffer around Study Area boundary)	The tool generates a list of matters protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that may occur in or near a selected area. The presence of communities or species within PMST reports does not equate to confirmed records within the search area. PMST reports are not intended to be exhaustive as mapped data is not available for all species or ecological communities.
DCCEEW (2022b) Species Profile and Threats (SPRAT) database	The SPRAT database is designed to provide information from a range of sources and contributors about species and ecological communities listed under the EPBC Act. Information contained within the profiles include population and distribution, habitat, movements, feeding, reproduction and taxonomic comments. Profiles are not available for all species and ecological communities. While updated fairly regularly, the information contained in these profiles may not be the most current.
Department of Environment and Science (DES) (2022) WildNet database (15 km buffer around coordinates central to the Study Area, equating to 10 km buffer around Study Area boundary)	The tool generates a species lists from the WildNet database for a given area. WildNet contains information on more than 21,000 species collated from a range of sources including government agencies, researchers, business, natural resource management bodies and citizen science programs. Data is continuously being collated and evaluated, so the absence of species on a list does not mean it does not occur within the search extent. Further, the database contains collection data from the 1700s, so the presence of a species on a list does not mean it still inhabits the area.
Department of Resources (DoR) (2022a) Vegetation Management Report including • Regulated Vegetation Management Map • Vegetation Management Supporting Map including essential habitat mapping • Protected Plants Flora Survey Trigger Map • Koala priority area and koala habitat area map	Vegetation Management Reports are generated using lot on plan and show vegetation categories needed to determine the relevant assessment category under the *Vegetation Management Act 1999*. The supporting map provides information on regional ecosystems, wetlands, watercourses and essential habitat. Maps are generally updated monthly to show new property maps of assessable vegetation. The positional accuracy of data are largely reliant on the accuracy of regional ecosystem data, which being mapped at a scale of 1:100,000 is 100 metres. Essential habitat is compiled from a combination of species habitat models and buffered species records. Mapping only indicates an associated species and does not provide any information on the age of records. Flora survey trigger maps are used to determine if any part of the proposed clearing is within a high-risk area, however they do not identify which species are associated with these areas.

Source	Comment on Suitability and Reliability
DoR (2022b) Regional Ecosystem Map (Version 12)	This map provides regional ecosystem and vegetation management status information to support the Regulated Vegetation Management map. Maps and data are based on extensive field survey, analysis of aerial photographs, satellite imagery and detailed site data, and assessment of other data such as geology and soil mapping and historical survey plans. Mapping of pre-clearing vegetation is based on the interpretation of landscape as depicted on aerial photos or satellite imagery, and ground truthed on a limited sample of known points. The positional accuracy of regional ecosystem data, mapped at a scale of 1:100,000, is 100 metres. Positional accuracy of polygon boundaries as well as accuracy of polygon attributes (RE and percent) is noted as high, moderate or low confidence.
Atlas of Living Australia (2022) (ALA) database	The ALA database contains records from a range of contributors from the Queensland Government to eBird, Birdlife Australia and individual users. As such, the quality, accuracy, completeness, currency, relevance and suitability of data are highly variable. The coordinate uncertainty associated with species records has been taken into account when undertaking the likelihood of occurrence assessment, noting that locations are often generalised to protect sensitive species.
eBird and Birdlife Australia Birdata databases	The eBird database is a global platform that documents bird distribution, abundance, habitat use, and trends through checklist data collected by users. When unusual birds are seen, or high counts are reported, regional experts (volunteers) review these records to ensure the highest quality of data. Similarly, the Birdlife Australia Birdata database contains bird survey data collected by volunteers and researchers, including Birdlife Australia's monitoring programs. There is a data sharing agreement between the two platforms. The eBird and Birdlife Australia databases contain records from a range of contributors. The quality, accuracy, completeness, currency, relevance and suitability of data are highly variable given the open access, volunteer-driven nature of these platforms.
Published and unpublished ecology reports where available.	Hydrobiology 2022, *Aquatic Ecology Technical Report*, Borumba Pumped Hydro Project, draft.

2.2 Field Surveys

This section identifies the Project team, relevant licensing and approvals and field survey methods that were implemented to verify desktop results, ground truth regional ecosystems (REs),wildlife habitat, confirm the presence of threatened ecological communities (TECs) and identify threatened species. This section also identifies the limitations associated with flora and fauna field surveys and the criteria under which the likelihood of occurrence was assessed.

2.2.1 Project Team and Qualifications

Table 2.2 provides a list of the key Umwelt personnel involved with this Project and their relevant qualifications and experience.

Table 2.2 Key Personnel

Personnel and Role	Qualifications	Experience
DAVID GATFIELD Principal Ecologist	• Bachelor of Science, Griffith University	David is a Principal Ecologist with 14 years of experience in the planning and implementation of terrestrial ecology surveys, including threatened species monitoring and impact assessments in support of State and Commonwealth approvals. He has extensive experience across a range of industries including infrastructure, coal seam gas, renewables, transport, and government sectors. A focus of David's career has been within the Queensland, delivering ecological impact and approval documents, monitoring surveys and management plans. David also has an in-depth working knowledge of the EPBC Act assessment framework, having managed numerous EPBC Act approvals, facilitated regulator engagement, and delivered referral documents.
GILLIAN TURNER Principal Ecologist (Flora)	• Bachelor of Science (Environmental Biology) (Hons), Curtin University of Technology • Master of Science (Plant Biology), University of Western Australia	Gillian is a Botanist with 14 years of experience in surveying, identifying, managing, and monitoring flora and vegetation. She regularly co-ordinates and undertakes flora and vegetation field surveys, threatened flora searches, plant community and condition mapping, threatened ecological community determination and mapping, vegetation monitoring, technical report writing, ecological due-diligence and environmental impact assessments.
PHOEBE WORTH Ecologist (Fauna)	• Bachelor of Science (Resource and Environmental Management), Australian National University	Phoebe is an Ecologist with 4 years of experience working on a range of ecological and environmental assessment projects including large resource projects. She has experience undertaking ecological field assessments including baseline terrestrial ecology surveys and targeted threatened species surveys. She has also undertaken several offset assessments for State and Federal values.
NICHOLAS ROYAL Ecologist (Fauna)	• Bachelor of Science, Griffith University	Nick is an Ecologist with more than 7 years of industry experience working on infrastructure, transport, and energy projects. He has experience delivering environmental impact statements, biodiversity assessments and species management plans with appreciation for State and Commonwealth environmental legislation, assessment pathways and compliance.
GINA MINATEL Ecologist (Flora)	• Bachelor of Science, University of Queensland	Gina is an ecologist with 3.5 years of industry experience across an array of sectors including renewables, mining and infrastructure. She has experience in biodiversity offset monitoring, baseline assessments, progressive rehabilitation, initial constraints assessments and subsidence monitoring, with a focus on vegetation.

2.2.2 Scientific License and Animal Ethics Approval

Umwelt hold all licences and permits required to undertake this scope of works. Relevant licences and identifiers for Queensland are provided below:

- Scientific Use Registration (Registration number SUR001572): this satisfies the registration requirements of Section 52 of the Qld Animal Care and Protection Act 2001 and confirms that Umwelt is registered as being able to use animals for scientific purposes.

- Scientific Purposes Permit (Permit number WAOO16023): granted under Section 12 (f) of the Nature Conservation (Administration) Regulation 2017, this permit allows the taking of a protected animal for scientific purposes.

- Animal Ethics Committee (AEC) Approval (Reference number CA 2022/01/1573); allowing for the completion of activities that required the 'use' of animals in accordance with the requirements of the Qld Animal Care and Protection Act 2001.

2.2.3 Field Survey Timing and Weather Conditions

The field surveys are detailed in **Table 2.3**, along with the weather conditions experienced during the surveys. Weather data for all field surveys was extracted from the nearest Bureau of Meteorology (2022) weather station. The rainfall data was derived from the Oakwood TM station (station number 40889) whilst temperature data was derived from Nambour Daff – Hillside (station number 40988) (BoM 2022). Rainfall during for the duration of the fauna survey is provided in **Appendix E**.

Table 2.3 Field Survey Timing and Weather Conditions

Field Survey	Survey Dates	Survey Length (Days)	Total Rainfall* (mm)	Temperature (°C)		Season
				Minimum	Maximum	
Baseline Flora Survey 1	29 May–2 June 2022	5	502.8	10.7	23.8	Autumn / Winter
Baseline Flora Survey 2	21 June–22 June 2022	2	377.8	8.7	23.6	Winter
Baseline Flora Survey 3	18 July	1	435.2	10.8	25	Winter
Fauna Survey 1	4 May–8 May	5	704	16.5	28.1	Autumn
Fauna Survey 2	30 May–2 June	4	502.8	10.7	23.8	Autumn / Winter
Fauna Survey 3	21 June–22 June	2	377.8	8.7	23.6	Winter

* Includes combined weather data from the three months preceding the surveys.

2.2.4 Flora

2.2.4.1 Flora and Vegetation Assessment including BioCondition

Flora and vegetation surveys were undertaken to identify and record vascular flora species and classify and map vegetation communities. The sampling of flora and identification and mapping of REs was undertaken in accordance with the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities* (Neldner *et al.*, 2022). Vegetation sampling was undertaken by completing a total of 41 quaternary and 7 secondary level plots within representative examples of each RE observed within the Study Area, as shown on **Figure 2.1**. The mapping of vegetation was completed at a scale of 1: 10,000.

Quaternary plots constituted a rapid vegetation survey which included marking the GPS location and recording the dominant species in the characteristic layers, along with soil/landform and structural data. Secondary level surveys involved the collection of full flora species composition and structural data within a 50 x 10 m plot (Neldner *et al.*, 2022).

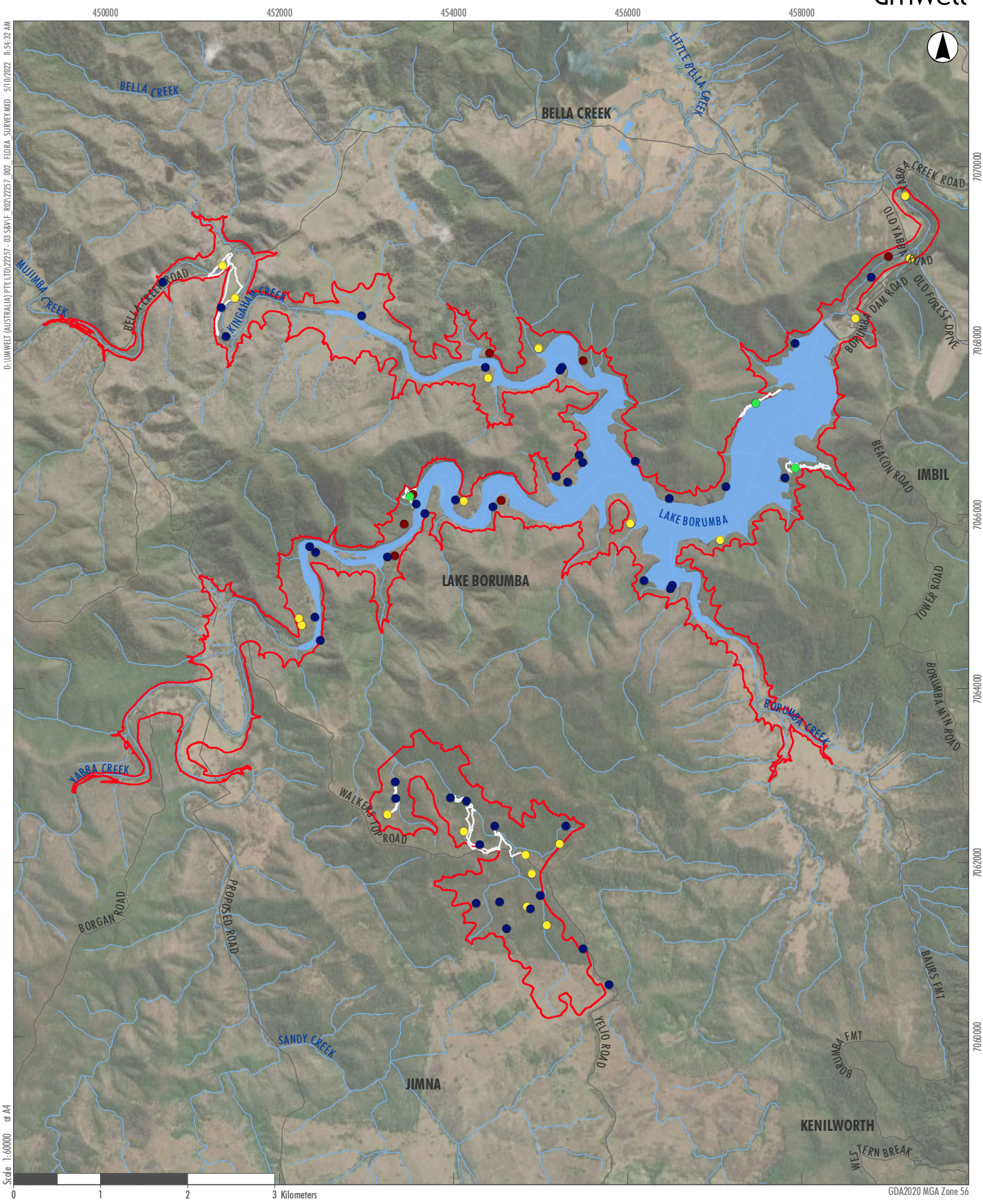
A total of 19 BioCondition assessments were undertaken in accordance with the *BioCondition Assessment Manual: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland* (Eyre *et al.*, 2015) for the purpose of informing preliminary offset requirements as well as supplementing the vegetation sampling (**Figure 2.1**). The BioCondition assessments involved the collection of structural, floristic and habitat data within a 100 x 50 m plot. The attributes recorded within each plot are provided in **Table 2.4**. The sampling effort for each confirmed RE is provided in **Table 2.5**.

Table 2.4 Attributes recorded within BioCondition Sites

Plot area	Attribute
100 x 50 m plot	• Structural and floristic data of the tree and shrub layers • Cover values of the tree and shrub layers • Number of large trees • Recruitment of canopy species
50 x 20 m sub-plot	• Coarse woody debris
50 x 10 m sub-plot	• Native plant species richness • Weed cover
1 x 1 m sub-plots	• Individual species and cover values for native and non-native grass and forb species • Bare ground and litter cover

Table 2.5 Flora Survey Effort Summarised by Confirmed Regional Ecosystem

Confirmed RE	Area (ha)	Sampling Effort (Number of Sites)		
		Quaternary	Secondary	BioCondition
12.3.7	129.5	7	-	4
12.11.3	212.4	8	2	3
12.11.9	9.7	2	-	-
12.11.10	104.0	6	2	3
12.11.14	254.7	13	3	3
12.12.12	22.1	-	-	1
12.12.15	113.6	4	-	3
12.12.16	6.4	-	-	1
12.12.23	2.7	1	-	1
Non-remnant	273.4	-	-	-
Not surveyed	54.9	-	-	-
Total sites		**41**	**7**	**19**



Legend

- Study Area
- Reservoirs
- Roads
- Watercourse
- Threatened Species Meanders
- Biocondition Survey Locations
- Quaternary Survey Locations
- Secondary Survey Locations
- TEC Survey Locations

FIGURE 2.1

Flora Survey Locations

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

Specimens of plant taxa that could not be identified in the field were collected, pressed, and dried in accordance with the requirements of the Queensland Herbarium (Queensland Herbarium & Bean 2016). Dried specimens were then identified through reference books and keys and through comparison with named species. Species suspected of being threatened flora were sent to the Queensland Herbarium for further identification. Nomenclature used in this report follows that of the *Census of the Queensland flora 2021* (Brown, 2021). Introduced species are denoted by an asterisk in the text (*) where appropriate.

2.2.4.2 Threatened Ecological Communities

The verification of EPBC Act-listed TECs was undertaken by confirming the presence of analogous REs within the Study Area, and where suitable analogous REs were identified, the vegetation composition and structure was assessed against the TECs key diagnostic characteristics and condition thresholds as specified on the SPRAT database (Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2022c). Three dedicated assessment sites for the Lowland Rainforest of Subtropical Australia TEC were undertaken within the proposed lower reservoir, the locations are provided on **Figure 2.1**. The TEC assessments involved either quaternary or secondary flora plot to record vegetation structure and composition and random meanders through the patches to compile a comprehensive species list to cross check against the required species listed in Appendix A of the TEC listing advice (TSSC, 2011).

2.2.4.3 Threatened Flora Surveys

Threatened flora species identified through the desktop assessment were targeted as part of the flora survey effort. Threatened species were opportunistically identified while traversing the Study Area and searched for at the flora sampling sites. Dedicated threatened species meanders were conducted within three different patches of RE 12.11.10 within the upper reservoir (**Figure 2.1**), which was identified as being habitat for species including ball nut (*Floydia praealta*), three-leaved Bosistoa (*Bosistoa transversa*) and rib-fruited malletwood (*Rhodamnia dumicola*). Dedicated meanders were also undertaken along the creek lines in the proposed upper reservoir where several specimens of scrub turpentine (*Rhodamnia rubescens*) had been identified. A meander was also undertaken within riparian woodland within the proposed upper reservoir (**Figure 2.1**). Where threatened flora species were identified, the location was marked with a GPS and information regarding number of individuals and habitat were noted.

Supplementary Flora Survey

Supplementary threatened species data was obtained from protected plant surveys concurrently being undertaken by SMEC within the proposed upper reservoir. These threatened flora records were obtained during random meander surveys within the Study Area on 4 May 2022 and 22-24 June 2022 and were undertaken by a suitably qualified person. Threatened species recorded during these surveys have been incorporated into the results described in **Section 3.2.2**.

2.2.5 Fauna

Fauna surveys were undertaken to determine the baseline terrestrial fauna values in consideration of relevant State and Federal survey guidelines, including:

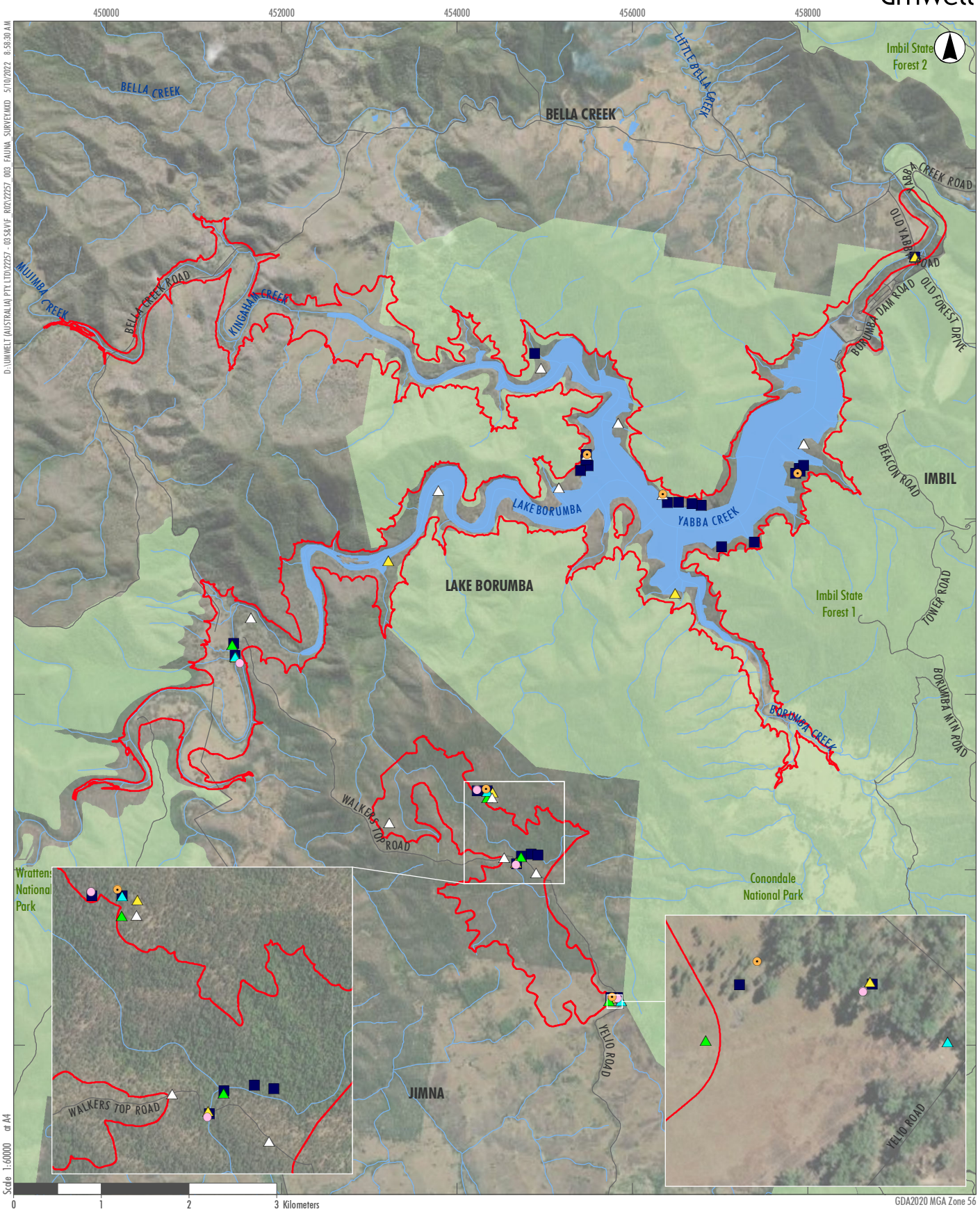
- *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre *et al.*, 2018)
- *Survey Guidelines for Australia's Threatened Mammals* (DSEWPaC, 2011a)
- *Survey Guidelines for Australia's Threatened Reptiles* (DSEWPaC, 2011b)
- *Survey Guidelines for Australia's Threatened Birds* (DEWHA, 2010a)
- *Survey Guidelines for Australia's Threatened Bats* (DEWHA, 2010b)
- *Survey Guidelines for Australia's Threatened Frogs* (DEWHA, 2010c).

Terrestrial vertebrates were sampled using both direct and passive detection methods. Systematic fauna trapping sites were established at three locations in consideration of the Qld terrestrial vertebrate survey guidelines (Eyre *et al.*, 2018). The methods that were employed during the fauna survey, including survey effort, are detailed in **Table 2.6** and locations mapped on **Figure 2.2**.

Table 2.6 Fauna Survey Methods and Effort

Survey Method	Description	Survey Effort	Effort Breakdown
Fauna Habitat Assessments	Detailed descriptions of the habitat values present within the Study Area were recorded via a fauna habitat assessment methodology. The methodology involved the description of micro-habitat at each location, including abundance of tree hollows, fallen logs, exfoliating bark, leaf litter, native grass, rocks and boulders; disturbance present; distance to water sources; and any other vegetation values present.	69 sites	-
Active Diurnal Searches	Active diurnal searches were undertaken for reptiles, amphibians and small mammals. Searches involved the scanning of trees and ground, searching beneath microhabitat such as rocks, fallen timber and peeling bark, and digging through leaf litter and soil at tree bases. Tracks and traces of fauna species were also opportunistically identified.	6 hours	5 sites x 0.5-0.75 hours x 2 ecologists
Bird Surveys	Bird surveys involved ecologists undertaking a full compositional survey on bird species within a given area. During 30-minute timed surveys, all species observed aurally or visually with the aid of binocular were noted. Surveys were generally undertaken in the morning during periods of peak bird activity. These surveys were supplemented by opportunistic observations made while traversing the Study Area.	5 hours	5 sites x 0.5 hours x 2 ecologists
Spotlight Searches	Spotlighting was undertaken on foot and from the passenger window of a slow-moving vehicle in representative habitats using handheld spotlights and binoculars to detect nocturnal animals.	4 hours	1 hour x 4 ecologists
Camera Trapping	Automated camera traps were deployed in representative habitats to record visitation by nocturnal and diurnal animals. Baits were placed in front of the cameras and consisted of universal mammal bait (oats and peanut butter). Other bait types including chicken necks and sardines were also used in combination.	832 trap nights	26 units x average 32 nights (maximum 48 nights)
Koala Spot Assessment Technique (SAT)	The SAT is a point-based tree sampling methodology. At each SAT site, 30 trees greater than 10 cm diameter at breast height (dbh) were searched at the base for koala scats and scratches on the trunk.	12 sites	-
Elliot Trapping	Type A aluminium Elliot traps were placed at approximately 10 m intervals along two transects (ten per transect). Traps were baited with universal mammal bait (a mixture of rolled oats, peanut butter, honey and vanilla essence), and checked each morning to identify and release captured fauna.	195 trap nights	4 traplines total – 20 traps x 4 nights, 20 traps x 3 nights, 20 traps x 2 nights, 15 traps x 1 night

Survey Method	Description	Survey Effort	Effort Breakdown
Acoustic Bat Call Detection	Anabat Swift units were deployed in representative habitats to record microchiropteran calls. Detection was conducted across the Study Area between dusk and dawn across all habitat types. Recorded calls were analysed by Balance Environmental for species identification purposes.	82 trap nights	7 units x average 20 nights (maximum 40 nights)
Pitfall Trapping	Pitfall trapping was undertaken using three 20 litre (L) buckets at three sites, spaced approximately 10 m apart and dug into the ground so they are flush with the surface. A drift fence, approximately 30 cm high, was erected between each bucket to direct small animals towards the pitfall traps.	20 trap nights	3 traplines total - 3 traps x 2 nights, 3 traps x 2 nights, 4 traps x 2 nights
Incidental Observations	All fauna observed incidentally throughout the Study Area were recorded, including large mammals when encountered during spotlight surveys and when travelling between survey sites.	8 days	-



Legend

- Study Area
- Protected Areas
- Reservoirs
- Roads
- Watercourse
- Anabat Locations
- Bird Surveys
- Camera Trap Locations
- Elliot Trapline Start Locations
- Elliot Trapline Finish Locations
- SAT Survey Locations
- Pitfall Trapline Locations

FIGURE 2.2

Fauna Survey Locations

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

2.2.6 Survey Limitations

2.2.6.1 General

- Prior to the completion of this report, the Study Area was altered due to a design change. This change occurred after field surveys had been undertaken and as such, some areas have not been surveyed (**Figure 3.8**). Ecological values associated with these areas (representing 4.6% of the Study Area) will be captured in future field survey effort. For the purposes of this report, only flora and fauna values determined from the desktop assessment have been described for these areas.

- Access across the Study Area was limited in some areas due to the steep terrain and lack of adequate access tracks. This limitation has been considered when undertaking the likelihood of occurrence assessment for threatened species in **Section 3.3.2**.

- A portion of the Study Area occurs within Conondale National Park. Due to strict permitting requirements, the ecologists were unable to survey these areas.

2.2.6.2 Flora

- Timing of the flora field survey (autumn/winter) did not coincide with the main flowering periods of flora species in southeast Queensland.

- The Project region experienced periods of high rainfall prior to the flora surveys, however they were not materially impacted due to adverse weather.

2.2.6.3 Fauna

- Patterns of faunal activity and estimates of relative abundance or presence/absence of species varies temporally in response to the time of day (day versus night), seasonal changes (e.g. spring versus winter) as well as between years (e.g. rainy year versus drought year) (Eyre *et al.*, 2018). Wetter than average conditions and flooding in southeast Queensland resulted in delays to field survey efforts. As such, surveys were conducted in autumn/winter, outside the prescribed survey periods. Colder conditions may have resulted in fewer reptile and amphibian captures at systematic trapping sites and during active searches. The wet conditions may have also resulted in reduced detectability of species during the survey.

- Trapping in the proposed lower reservoir was not undertaken due to the need to utilise boats for access. This was deemed both a safety and ethics issue as trap line equipment is heavy and difficult to load/unload on shoreline from boat. Access to the lake is limited to daytime hours (6am-6pm) and the time it would take to check traplines would have exceeded ethical consideration.

- During the fauna trapping survey conducted between 4–9 May (inclusive) the Project region experienced heavy rainfall (**Appendix E**). Track conditions at the proposed upper reservoir deteriorated throughout the survey period, making access difficult and presenting safety concerns. This limited the extent and intensity of survey effort throughout the survey.

- Two camera traps were knocked off their line of sight after cows had rubbed against them. As such, these cameras did not collect images facing the bait tube. Two bait tubes were removed from their original position either by fauna or from the rising water level and debris along a watercourse after

heavy rainfall. While images were captured without a bait tube present, the trap success of these cameras may have been reduced.

- To accurately identify small mammals, key measurements are required to identify individuals to genus and species. Identifying small mammals captured on camera trap imagery is inherently difficult in the absence of accurate measurements and key diagnostic features. As such, camera trap images of small mammals have not been included where identification could not be confidently ascertained.
- Trapping in the proposed lower reservoir was not undertaken due to the need to utilise boats for access. This was deemed both a safety and ethics issue as trap line equipment is heavy and difficult to load/unload on shoreline from boat. Access to the lake is limited to daytime hours (6am-6pm) and the time it would take to check traplines would have exceeded ethical consideration.

2.3 Likelihood of Occurrence Assessment

The likelihood that TECs, threatened or migratory species occur within the Study Area was initially assessed based on the results of the desktop assessment then supplemented by field survey observations. The likelihood of occurrence considered database records including historical sightings and a review of the known ecological requirements such as foraging and habitat preferences. The likelihood of occurrence category definitions used for this assessment are detailed in **Table 2.7**.

Table 2.7 Likelihood of Occurrence Definitions

Potential to Occur	Description
Known	All species or communities recorded in the Study Area during field surveys undertaken for the Project.
High	Species or communities previously recorded in the Study Area or in the immediate vicinity (within 1 km). The Study Area contains preferred habitat resources which may support a population of the species.
Moderate	Species or communities are known from the broader area (desktop search extent) and some of the preferred habitat is present within the Study Area. Species records exist within the general area with records from less than 10 years ago. Aerial foragers and other migratory birds that may overfly the Study Area are also included.
Low	The Study Area supports some of the suitable habitat, often marginal for species or communities. The species may disperse through the Project infrequently and is unlikely to depend on the habitat for their survival. Species records exist within the general area however these have been recorded more than 10 years ago and are greater than 10 km from the Study Area.
Unlikely	This category includes those species or communities for which the Study Area offers limited or no potential habitat, is outside their known range and/or is without broader habitat requirements or the species are considered locally extinct according to literature and/or expert knowledge.

2.4 Preliminary Impact Assessment

A preliminary impact assessment has been undertaken to assess and assign criteria to the unmitigated and mitigated impacts relevant to flora and fauna during construction and operational phases of the Project. The criteria used is being reflected across each technical report being developed for the Project, providing a simplified and consistent assessment process. The unmitigated significance assessment criteria have been outlined in **Table 2.8** and residual significance assessment criteria have been outlined in **Table 2.9**.

Table 2.8 Unmitigated Significance Assessment Criteria

Issue Significance	Criteria
Positive	• Expected to improve environmental outcomes, resulting in benefits for ecological communities • Expected to generate socio-economic opportunities/benefits resulting in an improvement to the wellbeing of the affected stakeholder group(s).
Minor	• Unlikely to be a significant issue for the Project, the community, or the environment • Associated risks/potential impacts (if any) can be managed through typical established industry practices • Minimal (if any) design modification required to address.
Moderate	• May be a significant issue in some circumstances • Associated risks/potential impacts can be managed through a combination of established industry practices, and some targeted mitigation • May require minor modification of design to address.
Major	• Expected to be a significant issue for the Project, the community, or the environment • Associated risks/potential impacts can only be managed through targeted, bespoke mitigation measures • Likely to require some modification of design to address.
Critical	• Potentially insurmountable issue • Associated risks/potential impacts cannot be feasibly addressed through application of mitigation measures • Requires a substantial re-design of one or more project elements to address.

Table 2.9 Residual Significance Assessment Criteria

Issue Significance	Criteria
Positive	• Proposed measures to enhance potential benefits and opportunities are considered appropriate • The project will continue to investigate additional opportunities to enhance potential benefits and opportunities through future stages of design.
Minor	• Proposed measures are considered appropriate to mitigate the associated risks/potential impacts to an acceptable degree • These measures may be further refined as development of the Project progresses, however no further re-design is likely to be required.
Moderate	• Proposed measures are expected to reduce the significance of the risk/potential impact, however further mitigation may still be required • Additional measures, which may include minor modification of design, will need to be identified as development of the Project progresses • Environmental offsets or other compensation for residual impacts may be required.
Major	• Proposed measures are not sufficient to mitigate the associated risk/potential impact to an acceptable degree • Additional measures, including further modification of design, are likely to be required as development of the Project progresses • Environmental offsets or other compensation for residual impacts are likely to be required.
Critical	• Proposed measures are clearly insufficient to mitigate the risk/potential impact to an acceptable degree • Substantial re-design of one or more fundamental project elements should be prioritised as development of the Project progresses • Extensive environmental offsets or other compensation for residual impacts required • Requires amendment to government policy or statutory instruments in order for the Project to progress.

2.5 Preliminary Offset Analysis

For the purposes of the preliminary offsets analysis, preliminary significant impact assessments have been undertaken in accordance with State and Federal guidelines:

- *Significant Residual Impact Guideline* (DEHP, 2014)
- *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DoE 2013).

Given the early stages of the Project (design is still in progress and seasonal surveys are ongoing), complete impact tests of significance are unable to be completed. Rather, a risk of significant impact profile has been adopted. This risk rating considers the likelihood of occurrence of species in relation to the Project, the availability of important habitat or habitat critical to the survival of the species and potential impacts at the level of a population or an important population (relevant to the listing status). The significant impact risk criteria are provided in **Table 2.10**.

Table 2.10 Significant Impact Risk Criteria

Risk of Significant Impact	Criteria
Low	Likelihood of occurrence assessed as moderate or less, critical habitat for the species absent, limited or avoidable. Project associated indirect impacts considered low.
Moderate	Likelihood of occurrence assessed as moderate or high, some critical habitat for the species present and Project associated impacts have potential to indirectly impact a population, important population, or habitat.
High	Likelihood of occurrence assessed as high or known, critical habitat present and Project associated impacts likely to impact critical habitat, a population, or an important population.

3.0 Results

3.1 Desktop Assessment

A review of federal and Queensland state databases identified listed threatened species and communities, watercourses, wetlands, and biodiversity planning assessment (BPA) biodiversity corridors as occurring or potentially occurring within the Study Area. The results have been summarised in **Sections 3.1.1** to **3.1.6**. The database outputs have been compiled in **Appendix A**.

3.1.1 Regional Setting

3.1.1.1 Bioregional Context

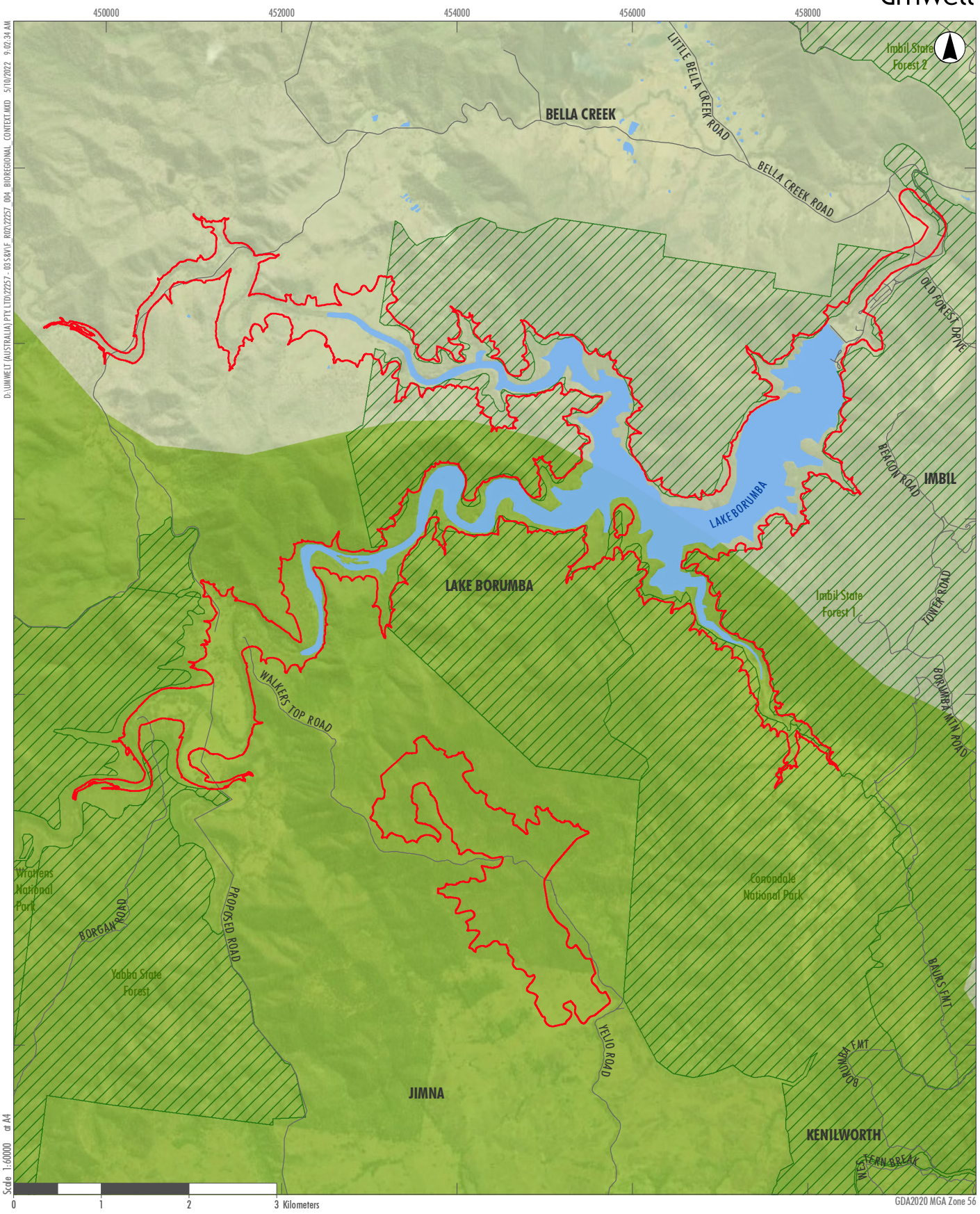
The Study Area is located within the South East Queensland bioregion (**Figure 3.1**), which is characterised by moderate to high rainfall (between 800-1500 mm per year) with warm to hot summers and cool winters. This bioregion comprises coastal plains, adjacent hills and ranges and the major drainage basins of Brisbane River, Mary River, Barambah Creek and Lower Burnett River. It also includes coastal mainland and island sand masses (Sattler & Williams 1999).

The Study Area is located within two subregions: Burringbar-Conondale Ranges and Gympie Block. Burringbar-Conondale Ranges subregion, also known as the Southeast Hills and Ranges subregion is moist and hilly to mountainous. It is comprised metamorphic geology with some acid volcanic intrusions. The vegetation is characterized by eucalypt tall open forests, complex notophyll rainforest and Araucarian notophyll rainforest (Sattler & Williams 1999). The Gympie Block subregion comprises low hilly landscapes on old sedimentary rocks, metamorphics and intermediate and basic volcanoes. The relatively fertile soils support extensive patches of Araucarian/notophyll and microphyll rainforest and mixed eucalypt forests (Sattler & Williams 1999).

3.1.2 Connectivity

The Study Area occurs at the northern extent of the Conondale Range extending into Conondale National Park and bordered by Imbil State Forest and Yabba State Forest. The surrounding state forest areas are production and plantation forests comprising native timber (hoop pine). Review of the BPA Mapping (DES 2016) indicates that the Study Area represents the intersection of several mapped biodiversity significant terrestrial and riparian corridors (**Figure 3.2**). The Study Area comprises contiguous vegetation acting as a corridor between Conondale National Park and Wrattens National Park within a mosaic of vegetated freehold land and state forest reserves.

The Study Area intersects a state significant terrestrial corridor that runs east-west from the Elgin Vale State Forest to the coast at Peregian via Mapleton National Park, Imbil State Forest, Conondale National Park and Yabba State Forest. The justification for this corridor is due to the linking of four state and two regional terrestrial corridors, intersection with riparian corridors, incorporation of latitudinal and climatic gradients, connectivity of remnant vegetation, connectivity between coast and inland, linking of protected areas and estates and that it falls partially within the Great Eastern Ranges corridor (DEHP, 2016). The current extent of Lake Borumba acts as a partial connectivity barrier from north to south.



Legend

- Study Area
- Protected Areas
- Reservoirs
- Roads

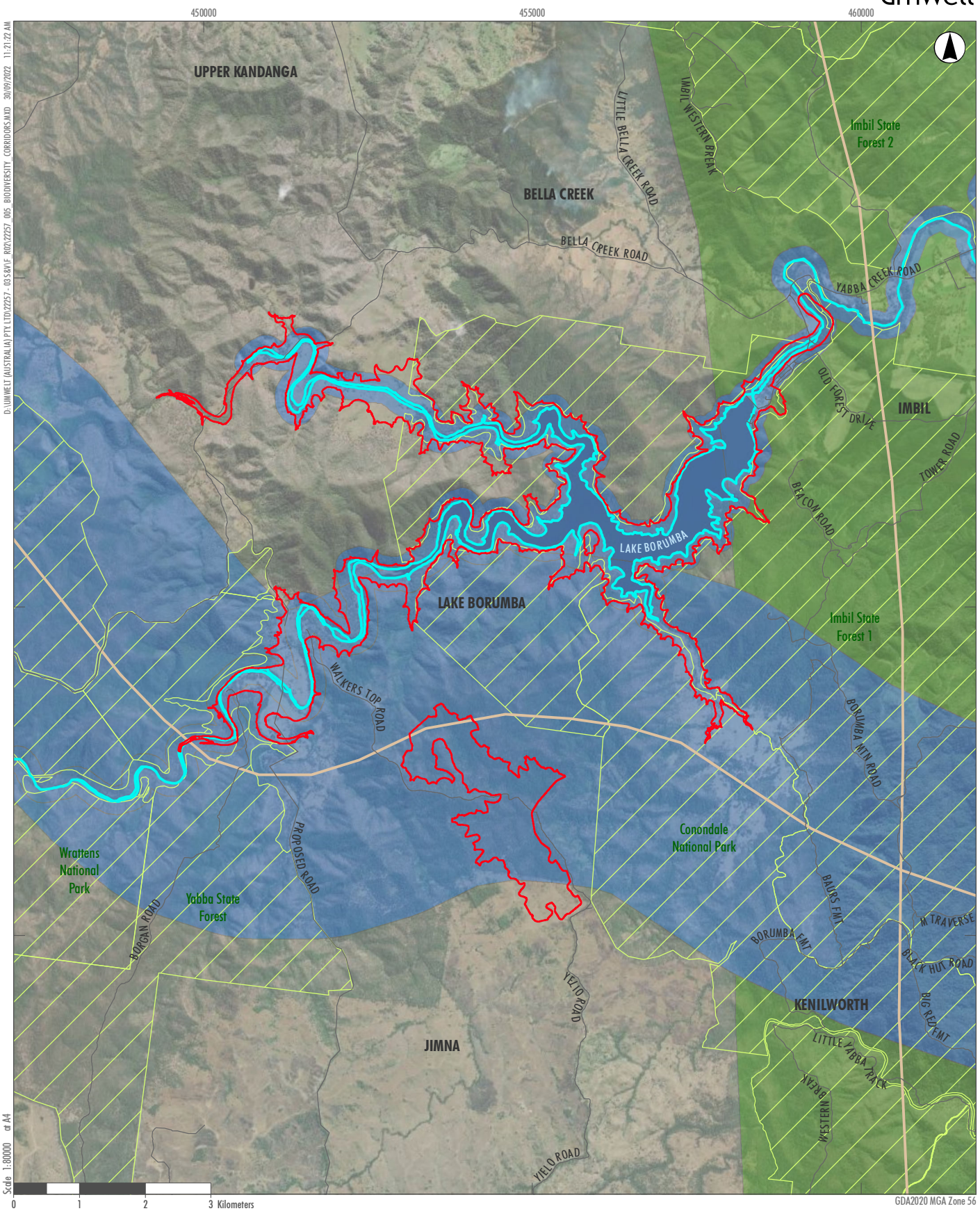
QLD Bioregions / Subregions

- South Eastern Queensland / Burringbar - Conondale Ranges
- South Eastern Queensland / Gympie Block

FIGURE 3.1

Bioregional Context

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022); QLD Department of Environment and Science (2010)



Legend

- Study Area
- Protected Areas
- Roads
- Terrestrial Corridor Centrelines
- Riparian Corridor Centrelines

Corridor Buffers

- Regional
- State

FIGURE 3.2

Statewide Biodiversity Corridors

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

The eastern extent of the Study Area associated with Lake Borumba occurs partially within a regionally significant terrestrial corridor the runs south-north from Imbil State Forest to Curra State Forest via Marys Creek Sate Forest and Brooyar State Forest. The justification for this corridor was due to recommendation by the panel and that it falls partially within the Great Eastern Ranges corridor (DEHP, 2016).

3.1.3 Flora

3.1.3.1 Threatened Flora Species

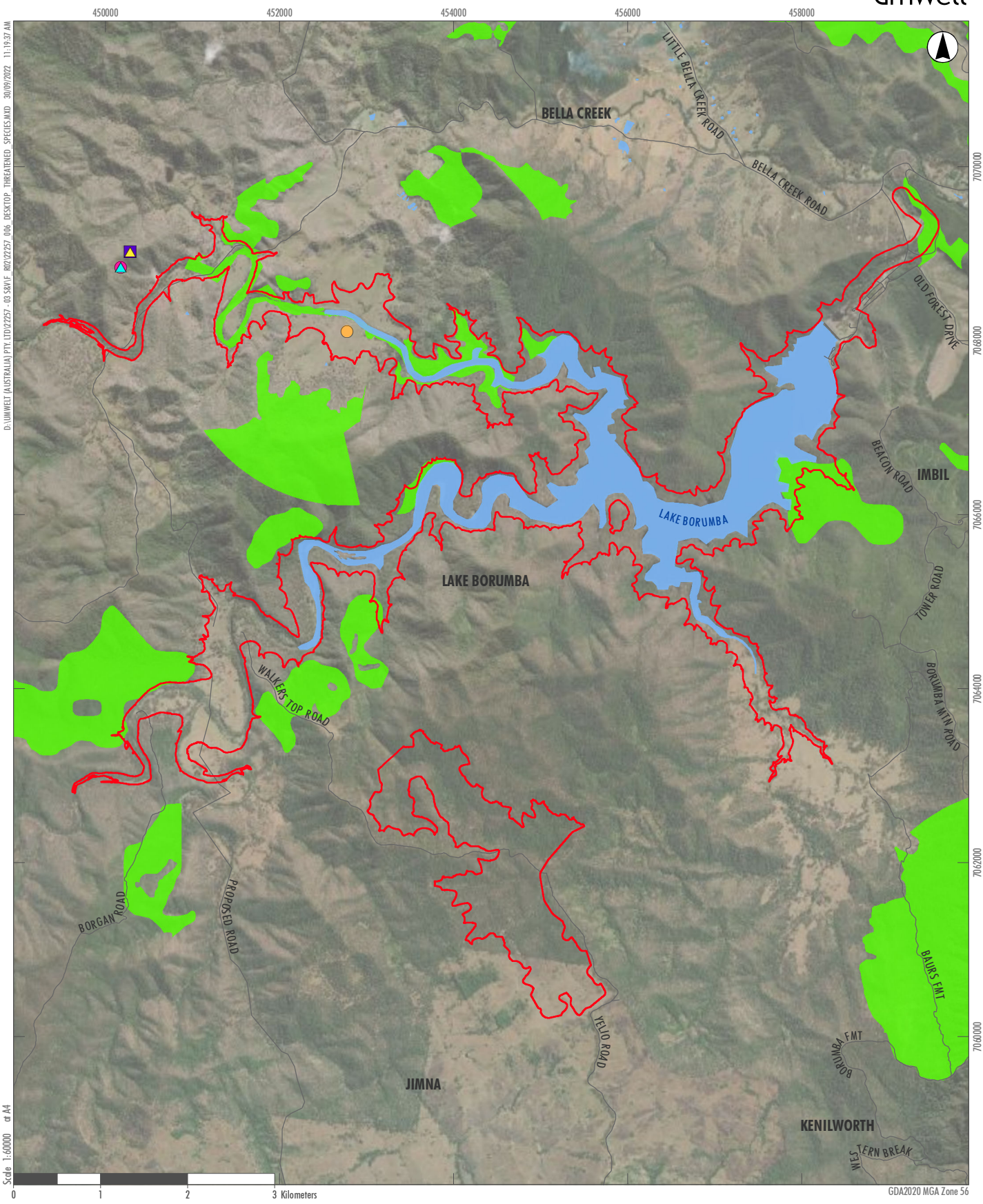
Database searches identified a total of 36 threatened flora species as having potential to occur within the Study Area (**Appendix A**). Review of Atlas of Living Australia and WildNet databases indicate that of these, records for 19 species occur within 10 km of the Study Area (**Table 3.1**). The ALA records are also depicted in **Figure 3.3**.

Table 3.1 Threatened Flora Species with Records within 10 km of Study Area

Common Name	Scientific Name	NC Act Status	EPBC Act Status
-	*Aponogeton elongatus* subsp. *elongatus*	Near Threatened	-
three-leaved bosistoa	*Bosistoa transversa*	-	Vulnerable
-	*Corynocarpus rupestris* subsp. *arborescens*	Vulnerable	-
-	*Coleus torrenticola*	Endangered	Endangered
ball nut	*Floydia praealta*	Vulnerable	Vulnerable
-	*Haloragis exalata* subsp. *velutina*	Vulnerable	Vulnerable
slender milkvine	*Leichhardtia coronata*	Vulnerable	-
-	*Leptospermum oreophilum*	Vulnerable	-
macadamia nut	*Macadamia integrifolia*	Vulnerable	Vulnerable
bopple nut	*Macadamia ternifolia*	Vulnerable	Vulnerable
-	*Nothoalsomitra suberosa*	Near threatened	-
-	*Pararistolochia praevenosa*	Near Threatened	
-	*Parsonsia largiflorens*	-	Endangered
-	*Plectorrhiza beckleri*	-	Near Threatened
rib-fruited malletwood	*Rhodamnia dumicola*	-	Endangered
scrub turpentine	*Rhodamnia rubescens*	Critically Endangered	Critically Endangered
-	*Sophora fraseri*	Vulnerable	Vulnerable
hairy hazelwood	*Symplocos harroldii*	Near threatened	-
Austral toadflax	*Thesium australe*	Vulnerable	Vulnerable

3.1.3.2 Protected Plant Flora Survey Trigger Map

Nine high-risk protected plant areas are mapped within the Study Area. The high-risk areas for protected plants are shown on **Figure 3.3**.



Legend

- Study Area
- Protected Plant Trigger Area
- Reservoirs
- Roads

ALA Desktop Flora Records

- *Bosistoa transversa*
- *Floydia praealta*
- *Macadamia ternifolia*
- *Nothoalsomitra suberosa*
- *Thesium australe*

FIGURE 3.3

Protected Plant Trigger Mapping and Desktop Threatened Flora Records

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022); ALA (2022)

3.1.4 Vegetation Communities

3.1.4.1 Regulated Vegetation

Review of the Regulated Vegetation Management Map Version 5.07 (DoR, 2022b) indicates that the Study Area contains Category B, C, R and X regulated vegetation (**Table 3.2**).

Table 3.2 Regulated Vegetation Mapped within the Study Area

Category	Description	Area (ha)
B	Remnant vegetation	859.2
C	High-value regrowth vegetation	5.4
R	Regrowth watercourse and drainage feature vegetation	114.8
X	Non-remnant (Unregulated) vegetation	256.0

3.1.4.2 Regional Ecosystems

The Vegetation Management Regional Ecosystem Map - Version 12.0 (Department of Resources, 2022a) identifies 13 REs within the Study Area (**Figure 3.4**). Of these, one RE is listed as Endangered, five REs are listed as Of Concern and seven REs are listed as Least Concern under the VM Act (**Table 3.3**).

Table 3.3 Regional Ecosystems Mapped within the Study Area

RE[1]	REDD Description	VM Act Class
12.3.1a	Complex notophyll vine forest. Typical canopy species include *Castanospermum australe*, *Elaeocarpus grandis*, *Grevillea robusta*, *Cryptocarya obovata*, *Beilschmiedia obtusifolia*, *Dysoxylum mollissimum subsp. molle*, *Pseudoweinmannia lachnocarpa*, *Argyrodendron trifoliolatum*, *Planchonella australis*, *Ficus watkinsiana*, *F. macrophylla forma macrophylla*, *Aphananthe philippinensis*, *Toona ciliata* and *Syzygium francisii*.	Endangered
12.3.7	*Eucalyptus tereticornis*, *Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland.	Least concern
12.3.7b	Naturally occurring instream waterholes and lagoons, both permanent and intermittent. Includes exposed stream bed and bars.	Least concern
12.3.11	*Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near coast.	Of concern
12.11.3	*Eucalyptus siderophloia*, *E. propinqua* +/- *E. microcorys*, *Lophostemon confertus*, *Corymbia intermedia*, *E. acmenoides* open forest on metamorphics +/- interbedded volcanics.	Least concern
12.11.9	*Eucalyptus tereticornis* subsp. *tereticornis* or *E. tereticornis* subsp. *basaltica* open forest on metamorphics +/- interbedded volcanics. Usually higher altitudes.	Of concern
12.11.10	Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics.	Least concern
12.11.14	*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics.	Of concern
12.11.15	*Eucalyptus tereticornis, Corymbia intermedia* open woodland with *Xanthorrhoea johnsonii* understorey on serpentinite	Of concern
12.12.12	*Eucalyptus tereticornis*, *Corymbia intermedia*, *E. crebra* +/- *Lophostemon suaveolens* woodland on Mesozoic to Proterozoic igneous rocks.	Of concern

RE[1]	REDD Description	VM Act Class
12.12.15	*Corymbia intermedia* +/- *Eucalyptus propinqua*, *E. siderophloia*, *E. microcorys*, *Lophostemon confertus* open forest on Mesozoic to Proterozoic igneous rocks.	Least concern
12.12.16	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks.	Least concern
12.12.23	*Eucalyptus tereticornis* subsp. *tereticornis* or *E. tereticornis* subsp. *basaltica* +/- *E. eugenioides* woodland to open forest on crests, upper slopes and elevated valleys and plains on Mesozoic to Proterozoic igneous rocks.	Least concern

3.1.4.3 Flora Species Essential Habitat

Essential habitat has been mapped for three flora species within the desktop search extent (**Table 3.4** and **Figure 3.5**).

Table 3.4 Essential Habitat Flora Species

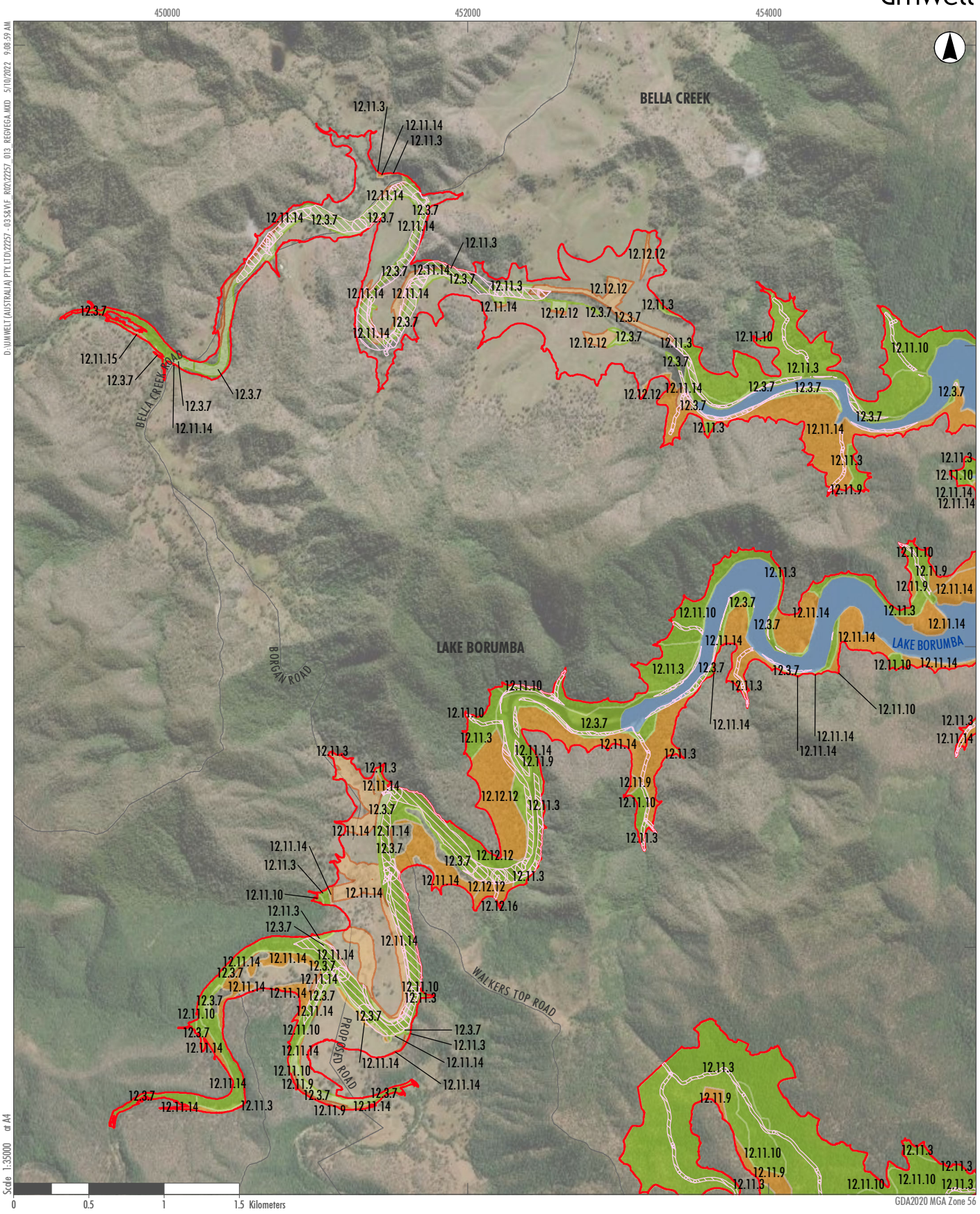
Common Name	Scientific Name	NC Act Status
bopple nut	*Macadamia ternifolia*	Vulnerable
macadamia nut	*Macadamia integrifolia*	Vulnerable
-	*Papillilabium beckleri*	Near Threatened

3.1.4.4 Threatened Ecological Communities

Database search results identified three TECs that are likely to occur within a 10 km radius of the Study Area (**Table 3.5**). Based on the desktop RE mapping for the Study Area (**Table 3.3**), the Lowland Rainforest of Subtropical Australia (Critically Endangered) has the potential to occur within the Study Area based on the mapped occurrence of analogous REs.

Table 3.5 TECs likely to occur within 10 km of the Study Area

TEC	Status	Analogous RE (SEQ only)
Coastal Swamp Sclerophyll Forest of New South Wales and Southeast Queensland	Endangered	12.2.7, 12.3.4/12.3.4a, 12.3.5, 12.3.6, 12.3.20 (only parts not dominated by *Casuarina glauca*)
Lowland Rainforest of Subtropical Australia	Critically Endangered	12.3.1, 12.5.13, 12.8.3, 12.8.4, 12.11.1, 12.11.10, 12.12.1, 12.12.16
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands	Critically Endangered	12.8.16



Legend

- Study Area
- Roads
- Watercourse Vegetation

Regional Ecosystems

- Remnant Least Concern
- Remnant Of Concern
- High Value Regrowth Least Concern
- High Value Regrowth Of Concern
- Water

FIGURE 3.4A

Regional Ecosystems and Watercourse Vegetation

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022); ALA (2022)

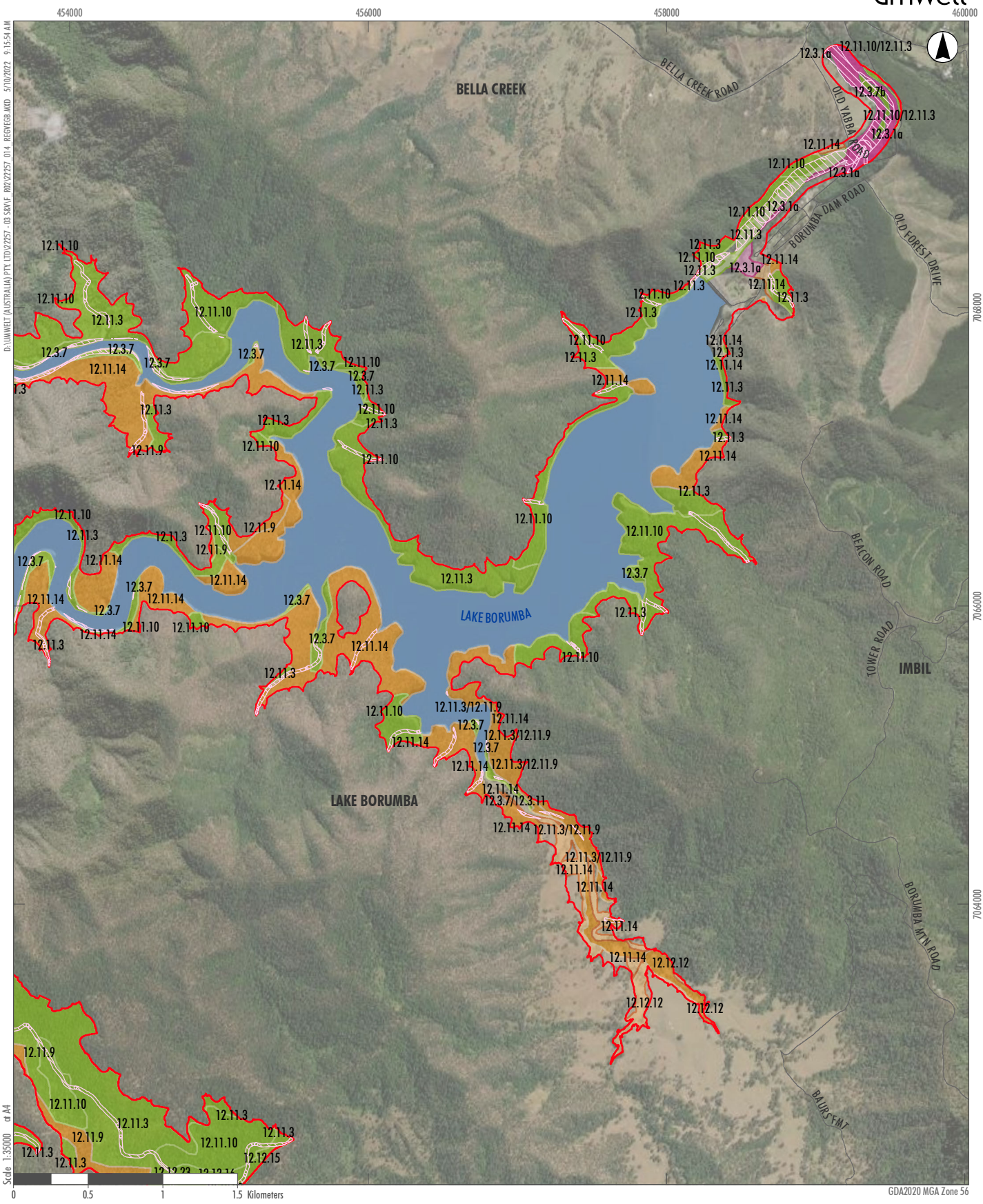
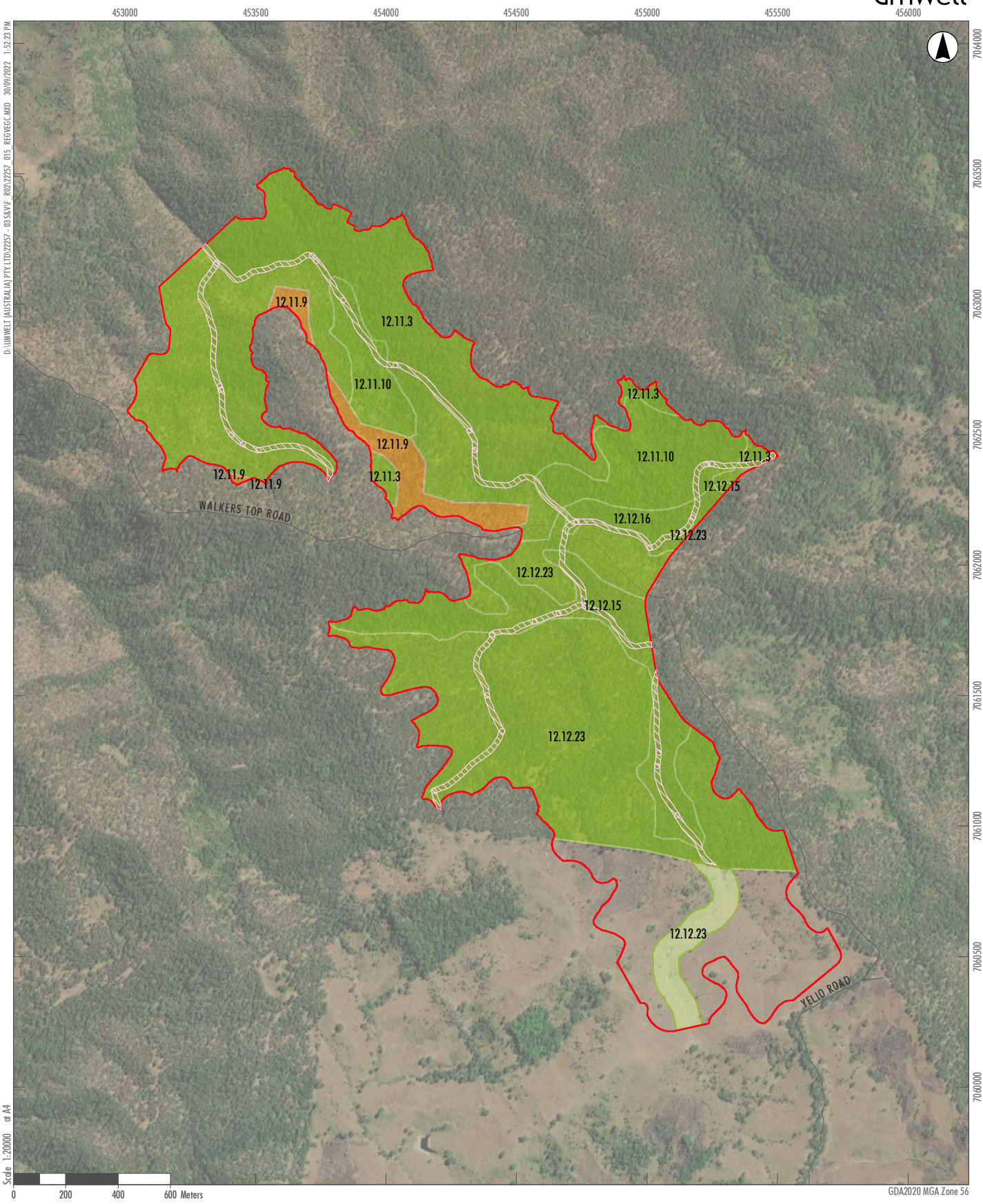


FIGURE 3.4B

Regional Ecosystems and Watercourse Vegetation

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022); ALA (2022)



Legend

- Study Area
- Roads
- Watercourse Vegetation

Regional Ecosystems

- Remnant Least Concern
- Remnant Of Concern
- High Value Regrowth Least Concern

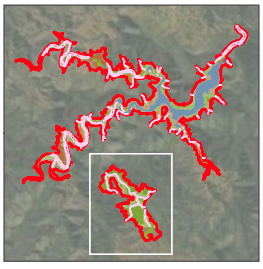
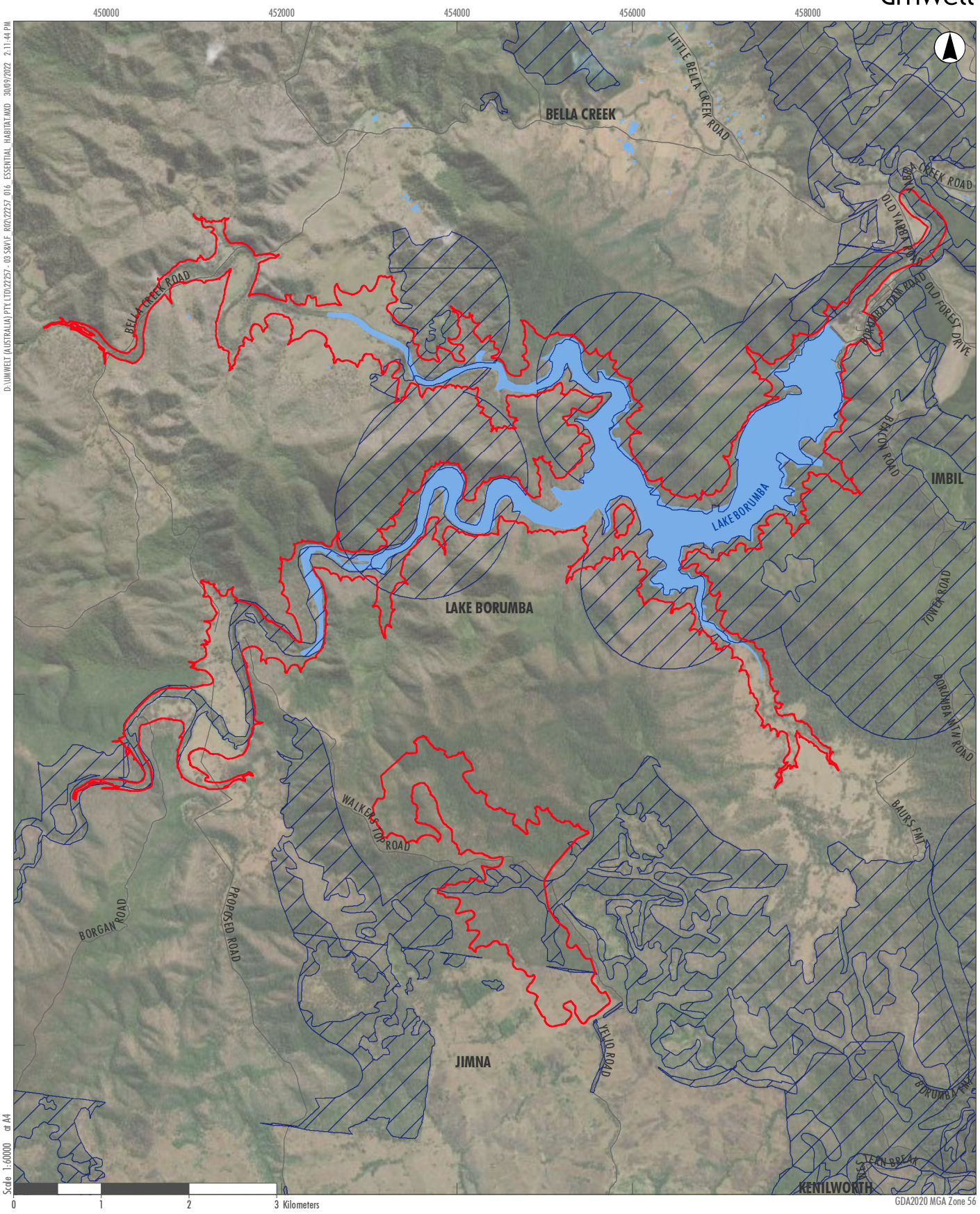


FIGURE 3.4C

Regional Ecosystems and Watercourse Vegetation

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022); ALA (2022)



Legend

- Study Area
- Essential Habitat
- Roads

FIGURE 3.5

Essential Habitat

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022); ALA (2022)

3.1.5 Fauna

3.1.5.1 Threatened Fauna

A review of database search results identified 42 threatened species as having the potential to occur within the Study Area comprising 16 birds, 10 mammals, 7 reptiles, 4 frogs, 3 insects and 2 fishes (**Appendix A**). Aquatic fauna identified in database searches – including turtles and fishes – are discussed in the aquatic ecology technical report prepared for the Project by Hydrobiology (2022) and thus have not been discussed further in this report.

Table 3.6 Desktop Search Results: Threatened Fauna Species

Common Name	Scientific Name	EPBC Act Status	NC Act Status
Birds			
regent honeyeater	*Anthochaera phrygia*	Critically Endangered	Critically Endangered
Australasian bittern	*Botaurus poiciloptilus*	Endangered	Endangered
curlew sandpiper	*Calidris ferruginea*	Critically Endangered	Critically Endangered
south-eastern glossy black-cockatoo	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable
Coxen's fig-parrot	*Cyclopsitta diophthalma coxeni*	Endangered	Endangered
red goshawk	*Erythrotriorchis radiatus*	Vulnerable	Endangered
grey falcon	*Falco hypoleucos*	Vulnerable	Vulnerable
squatter pigeon (southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable
painted honeyeater	*Grantiella picta*	Vulnerable	Vulnerable
white-throated needletail	*Hirundapus caudacutus*	Vulnerable, Migratory	Vulnerable
swift parrot	*Lathamus discolor*	Critically Endangered	Endangered
powerful owl	*Ninox strenua*	-	Vulnerable
eastern curlew	*Numenius madagascariensis*	Critically Endangered, Migratory	Endangered
plumed frogmouth	*Podargus ocellatus plumiferus*	-	Vulnerable
Australian painted snipe	*Rostratula australis*	Endangered	Endangered
black-breasted button-quail	*Turnix melanogaster*	Vulnerable	Vulnerable
Frogs			
tusked frog	*Adelotus brevis*	-	Vulnerable
cascade tree frog	*Litoria pearsoniana*	-	Vulnerable
Fleay's frog	*Mixophyes fleayi*	Endangered	Endangered
giant barred frog	*Mixophyes iteratus*	Vulnerable	Vulnerable
Insects			
Australian fritillary	*Argynnis hyperbius inconstans*	Critically Endangered	Endangered
richmond birdwing	*Ornithoptera richmondia*	-	Vulnerable

Common Name	Scientific Name	EPBC Act Status	NC Act Status
pink underwing moth	*Phyllodes imperialis smithersi*	Endangered	-
Fishes			
Australian lungfish^	*Neoceratodus forsteri*	Vulnerable	-
Mary River cod^	*Maccullochella mariensis*	Endangered	-
Mammals			
large-eared pied bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable
northern quoll	*Dasyurus hallucatus*	Endangered	-
spot-tailed quoll (south eastern mainland population)	*Dasyurus maculatus maculatus*	Endangered	-
ghost bat	*Macroderma gigas*	Vulnerable	Endangered
greater glider (southern and central)	*Petauroides volans*	Endangered	Endangered
yellow-bellied glider (south-eastern)	*Petaurus australis australis*	Vulnerable	Vulnerable
brush-tailed rock-wallaby	*Petrogale penicillata*	Vulnerable	Vulnerable
koala	*Phascolarctos cinereus*	-	Endangered
long-nosed potoroo (northern)	*Potorous tridactylus tridactylus*	Vulnerable	Vulnerable
grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	-
Reptiles			
common death adder	*Acanthophis antarcticus*	-	Vulnerable
three-toed snake-tooth skink	*Coeranoscincus reticulatus*	Vulnerable	-
collared delma	*Delma torquata*	Vulnerable	Vulnerable
yakka skink	*Egernia rugosa*	Vulnerable	Vulnerable
southern snapping turtle^	*Elseya albagula*	Critically Endangered	Critically Endangered
Mary River turtle^	*Elusor macrurus*	Endangered	Endangered
Dunmall's snake	*Furina dunmalli*	Vulnerable	Vulnerable

^ these species are discussed in the aquatic ecology technical report prepared for the Project by Hydrobiology (2022) and as such are not discussed further in this report.

3.1.5.2 Migratory Species

A review of database search results identified 16 migratory species as having the potential to occur within the Study Area (**Appendix A**). Aquatic fauna identified in database searches – including the saltwater crocodile – are discussed in the aquatic ecology technical report prepared for the Project by Hydrobiology (2022) and thus have not been discussed further in this report.

Table 3.7 Desktop Search Results: Migratory Species

Common Name	Scientific Name	EPBC Act Status	NC Act Status
Migratory Marine Birds			
fork-tailed swift	*Apus pacificus*	Migratory	Special Least Concern
Migratory Marine Species			
salt-water crocodile	*Crocodylus porosus*	Migratory	Special Least Concern
Migratory Terrestrial Species			
oriental cuckoo	*Cuculus optatus*	Migratory	Special Least Concern
white-throated needletail	*Hirundapus caudacutus*	Vulnerable, Migratory	Vulnerable
black-faced monarch	*Monarcha melanopsis*	Migratory	Special Least Concern
spectacled monarch	*Monarcha trivirgatus*	Migratory	Special Least Concern
rufous fantail	*Rhipidura rufifrons*	Migratory	Special Least Concern
satin flycatcher	*Myiagra cyanoleuca*	Migratory	Special Least Concern
Migratory Wetlands Species			
common sandpiper	*Actitis hypoleucos*	Migratory	Special Least Concern
sharp-tailed sandpiper	*Calidris acuminata*	Migratory	Special Least Concern
pectoral sandpiper	*Calidris melanotos*	Migratory	Special Least Concern
Latham's snipe	*Gallinago hardwickii*	Migratory	Special Least Concern
eastern curlew	*Numenius madagascariensis*	Critically Endangered, Migratory	Critically Endangered
osprey	*Pandion haliaetus*	Migratory	Special Least Concern
common greenshank	*Tringa nebularia*	Migratory	Special Least Concern

3.1.5.3 Essential Habitat

Mapped essential habitat for 12 terrestrial fauna species occurs within the desktop search extent (**Table 3.8**).

Table 3.8 Essential Habitat Fauna Species

Common Name	Scientific Name	NC Act Status
black-breasted button-quail	*Turnix melanogaster*	Vulnerable
cascade treefrog	*Litoria pearsoniana*	Vulnerable
Coxen's fig-parrot	*Cyclopsitta diophthalma coxeni*	Endangered
giant barred frog	*Mixophyes iteratus*	Vulnerable
glossy-black cockatoo	*Calyptorhynchus lathami*	Vulnerable
greater glider	*Petauroides volans*	Endangered
koala	*Phascolarctos cinereus*	Endangered
long-nosed potoroo (northern)	*Potorous tridactylus tridactylus*	Vulnerable
marbled frogmouth	*Podargus ocellatus plumiferus*	Vulnerable
powerful owl	*Ninox strenua*	Vulnerable
spotted-tailed quoll (southern subspecies)	*Dasyurus maculatus maculatus*	Endangered
tusked frog	*Adelotus brevis*	Vulnerable

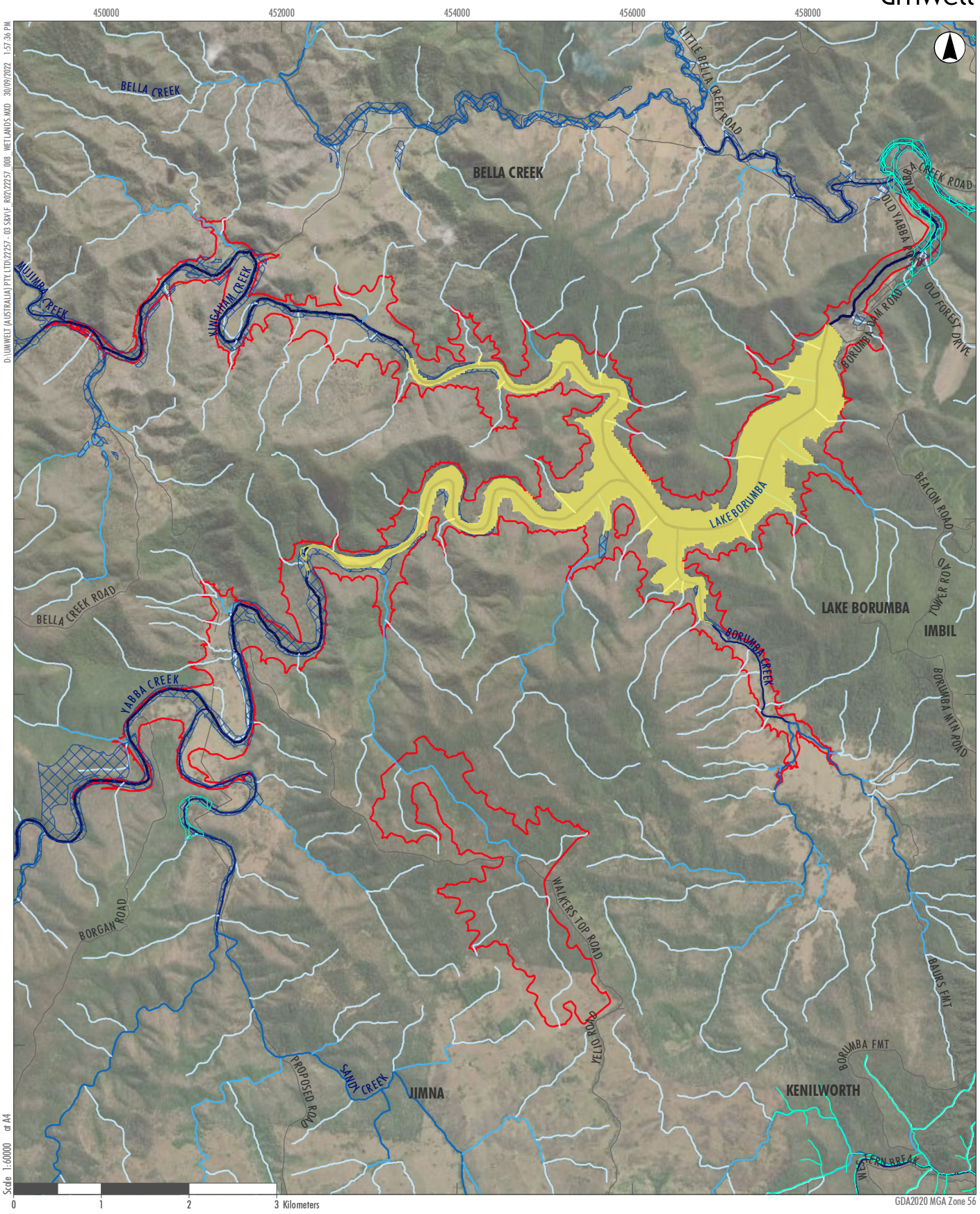
3.1.6 Watercourses and Wetlands

Watercourses and wetlands are discussed in detail in the aquatic ecology technical report prepared for the Project by Hydrobiology (2022). A summary of mapped watercourse and wetland values is provided below.

The Study Area forms part of the Mary River catchment and the Upper Mary River drainage sub-basin. The terrain associated with the Study Area is typically steep adjacent to Lake Borumba, with watercourses generally flowing into the lake via three main tributaries including Kingaham, Yabba and Borumba creeks. Kingaham and Yabba creeks flow from west to east and Borumba Creek flows from south to north. Several smaller unnamed watercourses flow into Lake Borumba from the surrounding steep terrain. Most drainage lines associated with the upper slopes of the Study Area are stream order 1 or 2 and are typically defined by rocky vegetated banks in moderately steep to steep gullies. Borumba Creek is mapped as stream order 4, Kingaham and Yabba creeks are mapped as stream order 5 whilst Lake Borumba and Yabba Creek downstream of the existing dam wall is mapped as stream order 6.

Lake Borumba is mapped as an artificial lacustrine waterbody (dam). Areas downstream of the existing dam wall are mapped as high ecological significant (HES) wetlands.

Watercourse and wetland mapping is provided in **Figure 3.6**.



Legend

Study Area
Roads

Stream Order
1
2
3
4
≥ 5

Wetland Areas
Lacustrine Wetlands (dam)
Riverine Wetlands
High Ecological Significance Wetlands

FIGURE 3.6

Watercourses and Wetlands

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

3.1.7 Protected Areas

Lake Borumba is bordered by Conondale National Park (**Figure 2.2**). Conondale National Park covers an area of approximately 35,700 ha and is characterised by large areas of remnant vegetation, rugged mountain ranges and boulder lined creeks. The aim of the national park is to provide mountainous protection areas for flora and fauna including threatened species that are at the limit of their range. The National Park provides refuge, including elevation for a number of threatened flora and fauna species and vegetation communities (DNPRSR, 2013).

The proposed lower reservoir extends into the National Park boundary, encompassing approximately 116 ha. These areas will become permanently inundated at the proposed FSL.

3.2 Field Surveys

3.2.1 Study Area Characteristics

Extending over approximately 1,588.9 ha, the Study Area is comprised predominantly of remnant vegetation and characterised by rolling and steep mountains. Areas to the west of the proposed lower reservoir and south of the proposed upper reservoir consist of cleared rolling hills where the dominant land use is cattle grazing.

The proposed upper reservoir consists primarily of remnant vegetation on the steep hills and gullies, particularly in the northern section (**Photo 3.1**). The Study Area ranges greatly in elevation between the proposed reservoirs. The upper reservoir ranges between 400 and 500 m AHD, while Lake Borumba ranges between 100 and 170 m AHD. The surface geology of the Study Area mostly occurs on volcanic and metamorphic geologies with intrusive granitoids and ultramafic rock.

The southern extent of the proposed upper reservoir Study Area consists of cleared land and is used for cattle grazing. Previous logging activity at the proposed upper reservoir is evident by the presence of cut stumps. Vegetation communities associated with the upper reservoir are comprised woodland to open forest, dominated by *Eucalyptus propinqua*, *E. siderophloia*, *E. acmenoides* and *E. microcorys*, with smaller intersecting patches of rainforest vegetation dominated by *Araucaria bidwillii* and *A. cunninghamii*.

Lake Borumba is primarily bordered by Conondale National Park and Imbil State Forest as protected areas and timber production respectively. Kingaham Creek and Yabba Creek are mostly cleared on the alluvial flats except for riparian vegetation and used for cattle grazing. The upper slopes surrounding these creeks are mostly vegetated outside of protected areas (**Photo 3.2**). Small pockets of residential land occur to the north and northwest of Borumba Dam with the town of Imbil occurring within 10 km of the existing dam wall. Vegetation types associated with the proposed lower reservoir are similar those of the proposed upper reservoir. Additionally, narrow patches of riparian vegetation exist shouldering creeks and rivers feeding into Lake Borumba, dominated by *Eucalyptus tereticornis* subsp. *tereticornis* and *Casuarina cunninghamiana* subsp. *cunninghamiana*.

Due to the steep topography within and surrounding the Study Area, vegetation communities on the upper hill crests and slopes remain relatively intact, having not been previously cleared. They typically consist of woodlands over native grasses. This trends to wet sclerophyll with vine thicket and dense shrub understorey along creek lines and gullies.

Photo 3.1 Proposed Upper Reservoir

Photo 3.2 Lower Reservoir

3.2.2 Flora

3.2.2.1 Flora Diversity

The flora surveys recorded 406 flora species from 93 families and 277 genera. The plant families represented by ten or more taxa included *Apocynaceae* (13 taxa), *Asteraceae* (18 taxa), *Cyperaceae* (13 taxa), *Euphorbiaceae* (10 taxa), *Fabaceae* (12 taxa), *Leguminosae* (38 taxa), *Moraceae* (10 taxa), *Myrtaceae* (27 taxa), *Poaceae* (41 taxa), *Rutaceae* (17 taxa) and *Sapindaceae* (15 taxa). Genera represented by five or more species included *Acacia* (6), *Cyperus* (6), *Eucalyptus* (9), *Ficus* (7), *Solanum* (5) and *Sporobolus* (5).

The full list of flora species recorded during field surveys is provided in **Appendix B**. Vouchered specimens that have been identified by the Queensland Herbarium have been included in **Appendix C**.

3.2.2.2 Introduced Species

Of the 406 flora species recorded, 43 (11 %) are introduced species. Seven of these are listed as Category 3 Restricted Plants under the Biosecurity Act while two are also a Weed of National Significance (WoNS):

- Chinese celtis (*Celtis sinensis*) – Category 3 Restricted Plant
- camphor laurel (*Cinnamomum camphora*) – Category 3 Restricted Plant
- cat's claw creeper (*Dolichandra unguis-cati*) – Category 3 Restricted Plant and WoNS
- lantana (*Lantana camara*) – Category 3 Restricted Plant and WoNS
- rat's tail grasses including *Sporobolus fertilis*, *Sporobolus natalensis* and *Sporobolus pyramidalis* – Category 3 Restricted Plants.

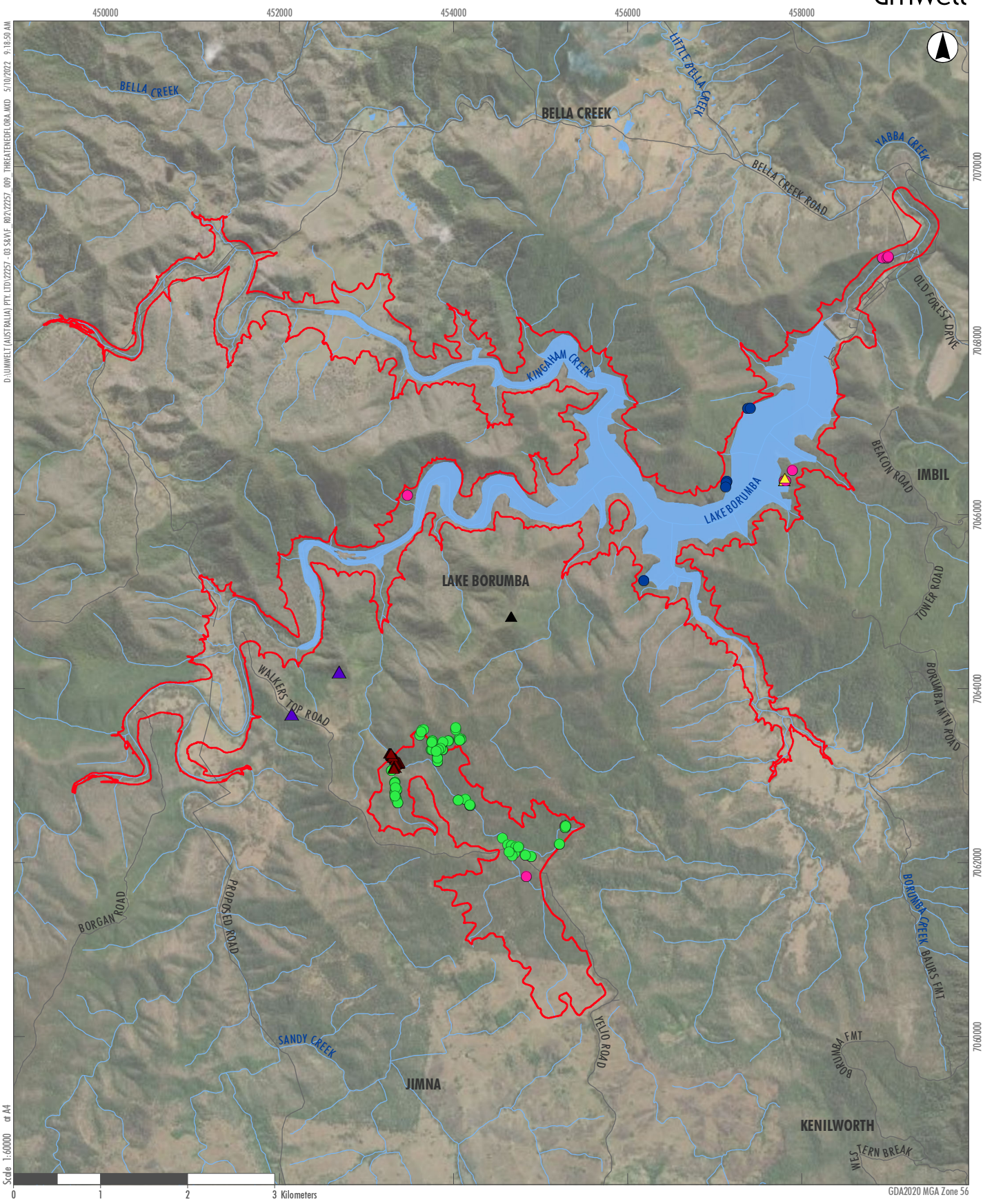
Five of the recorded introduced flora species are listed as 'Other Invasive Plants' by the Queensland Government (2016) including Bathurst burr (*Xanthium spinosum*), common sensitive plant (*Mimosa pudica*), corky passionflower (*Passiflora suberosa*), Easter cassia (*Senna pendula var. glabrata*) and noogoora burr (*Xanthium occidentale*).

3.2.2.3 Threatened Species

A total of seven threatened flora were identified within or immediately adjacent the Study Area during field surveys (**Table 3.9** and **Figure 3.7**).

Table 3.9 Threatened Flora Species Recorded Within and Adjacent to the Study Area

Common Name	Scientific Name	EPBC Act Status	NC Act Status
three-leaved bosistoa	*Bosistoa transversa*	Vulnerable	Least concern
-	*Coleus torrenticola*	Endangered	Endangered
ball nut	*Floydia praealta*	Vulnerable	Vulnerable
slender milkvine	*Leichhardtia coronata*	-	Vulnerable
rib-fruited malletwod	*Rhodamnia dumicola*	-	Endangered
scrub turpentine	*Rhodamnia rubescens*	Critically endangered	Critically Endangered
brush sophora	*Sophora fraseri*	Vulnerable	Vulnerable



Legend

- Study Area
- Reservoirs
- Roads
- Watercourse

Threatened Flora Records (Umwelt and SMEC 2022)

- *Bosistoa transversa*
- *Coleus torrenticola*
- *Floydia praealta*
- *Leichhardtia coronata*
- *Rhodamnia dumicola*
- *Rhodamnia rubescens*
- *Sophora fraseri*

FIGURE 3.7

Threatened Flora Records within Study Area

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

Bosistoa transversa

Bosistoa transversa was recorded at one location within the Study Area within a patch of RE 12.11.10 in the south-east area of the proposed lower reservoir. The species was recorded as being 'occasionally' present within the lower tree and shrub layers of the community with juveniles present. RE 12.11.10 comprises emergent *Araucaria cunninghamii* and *A. bidwillii* over a closed forest of *Argyrodendron trifoliolatum*, *Dendrocnide photinophylla* and *Brachychiton discolor*. Suitable habitat also occurs within RE 12.12.16.

Coleus torrenticola

Coleus torrenticola was recorded in the north-western corner of the proposed upper reservoir within community RE 12.11.3. RE 12.11.3 comprises a woodland to open forest dominated by *Eucalypts siderophloia, E. propinqua, E. microcorys* and *Lophostemon confertus*. A total of 36 individuals were recorded within the creek line of a gully within this community growing on the rocky creek edges.

Floydia praealta

Floydia praealta was recorded within patches of RE 12.11.10 within the proposed lower reservoir. These patches of RE 12.11.10 occurred on steep terrain and comprised emergent *Araucaria cunninghamii* and *A. bidwillii* over a closed forest of *Argyrodendron trifoliolatum*, *Dendrocnide photinophylla* and *Brachychiton discolor*.

Rhodamnia dumicola

Rhodamnia dumicola was recorded at both the proposed reservoirs. In the proposed lower reservoir, it was scattered throughout patches of RE 12.11.10, dominated by *Araucaria cunninghamii* and *A. bidwillii*. In the proposed upper reservoir, 11 individuals were recorded in a patch of RE 12.12.15 and one was recorded in RE 12.11.3. RE 12.12.15 is a woodland to open forest, dominated by *Eucalyptus propinqua, E. siderophloia, E. acmenoides* and *E. tereticornis*.

Rhodamnia rubescens

Rhodamnia rubescens was recorded within the northern half of the proposed upper reservoir. Approximately 160 individuals were recorded within and directly adjacent to the Study Area. Within the Study Area, it was mostly recorded within RE 12.11.3 with a few records within RE 12.12.23 and 12.12.16. RE 12.11.3 is a woodland to open forest dominated by *Eucalyptus siderophloia*, *E. propinqua*, *E. microcorys*, *Lophostemon confertus*, *Corymbia intermedia*, *E. acmenoides* and *Angophora leiocarpa*.

The species is depicted in **Photo 3.3** and field records outlined in **Figure 3.7**.

Photo 3.3 *Rhodamnia rubescens* individuals recorded within the Study Area

Leichhardtia coronata

Leichhardtia coronata was recorded approximately 1 km south of the proposed lower reservoir, outside of the Study Area. RE field verification was not undertaken for this area, but the state RE mapping identifies it as RE 12.11.3. Suitable habitat occurs within the Study Area, including RE 12.11.3 and 12.12.15.

Sophora fraseri

Sophora fraseri was recorded outside of the Study Area, approximately 400 m south of the proposed lower reservoir. RE field verification was not undertaken for this area given it is outside of the Study Area, but the state RE mapping for the area identifies it as RE 12.11.10. A total of five individuals were recorded. Suitable habitat within the Study Area comprises RE 12.11.10 and 12.12.16, as well as eucalypt dominated REs adjacent to these patches.

3.2.2.4 Vegetation Communities

Regional Ecosystems

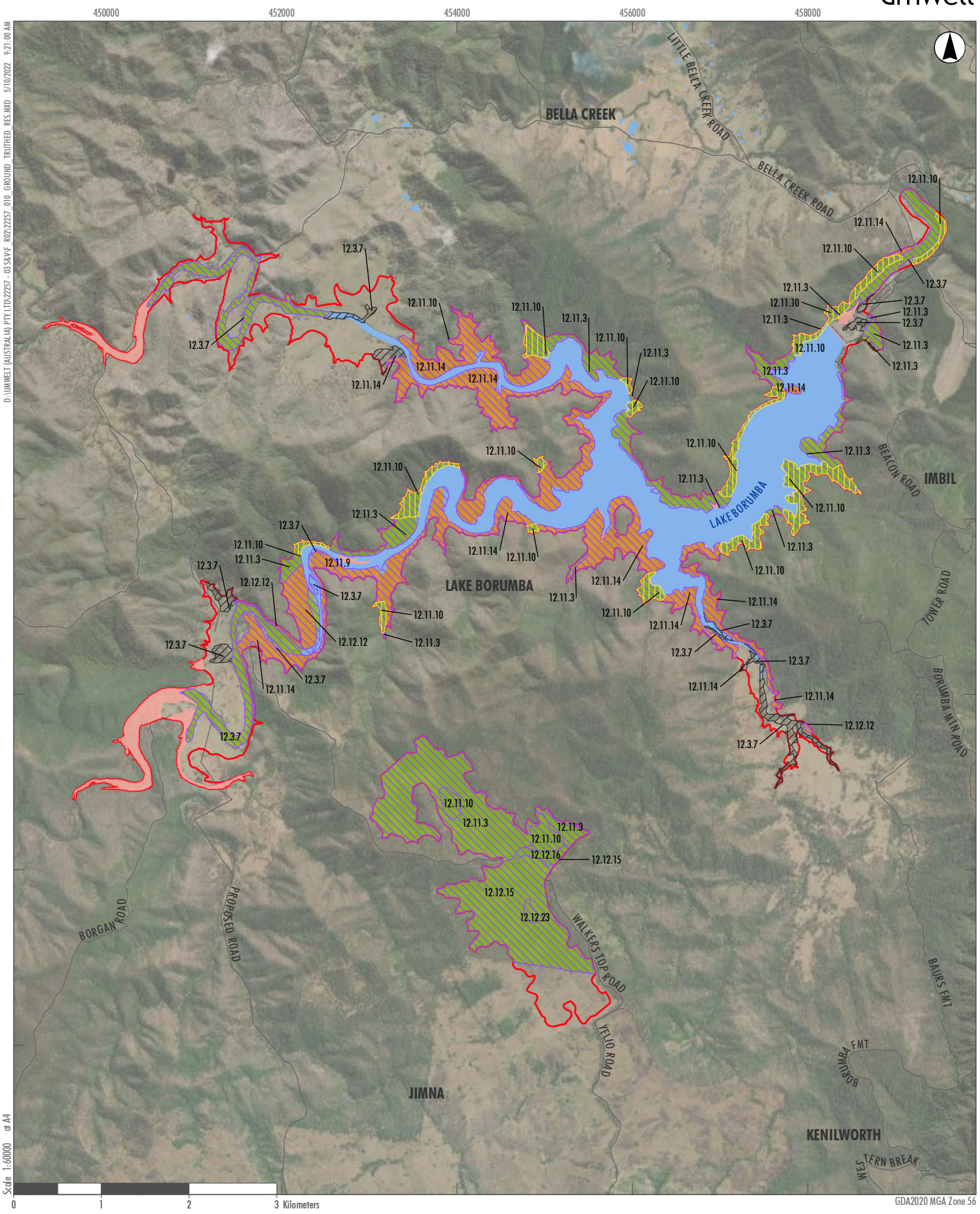
The field survey confirmed that the Study Area consists mostly of remnant vegetation (51 %). Non-remnant areas account for 17 % of the total area, with water (26 %), non-surveyed areas (3 %), regrowth vegetation (2 %), and native plantation (0.01 %) making up the remaining portions of the Study Area.

Nine REs were identified during field surveys, including three listed as Of Concern and six listed as Least Concern. Ground-truthed REs are presented in **Table 3.10** and described further in **Table 3.11**. Ground-truthed vegetation mapping is presented in **Figure 3.8**. Non-remnant areas (generally cleared areas utilised for cattle grazing) are present within both proposed reservoirs, particularly on the alluvial flats adjacent to Lake Borumba and Borumba, Kingaham and Yabba creeks in the proposed lower reservoir.

Table 3.10 Regional Ecosystems Ground-truthed within the Study Area

RE ID	Short Description	VM Act Class	Remnant Status	Area (ha)		
				Proposed Lower Reservoir	Proposed Upper Reservoir	Total (Study Area)
12.3.7	*Eucalyptus tereticornis*, *Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland.	Least concern	Remnant	97.8	-	97.8
			Regrowth	31.7	-	31.7
12.11.3	*Eucalyptus siderophloia*, *E. propinqua* +/- *E. microcorys*, *Lophostemon confertus*, *Corymbia intermedia*, *E. acmenoides* open forest on metamorphics +/- interbedded volcanics.	Least concern	Remnant	86.4	124.9	211.3
			Regrowth	1.1	-	1.1
12.11.9	*Eucalyptus tereticornis* subsp. *tereticornis* or *E. tereticornis* subsp. *basaltica* open forest on metamorphics +/- interbedded volcanics. Usually higher altitudes.	Of concern	Remnant	9.7	-	9.7
			Regrowth	-	-	-
12.11.10	Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics.	Least concern	Remnant	87.6	16.4	104.0
			Regrowth	-	-	-
12.11.14	*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics.	Of concern	Remnant	249.4	-	249.4
			Regrowth	5.3	-	5.3
12.12.12	*Eucalyptus tereticornis*, *Corymbia intermedia*, *E. crebra* +/- *Lophostemon suaveolens* woodland on Mesozoic to Proterozoic igneous rocks.	Of concern	Remnant	22.1		22.1
			Regrowth	-		-
12.12.15	*Corymbia intermedia* +/- *Eucalyptus propinqua*, *E. siderophloia*, *E. microcorys*, *Lophostemon confertus* open forest on Mesozoic to Proterozoic igneous rocks.	Least concern	Remnant	-	113.6	113.6
			Regrowth	-	-	-
12.12.16	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks.	Least concern	Remnant	-	6.4	6.4
			Regrowth	-	-	-
12.12.23	*Eucalyptus tereticornis* subsp. *tereticornis* or *E. tereticornis* subsp. *basaltica* +/- *E. eugenioides* woodland to open forest on crests, upper slopes and elevated valleys and plains on Mesozoic to Proterozoic igneous rocks.	Least concern	Remnant	-	2.7	2.7
			Regrowth	-	-	-

RE ID	Short Description	VM Act Class	Remnant Status	Area (ha)		
				Proposed Lower Reservoir	Proposed Upper Reservoir	Total (Study Area)
Non-remnant	Predominantly comprises cleared pasture, not representative remnant or regrowth vegetation.	-	-	229.2	44.1	273.4
Native Plantation	Commercially planted native species used for timber production, not representative of remnant or regrowth vegetation.	-	-	0.1	-	0.1
Not surveyed	As noted in **Section 2.2.6**, this area was not assessed during field surveys and may contain non-remnant, remnant and/or regrowth vegetation.	-	-	54.9	-	54.9
Water	-	-	-	405.3	-	405.3
			Total Area (ha)	**1,280.8**	**308.0**	**1,588.8**



Legend

- Study Area
- Roads
- Not Surveyed
- Reservoirs

Threatened Ecological Community

- Lowland Rainforest of Subtropical Australia

Remnant Status

- Regrowth
- Remnant

Ground-truthed Regional Ecosystems

- Of Concern
- Least Concern

FIGURE 3.8

Ground-truthed REs and TECs

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

Table 3.11 Descriptions of Remnant Regional Ecosystems Confirmed Within the Study Area

RE Code	Vegetation Description	
12.3.7	Woodland to open forest of *Eucalyptus tereticornis* subsp. *tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana, Grevillea striata* and *Angophora floribunda* over woodland to open forest of *Melaleuca bracteata, Melaleuca viminalis* and *Waterhousea floribunda* over a ground layer of *Lomandra hystrix, Ottochloa gracillima, Dianella caerulea, *Oxalis* sp., and **Stenotaphrum secundatum.*	
VM Act Status	Least Concern	
TEC(s) that the RE may correspond to	N/A	
Area (ha) in proposed lower reservoir	97.8	
Area (ha) in proposed upper reservoir	-	
Total Area (ha) in Study Area	97.8	
Structure (m)	T1 (19-25) T2 (10-18) T3 (3-6) S (0.5-2)	
12.11.3	Woodland to open of *Eucalyptus siderophloia, E. propinqua, E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides* and *Angophora leiocarpa* over a woodland to open forest of *L. confertus, C. intermedia, Acacia disparrima* subsp. d*isparrima, Allocasuarina torulosa* over a shrub layer of *A. disparrima* subsp. *disparrima, Alphitonia excelsa, *Lantana camara, Breynia oblongifolia, *Solanum seaforthianum* and *Everistia vacciniifolia forma vacciniifolia* over a ground layer of *Ottochloa gracillima, Pandorea pandorana, Cyperus gracilis, Eustrephus latifolia, Lomandra confertifolia* subsp. *pallida* and **Rivina humilis*.	
VM Act Status	Least Concern	
TEC(s) that the RE may correspond to	N/A	
Area (ha) in proposed lower reservoir	86.4	
Area (ha) in proposed upper reservoir	124.9	
Total Area (ha) in Study Area	211.3	
Structure (m)	T1 (25-27) T2 (14-18) T3 (4-7) S1 (1-2)	

<table>
<tr><th>RE Code</th><th colspan="2">Vegetation Description</th></tr>
<tr><td>12.11.9</td><td colspan="2">Woodland of open forest of Eucalyptus tereticornis subsp. tereticornis and E. crebra over an open woodland of Lophostemon suaveolens and Angophora subvelutina over an open shrubland of *Lantana camara and *Gomphocarpus physocarpus over a grassland of Themeda triandra, Eragrostis sp., and Bothriochloa decipiens subsp. Decipiens.</td></tr>
<tr><td>VM Act Status</td><td>Of Concern</td><td rowspan="6">  </td></tr>
<tr><td>TEC(s) that the RE may correspond to</td><td>N/A</td></tr>
<tr><td>Area (ha) in proposed lower reservoir</td><td>9.7</td></tr>
<tr><td>Area (ha) in proposed upper reservoir</td><td>-</td></tr>
<tr><td>Total Area (ha) in Study Area</td><td>9.7</td></tr>
<tr><td>Structure (m)</td><td>T1 (20-30)
T2 (8-14)
T3 (4-6)
S (1-2)</td></tr>
<tr><td>12.11.10</td><td colspan="2">Emergent Araucaria cunninghamii and Araucaria bidwillii over a closed forest of Argyrodendron trifoliolatum, Dendrocnide photinophylla, Brachychiton discolor, Flindersia australis, Ficus obliqua, Vitex lignum-vitae and Ackama paniculosa over a subcanopy of Mallotus philippensis, Aphananthe philippensis, Gossia bidwillii over a shrub layer of Diospyros fasciculosa, Atractocarpus chartaceus, Acronychia imperforate, Wilkiea macrophylla, Citrus australis and *Lantana camara over a ground layer of Ottochloa gracillima, Oplismenus aemulus, Cordyline rubra, and *Rivina humilis.</td></tr>
<tr><td>VM Act Status</td><td>Least Concern</td><td rowspan="6">  </td></tr>
<tr><td>TEC(s) that the RE may correspond to</td><td>Lowland Rainforest of Subtropical Australia (Critically Endangered)</td></tr>
<tr><td>Area (ha) in proposed lower reservoir</td><td>87.6</td></tr>
<tr><td>Area (ha) in proposed upper reservoir</td><td>16.4</td></tr>
<tr><td>Total Area (ha) in Study Area</td><td>104.0</td></tr>
<tr><td>Structure (m)</td><td>E (25-30)
T1 (18-22)
T2 (10-15)
T3 (4-8)
S1 (1-3)</td></tr>
</table>

RE Code	Vegetation Description	
12.11.14	**Woodland to open forest of *Eucalyptus crebra, Angophora leiocarpa* and *Corymbia intermedia* over a woodland to low open forest of *E. crebra, C. intermedia, E. acmenoides* and *Acacia disparrima* subsp. *disparrima* over a grassland of *Themeda triandra, Imperata cylindrica, Panicum simile, Desmodium rhytidophyllum, Goodenia rotundifolia* and *Scleria mackaviensis*.**	
VM Act Status	Of Concern	
TEC(s) that the RE may correspond to	N/A	
Area (ha) in proposed lower reservoir	249.4	
Area (ha) in proposed upper reservoir	-	
Total Area (ha) in Study Area	249.4	
Structure (m)	T1 (15-20) T2 (5-13) S1 (2-3) G (0 -0.5)	
12.12.12	**Open forest of *Eucalyptus tereticornis* subsp. *tereticornis and E. crebra* over a woodland of *Lophostemon suaveolens, E. crebra* and *E. tessellaris* over an open shrubland of **Lanata camara* over a ground layer of *Themeda triandra, Chrysopogon fallax, Entolasia stricta, Cymbopogon refractus* and *Fimbristylis dichotoma*.**	
VM Act Status	Of Concern	
TEC(s) that the RE may correspond to	N/A	
Area (ha) in proposed lower reservoir	22.1	
Area (ha) in proposed upper reservoir	-	
Total Area (ha) in Study Area	22.1	
Structure (m)	T1 (17-24) T2 (10-14) T3 (4-8) S1 (0.5-1) G (0 - 0.5)	

RE Code	Vegetation Description	
12.12.15	Woodland to open forest of *Eucalyptus propinqua, E. siderophloia, E. acmenoides, E. tereticornis* and *Lophostemon confertus* over a woodland of *E. acmenoides, Acacia melanoxylon, Allocasuarina torulosa,* over a ground layer of *Imperata cylindrica*, T*hemeda triandra, Ottochloa gracillima, Cymbopogon refractus, Desmodium rhytidophyllum, Hydrocotyle laxiflora* and *Lobelia purpurascens.*	
VM Act Status	Least Concern	
TEC(s) that the RE may correspond to	N/A	
Area (ha) in proposed lower reservoir	-	
Area (ha) in proposed upper reservoir	113.6	
Total Area (ha) in Study Area	113.6	
Structure (m)	T1 (25-35) T2 (10-15) T3 (3-6) S1 (1-2) G (0-0.5)	
12.12.16	Closed to open forest of *Araucaria bidwillii, Eucalyptus grandis* and *Ficus rubiginosa* over a closed forest of *E. grandis, Lophostemon confertus, Diploglottis australis, Polyscias elegans*, and *Mallotus philippensis* over a shrub layer of *Carissia ovata* and *Smilax australis* over a ground layer of *Blechnum* sp.	
VM Act Status	Least Concern	
TEC(s) that the RE may correspond to	Lowland Rainforest of Subtropical Australia (Critically Endangered)	
Area (ha) in proposed lower reservoir	-	
Area (ha) in proposed upper reservoir	6.4	
Total Area (ha) in Study Area	6.4	
Structure (m)	T1 (25-35) T2 (15-22) T3 (5-8) S1 (2-4) S2 (0.5-2) G (0-0.5)	

RE Code	Vegetation Description	
12.12.23	Woodland to open forest of *Eucalyptus tereticornis* subsp. *tereticornis*, *E. propinqua*, *E. microcorys*, *E. siderophloia* over woodland to open forest of *E. acmenoides*, *E. propinqua*, *E. siderophloia*, *Allocasuarina torulosa* and *Acacia melanoxylon* over a ground layer of *Imperata cylindrica*, *Cymbopogon refractus*, *Themeda triandra*, *Capillipedium spicigerum*, *Panicum simile*, *Desmodium rhytidophyllum* and *Hydrocotyle laxiflora*.	
VM Act Status	Least Concern	
TEC(s) that the RE may correspond to	N/A	
Area (ha) in proposed lower reservoir	-	
Area (ha) in proposed upper reservoir	2.7	
Total Area (ha) in Study Area	2.7	
Structure (m)	T1 (20-27) T2 (6-16) T3 (3-6) S1 (0.5-1) G (0-0.5)	

Threatened Ecological Communities

One TEC was identified within the Study Area: Lowland Rainforest of Subtropical Australia. The extent of the TEC within the Study Area is shown in **Figure 3.8**.

The TEC occurs on basalt and alluvial soils, as well as occasionally on historically enriched rhyolitic soils and basaltically enriched metasediments (DSEWPaC, 2011c). It generally occurs in areas <300 m above sea level (ASL) and greater than 2 km from the coast. This TEC is a moderately tall (≥20 m) to tall (≥30 m) closed forest. Tree species comprise those with compound, relatively large leaves (notophyll to mesophyll). The canopy is often multilayered, comprising an upper, discontinuous layer of emergent over the main canopy. The understorey comprises sparse shrubs and seedlings. To be considered this TEC, the community needs to contain > 30 woody species that are listed in Appendix A of the TECs Listing Advice.

Targeted surveys for the TEC were undertaken within three patches of RE 12.11.10 in the proposed lower reservoir (LRSA 1, 2 and 3). The state of the three TEC patches varied, though all three patches met the minimum 30 woody species from Appendix A of the listing advice (DSEWPaC, 2011c) to be considered the TEC. Given the similarity of quality of all patches of RE 12.11.10 observed during the flora survey in the proposed lower reservoir, it is considered highly likely that all patches of RE 12.11.10 within the proposed lower reservoir constitute the TEC.

Patches of RE 12.11.10 and RE 12.12.16 recorded in the proposed upper reservoir may also be synonymous with the TEC, despite their altitude higher than what is generally recorded for the TEC. Targeted surveys are recommended for the patches of RE 12.11.10 and RE 12.12.16 in the proposed upper reservoir and the remaining patches of RE 12.11.10 in the proposed lower reservoir to confirm the extent of the TEC.

An assessment of RE 12.11.10 against the key diagnostic characteristics and condition thresholds is provided in **Table 3.12** and **Table 3.13**. Assumptions have been made for patches that were not subject to targeted surveys. The assessment against the condition thresholds indicates that the three confirmed patches of the TEC within the proposed lower reservoir are classified as Type A, with criteria relevant to the patches highlighted in green. The patch on the northern margin of Lake Borumba (LRSA 2) had a canopy to 24 m high, with a shrub layer to 5 m high. It was typically dominated by bunya pine (*Araucaria bidwillii*), hoop pine (*Araucaria cunninghamii* var. *cunninghamii*) and *Ficus obliqua*. Weeds, including lantana (*Lantana camara*), were persistent throughout. The patches along the western and southern margins of Lake Borumba (LRSA 1 and 3 had a canopy to 22 m, with a shrub layer to 4 m. These patches were typically less weedy, and were dominated by blackwood (*Acacia melanoxylon*), *Araucaria bidwillii*, *Araucaria cunninghamii* var. *cunninghamii*, *Ficus macrophylla* and *Vitex lignum-vitae*.

Table 3.12 Lowland Rainforest of Subtropical Australia Key Diagnostic Characteristics

Key Diagnostic Characteristics	Site Results	
	Verified Patches (LRSA 1, 2 and 3)	Unverified Patches
Distribution of the ecological community is primarily in the NSW North Coast and South Eastern Queensland bioregions, according to Interim Biogeographic Regionalisation for Australia (IBRA) version 6.1 (2004).	**Yes**, the Study Area occurs within the South Eastern Queensland bioregion.	**Yes**, the Study Area occurs within the South Eastern Queensland bioregion.
The ecological community occurs on: soils derived from basalt or alluvium; or enriched rhyolitic soils; or basaltically enriched metasediments.	**Yes**, the Study Area occurs on basalt or alluvium.	**Yes**, the Study Area occurs on basalt or alluvium.
The ecological community generally occurs at an altitude less than 300 m ASL.	**Yes**, patches occur below 300 m ASL.	**Likely**, Patches in the proposed lower reservoir are below 300 m ASL. Patches in the proposed upper reservoir occur between 450-500 m ASL, however, this does not preclude them from being the TEC.
The ecological community typically occurs in areas with high annual rainfall (>1300 mm).	**Yes**, average annual rainfall 1,483 mm (weather station 040861, 50 km east of Study Area (BoM 2022).	**Yes**, average annual rainfall 1,483 mm (weather station 040861, 50 km east of Study Area (BoM 2022).
The ecological community is typically more than 2 km inland from the coast.	**Yes**, the Study Area is greater than 2 km from the coast.	**Yes**, the Study Area is greater than 2 km from the coast.
The structure of the ecological community is typically a tall (20 m–30 m) closed forest, often with multiple canopy layers.	**Yes**, the vegetation comprises a canopy of 22-24 m tall and is a closed forest with multiple canopy layers.	**Likely**, requires additional targeted surveys to verify.
Patches of the ecological community typically have high species richness (at least 30 woody species from Appendix A of the listing advice (TSSC 2011)).	**Yes**, patches had at least 30 woody species. See **Appendix B**.	**Likely**, requires additional targeted surveys to verify.

Table 3.13 Lowland Rainforest of Subtropical Australia Condition Thresholds

Patch Type	A	B	C
Evidence of remnant vegetation and regeneration status	Natural remnant evident by the persistence of mature residual trees from Appendix B of the listing advice (TSSC 2011) **AND**	Some residual trees from Appendix B are present plus evidence of either; natural regeneration **AND/OR** regeneration with active management **AND**	A non-remnant patch that has recovered through: a) natural regeneration **AND/OR** b) supplementary planting that has stature and quality that is reflective of the 'Description' **AND**
Patch Size (excludes buffer zone)	≥ 0.1 ha **AND**	≥ 1 ha **AND**	≥ 2 ha **AND**
Canopy Cover (over entire patch)	Emergent/canopy/subcanopy cover is ≥ 70 % **AND**		
Species Richness (over entire patch)	Contains ≥ 40 native woody species from Appendix A of listing advice (TSSC 2011). **AND**	Contains ≥ 30 native woody species from Appendix A of the listing advice (TSSC 2011). **AND**	
Percent of total vegetation cover that is native (use sample plot)	≥70 % of vegetation is native	≥50 % of vegetation is native	

3.2.2.5 Vegetation Condition

As described in **Section 2.2.4** , a total of 19 BioCondition assessments were completed across the Study Area. BioCondition assessments targeted a total of eight REs in remnant and regrowth condition comprising nine Assessment Units (AUs). Raw attribute values in relation to the benchmark values are presented in **Appendix D**, with scores summarised in **Table 3.14**.

The average condition score per AU ranges from 7.1 (AU 2) to 5.3 (AU 8) however, it is noted that current sampling effort is not even and not all REs present have been assessed. Of the nine AUs, AU1, 2 and 3 all achieved a score of 7 or higher, reflecting the moderate to high native species diversity, low weed cover and established canopy layers with heights and cover comparable to the benchmark. In contrast, AUs 8 and 9 received scores less than six. This was primarily a result of low to absent native grass cover, low grass and forb richness and low coarse woody debris levels relative to the benchmark.

Table 3.14 BioCondition Results Summary – Vegetation Condition Scores

Assessment Unit	RE	Condition	Number of Sites	Average AU Score (/10)
1	12.11.3	Remnant	3	7.0
2	12.11.10	Remnant	3	7.1
3	12.11.14	Remnant	3	7.0
4	12.12.12	Remnant	1	6.5
5	12.12.15	Remnant	3	6.5
6	12.12.16	Remnant	1	6.7
7	12.12.23	Remnant	1	6.9
8	12.3.7	Regrowth	1	5.3
9	12.3.7	Remnant	3	5.6

3.2.3 Fauna

3.2.3.1 Fauna Diversity

A total of 147 fauna species were identified within the Study Area, comprising of 91 birds, 45 mammals, 6 reptiles and 5 amphibians. The full list of fauna species identified during the fauna survey is provided in **Appendix F**.

3.2.3.2 Threatened Species

Three threatened species were recorded during preliminary field surveys (**Table 3.15**). Record locations are provided in **Figure 3.9**.

Table 3.15 Threatened Fauna Species Recorded within the Study Area

Common Name	Scientific Name	EPBC Act Status	NC Act Status
glossy black-cockatoo (south-eastern)	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable
koala	*Phascolarctos cinereus*	Endangered	Endangered
long-nosed potoroo (northern)	*Potorous tridactylus tridactylus*	Vulnerable	Vulnerable

Glossy Black-Cockatoo (South-Eastern)

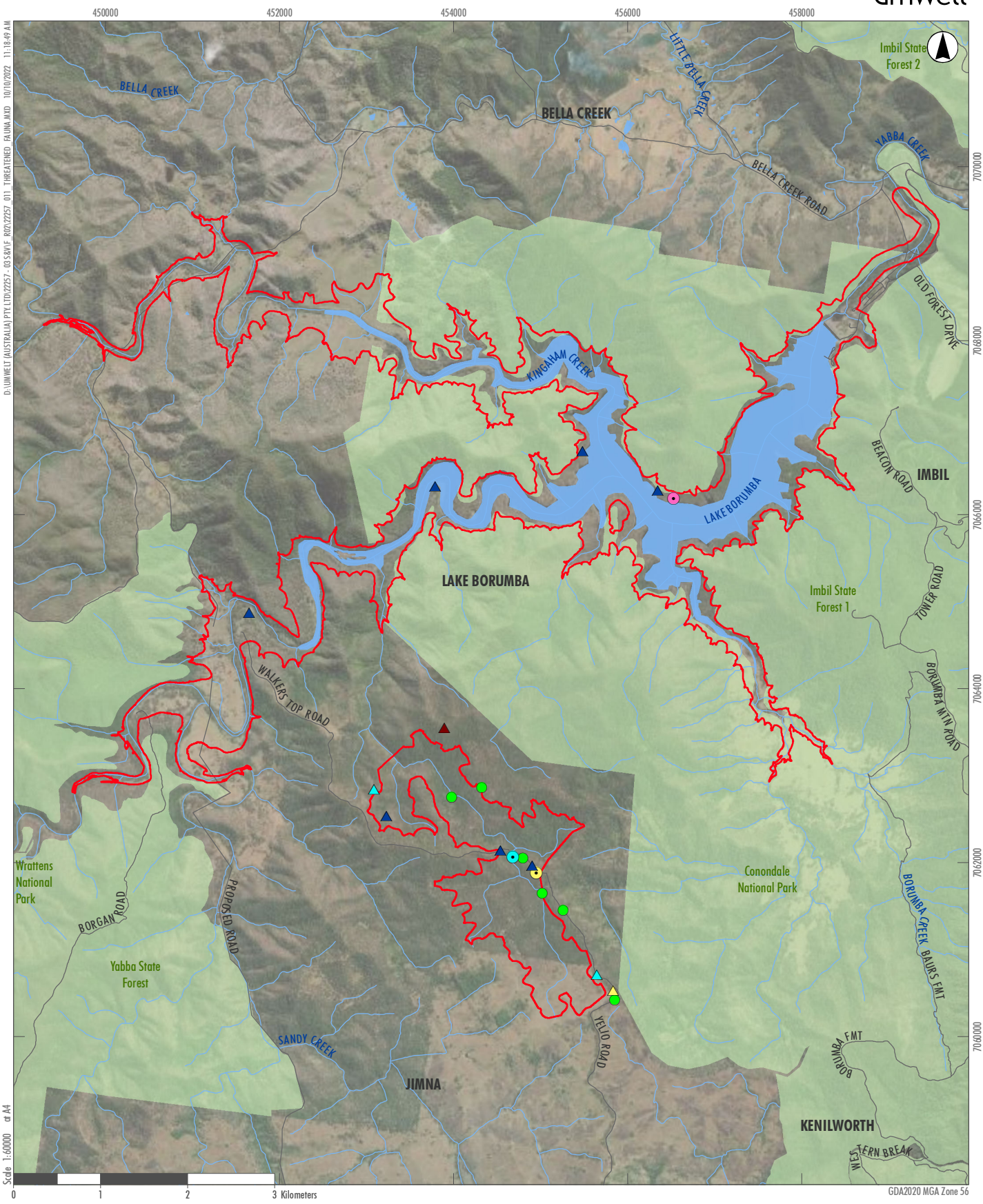
Six glossy-black cockatoo records were made within the proposed upper reservoir, with one record made aurally. Two individuals were observed feeding in *Allocasuarina torulosa*.

Koala

Koalas were visually observed once and recorded once on a camera trap in the proposed upper reservoir. Koala scats were found at 7 SAT sites across both proposed reservoirs, within Eucalypt dominated woodland.

Long-nosed Potoroo

Long-nosed potoroo (northern) was recorded once on a camera trap in the proposed upper reservoir. The record was made along a creekline within notophyll vine forest.



Legend

- Study Area
- Protected Areas
- Reservoirs
- Roads
- Watercourse

SMEC Records

- Glossy-black Cockatoo (SMEC 2022)
- Koala (SMEC 2022)

Umwelt Records

- Glossy-black Cockatoo
- Koala
- Koala (Scats)
- Koala (Photo)
- Long-nosed Potoroo
- Short-beaked Echidna

FIGURE 3.9

Threatened and Migratory Fauna Records

3.2.3.3 Special Least Concern (Non-Migratory) Species

One special least concern (non-migratory) species was recorded during preliminary field surveys: short-beaked echidna (*Tachyglossus aculeatus*). The species a was recorded within the lower reservoir, within mixed Eucalypt woodland associated with RE 12.11.3 (**Figure 3.9**).

3.2.3.4 Migratory Species

One migratory/special least concern species listed under the EPBC Act and NC was recorded during preliminary field surveys: osprey (*Pandion haliaetus*) was recorded flying over Lake Borumba (**Figure 3.9**).

3.2.3.5 Introduced Species

The fauna survey recorded nine introduced fauna species, two of which are listed as invasive and five listed as restricted invasive biosecurity matters under the *Biosecurity Act 2014* (**Table 3.16)**.

Table 3.16 Introduced Species Recorded within the Study Area

Common Name	Scientific Name	*Biosecurity Act 2014* Status
cane toad	*Rhinella marina*	Invasive
European brown hare	*Lepus europaeus*	-
European cattle	*Bos taurus*	-
European rabbit	*Oryctolagus cuniculus*	Restricted Invasive
European red fox	*Vulpes vulpes*	Restricted Invasive
feral cat	*Felis catus*	Restricted Invasive
feral pig	*Sus scrofa*	Restricted Invasive
house mouse	*Mus musculus*	Invasive
rusa deer	*Cervus timorensis*	Restricted Invasive

EPBC Act 'key threatening processes' are processes which threaten the survival, abundance or evolutionary development of a native species or ecological community (DCCEEW, 2022c). Key threatening processes relevant to the above introduced species include:

- the biological effects, including lethal toxic ingestion, caused by cane toads (*Rhinella marina*)
- predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)
- competition and land degradation by European rabbits (*Oryctolagus cuniculus*)
- predation by European red foxes (*Vulpes vulpes*)
- predation by feral cats (*Felis catus*).

3.2.3.6 Fauna Habitat Types

The Study Area supports six broad fauna habitat types (**Table 3.17**). These fauna habitat types have been mapped based on ground-truthed RE mapping in combination with habitat values assessed within the Study Area (**Figure 3.10**). The various habitat types support multiple threatened and migratory fauna species which are known to occur or have a moderate or high likelihood of occurring within the Study Area.

Table 3.17 Fauna Habitat Types within the Study Area

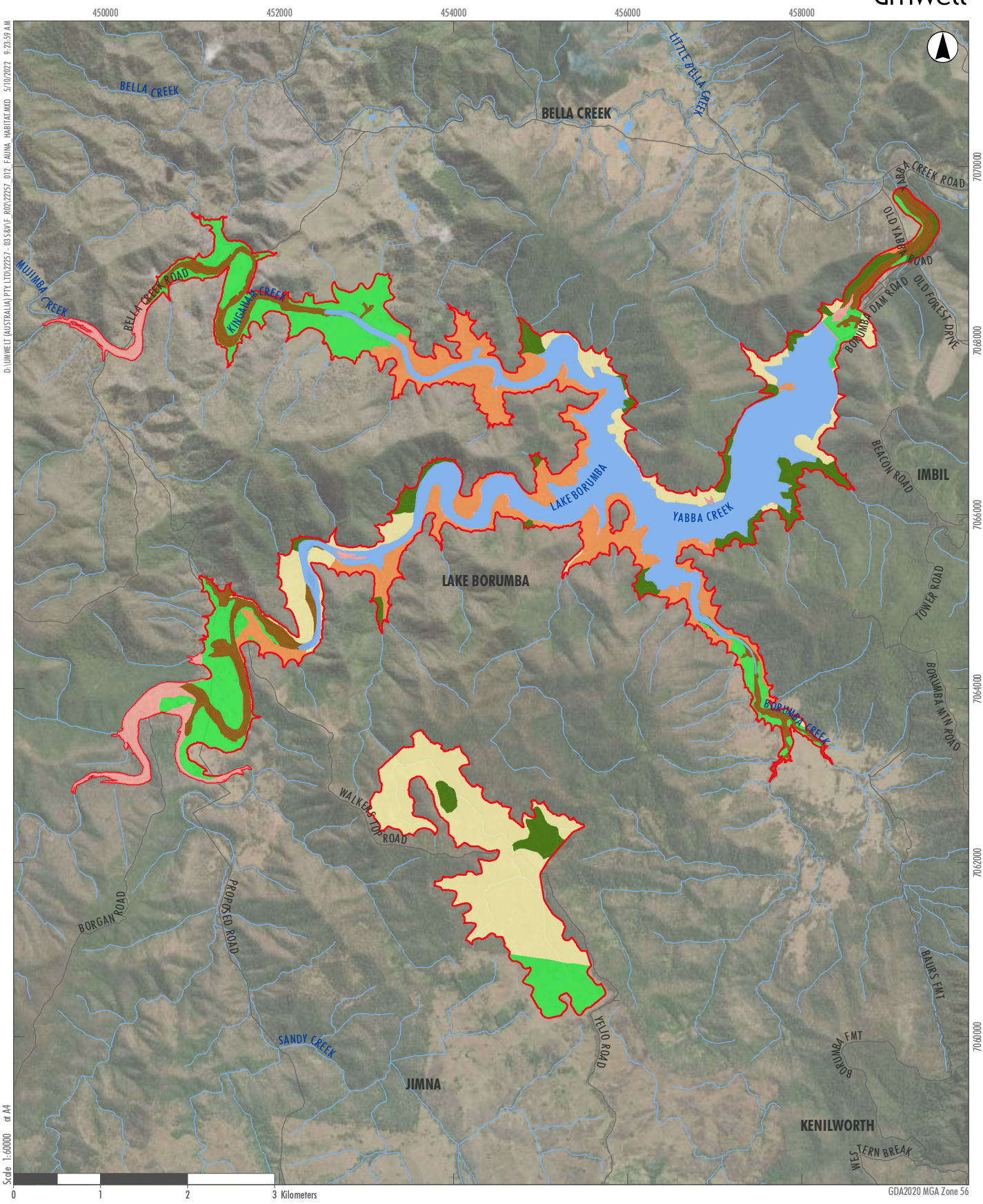
Fauna Habitat Type	Habitat Description, Structure and Associated Habitat Features	Associated Regional Ecosystems	Area (ha)		
			Proposed Lower Reservoir	Proposed Upper Reservoir	Total
Notophyll vine forests on foothills and ranges	This habitat type occurred on hillslopes and stream banks of gently undulating plains, steep hills and steep mountains within the Study Area. The vegetation structure and composition comprised complex evergreen notophyll vine forests with a dense closed canopy of up to 30 m in height with 70 % canopy cover with emergent trees including *Araucaria cunninghamii*, *A. bidwillii*, *Alphitonia excelsa*, and *Ficus obliqua*. This habitat type formed a mid-dense subcanopy, a mid-dense shrub or low tree layer and a low layer which was generally sparse. The dense structure of this habitat type provides important shelter habitat for ground dwelling fauna such as long-nosed potoroo (northern). It also provides complex habitat for bird species including migratory (black-faced monarch, oriental cuckoo, spectacled monarch) and marbled frogmouth. Ficus spp. provide foraging opportunities for frugivorous birds. Rainforest gullies associated with flowing streams have the potential to provide foraging and breeding habitat for amphibian species including the threatened cascade treefrog, Fleay's frog, giant barred frog, and tusked frog. The Richmond birdwing vine (*Pararistolochia praevenosa*) and mountain aristolochia vine (*Aristolochia acuminata*) occur in sub-tropical rainforest which are important larval host plants of the Richmond birdwing. Small and large litter was common to abundant providing potential foraging and refuge opportunities for species that utilise this habitat feature including black-breasted button-quail and common death adder. Small fallen logs under 10 cm in diameter were occasional to common in abundance providing foraging and refuge microhabitat for detritivore insects which also provides foraging opportunities for insectivorous fauna. Disturbance within this habitat type was mostly associated with weeds; lantana commonly formed dense thickets. Disturbance from fire and logging was also observed, though generally low in severity.	12.11.10, 12.12.16	87.6	22.8	110.4

Moist to dry open woodlands on metamorphic and volcanic rocks	This habitat type occurred on stream banks, hillslopes, hillcrests and plains of rolling hills to steep hills and mountains on metamorphic and igneous rocks. The vegetation structure and composition comprised open woodland with a canopy of 18 to 25 m in height and up to 70 % cover with emergent trees including *Eucalyptus tereticornis* and *E. grandis*. The canopy was dominated by myrtaceous tree species including *Corymbia intermedia*, *E. acmenoides*, *E. siderophloia*, *E. tereticornis*, *E. propinqua*, and *Lophostemon confertus*. The subcanopy and shrub layer was sparse comprised predominantly of young canopy species and *Allocasuarina torulosa*. The dense ground cover consisted of native grasses and occasional forbs. This habitat type provides dispersal opportunities for woodland and migratory bird species. Tree species associated with the canopy typically bore hollows as mature trees. Small hollows were recorded regularly through this habitat type however they were generally rare or occurred occasionally at a local scale. Large hollows were generally rarely observed or absent with only some areas recording higher densities. Hollows provide important nesting and refuge habitat for arboreal mammals and hollow nesting bird species. Hollows also provide habitat for threatened species including powerful owl, glossy black-cockatoo, greater glider and yellow-bellied glider. The myrtaceous canopy provides foraging opportunities for species that feed on nectar and foliage. These resources have the potential to provide foraging resources for grey-headed flying-fox, greater glider, and yellow-bellied glider. Furthermore, the canopy was dominated by koala food trees providing suitable foraging, breeding, dispersal and refuge habitat for the species with both the species and signs of the species being recorded in this habitat type. Glossy black-cockatoos were observed feeding in stands of *A. torulosa* during the field survey. *A. torulosa* was recorded regularly throughout this habitat type, and is an important foraging species for glossy black-cockatoos. Microhabitat features associated with this habitat type included fallen logs of varying size categories (small, medium and large), decorticating bark, litter (coarse and fine), native grasses, arboreal termitaria and dense shrubs. Large fallen logs were observed regularly, providing foraging and shelter opportunities for ground dwelling fauna. The combination of microhabitat features associated with fallen logs, native grasses and dense shrubs provides important foraging, refuge, breeding and dispersal habitat for a variety of ground dwelling fauna. A high diversity of ground dwelling mammals was recorded during the systematic trapping and camera trap program. The threatened long-nosed potoroo (northern) was recorded in this habitat type. Wet sclerophyll gullies associated with flowing streams have the potential to provide foraging and breeding habitat for amphibian species including the threatened cascade treefrog, Fleay's frog, giant barred frog, and tusked frog. Evidence of disturbance from logging was regularly observed and of moderate severity.	12.11.3, 12.11.9, 12.12.12, 12.12.15, 12.12.23	119.4	241.1	360.5

Fauna Habitat Type	Habitat Description, Structure and Associated Habitat Features	Associated Regional Ecosystems	Area (ha)		
			Proposed Lower Reservoir	Proposed Upper Reservoir	Total
Dry to moist eucalypt woodlands and open forests on undulating to hilly terrain of metamorphic and volcanic rocks	This habitat type occurred on plains, foot slopes and hillslopes of rolling plains, undulating rises, steep to very steep hills and steep mountains on metamorphic and volcanic rocks. The vegetation structure and composition comprised open woodland with a canopy of 15 to 25 m in height and up to 70 % cover. The canopy generally comprised *Angophora leiocarpa*, *Eucalyptus crebra*, *E. tereticornis*, *E. acmenoides* and *E. siderophloia*. The subcanopy was generally sparse, comprising young canopy species and *Allocasuarina torulosa*. The shrub layer was generally very sparse and comprised *Lantana camara** and *Acacia* spp.. The dense ground cover comprised native and exotic grasses. This habitat type demonstrated the highest density of hollows. Small hollows were relatively common, while large hollows were common in some locations but rare in others. Hollows provide important nesting and refuge habitat for arboreal mammals and hollow nesting bird species. Hollows have the potential to provide habitat for threatened species including powerful owl, glossy black-cockatoo, greater glider and yellow-bellied glider. The myrtaceous canopy provides foraging opportunities for species that feed on nectar and foliage. These resources have the potential to provide foraging resources for grey-headed flying-fox, greater glider, and yellow-bellied glider. Furthermore, the canopy was dominated by koala food trees providing suitable foraging, breeding, dispersal and refuge habitat for the species with both the species and signs of the species being recorded in this habitat type. Glossy black-cockatoos were observed feeding in stands of *A. torulosa* during the field survey. *A. torulosa* was recorded regularly throughout this habitat type, and is an important foraging species for glossy black-cockatoos. Microhabitat features associated with this habitat type included fallen logs of varying size categories (small, medium and large), decorticating bark, litter (coarse and fine), native grasses, arboreal termitaria and dense shrubs. Large fallen logs were observed occasionally, providing foraging and shelter opportunities for ground dwelling fauna. The combination of microhabitat features associated with fallen logs and native grasses and dense ground cover provides important foraging, refuge, breeding and dispersal habitat for a variety of ground dwelling fauna. Disturbances from fire, logging and grazing were noted however the severity was low.	12.11.14	254.7	-	254.7

Fauna Habitat Type	Habitat Description, Structure and Associated Habitat Features	Associated Regional Ecosystems	Area (ha)		
			Proposed Lower Reservoir	Proposed Upper Reservoir	Total
Eucalyptus open forest and woodlands on drainage lines and alluvial plains	This habitat type was associated with channel beds, streams, gullies, drainage lines and alluvial plains associated with Borumba, Kingaham and Yabba creeks. The vegetation structure comprised low open woodland with a canopy of 12 to 25 m in height and up to 70 % cover. The canopy generally comprised *Casuarina cunninghamiana*, *Eucalyptus tereticornis* and *Grevillea robusta*. The mid-dense subcanopy layer comprised *Melaleuca bracteata*, *M. viminalis*, *Ficus* spp. and young *C. cunninghamiana*. The shrub and ground layer were sparse, comprising both native and exotic species. *Eucalyptus tereticornis* typically provides hollows as mature trees however, hollows were infrequently recorded in this habitat type. Fallen logs of varying sizes were occasional to common and were generally represented as flood debris along stream banks and alluvial flats. Disturbance from flooding was evident resulting in erosion in some areas. Clearing and grazing severity was high in some areas where vegetation had been cleared to the stream bank and movement of cattle was evident along stream banks. Weed severity was generally low, though *Lantana camara* noted in several areas. Large areas have been cleared for grazing along the upper reaches of the creeks. The vegetation associated with this habitat type provides refuge habitat and dispersal opportunities, particularly in more modified areas where surrounding cover is low.	12.3.7	129.5	-	129.5
Non-remnant pasture	This habitat type was associated with areas containing native and non-native, scattered native trees and various infrastructure including tracks and dams. Habitat features were largely absent or of low value due to the level of disturbance. Small hollows were present on rare occasion in isolated paddock trees and fallen logs. Large grassy areas comprising native and exotic grasses were the dominant feature in this habitat type. There was a medium level of disturbance associated with grazing and a high level of disturbance associated with clearing.	-	229.2	44.1	273.4
Native Plantation	This habitat type was associated with a small area downstream of the existing dam wall. Trees were generally of a young size class and are not old enough to produce hollows. The area is adjacent to notophyll vine forest and eucalyptus woodland to open forest. This habitat type may provide suitable dispersal and refuge habitat for species traversing through the broader landscape. Native timber plantations may provide foraging opportunities when trees are flowering.	-	0.1	-	0.1

Fauna Habitat Type	Habitat Description, Structure and Associated Habitat Features	Associated Regional Ecosystems	Area (ha)		
			Proposed Lower Reservoir	Proposed Upper Reservoir	Total
Water	Water associated with Lake Borumba and Borumba, Kingaham and Yabba creeks provides suitable foraging habitat for terrestrial species such as osprey. Additional habitat values may provide suitable habitat for waders and wetland bird species in the form of fringing vegetation at the edge of major water bodies.	-	405.3	-	405.3
Not surveyed	These areas were not assessed during field surveys and thus the status of fauna habitat is unknown. These areas may contain non-remnant, remnant and/or regrowth vegetation.	-	54.9	-	54.9
		Total Area (ha)	**1,280.8**	**308.0**	**1,588.8**



Legend

- Study Area
- Roads
- Watercourse

Fauna Habitat

- Dry to moist eucalypt woodlands and open forests
- Eucalyptus open forest and woodlands
- Moist to dry open woodlands
- Non-remnant pasture
- Notophyll vine forests
- Not Surveyed
- Water

FIGURE 3.10

Fauna Habitat Mapping

Image Source: ESRI Basemap (2021) Data source: QLD Department of Resources (2022)

3.3 Watercourses and Wetlands

Watercourses and wetlands are discussed in detail in the aquatic ecology technical report prepared for the Project by Hydrobiology (2022). A summary of watercourse and wetland values noted during the preliminary surveys is provided below.

A stream occurs at the proposed upper reservoir with upstream gullies providing ephemeral flow. This stream was characterised by slow moving water flow; still pools; rocky substrate and banks and heavily vegetated banks. Both Kingaham and Yabba Creeks were largely vegetated to the upper bank with riparian and stream bank vegetation present. Beyond the defining bank, vegetation was largely cleared with scattered paddock trees.

3.3.1 Flood Regime

Visual observations of the effect of the flood regime above the current FSL (within the existing flood margin or riparian zone of Lake Borumba) determined little evidence of disturbance from recent flooding.

Given heavy rains prior to field surveys, and that the capacity of the dam has been over 100 % since the start of 2022 (Seqwater 2022), the effect of occasional lowered water levels within storage (below the current FSL) was unable to be determined during field surveys.

3.4 Likelihood of Occurrence Assessment

3.4.1 Threatened Flora

Flora species that are known or have a high or moderate likelihood of occurring within the Study Area are summarised in **Table 3.18**. The complete likelihood of occurrence assessment is provided as **Appendix G**.

Table 3.18 Threatened Flora Known to Occur or with a High or Moderate Likelihood of Occurring within the Study Area

Scientific Name	Common Name	EPBC Act Status	NC Act Status
Known			
three-leaved bosistoa	*Bosistoa transversa*	Vulnerable	Least Concern
nightcap plectranthus	*Coleus torrenticola*	Endangered	Endangered
ball nut	*Floydia praealta*	Vulnerable	Vulnerable
rib-fruited malletwood	*Rhodamnia dumicola*	-	Endangered
scrub turpentine	*Rhodamnia rubescens*	Critically Endangered	Critically Endangered
High			
slender milkvine^	*Leichhardtia coronata*	-	Vulnerable
small-fruited Queensland nut	*Macadamia ternifolia*	Vulnerable	Vulnerable
-	*Nothoalsomitra suberosa*	-	Near Threatened
brush sophora^	*Sophora fraseri*	Vulnerable	Vulnerable
Austral toadflax	*Thesium australe*	Vulnerable	Vulnerable

Moderate			
hairy-joint grass	*Arthraxon hispidus*	Vulnerable	-
southern corynocarpus	*Corynocarpus rupestris* subsp. *arborescens*	-	Vulnerable
macadamia nut	*Macadamia integrifolia*	Vulnerable	Vulnerable
rough-shelled bush nut	*Macadamia tetraphylla*	Vulnerable	Vulnerable
-	*Parsonsia largiflorens*	-	Endangered

^ Recorded during field surveys in the immediate vicinity of the Study Area

3.4.2 Threatened Ecological Communities

One TEC is known to occur within the Study Area and is described in **Table 3.19**. This TEC is associated with RE 12.11.10, which is depicted on **Figure 3.8**. The complete likelihood of occurrence assessment has been included in **Appendix G**.

Table 3.19 TEC Known to Occur within the Study Area

Threatened Ecological Community	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
Lowland Rainforest of Subtropical Australia	Critically Endangered	The community is generally a moderately tall to tall, closed forest. The upper, discontinuous layer includes canopy emergent. Tree species with compound notophyll to mesophyll leaves are common and there is typically a relatively low abundance of *Eucalyptus*, *Melaleuca* and *Casuarina* species. It occurs on basalt and alluvial soils, including sand and old/elevated alluvial soils as well as floodplain alluvia, and occasionally on historically enriched rhyolitic soils and basaltically enriched metasediments.	**Known** – REs that correspond with the TEC occur within the Study Area and meet the key diagnostic characteristics and condition thresholds of the TEC.

3.4.3 Likelihood of Occurrence of Threatened Fauna

Fauna species that are known to occur or that have been determined to have a high or moderate likelihood of occurring within the Study Area are summarised in **Table 3.20**. The complete likelihood of occurrence assessment is provided as **Appendix G**.

Table 3.20 Threatened/Special Least Concern/Migratory Fauna Known to Occur or with a High or Moderate Likelihood of Occurring within the Study Area

Common Name	Scientific Name	EPBC Act Status	NC Act Status
Known			
glossy black-cockatoo (south-eastern)	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable
osprey	*Pandion haliaetus*	Migratory	Special Least Concern
koala	*Phascolarctos cinereus*	Endangered	Endangered
long-nosed potoroo (northern)	*Potorous tridactylus tridactylus*	Vulnerable	Vulnerable
short-beaked echidna	*Tachyglossus aculeatus*	-	Special Least Concern
High			
tusked frog	*Adelotus brevis*	-	Vulnerable
Latham's snipe	*Gallinago hardwickii*	Migratory	Special Least Concern
black-faced monarch	*Monarcha melanopsis*	Migratory	Special Least Concern
spectacled monarch	*Monarcha (Symposiachrus) trivirgatus*	Migratory	Special Least Concern
satin flycatcher	*Myiagra cyanoleuca*	Migratory	Special Least Concern
yellow-bellied glider (southern subspecies)	*Petaurus australis australis*	Vulnerable	Vulnerable
grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	Least Concern
rufous fantail	*Rhipidura rufifrons*	Migratory	Special Least Concern
black-breasted button-quail	*Turnix melanogaster*	Vulnerable	Vulnerable
Moderate			
common death adder	*Acanthophis antarcticus*	-	Vulnerable
regent honeyeater	*Anthochaera phrygia*	Critically Endangered	Critically Endangered
fork-tailed swift	*Apus pacificus*	Migratory	Special Least Concern
oriental cuckoo	*Cuculus optatus*	Migratory	Special Least Concern
Coxen's fig-parrot	*Cyclopsitta diophthalma coxeni*	Endangered	Endangered
spotted-tailed quoll	*Dasyurus maculatus maculatus*	Endangered	Endangered
white-throated needletail	*Hirundapus caudacutus*	Vulnerable, Migratory	Vulnerable
cascade treefrog	*Litoria pearsoniana*	-	Vulnerable
Fleay's frog	*Mixophyes fleayi*	Endangered	Endangered
giant barred frog	*Mixophyes iteratus*	Vulnerable	Vulnerable
powerful owl	*Ninox strenua*	-	Vulnerable
Richmond birdwing	*Ornithoptera richmondia*	-	Vulnerable
greater glider	*Petauroides volans*	Endangered	Endangered
marbled frogmouth	*Podargus ocellatus plumiferus*	-	Vulnerable
Australian painted snipe	*Rostratula australis*	Endangered	Endangered

4.0 Preliminary Impact Assessment

This section provides a preliminary impact assessment relating to MSES and MNES that have been determined from the desktop assessment and identified during field surveys. For the purpose of this report, it has been assumed that Project associated impacts will apply to the entire Study Area used in this assessment and these impacts will result in a total loss, removal or inundation of vegetation.

Potential impacts to terrestrial ecology may occur during the construction, operation and decommissioning phases of the Project but the latter is not assessed as this stage. The potential impacts considered within the scope of this assessment include:

- vegetation clearance and habitat loss
- loss of fauna movement opportunities
- exacerbation of pest fauna and weeds.

Potential impacts have been assessed using the risk matrix identified in **Section 2.4** and are presented in **Table 4.1**.

4.1 Vegetation Clearance and Habitat Loss

The inundation of the proposed upper and lower reservoirs would result in the loss of existing vegetation communities and associated habitat types / features. It is likely that some level of pre-emptive vegetation clearing will occur prior to the inundation, as well as clearing requirements to facilitate the construction of dam walls. Potential impacts include:

- loss of remnant vegetation communities, including regional ecosystems listed as Of Concern and one TEC
- loss and /or reduction in the populations of threatened flora, including those species listed in **Section 3.2.2**
- direct displacement of fauna from the Study Area, an overall reduction in fauna diversity and/or loss of local populations
- reduced availability of important habitat features (e.g., tree hollows, recognised forage trees) for threatened and migratory species which rely on the availability of nesting, breeding, foraging and shelter habitat for survival, including species listed in **Section 3.2.3.1**
- fragmentation of flora and fauna populations, potentially reducing gene flow.

4.2 Loss of Fauna Movement Opportunities

The Study Area is mapped as supporting corridors of State significance, known to support threatened flora and fauna populations. The inundation of the proposed reservoirs is likely to create new barriers to movement or increase existing barriers. The proposed upper reservoir may result in considerable disruption to existing movement corridors, including movement into and from Conondale National Park.

4.3 Exacerbation of Pest Fauna and Weeds

4.3.1 Pest Fauna

The Study Area was found to support several introduced fauna species. These species, if left unmanaged, may flourish in newly disturbed areas, disperse into higher quality habitat areas and further contribute toward the degradation of habitat within the Study Area. Given the prevalence of these species within the existing landscape, it is unlikely that the proposed works will result in further introductions of feral vertebrate species.

4.3.2 Weeds

Within the Study Area, weed species are common within cleared and regrowth vegetation, as well as sporadically throughout remnant vegetation. Terrestrial weed species that are present within the proposed reservoirs will not persist following inundation.

The construction phase of the Project has the potential to spread weeds and pathogens (i.e., *Phytophthora cinnamomi*). The introduction and/or spread of weeds is an indirect impact that can impact the integrity of remaining vegetation, increase the intensity and/or frequency of fires, as well as threaten the long-term survival of threatened species. These impacts will largely be restricted to disturbance associated with ancillary infrastructure that has not yet been assessed. These areas will be relatively small in relation to the overall impact area. Furthermore, a construction environmental management plan (CEMP) will be in place to address and manage biosecurity risks.

Table 4.1 Summary of Impacts

Project Phase and Activity[1]	Issue	Unmitigated Significance	Mitigation	Residual Significance	Project Element
Construction					
General construction activities and inundation of reservoirs including vegetation clearing	Loss of remnant vegetation communities including listed REs, TECs and vegetation within national park boundaries (Conondale Nation Park).	**Critical**	• Development and implementation of a vegetation management plan • Development of a construction environmental management plan	**Critical**	Proposed upper and lower reservoirs
	Loss and/or reduction of threatened flora populations	**Critical**	• Development and implementation of a vegetation management plan	**Major**	Proposed upper and lower reservoirs
	Indirect impacts from dust generation and edge effect	**Moderate**	• Development of a construction environmental management plan	**Minor**	Proposed upper and lower reservoirs
	Direct displacement and mortality of threatened and migratory fauna, reduction of fauna diversity	**Critical**	• Development and implementation of a fauna management plan	**Major**	Proposed upper and lower reservoirs
	Disruption of breeding patterns during key times of year	**Critical**	• Development and implementation of a fauna management plan	**Major**	Proposed upper and lower reservoirs
	Reduction in the availability of threatened fauna microhabitat features	**Major**	• Development and implementation of a vegetation management plan	**Moderate**	Proposed upper and lower reservoirs
	Loss or reduction in the quality of HES wetlands and watercourses within impact area	**Major**	• Development and implementation of a surface water management plan	**Moderate**	Proposed lower reservoir
	Loss and inundation of riverine wetlands	**Major**	• Development and implementation of a surface water management plan	**Major**	Proposed lower reservoir

Project Phase and Activity[1]	Issue	Unmitigated Significance	Mitigation	Residual Significance	Project Element
Loss of fauna movement opportunities	Full supply level of proposed upper and lower reservoirs likely to create new barriers to movement	**Major**	• Development and implementation of a fauna management plan • Improve off-site habitat connectivity to provide increased opportunities for fauna passage at the local scale	**Major**	Proposed upper and lower reservoirs
	Disruption to existing movement corridors including parts of Conondale National Park	**Critical**	• Development and implementation of a fauna management plan • Improve off-site habitat connectivity to provide increased opportunities for fauna passage at the regional scale	**Major**	
	Fragmentation of threatened flora and fauna populations reducing genetic flow	**Major**	• Development and implementation of a flora and fauna management plan • Improve off-site habitat connectivity to provide increased opportunities for fauna passage at the local and regional scale	**Major**	
Exacerbation of pest fauna and weeds	Decrease integrity of existing flora and fauna assemblages	**Moderate**	• Incorporate best practice biosecurity measure and a Construction Environmental Management Plan	**Minor**	Proposed upper and lower reservoirs
	Introduce and exacerbate the spread of weeds	**Moderate**	• Incorporate best practice biosecurity measure and a Construction Environmental Management Plan • Implement weed and pest management plan	**Minor**	
	Threaten the long-term survival of vegetation and remnant vegetation	**Moderate**	• Incorporate best practice biosecurity measure and a Construction Environmental Management Plan	**Minor**	

Project Phase and Activity[1]	Issue	Unmitigated Significance	Mitigation	Residual Significance	Project Element
Operation					
Loss of fauna movement opportunities	Full supply level of proposed upper and lower reservoirs likely to create new barriers to movement	**Major**	• Development and implementation of a fauna management plan • Improve off-site habitat connectivity to provide increased opportunities for fauna passage at the local scale	**Major**	Proposed upper and lower reservoirs
Exacerbation of pest fauna and weeds	Decrease integrity of existing flora and fauna assemblages	**Moderate**	• Incorporate best practice biosecurity measure and a Construction Environmental Management Plan	**Minor**	Proposed upper and lower reservoirs
	Introduce and exacerbate the spread of weeds	**Moderate**	• Incorporate best practice biosecurity measure and a Construction Environmental Management Plan • Implement weed and pest management plan	**Minor**	
	Threaten the long-term survival of vegetation and remnant vegetation	**Moderate**	• Incorporate best practice biosecurity measure and a Construction Environmental Management Plan	**Minor**	

[1] C – Construction, O - Operation

5.0 Preliminary Offset Analysis

Offsets are measures that compensate for the residual significant impacts of an action on the environment, after avoidance and mitigation measures are taken. Where appropriate, offsets are considered during the assessment phase of an environmental impact assessment.

5.1.1 *Environment Protection and Biodiversity Conservation Act 1999* (Cwth)

Where a project is deemed to have a significant impact on MNES, an environmental offset is required in accordance with the EPBC Act. The EPBC Act Environmental Offsets Policy (EPBC Offset Policy) outlines the approach for the use of environmental offsets under the EPBC Act. Typically, environmental offsets delivered under the EPBC Act are required to be proponent driven, land-based offsets.

This ecological assessment has considered potential impacts to MNES and completed a preliminary significant impact assessment (**Appendix H**). The assessment determined that the Project presents a high risk of significant impacts to the following MNES:

- One Threatened Ecological Community:
    - Lowland Rainforest of Subtropical Australia.
- Three Critically Endangered or Endangered species:
    - Flora:
        - nightcap plectranthus (*Coleus torrenticola*)
        - scrub turpentine (*Rhodamnia rubescens*).
    - Fauna:
        - koala (*Phascolarctos cinereus*).
- Ten Vulnerable species:
    - Flora:
        - three-leaved bosistoa (*Bosistoa transversa*)
        - ball nut (*Floydia praealta*)
        - small-fruited Queensland nut (*Macadamia ternifolia*)
        - brush sophora (*Sophora fraseri*)
        - Austral toadflax (*Thesium australe*).
    - Fauna:
        - glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)
        - long-nosed potoroo (northern) (*Potorous tridactylus tridactylus*)

- yellow-bellied glider (south-eastern) (*Petaurus australis australis*)
- grey-headed flying-fox (*Pteropus poliocephalus*)
- black-breasted button-quail (*Turnix melanogaster*).

5.1.2 *Environmental Offsets Act 2014* (Qld)

Where a Project is deemed to have a significant residual impact (SRI) on MSES, an environmental offset is required in accordance with the Queensland *Environmental Offsets Act 2014* (EO Act). Environmental offsets under the EO Act can take various forms, including financial settlement offsets, proponent driven offsets or a combination of the two.

This ecological assessment has considered potential impacts to MSES and completed a preliminary SRI assessment (**Appendix H**). The SRI assessment determined that the Project presents a high risk of SRI on the following MSES:

- Regulated Vegetation – Of Concern REs (12.11.9, 12.11.14, 12.12.12)
- Regulated Vegetation – within a defined distanced from a watercourse
- Regulated Vegetation – HES wetlands
- Protected wildlife habitat (including essential habitat) for eight endangered and vulnerable flora species that are known to occur within the Study Area or have been assessed as having a moderate or high likelihood of occurring:
  - nightcap plectranthus (*Coleus torrenticola*)
  - ball nut (*Floydia praealta*)
  - slender milkvine (*Leichhardtia coronata*)
  - small-fruited Queensland nut (*Macadamia ternifolia*)
  - rib-fruited malletwood (*Rhodamnia dumicola*)
  - scrub turpentine (*Rhodamnia rubescens*).
  - brush sophora (*Sophora fraseri*)
  - Austral toadflax (*Thesium australe*).
- Protected wildlife habitat (including essential habitat) for seven endangered and vulnerable fauna species that are known to occur within the Study Area or have been assessed as having a moderate or high likelihood of occurring:
  - tusked frog (*Adelotus brevis*)
  - glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)
  - yellow-bellied glider (south-eastern) (*Petaurus australis australis*)

- grey-headed flying-fox (*Pteropus poliocephalus*)
- long-nosed potoroo (northern) (*Potorous tridactylus tridactylus*)
- koala (*Phascolarctos cinereus*)
- black-breasted button-quail (*Turnix melanogaster*).

- Protected areas likely to be impacted by inundation as part of the Project include Conondale National Park. As such, the Project is likely to trigger a SRI to protected areas.

6.0 Conclusion and Recommendations

This report documents the findings of the terrestrial ecology assessment for the Project. Both MSES and MNES have been reviewed and identified within the Study Area via desktop and field assessments (**Section 3.0**). The Project has the potential to result in a significant impact for a variety of MSES and MNES and trigger offset obligations for these matters. Future survey effort will help better understand the occurrence of threatened species and communities and the extent to which suitable habitat exists within the Study Area.

It is recommended that further targeted surveys for threatened flora and fauna species that are known or determined to have a moderate or high likelihood of occurring be undertaken in accordance with the relevant survey guidelines. The quantification of species and species habitat will further assist in the determination of offset liabilities associated with the Project. The Project will impact upon the Conondale National Park. This is a large constraint for the Project and will need to be considered further as a part of future assessments.

It is suggested that next steps for Project survey effort should include the following:

- Flora:
  - confirm the status of Lowland Rainforest TEC in additional patches in areas where targeted surveys have not been undertaken
  - undertake additional BioCondition surveys to provide sufficient survey effort in underrepresented REs
  - undertake targeted threatened flora surveys
  - survey additional areas that have not yet been surveyed. This should include ancillary infrastructure areas once they are defined (roads, bridges, quarries, other resource extraction areas, construction related temporary areas etc) and riparian areas in the upper reaches of the Yabba Creek
  - undertake surveys within timeframes in accordance with the relevant biology of flora species and in line with species specific survey guidelines.
- Fauna:
  - undertake a second round of camera trapping surveys targeting relevant threatened species
  - implement a detailed nocturnal survey including call playback
  - implement targeted surveys and detailed habitat assessments relevant to threatened frog species
  - implement diurnal bird surveys targeting relevant threatened and migratory species
  - seasonal survey requirements will need to be considered in line with relevant survey guidelines and to ensure efficient delivery of results to avoid lengthy delays in the planning and approvals process
  - survey additional areas that have not yet been surveyed including those noted above and the riparian area downstream of the proposed upper reservoir (as its flow regime is likely to be significantly reduced).

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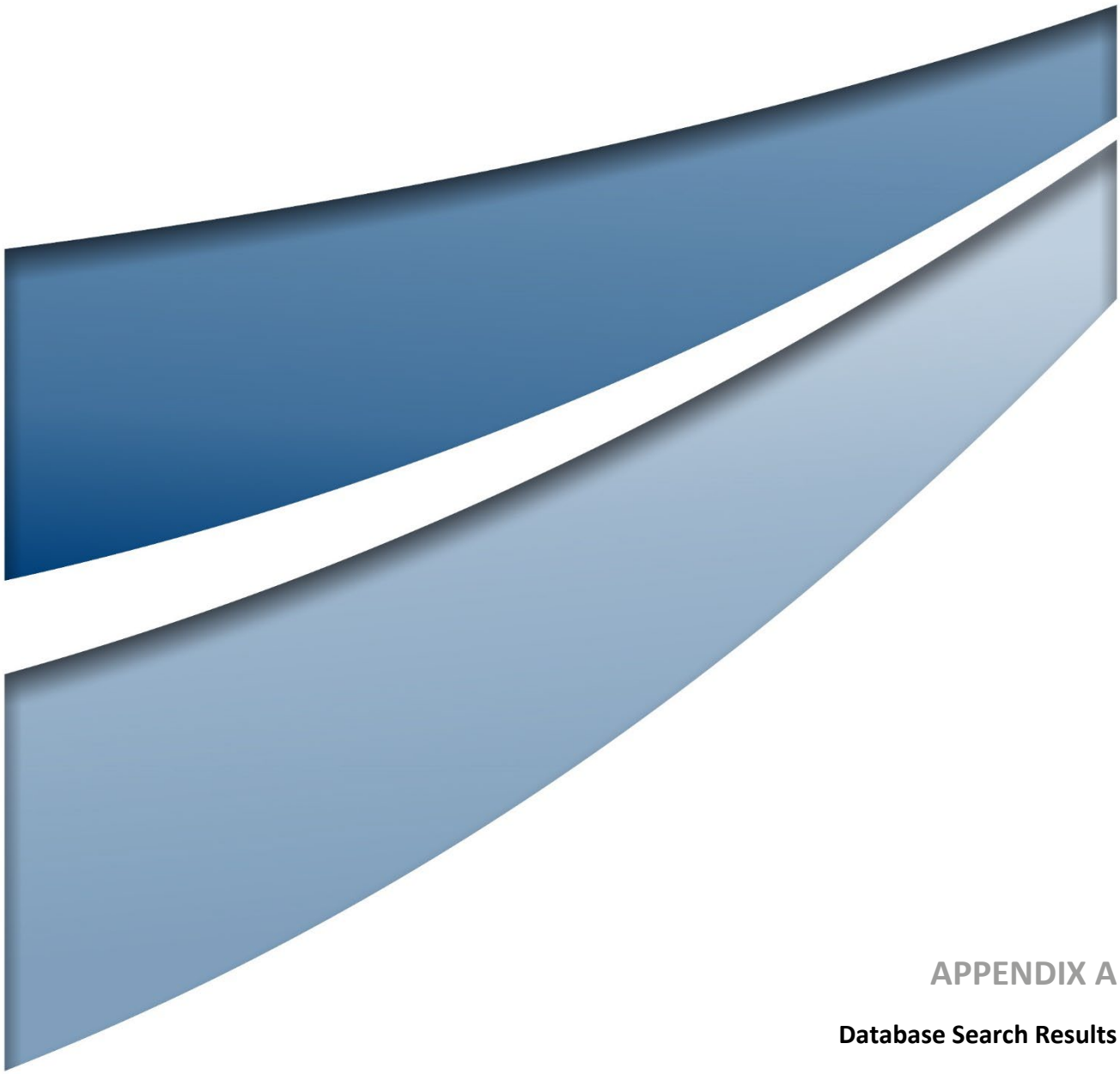

APPENDIX A

Database Search Results

Aspect	Value	Result	Description
Protected Matters Search Tool (10 km buffer around Study Area boundary)	**World Heritage Properties**	None	Not applicable.
	National Heritage Places	None	Not applicable.
	Wetlands of International Importance (Ramsar Wetlands)	1	• Great Sandy Strait (Including Great Sandy Strait, Tin Can Bay and Tin Can Inlet)
	Great Barrier Reef Marine Park	None	Not applicable.
	Commonwealth Marine Area	None	Not applicable.
	Listed Threatened Ecological Communities	3	• Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland • Lowland Rainforest of Subtropical Australia • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.
	Listed Threatened Species	62	• 26 plants • 14 birds • 10 mammals • 6 reptiles • 2 fishes • 2 frogs • 2 insects.
	Listed Migratory Species	16	• 8 migratory wetlands species • 6 migratory terrestrial species • 1 migratory marine birds • 1 migratory marine species

Aspect	Value	Result	Description
WildNet (15km buffer on coordinates central to the Study Area, equating to a ~10 km buffer around Study Area boundary)	**Listed Threatened Species**	38	• 17 plants • 9 birds • 5 mammals • 3 amphibians • 3 reptiles • 1 insect.
Regional Ecosystems	**Remnant – 'Endangered'**	12.4 ha	• 12.3.1a.
	Remnant – 'Of Concern'	288.6 ha	• 12.11.3 (8.9 ha) • 12.11.9 (12.2 ha) • 12.12.12 (27.4 ha) • 12.11.14 (235.7 ha) • 12.11.15 (4.4 ha).
	Remnant – 'Least Concern'	574.3 ha	• 12.3.7 (142.4 ha) • 12.3.7b (2.0 ha) • 12.11.3 (217 ha) • 12.11.10 (127.1 ha) • 12.12.15 (25.4 ha) • 12.12.16 (7.3 ha) • 12.12.23 (53.1 ha).
	High Value Regrowth – 'Endangered'	3.5 ha	• 12.3.1a.
	High Value Regrowth – 'Of Concern'	66.2 ha	• 12.3.7 (0.1 ha) • 12.11.3 (0.2 ha) • 12.11.9 (0.4 ha) • 12.11.14 (47.8 ha)

Aspect	Value	Result	Description
			• 12.11.15 (0.5 ha) • 12.12.12 (17.2 ha).
	High Value Regrowth – 'Least Concern'	60.9 ha	• 12.3.7 (43.1 ha) • 12.11.3 (6.1 ha) • 12.11.10 (5.1 ha) • 12.12.23 (6.6 ha).
Regulated Vegetation	**Category A - Vegetation Offsets, Compliance Notices, VDecs**	None	Not applicable.
	Category B - Remnant Vegetation	875.1 ha	
	Category C - High-Value Regrowth Vegetation	7.6 ha	
	Category R - Reef-Regrowth Watercourse Vegetation	123.1 ha	
	Category X - Exempt Clearing Work	296.2 ha	
Matters of State Environmental Significance	**Protected areas**	2	• Wrattens National Park • Conondale National Park.
	Marine park - highly protected zones	None	Not applicable.
	Declared fish habitat area	None	Not applicable.
	Legally secured offset area	None	Not applicable.
	Declared high ecological value waters (watercourse)	None	Not applicable
	Declared high ecological value waters (wetland)	None	Not applicable.
	High ecological significance wetlands	13.1 ha	
	Strategic environmental area (designated precinct)	None	Not applicable.
	Regulated vegetation (Category B 'endangered' and 'of concern' regional ecosystems)	300.9 ha	
	Regulated vegetation (Category C 'endangered' and 'of concern' regional ecosystems)	2.5 ha	
	Regulated vegetation (Category R - GBR Riverine)	123.1 ha	

Aspect	Value	Result	Description
	Regulated vegetation (within 100 metres from the defining bank of a wetland)	None	Not applicable.
	Regulated vegetation (within a defined distance from the defining banks of a relevant watercourse)	242.5 ha	
	Essential habitat	509.9 ha	
	Wildlife habitat for threatened wildlife and special least concern animals under the *Nature Conservation Act 1992*	549.5 ha	• Habitat for special least concern taxa (113.7 ha) • Habitat for endangered/vulnerable taxa (530.7 ha).
	Wildlife habitat - koala habitat area	0.8 ha	Core habitat area.
	Marine plants under the *Fisheries Act 1994*	None	Not applicable.
	Waterways that provide for fish passage under the *Fisheries Act 1994*	Present	
	High risk flora survey trigger area	128.7 ha	
Watercourses (VM Watercourses map)		400 features	• 165 stream order 1 features • 58 stream order 2 features • 13 stream order 3 features • 37 stream order 4 features • 101 stream order 5 features • 26 stream order 6 features • Named watercourses: Borumba Creek, Ante Borgan Creek, Sandy Creek, Kingaham Creek, Mujimba Creek, Yabba Creek.
Wetlands (VM Wetlands Map)		None	Not applicable
Biodiversity Planning Assessment (BPA) Biodiversity Corridor		Present	• Riparian corridor of State significance • Terrestrial corridor of State significance • Terrestrial corridor of regional significance.

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Queensland status: Rare and threatened species
Records: All
Date: All
Latitude: -26.5255
Longitude: 152.5432
Distance: 15
Email: pworth@umwelt.com.au
Date submitted: Wednesday 28 Sep 2022 15:28:26
Date extracted: Wednesday 28 Sep 2022 15:30:10

The number of records retrieved = 38

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Hylidae	*Litoria pearsoniana*	cascade treefrog		V		21
animals	amphibians	Limnodynastidae	*Adelotus brevis*	tusked frog		V		54/1
animals	amphibians	Myobatrachidae	*Mixophyes iteratus*	giant barred frog		V	V	5
animals	birds	Accipitridae	*Erythrotriorchis radiatus*	red goshawk		E	V	7
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		V	V	19
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V	V	17
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	1
animals	birds	Podargidae	*Podargus ocellatus plumiferus*	plumed frogmouth		V		46/2
animals	birds	Psittacidae	*Cyclopsitta diophthalma coxeni*	Coxen's fig-parrot		E	E	4
animals	birds	Rostratulidae	*Rostratula australis*	Australian painted-snipe		E	E	1
animals	birds	Strigidae	*Ninox strenua*	powerful owl		V		6
animals	birds	Turnicidae	*Turnix melanogaster*	black-breasted button-quail		V	V	53
animals	insects	Papilionidae	*Ornithoptera richmondia*	Richmond birdwing		V		1
animals	mammals	Dasyuridae	*Dasyurus maculatus maculatus*	spotted-tailed quoll (southern subspecies)		E	E	1
animals	mammals	Petauridae	*Petaurus australis australis*	yellow-bellied glider (southern subspecies)		V	V	14
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		E	E	175
animals	mammals	Potoroidae	*Potorous tridactylus tridactylus*	long-nosed potoroo		V	V	3
animals	mammals	Pseudocheiridae	*Petauroides armillatus*	central greater glider		E	E	13
animals	reptiles	Chelidae	*Elseya albagula*	southern snapping turtle		CR	CE	5
animals	reptiles	Chelidae	*Elusor macrurus*	Mary River turtle		E	E	20
animals	reptiles	Elapidae	*Acanthophis antarcticus*	common death adder		V		2/1
plants	land plants	Apocynaceae	*Leichhardtia coronata*			V		2/2
plants	land plants	Apocynaceae	*Parsonsia largiflorens*			E		1
plants	land plants	Aponogetonaceae	*Aponogeton elongatus subsp. elongatus*			NT		1/1
plants	land plants	Aristolochiaceae	*Pararistolochia praevenosa*			NT		1/1
plants	land plants	Corynocarpaceae	*Corynocarpus rupestris subsp. arborescens*	southern corynocarpus		V		1/1
plants	land plants	Cucurbitaceae	*Nothoalsomitra suberosa*			NT		2/2
plants	land plants	Haloragaceae	*Haloragis exalata subsp. velutina*			V	V	1/1
plants	land plants	Lamiaceae	*Coleus torrenticola*			E	E	1/1
plants	land plants	Leguminosae	*Sophora fraseri*	brush sophora		V	V	1/1
plants	land plants	Myrtaceae	*Rhodamnia dumicola*	rib-fruited malletwood		E		3/2
plants	land plants	Myrtaceae	*Rhodamnia rubescens*	scrub turpentine		CR	CE	9/2
plants	land plants	Orchidaceae	*Plectorrhiza beckleri*			NT		2/2
plants	land plants	Proteaceae	*Floydia praealta*	ball nut		V	V	5/5
plants	land plants	Proteaceae	*Macadamia integrifolia*	macadamia nut		V	V	11/9
plants	land plants	Proteaceae	*Macadamia ternifolia*	bopple nut		V	V	5/4
plants	land plants	Santalaceae	*Thesium australe*	toadflax		V	V	1/1
plants	land plants	Symplocaceae	*Symplocos harroldii*	hairy hazelwood		NT		2/2

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 28-Sep-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	62
Listed Migratory Species:	16

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity
Great sandy strait (including great sandy strait, tin can bay and tin can inlet)	50 - 100km upstream from Ramsar site

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community may occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat known to occur within area
FISH		

Scientific Name	Threatened Category	Presence Text
Maccullochella mariensis		
Mary River Cod [83806]	Endangered	Species or species habitat known to occur within area
Neoceratodus forsteri		
Australian Lungfish, Queensland Lungfish [67620]	Vulnerable	Species or species habitat known to occur within area
FROG		
Mixophyes fleayi		
Fleay's Frog [25960]	Endangered	Species or species habitat likely to occur within area
Mixophyes iteratus		
Giant Barred Frog, Southern Barred Frog [1944]	Vulnerable	Species or species habitat known to occur within area
INSECT		
Argynnis hyperbius inconstans		
Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area
Phyllodes imperialis smithersi		
Pink Underwing Moth [86084]	Endangered	Breeding may occur within area
MAMMAL		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus		
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas		
Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Petauroides volans		
Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Petaurus australis australis		
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
PLANT		
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa		
Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat known to occur within area
Cossinia australiana		
Cossinia [3066]	Endangered	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Cupaniopsis shirleyana		
Wedge-leaf Tuckeroo [3205]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Floydia praealta Ball Nut, Possum Nut, Big Nut, Beefwood [15762]	Vulnerable	Species or species habitat known to occur within area
Fontainea rostrata [24039]	Vulnerable	Species or species habitat likely to occur within area
Fontainea venosa [24040]	Vulnerable	Species or species habitat may occur within area
Haloragis exalata subsp. velutina Tall Velvet Sea-berry [16839]	Vulnerable	Species or species habitat may occur within area
Lepidium peregrinum Wandering Pepper-cress [14035]	Endangered	Species or species habitat may occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat known to occur within area
Macadamia ternifolia Small-fruited Queensland Nut, Gympie Nut [7214]	Vulnerable	Species or species habitat known to occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat likely to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Plectranthus nitidus Nightcap Plectranthus, Silver Plectranthus [55742]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Plectranthus omissus [55729]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat likely to occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area
Sarcochilus fitzgeraldii Ravine Orchid [19131]	Vulnerable	Species or species habitat may occur within area
Sarcochilus weinthalii Blotched Sarcochilus, Weinthals Sarcanth [12673]	Vulnerable	Species or species habitat likely to occur within area
Sophora fraseri [8836]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
Triunia robusta Glossy Spice Bush [14747]	Endangered	Species or species habitat likely to occur within area
REPTILE		
Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat likely to occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Elseya albagula		
Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat known to occur within area
Elusor macrurus		
Mary River Turtle, Mary River Tortoise [64389]	Endangered	Species or species habitat known to occur within area
Furina dunmalli		
Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area
[Symposiachrus trivirgatus as Monarcha trivirgatus](#) Spectacled Monarch [83946]		Species or species habitat known to occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat may occur within area overfly marine area
Reptile		
[Crocodylus porosus](#) Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Conondale	National Park	QLD
Little Bella	Nature Refuge	QLD
Wrattens	National Park	QLD

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
[Traveston Crossing Dam](#)	2006/3150	Controlled Action	Completed
Not controlled action			
[Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia](#)	2015/7522	Not Controlled Action	Completed
Not controlled action (particular manner)			
[Aerial and ground baiting control program (1080) for wild dog and fox populations](#)	2003/966	Not Controlled Action (Particular Manner)	Post-Approval

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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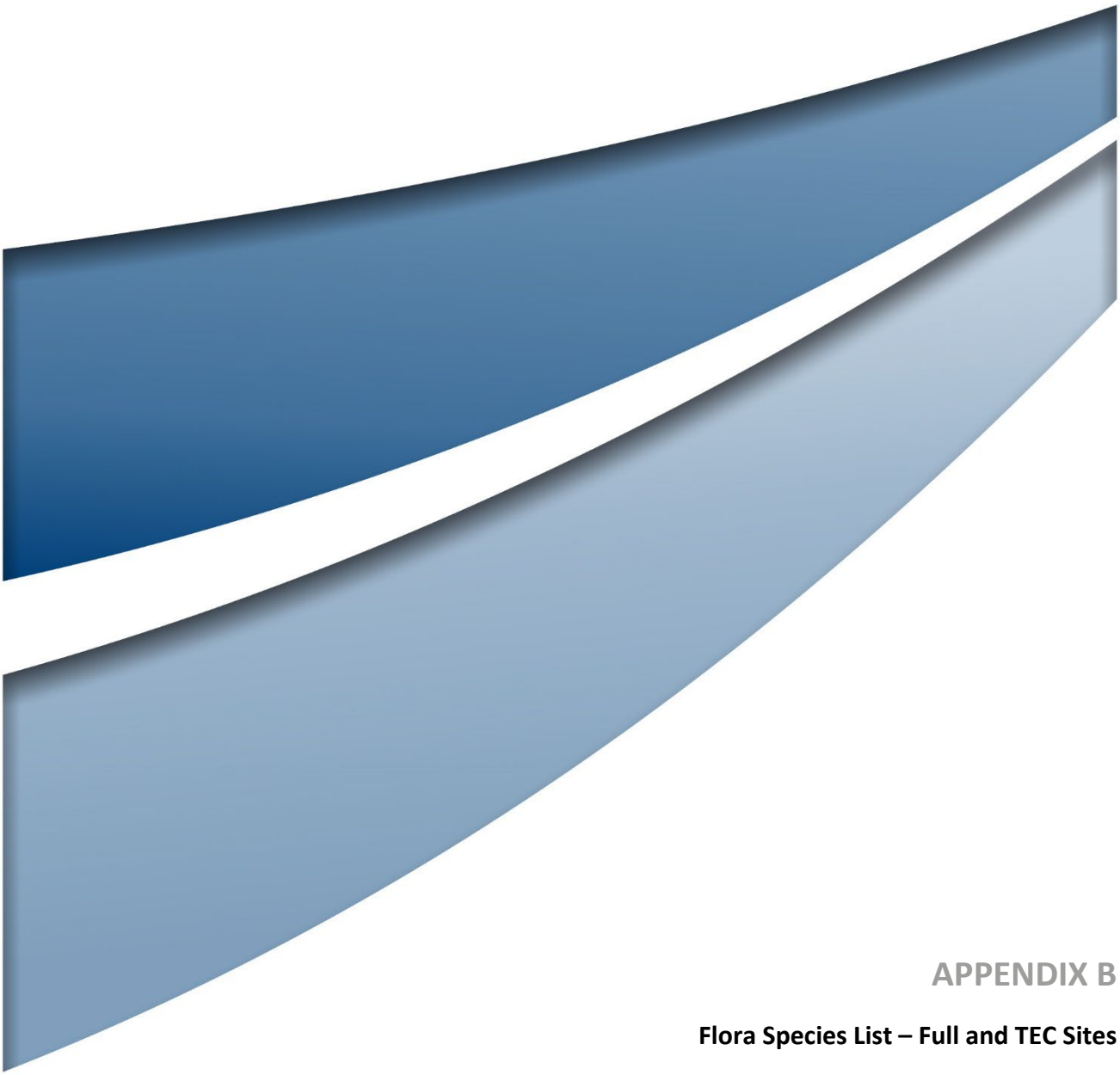


APPENDIX B

Flora Species List – Full and TEC Sites

Full Vascular Flora Species List – May and July 2022

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
Acanthaceae	blue trumpet		*Brunoniella australis*	LC	-
Acanthaceae	-		*Brunoniella spiciflora*	LC	-
	white karambal		*Harnieria hygrophiloides*	LC	-
	-		*Pseuderanthemum tenellum*	LC	-
	pastel flower		*Pseuderanthemum variabile*	LC	-
	pink tounge		*Rostellularia adscendens*	LC	-
Amaranthaceae	lesser joyweed		*Alternanthera denticulata*	LC	-
	-	*	*Alternanthera pungens*	-	-
	barbed-wire weed		*Nyssanthes diffusa*	LC	-
Anacardiaceae	-		*Euroschinus falcatus* var. *falcatus*	LC	-
	tulip satinwood		*Rhodosphaera rhodanthema*	LC	-
Annonaceae	Canary beech		*Huberantha nitidissima*	LC	-
Apiaceae	-		*Apiaceae* sp.	-	-
	Australian carrot		*Daucus glochidiatus*	LC	-
Apocynaceae	bitterbark		*Alstonia constricta*	LC	-
	-		*Alyxia ruscifolia*	LC	-
	currantbush		*Carissa ovata*	LC	-
	balloon cottonbush	*	*Gomphocarpus physocarpus*	-	-
	-		*Gymnanthera oblonga*	LC	-
	slender milkvine		*Leichhardtia coronata*	V	-
	bellbird vine		*Melodinus acutiflorus*	LC	-
	crisped silkpod		*Parsonsia lilacina*	LC	-
Apocynaceae	-		*Parsonsia paulforsteri*	LC	-
	monkey rope		*Parsonsia straminea*	LC	-
	-		*Secamone elliptica*	LC	-
	-		*Tabernaemontana orientalis*	LC	-
	banana bush		*Tabernaemontana pandacaqui*	LC	-
Araceae	-		*Alocasia brisbanensis*	LC	-
	-		*Alocasia macrorrhizos*	LC	-
	settler's flax		*Gymnostachys anceps*	LC	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
Araliaceae	stinking pennywort		*Hydrocotyle laxiflora*	LC	-
	-		*Hydrocotyle* sp.	-	-
	celery wood		*Polyscias elegans*	LC	-
Araucariaceae	bunya pine		*Araucaria bidwillii*	LC	-
	hoop pine		*Araucaria cunninghamii*	LC	-
Arecaceae	piccabeen palm		*Archontophoenix cunninghamiana*	LC	-
	lawyer vine		*Calamus muelleri*	LC	-
Aristolochiaceae	calico-flower		*Aristolochia elegans*	-	-
Asparagaceae	ornamental asparagus		*Asparagus africanus*	-	-
Asteraceae	mistflower	*	*Ageratina riparia*	-	-
	billygoat weed	*	*Ageratum conyzoides*	-	-
	blue billygoat weed	*	*Ageratum houstonianum*	-	-
	-		*Asteraceae* sp.	-	-
	Cobbler's pegs	*	*Bidens pilosa*	-	-
	yellow buttons		*Chrysocephalum apiculatum*	LC	-
	spear thistle	*	*Cirsium vulgare*	-	-
	thickhead		*Crassocephalum crepidioides*	-	-
	-		*Cyanthillium cinereum*	LC	-
	-	*	*Emilia sonchifolia*	-	-
	-		*Erigeron* sp.	-	-
	native cobbler's pegs		*Glossocardia bidens*	LC	-
	-		*Pterocaulon redolens*	LC	-
	Indian weed		*Sigesbeckia orientalis*	LC	-
	stinking roger	*	*Tagetes minuta*	-	-
	tridax daisy	*	*Tridax procumbens*	-	-
	-	*	*Xanthium occidentale*	-	-
	Bathurst burr	*	*Xanthium spinosum*	-	-
Atherospermataceae	-		*Daphnandra apatela*	LC	-
Bignoniaceae	cat's claw creeper	*	*Dolichandra unguis-cati*	-	-
	jacaranda	*	*Jacaranda mimosifolia*	-	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	yellow-flowered		*Pandorea floribunda*	LC	-
	wonga vine		*Pandorea pandorana*	LC	-
Blechnaceae	prickly raspy fern		*Blechnum neohollandicum*	LC	-
	-		*Blechnum patersonii*	SLC	-
	-		*Blechnum* sp.	-	-
Byttneriaceae	brown kurrajong		*Commersonia bartramia*	LC	-
Campanulaceae	white root		*Lobelia purpurascens*	SLC	-
Capparaceae	brush caper berry		*Capparis arborea*	LC	-
Casuarinaceae	-		*Allocasuarina* sp.	-	-
	-		*Allocasuarina torulosa*	LC	-
	-		*Casuarina cunninghamiana* subsp. *cunninghamiana*	LC	-
Celastraceae	-		*Denhamia silvestris*	LC	-
	-		*Elaeodendron melanocarpum*	LC	-
Commelinaceae	-		*Aneilema* sp.	-	-
	murdannia		*Murdannia graminea*	LC	-
Convolvulaceae	-		*Convolvulaceae* sp.	-	-
	kidney weed		*Dichondra repens*	LC	-
	-		*Ipomoea* sp.	-	-
	pink bindweed		*Polymeria calycina*	LC	-
Cornaceae	black muskheart		*Alangium polyosmoides* subsp. *polyosmoides*	LC	-
Cucurbitaceae	-		*Cucumis* sp.	-	-
	-		*Diplocyclos palmatus*	LC	-
Cunoniaceae	-		*Ackama paniculosa*	LC	-
Cyperaceae	-		*Carex appressa*	LC	-
	-		*Cyperus cyperoides*	LC	-
	-		*Cyperus gracilis*	LC	-
	-		*Cyperus polystachyos*	LC	-
	nutgrass		*Cyperus rotundus*	-	-
	-		*Cyperus* sp.	-	
	-		*Cyperus tetraphyllus*	LC	

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	common fringe-rush		*Fimbristylis dichotoma*	LC	
	-		*Fimbristylis* sp.	-	
	-		*Gahnia aspera*	LC	-
	sword grass		*Gahnia sieberiana*	LC	-
	-		*Scleria mackaviensis*	LC	-
	-		*Scleria* sp.	-	-
Dennstaedtiaceae	common bracken		*Pteridium esculentum*	LC	-
Dioscoreaceae	native yam		*Dioscorea transversa*	LC	-
Dryopteridaceae	prickly shield fern		*Arachniodes aristata*	SLC	-
Ebenaceae	black plum		*Diospyros australis*	LC	-
	grey ebony		*Diospyros fasciculosa*	LC	-
	myrtle ebony		*Diospyros pentamera*	LC	-
	-		*Diospyros* sp.	-	-
Elaeocarpaceae	yellow carrabeen		*Sloanea woollsii*	LC	-
Ericaceae	-		*Epacris* sp.	-	-
Euphorbiaceae	soft acalypha		*Acalypha eremorum*	LC	-
	native holly		*Alchornea ilicifolia*	LC	-
	scrub bloodwood		*Baloghia inophylla*	LC	-
	brittlewood		*Claoxylon australe*	LC	-
	Queensland cascarilla		*Croton insularis*	LC	-
	scrub poison tree		*Excoecaria dallachyana*	LC	-
	green kamala		*Mallotus claoxyloides*	LC	-
	white kamala		*Mallotus discolor*	LC	-
	red kamala		*Mallotus philippensis*	LC	-
	stinging-vine		*Tragia novae-hollandiae*	LC	-
Fabaceae	-		*Desmodium* sp.	-	-
Fringillidae	-		*Chloris* sp.	-	-
Geraniaceae	-		*Geranium solanderi*	LC	-
Goodeniaceae	-		*Goodenia rotundifolia*	LC	-
Hemerocallidaceae	-		*Dianella caerulea* var. *caerulea*	LC	-
	-		*Dianella longifolia*	LC	-
	-		*Dianella* sp.	-	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	scrambling lily		*Geitonoplesium cymosum*	LC	-
Juncaceae	-		*Juncus* sp.	-	-
Lamiaceae	velvet leaf		*Callicarpa pedunculata*	LC	-
	-		*Clerodendrum floribundum*	LC	-
	native coleus		*Coleus australis*	LC	-
	-		*Coleus torrenticola*	E	E
	native pennyroyal		*Mentha satureioides*	LC	-
	-		*Mentha* sp.	-	-
	-		*Vitex lignum-vitae*	LC	-
Lauraceae	grey walnut		*Beilschmiedia elliptica*	LC	-
	camphor laurel	*	*Cinnamomum camphora*	-	-
	yellow laurel		*Cryptocarya bidwillii*	LC	-
	-		*Cryptocarya laevigata*	LC	-
	pepperberry		*Cryptocarya obovata*	LC	-
	brown laurel		*Cryptocarya triplinervis*	LC	-
	hairy walnut		*Endiandra pubens*	LC	-
	brown bolly gum		*Litsea australis*	LC	-
	-		*Litsea reticulata*	LC	-
	white bolly gum		*Neolitsea dealbata*	LC	-
	-		*Neolitsea* sp.	-	-
Laxmanniaceae	large-leaved palm lily		*Cordyline petiolaris*	LC	-
	red-fruited palm lily		*Cordyline rubra*	LC	-
	wombat berry		*Eustrephus latifolius*	LC	-
	-		*Lomandra confertifolia* subsp. *pallida*	LC	-
	-		*Lomandra hystrix*	LC	-
	-		*Lomandra longifolia*	LC	-
Leguminosae	-		*Acacia disparrima* subsp. *disparrima*	LC	-
	Brisbane golden wattle		*Acacia fimbriata*	LC	-
	-		*Acacia leiocalyx*	LC	-
	Maiden's wattle		*Acacia maidenii*	LC	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
Leguminosae	blackwood		*Acacia melanoxylon*	LC	-
	-		*Acacia* sp.	-	-
	budda pea		*Aeschynomene indica*	LC	-
	lace flower tree		*Archidendron grandiflorum*	LC	-
	bloodvine		*Austrosteenisia blackii*	LC	-
	-		*Calliandra* sp.	-	-
	-		*Cassia* sp.	-	-
	black bean		*Castanospermum australe*	LC	-
	-	*	*Crotalaria lanceolata* subsp. *lanceolata*	-	-
	-		*Crotalaria montana*	LC	-
	-		*Desmodium rhytidophyllum*	LC	-
	-	*	*Erythrina x sykesii*	-	-
	flemingia		*Flemingia parviflora*	LC	-
	-		*Galactia tenuiflora*	LC	-
	-		*Glycine clandestina*	LC	-
	-		*Glycine* sp.	-	-
	glycine pea		*Glycine tabacina*	LC	-
	-		*Hardenbergia violacea*	LC	-
	-		*Kennedia* sp.	-	-
	perennial lespedeza		*Lespedeza juncea* subsp. *sericea*	LC	-
	-	*	*Medicago* sp.	-	-
	-	*	*Mimosa pudica*	-	-
	-	*	*Neonotonia wightii*	-	-
	native sensitive plant		*Neptunia gracilis*	LC	-
	-		*Neptunia* sp.	-	-
	-		*Pararchidendron pruinosum*	LC	-
	-		*Rhynchosia minima*	LC	-
	-		*Senna acclinis*	LC	-
	-		*Senna barclayana*	LC	-
	Easter cassia	*	*Senna pendula* var. *glabrata*	-	-
	-		*Senna* sp.	-	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	brush sophora		*Sophora fraseri*	V	V
	tipuana	*	*Tipuana tipu*	-	-
	-		*Zornia* sp.	-	-
Malvaceae	-		*Abutilon oxycarpum*	LC	-
	-		*Abutilon* sp.	-	-
	-		*Hibiscus heterophyllus*	LC	-
	-		*Hibiscus* sp.	-	-
	-	*	*Malvastrum americanum* var. *americanum*	-	-
	-	*	*Malvastrum coromandelianum* subsp. *coromandelianum*	-	-
	-	*	*Sida cordifolia*	-	-
	-		*Sida hackettiana*	LC	-
	-		*Sida* sp.	-	-
Meliaceae	incense cedar		*Anthocarapa nitidula*	LC	-
	-		*Dysoxylum rufum*	LC	-
	-		*Dysoxylum* sp.	-	-
	white cedar		*Melia azedarach*	LC	-
	red cedar		*Toona ciliata*	LC	-
	native honeysuckle		*Turraea pubescens*	LC	-
Menispermaceae	-		*Legnephora moorei*	LC	-
	wiry grape		*Pleogyne australis*	LC	-
	-		*Stephania japonica*	LC	-
Monimiaceae	large-leaved wilkiea		*Wilkiea macrophylla*	LC	-
	-		*Wilkiea* sp.	-	-
Moraceae	creek sandpaper fig		*Ficus coronata*	LC	-
	Moreton Bay fig		*Ficus macrophylla* forma *macrophylla*	LC	-
	-		*Ficus obliqua*	LC	-
	-		*Ficus opposita*	LC	-
	Port Jackson fig		*Ficus rubiginosa*	LC	-
	-		*Ficus* sp.	-	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	green-leaved Moreton Bay fig		*Ficus watkinsiana*	LC	-
	cockspur thorn		*Maclura cochinchinensis*	LC	-
	whalebone tree		*Streblus brunonianus*	LC	-
	-		*Trophis scandens*	LC	-
Myrsinaceae	embelia		*Embelia australiana*	LC	-
	-		*Myrsine variabilis*	LC	-
Myrtaceae	rough-barked apple		*Angophora floribunda*	LC	-
	rusty gum		*Angophora leiocarpa*	LC	-
	-		*Angophora* sp.	-	-
	-		*Angophora subvelutina*	LC	-
	pink bloodwood		*Corymbia intermedia*	LC	-
	Moreton Bay ash		*Corymbia tessellaris*	LC	-
	-		*Eucalyptus acmenoides*	LC	-
	narrow-leaved red ironbark		*Eucalyptus crebra*	LC	-
	flooded gum		*Eucalyptus grandis*	LC	-
	mountain grey gum		*Eucalyptus major*	LC	-
	tallowwood		*Eucalyptus microcorys*	LC	-
	small-fruited grey gum		*Eucalyptus propinqua*	LC	-
	-		*Eucalyptus siderophloia*	LC	-
	-		*Eucalyptus* sp.	-	-
	Queensland blue gum		*Eucalyptus tereticornis* subsp. *tereticornis*	LC	-
	Brazilian cherry tree	*	*Eugenia uniflora*	-	-
	-		*Gossia bidwillii*	LC	-
	brush box		*Lophostemon confertus*	LC	-
	swamp box		*Lophostemon suaveolens*	LC	-
	-		*Melaleuca bracteata*	LC	-
	-		*Melaleuca viminalis*	LC	-
	rib-fruited malletwood		*Rhodamnia dumicola*	E	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	scrub turpentine		*Rhodamnia rubescens*	CE	CE
	scrub cherry		*Syzygium australe*	LC	-
	giant watergum		*Syzygium francisii*	LC	-
	-		*Syzygium* sp.	-	-
	weeping lilly pilly		*Waterhousea floribunda*	LC	-
Oleaceae	-		*Jasminum simplicifolium* subsp. *australiense*	LC	-
	veinless mock-olive		*Notelaea johnsonii*	LC	-
	-		*Olea paniculata*	LC	-
Orchidaceae	-		*Cymbidium canaliculatum*	SLC	-
Oxalidaceae	-		*Oxalis* sp.	-	-
Passifloraceae	corky passion flower	*	*Passiflora suberosa*	-	-
Petiveriaceae	-	*	*Rivina humilis*	-	-
Phyllanthaceae	-		*Breynia oblongifolia*	LC	-
	-		*Bridelia exaltata*	LC	-
	omega		*Cleistanthus cunninghamii*	LC	-
	-		*Glochidion ferdinandi*	LC	-
	-		*Glochidion* sp.	-	-
	umbrella cheese tree		*Glochidion sumatranum*	LC	-
	-		*Phyllanthus virgatus*	LC	-
Phytolaccaceae	inkweed	*	*Phytolacca octandra*	-	-
Picrodendraceae	hauer		*Dissiliaria baloghioides*	LC	-
Piperaceae	-		*Piper hederaceum*	LC	-
Pittosporaceae	-		*Auranticarpa rhombifolia*	LC	-
	native frangipani		*Hymenosporum flavum*	LC	-
	-		*Pittosporum multiflorum*	LC	-
	-		*Pittosporum* sp.	-	-
Poaceae	purple wiregrass		*Aristida ramosa*	LC	-
	-		*Aristida* sp.	-	-
	reedgrass		*Arundinella nepalensis*	LC	-
	-		*Austrostipa blakei*	LC	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
Poaceae	-		*Bothriochloa decipiens* var. *decipiens*	LC	-
	-		*Bothriochloa* sp.	-	-
	-		*Capillipedium* sp.	-	-
	spicytop		*Capillipedium spicigerum*	LC	-
	-		*Chloris truncata*	LC	-
	-		*Chrysopogon fallax*	LC	-
	barbed-wire grass		*Cymbopogon refractus*	LC	-
	-		*Dichanthium* sp.	-	-
	shorthair plumegrass		*Dichelachne micrantha*	LC	-
	-		*Digitaria* sp.	-	-
	-		*Enteropogon* sp.	-	-
	wiry panic		*Entolasia stricta*	LC	-
	-		*Eragrostis* sp.	-	-
	black speargrass		*Heteropogon contortus*	LC	-
	blady grass		*Imperata cylindrica*	LC	-
	-	*	*Megathyrsus maximus*	-	-
	creeping shade grass		*Oplismenus aemulus*	LC	-
	-		*Oplismenus* sp.	-	-
	pademelon grass		*Ottochloa gracillima*	LC	-
	-		*Panicum simile*	LC	-
	-		*Panicum* sp.	-	-
	shotgrass		*Paspalidium distans*	LC	-
	-		*Paspalidium* sp.	-	-
	sourgrass	*	*Paspalum conjugatum*	-	-
	-		*Paspalum* sp.	-	-
	tussock grass		*Poa labillardierei* var. *labillardierei*	LC	-
	-		*Poa* sp.	-	-
	spiny mudgrass		*Pseudoraphis spinescens*	LC	-
	-		*Sarga leiocladum*	LC	-
	-		*Setaria* sp.	-	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
Poaceae	-		*Sporobolus creber*	LC	-
	giant Parramatta grass	*	*Sporobolus fertilis*	-	-
	-	*	*Sporobolus natalensis*	-	-
	-	*	*Sporobolus pyramidalis*	-	-
	-		*Sporobolus* sp.	-	-
	kangaroo grass		*Themeda triandra*	LC	-
	-		*Urochloa* sp.	-	-
Podocarpaceae	she pine		*Podocarpus elatus*	LC	-
Polygonaceae	princes feathers		*Persicaria orientalis*	LC	-
	-		*Persicaria* sp.	-	-
Polypodiaceae	staghorn fern		*Platycerium superbum*	SLC	-
Proteaceae	ball nut		*Floydia praealta*	V	V
	-		*Grevillea hilliana*	LC	-
	silky oak		*Grevillea robusta*	LC	-
	-		*Grevillea* sp.	-	-
	beefwood		*Grevillea striata*	LC	-
Pteridaceae	-		*Adiantum aethiopicum*	SLC	-
	-		*Adiantum atroviride*	SLC	-
	-		*Adiantum hispidulum*	SLC	-
	-		*Adiantum* sp.	-	-
	-		*Cheilanthes sieberi*	LC	-
	heart fern		*Pellaea paradoxa*	SLC	-
Putranjivaceae	grey boxwood		*Drypetes deplanchei*	LC	-
Restionaceae	-		*Restionaceae* sp.	-	-
Rhamnaceae	soap tree		*Alphitonia excelsa*	LC	-
	-		*Ventilago pubiflora*	LC	-
Ripogonaceae	small-leaved supplejack		*Ripogonum brevifolium*	LC	-
Rosaceae	-		*Rubus moluccanus*	LC	-
	pink-flowered native raspberry		*Rubus parvifolius*	LC	-
	-		*Rubus rosifolius*	LC	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	-		*Rubus* sp.	-	-
Rubiaceae	-		*Atractocarpus chartaceus*	LC	-
	-		*Everistia vacciniifolia* forma *vacciniifolia*	LC	-
	-		*Gynochthodes jasminoides*	LC	-
	-		*Pavetta australiensis*	LC	-
	-		*Psychotria daphnoides*	LC	-
	hairy psychotria		*Psychotria loniceroides*	LC	-
	-		*Psydrax lamprophylla*	LC	-
	white eye	*	*Richardia brasiliensis*	-	-
Rutaceae	beach acronychia		*Acronychia imperforata*	LC	-
	glossy acronychia		*Acronychia laevis*	LC	-
	common acronychia		*Acronychia oblongifolia*	LC	-
	soft acronychia		*Acronychia pauciflora*	LC	-
	-		*Bosistoa medicinalis*	LC	-
	three-leaved bosistoa		*Bosistoa transversa*	LC	V
	union nut		*Bouchardatia neurococca*	LC	-
	-		*Citrus australasica*	LC	-
	-		*Citrus australis*	LC	-
	crow's ash		*Flindersia australis*	LC	-
	-		*Flindersia bennettii*	LC	-
	bumpy ash		*Flindersia schottiana*	LC	-
	yellow-wood		*Flindersia xanthoxyla*	LC	-
	pinkheart		*Medicosma cunninghamii*	LC	-
	-		*Melicope elleryana*	LC	-
	bastard crow's ash		*Pentaceras australe*	LC	-
	yellow aspen		*Sarcomelicope simplicifolia* subsp. *simplicifolia*	LC	-
Salicaceae	flintwood	*	*Scolopia braunii*	-	-
Santalaceae	-		*Exocarpos latifolius*	LC	-
Sapindaceae	-		*Alectryon subcinereus*	LC	-
	-		*Alectryon subdentatus*	LC	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
	twin-leaved coogera		*Arytera distylis*	LC	-
	coogera		*Arytera divaricata*	LC	-
	-		*Atalaya salicifolia*	LC	-
	small-leaved tuckeroo		*Cupaniopsis parvifolia*	LC	-
	smooth tuckeroo		*Cupaniopsis serrata*	LC	-
	native tamarind		*Diploglottis australis*	LC	-
	green tamarind		*Elattostachys nervosa*	LC	-
	guioa		*Guioa semiglauca*	LC	-
	-		*Harpullia hillii*	LC	-
	-		*Jagera pseudorhus*	LC	-
	veiny pearfruit		*Mischocarpus anodontus*	LC	-
	steelwood		*Sarcopteryx stipata*	LC	-
	pitted-leaf steelwood		*Toechima tenax*	LC	-
Sapotaceae	-		*Planchonella cotinifolia*	LC	-
	-		*Planchonella myrsinifolia*	LC	-
	-		*Planchonella pohlmaniana*	LC	-
Simaroubaceae	white siris		*Ailanthus triphysa*	LC	-
Smilacaceae	barbed-wire vine		*Smilax australis*	LC	-
Solanaceae	wild tobacco	*	*Solanum mauritianum*	-	-
	Brazilian nightshade	*	*Solanum seaforthianum*	-	-
	-		*Solanum* sp.	-	-
	devil's needles		*Solanum stelligerum*	LC	-
	devil's fig	*	*Solanum torvum*	-	-
Sparrmanniaceae	dysentery plant		*Grewia latifolia*	LC	-
Sterculiaceae	booyong		*Argyrodendron trifoliolatum*	LC	-
	flame tree		*Brachychiton acerifolius*	SLC	-
	-		*Brachychiton discolor*	SLC	-
	peanut tree		*Sterculia quadrifida*	LC	-
Tectariaceae	climbing fern		*Arthropteris tenella*	LC	-
Thelypteridaceae	creek fern		*Christella dentata*	SLC	-
Thymelaeaceae	-		*Pimelea latifolia*	LC	-

Family	Common Name	Exotic	Scientific Name	NC Act Status[1]	EPBC Act Status[2]
Ulmaceae	-		*Aphananthe philippinensis*	LC	-
	Chinese celtis	*	*Celtis sinensis*	-	-
Urticaceae	giant stinging tree		*Dendrocnide excelsa*	LC	-
Urticaceae	shiny leaved stinging tree		*Dendrocnide photinophylla*	LC	-
	small nettle	*	*Urtica urens*	-	-
Verbenaceae	lantana	*	*Lantana camara*	-	-
	-	*	*Verbena rigida*	-	-
Violaceae	spade flower		*Pigea stellarioides*	LC	-
Vitaceae	-		*Causonis clematidea*	LC	-
	-		*Cissus antarctica*	LC	-
	-		*Cissus hypoglauca*	LC	-
	shining grape		*Tetrastigma nitens*	LC	-
Xanthorrhoeaceae	-		*Xanthorrhoea latifolia*	LC	-
	-		*Xanthorrhoea* sp.	-	-
Zingiberaceae	wild ginger		*Alpinia caerulea*	LC	-

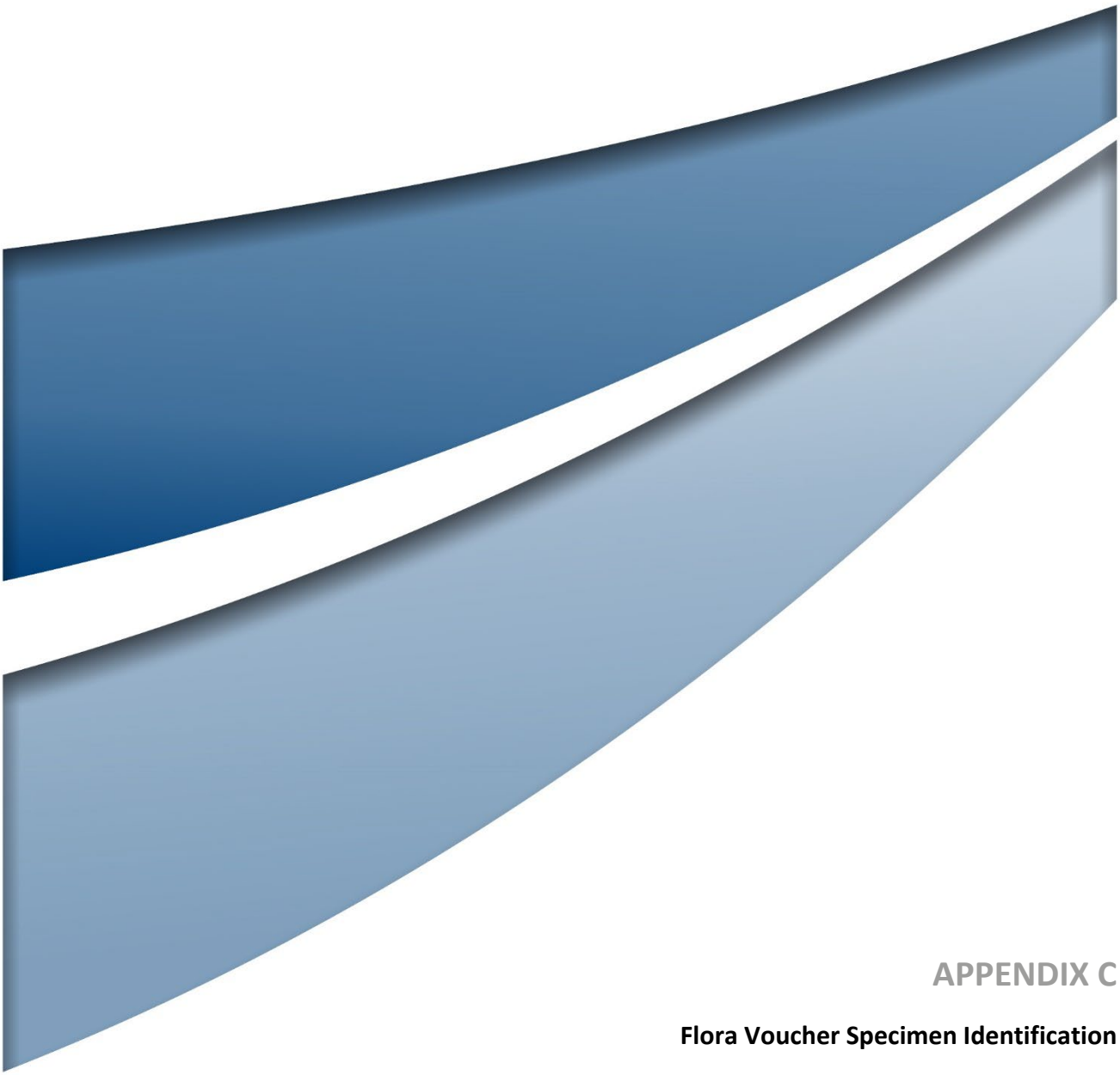
[1]: Status under the NC Act: CE = Critically Endangered, E = Endangered, V = Vulnerable, LC = Least Concern and SLC = Special Least Concern

[2]: Status under the EPBC Act: CE = Critically Endangered, E = Endangered, V = Vulnerable

Recorded Diagnostic Species per TEC Assessment Site

Scientific Name	Site 1	Site 2	Site 3
Acalypha eremorum	-	Yes	-
Ackama paniculata	Yes	Yes	Yes
Alphitonia excelsa	Yes	Yes	Yes
Anthocarapa nitidula	Yes	Yes	Yes
Aphananthe philippinensis	Yes	Yes	Yes
Araucaria cunninghamii	Yes	Yes	Yes
Archontophoenix cunninghamiana	-	Yes	Yes
Argyrodendron trifoliolatum	Yes	Yes	Yes
Arytera distylis	Yes	Yes	Yes
Atractocarpus chartaceus	Yes	Yes	Yes
Baloghia inophylla	Yes	Yes	Yes
Beilschmiedia elliptica	Yes	Yes	Yes
Breynia oblongifolia	Yes	Yes	-
Bridelia exaltata	-	Yes	-
Calamus muelleri	Yes	-	-
Capparis arborea	Yes	Yes	Yes
Castanospermum australe	-	-	Yes
Cissus antarctica	Yes	Yes	Yes
Cleistanthus cunninghamii	Yes	Yes	Yes
Clerodendrum floribundum	Yes	Yes	Yes
Cordyline rubra	Yes	Yes	Yes
Cryptocarya obovata	Yes	Yes	Yes
Cupaniopsis serrata	Yes	Yes	Yes
Dendrocnide excelsa	Yes	Yes	Yes
Diospyros pentamera	Yes	Yes	Yes
Diploglottis australis	Yes	Yes	Yes
Dysoxylum rufum	-	-	Yes
Elattostachys nervosa	Yes	Yes	Yes
Endiandra pubens	Yes	Yes	Yes
Ficus coronata	Yes	Yes	Yes
Ficus macrophylla	Yes	Yes	Yes
Ficus obliqua	Yes	Yes	Yes
Ficus watkinsiana	-	Yes	-
Flindersia australis	-	-	Yes
Flindersia schottiana	Yes	Yes	Yes
Flindersia xanthoxyla	Yes	Yes	Yes
Floydia praealta	Yes	-	-
Gossia bidwillii	Yes	Yes	Yes
Grevillea robusta	-	Yes	-

Scientific Name	Site 1	Site 2	Site 3
Guioa semiglauca	Yes	Yes	Yes
Hymenosporum flavum	-	Yes	-
Jagera pseudorhus	Yes	Yes	Yes
Litsea australis	-	Yes	-
Lophostemon confertus	-	Yes	-
Maclura cochinchinensis	Yes	Yes	Yes
Mallotus discolor	Yes	-	Yes
Mallotus philippensis	Yes	Yes	Yes
Melia azedarach	-	Yes	-
Neolitsea dealbata	-	-	Yes
Notelaea johnsonii	Yes	Yes	-
Pandorea floribunda	-	Yes	-
Pararchidendron pruinosum	-	Yes	-
Pentaceras australe	Yes	-	Yes
Pittosporum multiflorum	Yes	Yes	Yes
Polyscias elegans	Yes	Yes	-
Sarcomelicope simplicifolia	Yes	Yes	Yes
Sarcopteryx stipata	-	Yes	Yes
Sloanea woollsii	-	-	Yes
Streblus brunonianus	Yes	Yes	Yes
Syzygium australe	Yes	Yes	Yes
Syzygium francisii	-	Yes	-
Toona ciliata	-	Yes	-



APPENDIX C

Flora Voucher Specimen Identification

Queensland
Government

Department of
Environment and Science

Queensland Herbarium
Brisbane Botanic Gardens Mt Coot-tha•Toowong 4066 Queensland•Australia
Telephone +61 7 3199 7699 • Facsimile +61 7 3876 1278
e-mail Queensland.Herbarium@qld.gov.au
http://www.qld.gov.au/herbarium

Enquiries Tony Bean
Telephone 07 3199 7666
Your reference
Our reference ARB:PT 329/22

30 June 2022

Gillian Turner
gturner@umwelt.com.au

Dear Gillian

The botanical specimens received by the Queensland Herbarium on 20 June 2022 have been identified as:

NW1	*Bosistoa transversa*
NW2	*#Floydia praealta*. This species is listed as Vulnerable under Queensland's *Nature Conservation Act 1992*.
GT1	*Secamone elliptica*

These specimens have been kept for incorporation into the Herbarium collection, with thanks.

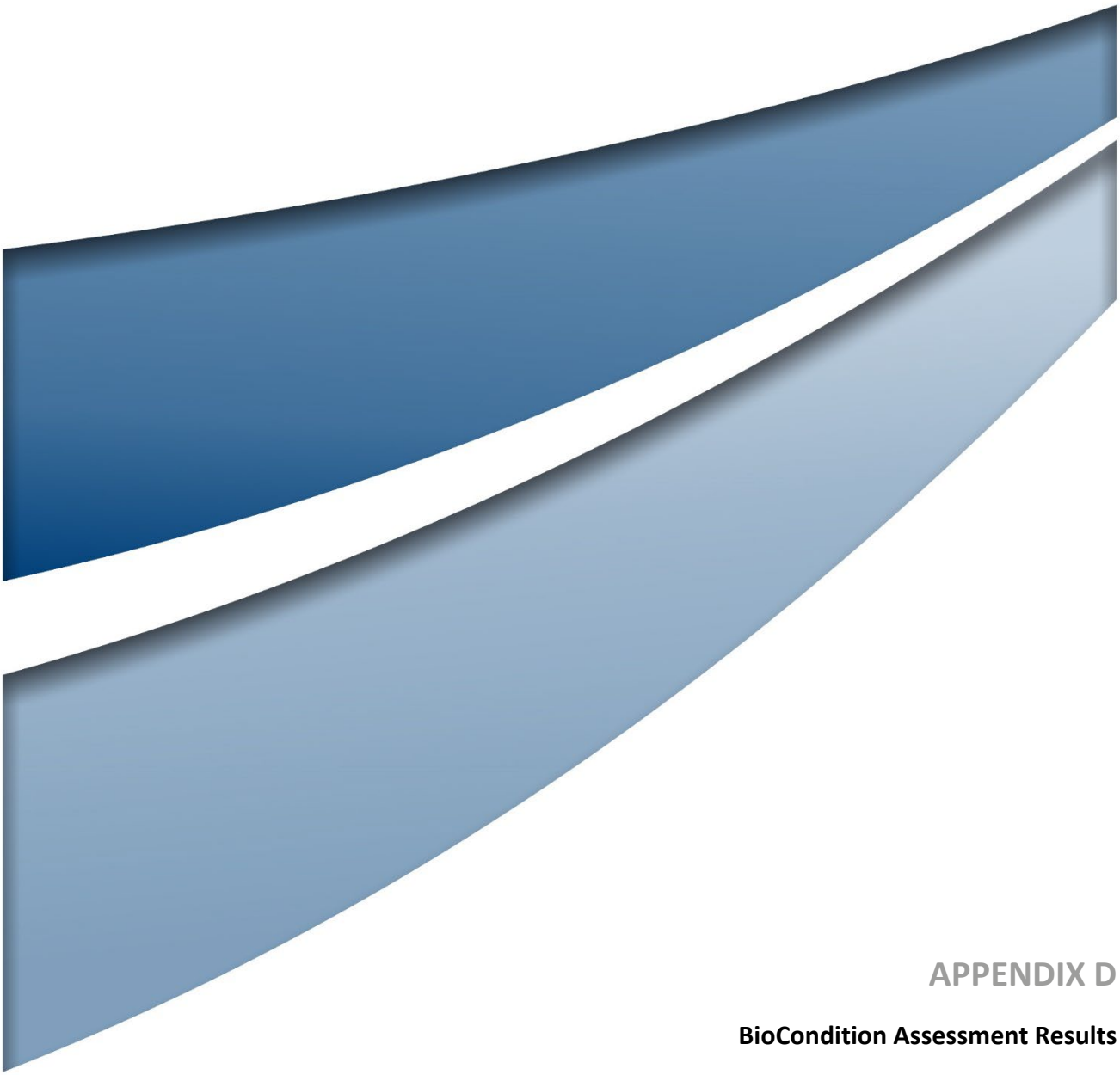
You can contribute to Queensland's biodiversity information by submitting these plant identifications and associated information to the Atlas of Living Australia using the 'Report a sighting' template at (https://www.ala.org.au/).
Note that for specimens retained by the Queensland Herbarium we provide the specimen data to the Australasian Virtual Herbarium and to the Atlas of Living Australia.

The amount of $121.00 (GST inclusive) has been paid for this identification. Thank you for your payment.

Yours sincerely

G.P. Guymer
Director

Download a full version of Census of the Queensland Flora 2021
https://www.data.qld.gov.au/dataset/census-of-the-queensland-flora-2021



APPENDIX D

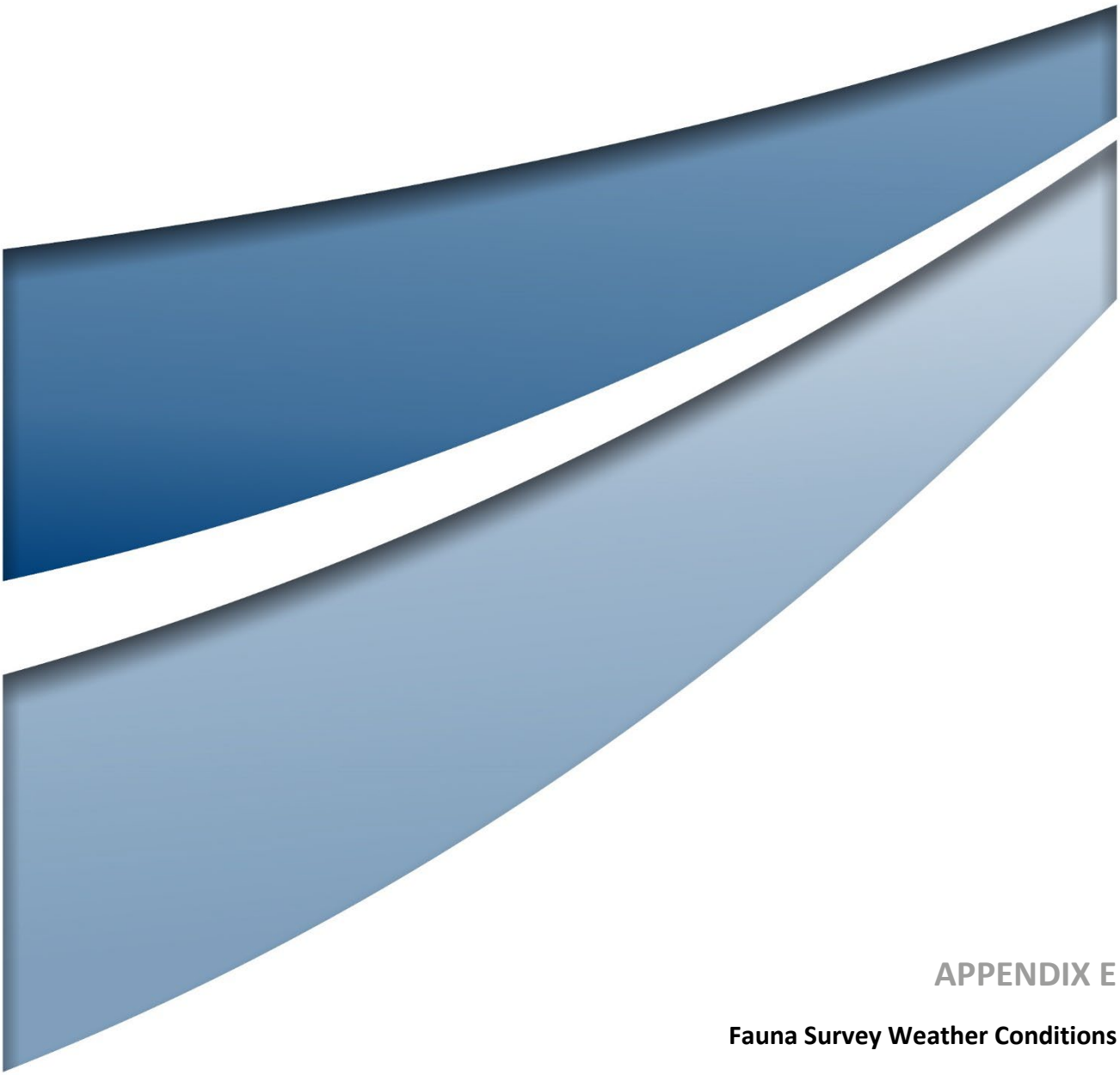
BioCondition Assessment Results

		RE:	12.11.3		RE:	12.11.10		RE:	12.11.10		RE:	12.11.14	
		Site / Assessment Unit:	1 / AU1		Site / Assessment Unit:	2 / AU2		Site / Assessment Unit:	3 / AU2		Site / Assessment Unit:	4 / AU3	
		Benchmark	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**
Large native trees per ha	*Eucalypts*	67	30	**5**	na	na	**10**	na	na	**5**	33	28	**10**
	Non-eucalypts	na	-		88	72		88	40		3	0	
Tree canopy height (m)	*Emergent median*	na	-	**5**	33	0	**3**	33	20	**4**	na	-	**5**
	Canopy median	25	22		22	0		22	10		25	25	
	Sub-canopy median	10	8		8	14		8	6		13	12	
EDL Recruitment (%)		100	100	**5**	100	100	**5**	100	100	**5**	100	100	**5**
Tree canopy cover (%)	*Emergent canopy cover*	na	-	**4**	5	0	**3**	5	0	**3**	na	-	**5**
	Canopy cover	72	55		64	95		64	100		40	38	
	Sub-canopy cover	17	8		47	94		47	100		22	28	
Native shrub layer cover (%)		21	0	**0**	29	80	**3**	29	29	**5**	4	7	**5**
Coarse woody debris		370	489	**5**	705	270	**2**	705	450	**5**	260	1017	**2**
Native plant species richness	Native t*ree*	6	7	**5**	25	17	**3**	25	23	**5**	6	4	**3**
	Shrub	12	2	**0**	23	25	**5**	23	20	**3**	7	4	**3**
	Grass	4	3	**3**	1	1	**5**	1	2	**5**	8	8	**5**
	Forbs/ other	21	15	**3**	35	9	**3**	35	10	**3**	23	22	**5**
Non-native plant cover (%)		0	1	**10**	0	5	**5**	0	2	**10**	0	5	**5**
Native perennial grass cover (%)		16	59	**5**	15	17	**5**	15	2	**1**	45	56	**5**
Organic litter cover (%)		76	22	**3**	54	73	**5**	54	36	**5**	30	24	**5**
			Total	**51.5**		**Total**	**55.2**		**Total**	**57.3**		**Total**	**62.0**

	RE:	12.11.14		RE:	12.11.14		RE:	12.11.3		RE:	12.11.3		RE	12.12.12	
	Site / Assessment Unit:	5 / AU 3		Site / Assessment Unit:	6 / AU3		Site / Assessment Unit:	7 / AU1		Site / Assessment Unit:	8 / AU1		Site / Assessment Unit	9 / AU4	
	Benchmark	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**
Eucalypts	33	6	**5**	33	34	**10**	67	34	**10**	67	24	**5**	60	14	**5**
Non-eucalypts	3	0		3	0		na	-		na	-		na	-	
Emergent median	na	18	**4**	na	-	**4**	na	-	**5**	na	-	**5**	na	-	**5**
Canopy median	25	9		25	18		25	20		25	20		22	21	
Sub-canopy median	13	100		13	8		10	8		10	9		11	12	
EDL Recruitment (%)	100	100	**5**	100	100	**5**	100	100	**5**	100	100	**5**	100	50	**3**
Emergent canopy cover	na	-	**5**	na	-	**4**	na	-	**5**	na	-	**5**	na	-	**4**
Canopy cover	40	64		40	33		72	40		72	55		31	50	
Sub-canopy cover	22	18		22	6		17	13		17	20		12	31	
Native shrub layer cover (%)	4	0	**0**	4	6	**5**	21	2	**0**	21	5	**2**	5	2	**2**
Coarse woody debris	260	110	**2**	260	340	**5**	370	455	**5**	370	710	**5**	500	371	**5**
Native t*ree*	6	9	**5**	6	3	**3**	6	7	**5**	6	4	**3**	4	4	**5**
Shrub	7	3	**3**	7	3	**3**	12	1	**0**	12	1	**0**	3	2	**3**
Grass	8	6	**3**	8	7	**3**	4	10	**5**	4	10	**5**	9	13	**5**
Forbs/ other	23	12	**3**	23	10	**3**	21	12	**3**	21	14	**3**	28	16	**3**
Non-native plant cover (%)	0	5	**5**	0	2	**10**	0	1	**10**	0	2	**10**	0	5	**5**
Native perennial grass cover (%)	45	39	**3**	45	78	**5**	16	57	**5**	16	73	**5**	40	60	**5**
Organic litter cover (%)	30	24	**3**	30	13	**3**	76	21	**3**	76	10	**3**	35	11	**3**
		Total	**46.5**		**Total**	**60.5**		**Total**	**60.5**		**Total**	**55.0**		**Total**	**52.0**

	RE:	12.12.15		RE:	12.12.15		RE:	12.12.16		RE:	12.12.23		RE	12.12.15	
	Site / Assessment Unit:	10 / AU 5		Site / Assessment Unit:	11 / AU5		Site / Assessment Unit:	12 / AU6		Site / Assessment Unit:	13 / AU7		Site / Assessment Unit	14 / AU5	
	Benchmark	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**
Eucalypts	47	20	**5**	47	20	**10**	na	-	**5**	34	8	**5**	47	0	**5**
Non-eucalypts	10	10		10	22		73	4		2	0		10	10	
Emergent median	na	-	**5**	na	-	**5**	na	-	**4**	na	-	**4**	na	-	**5**
Canopy median	24	30		24	21		28	30		25	24		24	19	
Sub-canopy median	10	9		10	9		18	13		12	8		10	13	
EDL Recruitment (%)	100	50	**3**	100	50	**3**	100	20	**3**	100	75	**5**	100	50	**3**
Emergent canopy cover	na	-	**2**	na	-	**4**	na	-	**4**	na	-	**4**	na	-	**5**
Canopy cover	82	39		82	48		70	66		56	48		82	44	
Sub-canopy cover	55	26		55	21		20	45		10	27		55	30	
Native shrub layer cover (%)	5	0	**0**	5	0	**0**	35	35	**5**	4	0	**0**	5	0	**0**
Coarse woody debris	613	709	**5**	613	142	**2**	461	385	**5**	461	627	**5**	613	629	**5**
Native t*ree*	8	8	**5**	8	4	**3**	45	8	**0**	7	7	**5**	8	6	**3**
Shrub	6	4	**3**	6	4	**3**	38	16	**3**	12	2	**0**	6	6	**5**
Grass	5	8	**5**	5	6	**5**	2	1	**3**	8	11	**5**	5	5	**5**
Forbs/ other	17	13	**3**	17	13	**3**	25	10	**3**	22	16	**3**	17	11	**3**
Non-native plant cover (%)	0	1	**10**	0	1	**10**	0	1	**10**	0	1	**10**	0	1	**10**
Native perennial grass cover (%)	23	82	**5**	23	83	**5**	1	6	**5**	38	72	**5**	23	78	**5**
Organic litter cover (%)	65	9	**3**	65	3	**0**	51	50	**5**	27	16	**5**	65	6	**0**
		Total	**53.0**		**Total**	**51.0**		**Total**	**53.5**		**Total**	**55.5**		**Total**	**53.0**

	RE:	12.11.10		RE:	12.3.7		RE:	12.3.7		RE:	12.3.7		RE	12.3.7	
	Site / Assessment Unit:	15 / AU 2		Site / Assessment Unit:	16 / AU9		Site / Assessment Unit:	17 / AU8		Site / Assessment Unit:	18 / AU9		Site / Assessment Unit	19 / AU9	
	Benchmark	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**	**Benchmark**	**Actual**	**Score**
Eucalypts	na	2	**15**	20	6	**10**	20	6	**5**	20	6	**10**	20	0	**10**
Non-eucalypts	88	114		40	42		40	0		40	34		40	58	
Emergent median	33	37	**5**	na	-	**5**	na	-	**5**	na	-	**4**	na	-	**4**
Canopy median	22	25		22	23		22	31		22	20		22	20	
Sub-canopy median	8	11		12	9		12	11		12	6		12	8	
EDL Recruitment (%)	100	100	**5**	100	33	**3**	100	100	**5**	100	100	**5**	100	50	**3**
Emergent canopy cover	5	32	**4**	na	-	**3**	na	-	**5**	na	-	**5**	na	-	**4**
Canopy cover	64	100		31	62		31	33		31	48		31	38	
Sub-canopy cover	47	50		23	53		23	15		23	13		23	6	
Native shrub layer cover (%)	29	49	**5**	22	57	**3**	22	2	**2**	22	4	**2**	22	2	**0**
Coarse woody debris	705	350	**2**	667	280	**2**	667	115	**2**	667	105	**2**	667	102	**2**
Native t*ree*	25	22	**3**	6	11	**5**	6	9	**5**	6	10	**5**	6	4	**3**
Shrub	23	25	**5**	8	13	**5**	8	8	**5**	8	8	**5**	8	3	**3**
Grass	1	0	**0**	6	2	**3**	6	0	**0**	6	5	**3**	6	5	**3**
Forbs/ other	35	6	**0**	17	8	**3**	17	4	**0**	17	8	**3**	17	4	**0**
Non-native plant cover (%)	0	1	**10**	0	5	**5**	0	10	**5**	0	15	**5**	0	70	**0**
Native perennial grass cover (%)	15	0	**0**	8	1	**1**	8	0	**0**	8	0	**0**	8	0	**0**
Organic litter cover (%)	54	40	**5**	27	13	**3**	27	7	**3**	27	5	**3**	27	3	**3**
		Total	**58.8**		**Total**	**50.0**		**Total**	**42.0**		**Total**	**51.0**		**Total**	**33.0**

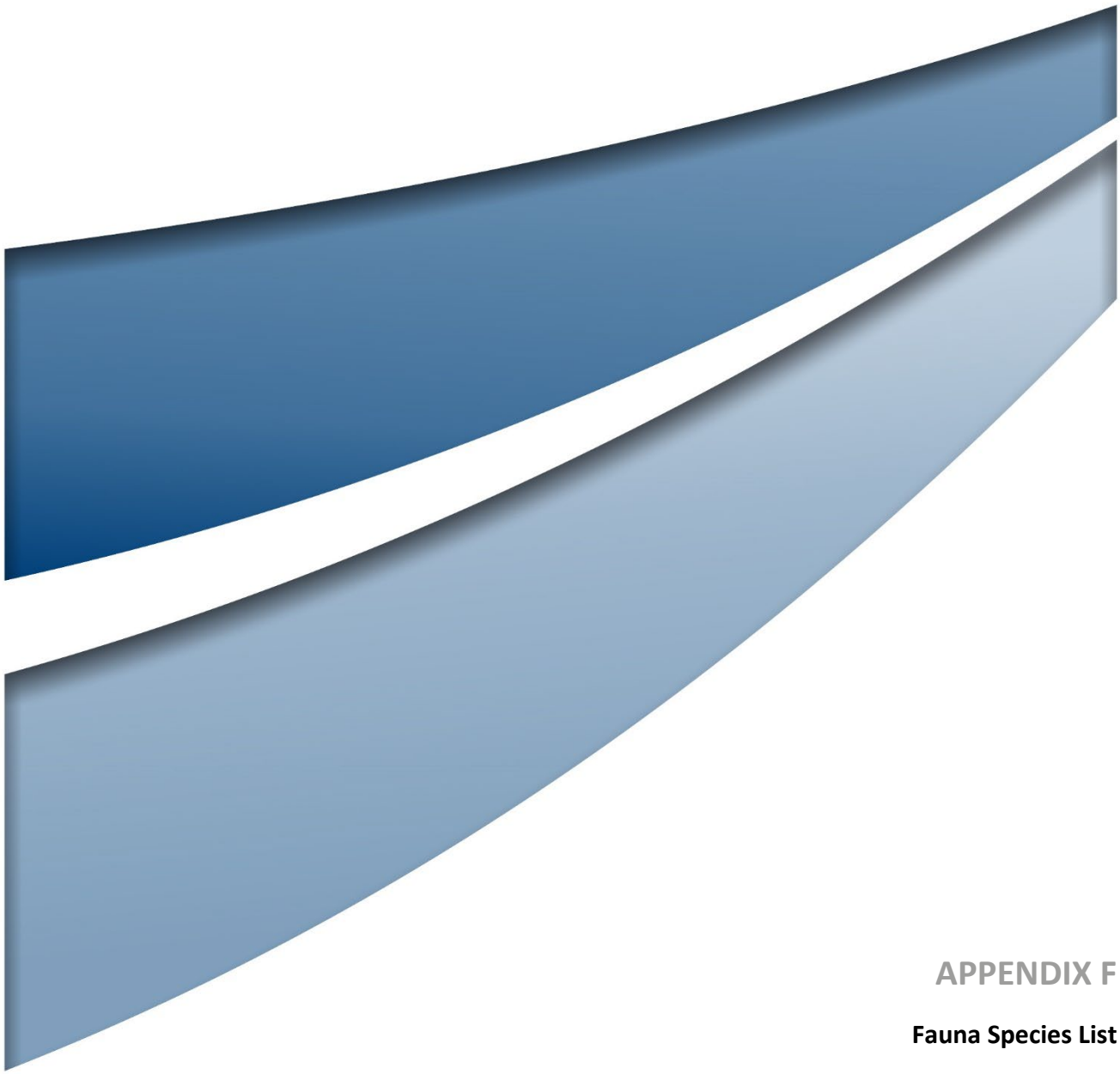


APPENDIX E

Fauna Survey Weather Conditions

Date	Rainfall (mm)	Temperature	
		Minimum	Maximum
5/05/2022	0	17.3	27.9
6/05/2022	1.6	19.0	28.1
7/05/2022	36.4	18.9	25.3
8/05/2022	0.4	18.1	22.4
9/05/2022	5.8	17.9	19.0
10/05/2022	1.6	16.9	21.5
11/05/2022	61.6	18.2	24.1
12/05/2022	28.8	20.0	25.1
13/05/2022	21.2	21.3	22.1
14/05/2022	88.8	18.9	24.2
15/05/2022	11.0	18.2	28.4
16/05/2022	0	21.1	27.8
17/05/2022	0.2	19.7	27.5
18/05/2022	5.2	20.0	25.6
19/05/2022	0.2	17.3	23.7
20/05/2022	0	17.7	22.0
21/05/2022	15.6	15.8	18.8
22/05/2022	34.0	16.0	19.1
23/05/2022	1.0	16.4	20.9
24/05/2022	3.6	16.4	22.6
25/05/2022	1.4	15.5	20.5
26/05/2022	0.2	15.7	22.6
27/05/2022	0	16.1	23.6
28/05/2022	0.4	14.8	25.2
29/05/2022	0	14.6	23.8
30/05/2022	0	11.4	-
31/05/2022	0	14.3	22.6
1/06/2022	0	11.6	21.7
2/06/2022	0	10.7	19.9
3/06/2022	0	9.0	22.6
4/06/2022	4.4	17.0	23.3
5/06/2022	0	6.2	21.2
6/06/2022	10.4	13.1	19.3
7/06/2022	0	8.4	19.4

Date	Rainfall (mm)	Temperature	
		Minimum	Maximum
8/06/2022	0	9.8	19.3
9/06/2022	0	6.1	-
10/06/2022	0	-	-
11/06/2022	0	9.1	19.9
12/06/2022	0	11.0	20.7
13/06/2022	0	8.5	22.0
14/06/2022	0	10.5	23.0
15/06/2022	0	10.7	23.3
16/06/2022	0.2	11.1	24.6
17/06/2022	0	7.8	23.0
18/06/2022	0	7.3	21.7
19/06/2022	0.2	9.2	21.1
20/06/2022	0	13.9	21.6
21/06/2022	0.2	9.9	21.8
22/06/2022	0	8.7	23.6



APPENDIX F

Fauna Species List

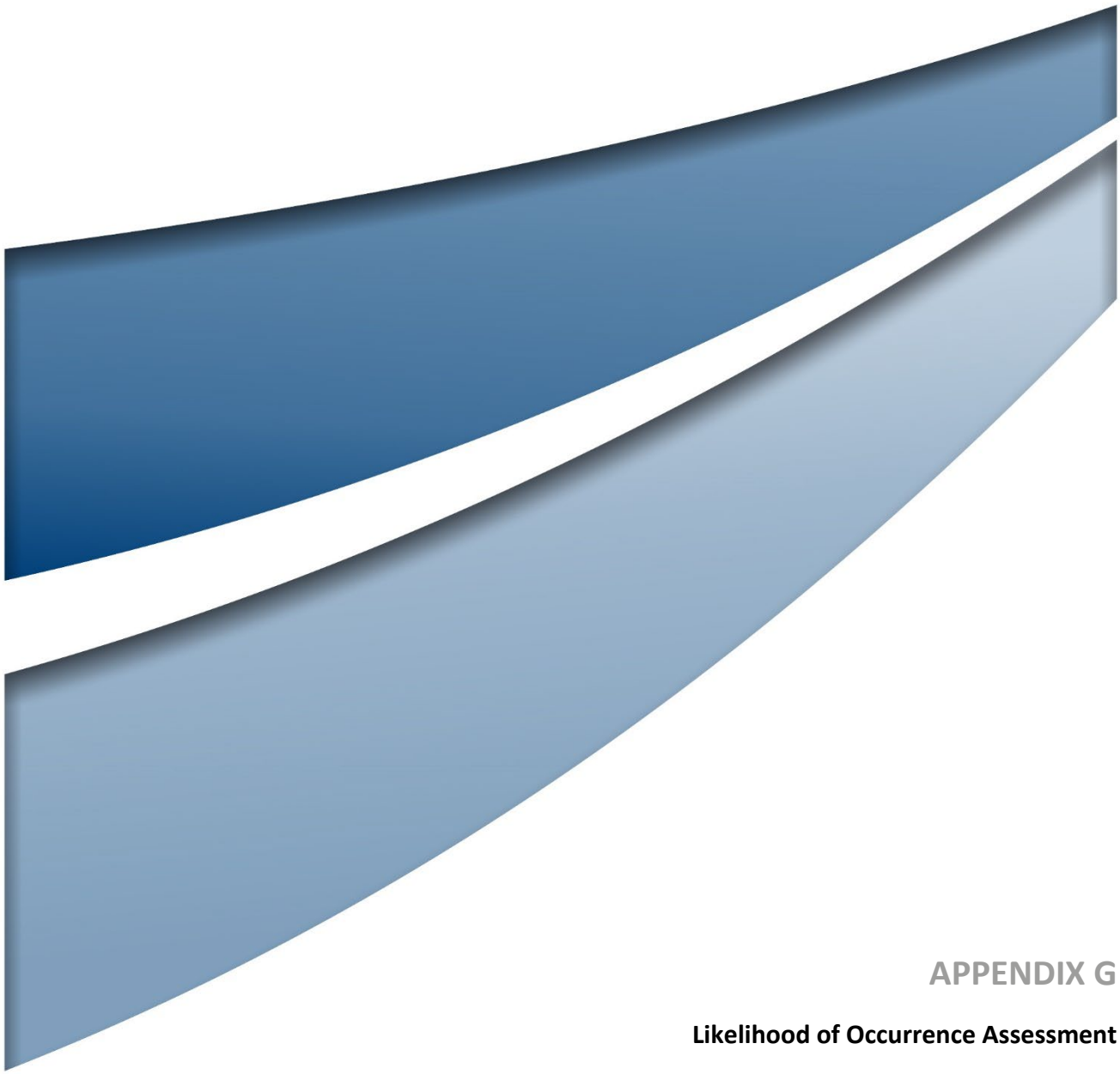
Class	Common Name	Species Name	EPBC Act Status	NC Act Status
Amphibians	cane toad	*Rhinella marina*	-	-
Amphibians	eastern sedgefrog	*Litoria fallax*	-	Least Concern
Amphibians	ornate burrowing frog	*Platyplectrum ornatum*	-	Least Concern
Amphibians	ruddy treefrog	*Litoria rubella*	-	Least Concern
Amphibians	striped marshfrog	*Limnodynastes peronii*	-	Least Concern
Birds	Australasian darter	*Anhinga novaehollandiae*	-	Least Concern
Birds	Australasian figbird	*Sphecotheres vieilloti*	-	Least Concern
Birds	Australasian grebe	*Tachybaptus novaehollandiae*	-	Least Concern
Birds	Australasian pipit	*Anthus novaeseelandiae*	-	Least Concern
Birds	Australian brush-turkey	*Alectura lathami*	-	Least Concern
Birds	Australian king-parrot	*Alisterus scapularis*	-	Least Concern
Birds	Australian magpie	*Gymnorhina tibicen*	-	Least Concern
Birds	Australian pelican	*Pelecanus conspicillatus*	-	Least Concern
Birds	Australian raven	*Corvus coronoides*	-	Least Concern
Birds	Australian wood duck	*Chenonetta jubata*	-	Least Concern
Birds	azure kingfisher	*Ceyx azureus*	-	Least Concern
Birds	bar-shouldered dove	*Geopelia humeralis*	-	Least Concern
Birds	bell miner	*Manorina melanophrys*	-	Least Concern
Birds	black swan	*Cygnus atratus*	-	Least Concern
Birds	black-faced cuckoo-shrike	*Coracina novaehollandiae*	-	Least Concern
Birds	black-faced woodswallow	*Artamus cinereus*	-	Least Concern
Birds	blue-faced honeyeater	*Entomyzon cyanotis*	-	Least Concern
Birds	blue-winged kookaburra	*Dacelo leachii*	-	Least Concern
Birds	brown cuckoo-dove	*Macropygia amboinensis*	-	Least Concern
Birds	brown honeyeater	*Lichmera indistincta*	-	Least Concern
Birds	brown thornbill	*Acanthiza pusilla*	-	Least Concern
Birds	common bronzewing	*Phaps chalcoptera*	-	Least Concern
Birds	dusky honeyeater	*Myzomela obscura*	-	Least Concern
Birds	dusky moorhen	*Gallinula tenebrosa*	-	Least Concern
Birds	eastern great egret	*Ardea alba modesta*	-	Least Concern
Birds	eastern osprey	*Pandion cristatus*	Migratory	Special Least Concern
Birds	eastern whipbird	*Psophodes olivaceus*	-	Least Concern
Birds	Eurasian coot	*Fulica atra*	-	Least Concern
Birds	fan-tailed cuckoo	*Cacomantis flabelliformis*	-	Least Concern

Class	Common Name	Species Name	EPBC Act Status	NC Act Status
Birds	forest kingfisher	*Todiramphus macleayii*	-	Least Concern
Birds	galah	*Eolophus roseicapilla*	-	Least Concern
Birds	glossy black-cockatoo	*Calyptorhynchus lathami*	-	Vulnerable
Birds	golden-headed cisticola	*Cisticola exilis*	-	Least Concern
Birds	great cormorant	*Phalacrocorax carbo*	-	Least Concern
Birds	grey butcherbird	*Cracticus torquatus*	-	Least Concern
Birds	grey fantail	*Rhipidura albiscapa*	-	Least Concern
Birds	grey shrike-thrush	*Colluricincla harmonica*	-	Least Concern
Birds	laughing kookaburra	*Dacelo novaeguineae*	-	Least Concern
Birds	leaden flycatcher	*Myiagra rubecula*	-	Least Concern
Birds	Lewin's honeyeater	*Meliphaga lewinii*	-	Least Concern
Birds	little black cormorant	*Phalacrocorax sulcirostris*	-	Least Concern
Birds	little lorikeet	*Parvipsitta pusilla*	-	Least Concern
Birds	little pied cormorant	*Microcarbo melanoleucos*	-	Least Concern
Birds	little shrike-thrush	*Colluricincla megarhyncha*	-	Least Concern
Birds	magpie-lark	*Grallina cyanoleuca*	-	Least Concern
Birds	masked lapwing	*Vanellus miles*	-	Least Concern
Birds	masked woodswallow	*Artamus personatus*	-	Least Concern
Birds	mistletoebird	*Dicaeum hirundinaceum*	-	Least Concern
Birds	noisy friarbird	*Philemon corniculatus*	-	Least Concern
Birds	noisy miner	*Manorina melanocephala*	-	Least Concern
Birds	pacific black duck	*Anas superciliosa*	-	Least Concern
Birds	painted button-quail	*Turnix varius*	-	Least Concern
Birds	pale-headed rosella	*Platycercus adscitus*	-	Least Concern
Birds	pheasant coucal	*Centropus phasianinus*	-	Least Concern
Birds	pied butcherbird	*Cracticus nigrogularis*	-	Least Concern
Birds	pied cormorant	*Phalacrocorax varius*	-	Least Concern
Birds	pied currawong	*Strepera graculina*	-	Least Concern
Birds	rainbow bee-eater	*Merops ornatus*	-	Least Concern
Birds	rainbow lorikeet	*Trichoglossus haematodus moluccanus*	-	Least Concern
Birds	red-backed fairy-wren	*Malurus melanocephalus*	-	Least Concern
Birds	red-browed finch	*Neochmia temporalis*	-	Least Concern
Birds	restless flycatcher	*Myiagra inquieta*	-	Least Concern
Birds	rose robin	*Petroica rosea*	-	Least Concern

Class	Common Name	Species Name	EPBC Act Status	NC Act Status
Birds	rufous whistler	*Pachycephala rufiventris*	-	Least Concern
Birds	scaly-breasted lorikeet	*Trichoglossus chlorolepidotus*	-	Least Concern
Birds	shining bronze-cuckoo	*Chalcites lucidus*	-	Least Concern
Birds	silvereye	*Zosterops lateralis*	-	Least Concern
Birds	spotted dove	*Streptopelia chinensis*	-	Least Concern
Birds	spotted pardalote	*Pardalotus punctatus*	-	Least Concern
Birds	straw-necked ibis	*Threskiornis spinicollis*	-	Least Concern
Birds	striated pardalote	*Pardalotus striatus*	-	Least Concern
Birds	striated thornbill	*Acanthiza lineata*	-	Least Concern
Birds	sulphur-crested cockatoo	*Cacatua galerita*	-	Least Concern
Birds	Torresian crow	*Corvus orru*	-	Least Concern
Birds	tree martin	*Petrochelidon nigricans*	-	Least Concern
Birds	varied sittella	*Daphoenositta chrysoptera*	-	Least Concern
Birds	varied triller	*Lalage leucomela*	-	Least Concern
Birds	wedge-tailed eagle	*Aquila audax*	-	Least Concern
Birds	welcome swallow	*Hirundo neoxena*	-	Least Concern
Birds	whistling kite	*Haliastur sphenurus*	-	Least Concern
Birds	white-bellied sea-eagle	*Haliaeetus leucogaster*	-	Least Concern
Birds	white-breasted woodswallow	*Artamus leucorynchus*	-	Least Concern
Birds	white-faced heron	*Egretta novaehollandiae*	-	Least Concern
Birds	white-throated gerygone	*Gerygone olivacea*	-	Least Concern
Birds	white-throated honeyeater	*Melithreptus albogularis*	-	Least Concern
Birds	white-throated treecreeper	*Cormobates leucophaea*	-	Least Concern
Birds	willie wagtail	*Rhipidura leucophrys*	-	Least Concern
Birds	wonga pigeon	*Leucosarcia melanoleuca*	-	Least Concern
Birds	yellow-faced honeyeater	*Caligavis chrysops*	-	Least Concern
Birds	yellow-rumped thornbill	*Acanthiza chrysorrhoa*	-	Least Concern
Birds	yellow-tailed black-cockatoo	*Calyptorhynchus funereus*	-	Least Concern
Mammals	black-striped wallaby	*Macropus dorsalis*	-	Least Concern
Mammals	brown antechinus	*Antechinus stuartii*	-	Least Concern
Mammals	brush-tailed phascogale	*Phascogale tapoatafa*	-	Least Concern
Mammals	bush rat	*Rattus fuscipes*	-	Least Concern

Class	Common Name	Species Name	EPBC Act Status	NC Act Status
Mammals	cat	*Felis catus*	-	-
Mammals	chocolate wattled bat	*Chalinolobus morio*	-	Least Concern
Mammals	common brushtail possum	*Trichosurus vulpecula*	-	Least Concern
Mammals	dingo	*Canis familiaris dingo*	-	-
Mammals	eastern broad-nosed bat	*Scotorepens orion*	-	Least Concern
Mammals	eastern cave bat	*Vespadelus troughtoni*	-	Least Concern
Mammals	eastern forest bat	*Vespadelus pumilus*	-	Least Concern
Mammals	eastern grey kangaroo	*Macropus giganteus*	-	Least Concern
Mammals	eastern horseshoe bat	*Rhinolophus megaphyllus*	-	Least Concern
Mammals	European brown hare	*Lepus europaeus*	-	-
Mammals	European cattle	*Bos taurus*	-	-
Mammals	Gould's wattled bat	*Chalinolobus gouldii*	-	Least Concern
Mammals	grassland melomys	*Melomys burtoni*	-	Least Concern
Mammals	house mouse	*Mus musculus*	-	Least Concern
Mammals	koala	*Phascolarctos cinereus*	Endangered	Endangered
Mammals	large bent-winged bat	*Miniopterus orianae oceanensis*	-	Least Concern
Mammals	large forest bat	*Vespadelus darlingtoni*	-	Least Concern
Mammals	little bent-wing bat	*Miniopterus australis*	-	Least Concern
Mammals	little broad-nosed bat	*Scotorepens greyii*	-	Least Concern
Mammals	long-eared bat	*Nyctophilus sp.*	-	Least Concern
Mammals	long-nosed bandicoot	*Perameles nasuta*	-	Least Concern
Mammals	long-nosed potoroo	*Potorous tridactylus tridactylus*	Vulnerable	Vulnerable
Mammals	northern brown bandicoot	*Isoodon macrourus*	-	Least Concern
Mammals	northern free-tailed bat	*Ozimops lumsdenae*	-	Least Concern
Mammals	pig	*Sus scrofa*	-	-
Mammals	rabbit	*Oryctolagus cuniculus*	-	-
Mammals	red fox	*Vulpes vulpes*	-	-
Mammals	red-necked pademelon	*Thylogale thetis*	-	Least Concern
Mammals	red-necked wallaby	*Macropus rufogriseus*	-	Least Concern
Mammals	ride's free-tailed bat	*Ozimops ridei*	-	Least Concern
Mammals	greater broad-nosed bat	*Scoteanax rueppellii*	-	Least Concern
Mammals	rusa deer	*Cervus timorensis*	-	Least Concern

Class	Common Name	Species Name	EPBC Act Status	NC Act Status
Mammals	short-beaked echidna	*Tachyglossus aculeatus*	-	Special Least Concern
Mammals	short-eared possum	*Trichosurus caninus*	-	Least Concern
Mammals	southern myotis	*Myotis macropus*	-	Least Concern
Mammals	swamp wallaby	*Wallabia bicolor*	-	Least Concern
Mammals	whiptail wallaby	*Macropus parryi*	-	Least Concern
Mammals	white-striped free-tail bat	*Austronomus australis*	-	Least Concern
Mammals	white-striped free-tail bat	*Micronomus norfolkensis*	-	Least Concern
Mammals	yellow-bellied sheath-tailed bat	*Saccolaimus flaviventris*	-	Least Concern
Mammals	yellow-footed antechinus	*Antechinus flavipes flavipes*	-	Least Concern
Reptiles	dark-flecked garden sun skink	*Lampropholis delicata*	-	Least Concern
Reptiles	lace monitor	*Varanus varius*	-	Least Concern
Reptiles	open-litter rainbow skink	*Carlia pectoralis*	-	Least Concern
Reptiles	red-bellied black snake	*Pseudechis porphyriacus*	-	Least Concern
Reptiles	shaded-litter rainbow-skink	*Carlia munda*	-	Least Concern
Reptiles	southern snapping turtle	*Elseya albagula*	Critically Endangered	Critically Endangered



APPENDIX G

Likelihood of Occurrence Assessment

Threatened Ecological Communities

Name	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	The community is associated with forested palustrine wetlands or swamp forests in temperature to sub-tropical coastal valleys of eastern coastal Australia. The layered canopy is often dominated by *Melaleuca* spp. and/or *Eucalyptus robusta* on sandy soils. This TEC typically occurs in coastal catchments below 20 m asl and up to 220 m asl.	**Low –** REs that correspond with the TEC are not present within the Study Area.
Lowland Rainforest of Subtropical Australia	Critically Endangered	The community is generally a moderately tall to tall, closed forest. The upper, discontinuous layer includes canopy emergent. Tree species with compound notophyll to mesophyll leaves are common and there is typically a relatively low abundance of Eucalyptus, Melaleuca and Casuarina species. It occurs on basalt and alluvial soils, including sand and old/elevated alluvial soils as well as floodplain alluvia, and occasionally on historically enriched rhyolitic soils and basaltically enriched metasediments.	**Known –** REs that correspond with the TEC occur within the Study Area and meet the key diagnostic characteristics and condition thresholds of the TEC.
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands	Critically Endangered	The community is characterised by a species-rich understorey of tussock grasses, herbs, scattered shrubs with a dominant tree cover consisting of white box, yellow box or Blakely's red gum. Trees are widely spaced and discontinuous with clear separation between the canopy. The TEC occurs in areas that receive between 400 and 1200 mm rainfall yearly and occur on soils that are moderately or highly fertile at altitudes between 170 and 1200 m asl.	**Low –** REs that correspond with the TEC are not present within the Study Area.

Threatened and Migratory Species

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
Threatened Species					
Birds					
regent honeyeater	*Anthochaera phrygia*	Critically Endangered	Critically Endangered	The species is most commonly associated with box-ironbark eucalypt woodland and dry sclerophyll forest, but also inhabits riparian vegetation such as *Casuarina* spp. where it feeds on needle-leaved mistletoe and sometimes breeds. It sometimes utilises lowland coastal forest, which may act as a refuge when its usual habitat is affected by drought. It also uses a range of other habitats including remnant patches in farmland and urban areas, roadside reserves and travelling stock routes.	**Moderate –** The species has been recorded twice from the search extent, however both have high spatial uncertainty (>10 km) (ALA 2022). Suitable riparian habitat occurs within the Study Area.
Australasian bittern	*Botaurus poiciloptilus*	Endangered	Endangered	The species occurs mainly in freshwater wetlands and, rarely, in estuaries or tidal wetlands. It favours wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. *Phragmites*, *Cyperus*, *Eleocharis*, *Juncus*, *Typha*, *Baumea*, *Bolboschoenus*) or cutting grass (*Gahnia*) growing over a muddy or peaty substrate.T	**Low –** Suitable wetland habitat may occur within the Study Area; however, the closest record occurs 30 km to the north of the Study Area (WildNet 2022).
curlew sandpiper	*Calidris ferruginea*			The species mainly occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	**Low –** The species has not been recorded from within the desktop search extent (ALA 2022) and suitable habitat is unlikely to occur within the Study Area, given the relative absence of muddy/sandy edges.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
Coxen's fig-parrot	*Cyclopsitta diophthalma coxeni*	Endangered	Endangered	The species favours sub-tropical rainforest, dry rainforest, littoral and developing littoral rainforest and vine forest. Within these habitats, alluvial areas supporting fig species and other tree species that produce fleshy fruit are favoured. Remnant vegetation at forest edges, gallery forest, sub-littoral mixed scrub, riparian vegetation and isolated stands of figs also provide suitable habitat for the species. The species has also been noted to utilise urban, agricultural and cleared land.	**Moderate –** the species has been historically recorded from an area adjacent to Imbil State Forest and Conondale National Park, just outside the desktop search extent (10.5 km from the Study Area), however there is 500 m spatial uncertainty associated with the record location (ALA 2022). Suitable habitat occurs within the Study Area; including mapped essential habitat.
glossy black-cockatoo (eastern)	*Calyptorhynchus lathami lathami*	Vulnerable	Vulnerable	The species prefers habitat dominated by *Allocasuarina*, or open sclerophyll forests and woodlands with a stratum of *Allocasuarina* beneath a canopy of myrtaceous species. They are known to feed in *Casuarina cristata* and *Allocasuarina luehmannii* forests. The species feeds almost exclusively on *Casuarina* and *Allocasuarina* seeds. Requires tree hollows, usually mature Eucalyptus for breeding.	**Known –** The species has been recorded within the Study Area during the fauna survey.
red goshawk	*Erythrotriorchis radiatus*	Vulnerable	Vulnerable	The species is associated with coastal and sub-coastal tall open forests and woodlands, preferring areas with a mosaic of vegetation types, permanent water and abundant small birds. Associated with gorge and escarpment country in partially cleared country in eastern Qld. In eastern Australia, birds seem to move from inland nest sites to coastal plains in winter. Requires large areas of suitable habitat, occupying home ranges of 50-220 km^2.	**Low –** Large expanses of vegetation exist in the broader region surrounding the Study Area. Borumba Lake provides a permanent water source and the vegetation communities are likely to provide suitable habitat for prey species. Several historic records occur within 5 km southeast of the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
grey falcon	*Falco hypoleucos*	Vulnerable	Vulnerable	The species occurs through a wide range of habitats predominantly in arid to semi-arid Australia. The species is mainly found where annual rainfall is less than 500mm.The species favours lightly timbered and untimbered lowland plains that are intersected by tree-lined water courses. Known to frequent other habitats including grassland and sand dune habitats.	**Low** – Marginal habitat may occur within the Study Area however there are no proximal records (ALA 2022),.
squatter pigeon (southern)	*Geophaps scripta scripta*	Vulnerable	Vulnerable	Suitable habitat for The species includes open, dry woodland with grassy understorey, never far from permanent water. Prefers areas of sandy soil with sparser cover of low grasses; less common on heavier soils with dense grass cover.	**Low –** Cleared grazing areas have the potential to provide suitable habitat for the species. However, no recent records occur within the region surrounding the Study Area (ALA 2022).
painted honeyeater	*Grantiella picta*	Vulnerable		The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, Acacia-dominated woodlands, paperbark (*Melaleuca* spp.), Casuarina, Callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes.	**Low –** Suitable habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).
white-throated needletail	*Hirundapus caudacutus*	Vulnerable	Vulnerable	The species is found across a range of habitats, more often over wooded areas, where it is almost exclusively aerial, though it roosts in tree hollows and the foliage canopy. It forages for insects aerially, flying anywhere between “cloud level” and “ground level”, often forming mixed feeding flocks with other species. The species roosts in tall trees at night, mainly in forests.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.
swift parrot	*Lathamus discolor*	Critically Endangered	Endangered	The species is a non-breeding winter migrant to mainland Australia. During the winter months small numbers of the species disperse to southeast Queensland where they forage on flowers and psyllid lerps associated with eucalypt species.	**Low –** Suitable foraging habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
powerful owl	*Ninox strenua*	-	Vulnerable	The species is found in open forests and woodlands, as well as along sheltered gullies in wet forests with a dense understory, especially along watercourses. It will sometimes be found in open areas near forests such as farmland, parks and suburban areas, as well as in remnant bushland patches. The species requires old growth trees to nest.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.
eastern curlew	*Numenius madagascariensis*	Critically Endangered		The species is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (Zosteraceae). It forages during the non-breeding season on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The species is rarely seen on near-coastal lakes or in grassy areas. It roosts during high tide periods on sandy spits, sandbars and islets, especially on beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves.	**Unlikely –** The species has not been recorded from within the desktop search extent (ALA 2022) and suitable habitat is unlikely to occur given the inland location of the Study Area.
marbled frogmouth	*Podargus ocellatus plumiferus*	-	Vulnerable	The species occurs in rainforest and wet sclerophyll forest, particularly in deep, wet, sheltered gullies along creeklines often containing stands of Bangalow Palms or ferns. Less often, they are found in the ecotone between rainforest and wet Eucalyptus forests, or occasionally in cool rainforest and higher elevation temperate rainforests. Rarely found in wet eucalypt forest.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.
Australian painted snipe	*Rostratula australis*	Endangered	Endangered	The species is most commonly associated with shallow freshwater wetlands or saltmarshes, including inundated grasslands, dams and bore drains, generally with good cover of grasses or low scrub. A secretive and difficult species to observe; often will only flush from dense cover at close range.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
black-breasted button-quail	*Turnix melanogaster*	Vulnerable	Vulnerable	The species favours rainforest and forest preferring drier low closed forest and semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest that receive 770–1,200 mm of rainfall per year. Highly fertile soils with deep leaf litter crucial for foraging. Also known from low, dense acacia thickets and in littoral area associated with vegetation behind sand dunes. A mosaic of lantana and emergent vine forest species provide important cover. Open eucalypt forest may provide dispersal habitat.	**High –** The species has been recently recorded within 20 km of the Study Area (ALA 2022) and there is suitable rainforest and vine thicket habitat within the Study Area. Field surveys have identified the presence of feeding platelets in suitable habitat.
Frogs					
tusked frog	*Adelotus brevis*	-	Vulnerable	The species inhabits wet eucalypt forest, rainforest, and sometimes dry eucalypt forest, where it can be found in close proximity to suitable breeding habitat such as ponds and slow-moving sections of streams.	**High –** The species has been recently observed in the immediate vicinity of the Study Area (ALA 2022) and suitable habitat occurs within the Study Area.
cascade treefrog	*Litoria pearsoniana*	-	Vulnerable	The species is found in rainforest gullies and adjacent wet sclerophyll forest, in association with flowing streams. Occasionally inhabits ponds within these habitats.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area
Fleay's frog	*Mixophyes fleayi*	Endangered	Endangered	The species is associated with montane rainforest and open forest adjacent to rainforest close to stream habitat with a stream order of 1 to 3. Adults can be found in leaf litter near streams. Important habitat includes streams and semi-permanent streams at altitudes between 100 and 1000 m in altitude and includes the Conondale Ranges.	**Moderate –** The species has been recorded at Conondale National Park within 15 km south of the Study Area (ALA 2022) and suitable habitat may occur within the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
giant barred frog	*Mixophyes iteratus*	Vulnerable	Vulnerable	The species occurs in rainforests and wet sclerophyll forests in upper to lower catchment areas. Populations have been found in cleared or disturbed areas, for example cattle farms with vegetated riparian strips and regenerated logged areas. Many sites where the species is known to occur are the lower reaches of streams which have been affected by major disturbances such as clearing, timber harvesting and urban development in their headwaters.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.
Insects					
Australian fritillary	*Argynnis hyperbius inconstans*	Critically Endangered		The species usually occurs around river estuaries or open, swampy coastal regions. It only occurs in areas where its larval food plant, the arrowhead violet (*Viola betonicifolia*) occurs. The arrowhead violet is a small perennial herb which usually grows in damp niches in open habitats. It often grows beneath grasses and other plants, often in association with long leaved matrush (*Lomandra longifolia*) and bladey grass (*Imperata cylindrica*).	**Low –** Suitable riverine habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).
Richmond birdwing	*Ornithoptera richmondia*	-	Vulnerable	The species occurs in subtropical rainforest where its larval host plants Richmond birdwing vine (*Pararistolochia praevenosa*) and mountain aristolochiavine (*P. deltantha*) grow. The Richmond birdwing vine occurs below 600 m asl on basaltic slopes, creek banks, or on volcanic alluvial soils near watercourses, while mountain aristolochia vine occurs on basaltic ridges and slopes at >800 m asl.	**Moderate –** The species has been recorded from the desktop search extent and suitable habitat may occur within the Study Area.
pink underwing moth	*Phyllodes imperialis smithersi*	Endangered	-	The species is found below the altitude of 600 m in undisturbed, subtropical rainforest on rich volcanic soils and fertile alluvium. It occurs in association with the vine *Carronia multisepalea*, a collapsed shrub that provides the food and habitat the moth requires in order to breed.	**Low –** Suitable rainforest habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
Mammals					
large-eared pied bat	*Chalinolobus dwyeri*	Vulnerable	Vulnerable	Roosting habitat for The species includes sandstone cliffs and fertile valley woodlands where these two habitat types occur within proximity of one another. In southeast Queensland high elevation rainforest and moist eucalypt forest on rocky substrates including rhyolite, trachyte and basalt also provide suitable habitat for the species. Roosting habitat includes arched caves with a domed roof.	**Low –** The species has not been recorded from within the desktop search extent and important cliff and cave features are largely absent from the Study Area (ALA 2022).
northern quoll	*Dasyurus hallucatus*	Endangered	Endangered	The species utilises habitats including rocky outcrops, eucalypt woodlands, rainforest, sandy lowlands and beaches, shrublands, grasslands and deserts. Habitat typically includes some form of rocky structure for denning where surrounding vegetation is utilised for foraging and dispersal.	**Low –** The species has not been recorded from within the desktop search extent however, suitable rocky outcrop habitat may occur within the Study Area (ALA 2022).
spotted-tailed quoll	*Dasyurus maculatus maculatus*	Endangered	Endangered	The species occurs in a variety of habitats including closed forests (including temperate and sub-tropical rainforest), tall eucalypt forests, open woodlands, open forests, drier rain shadow woodlands and coastal heathlands. During the day they shelter in fallen logs, boulder piles, burrows, tree hollows and occasionally under dwellings.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.
ghost bat	*Macroderma gigas*			The species occupies habitats ranging from the arid Pilbara to tropical savanna woodlands and rainforests. During the daytime they roost in caves, rock crevices and old mines.	**Unlikely –** Suitable foraging habitat may occur within the Study Area; however, the species has not been recorded from the region, with the nearest records being from the Rockhampton/Gladstone area.
greater glider	*Petauroides volans*	Endangered	Endangered	The species is largely restricted to eucalypt forests and woodlands; it is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
yellow-bellied glider (south-eastern)	*Petaurus australis australis*	-	Vulnerable	The species occurs in eucalypt-dominated woodlands and forests, including both wet and dry sclerophyll forests. Abundance is highly dependent on habitat suitability, which is in turn determined by forest age and floristics. The subspecies shows a preference for large patches of mature old growth forest that provide suitable trees for foraging and shelter.	**High –** The species has been historically observed in the immediate vicinity of the Study Area (ALA 2022) and suitable habitat occurs in the Study Area.
brush-tailed rock-wallaby	*Petrogale penicillata*	Vulnerable	Vulnerable	The species inhabits rocky outcrops, steep rocky slopes, boulder piles, cliffs, gorges and isolated rock stacks that are typically north facing or on cliff lines. Dense vegetation cover above or below rock features provides important habitat for foraging, shelter and protection from predators.	**Low –** The species has been recorded recently from within the desktop search extent. A recent record occurs approximately 6 km west of the Study Area at Yabba State Forest (ALA 2022). However, suitable habitat for the species was not determined from field surveys. Some rocky features do exist within the Study Area but not to the extent they are likely to support the species.
koala	*Phascolarctos cinereus*	Endangered	Endangered	The species inhabits a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by eucalypt species. The species is limited by habitat (restricted to below 800 m asl (above sea level)), temperature and, at the western and northern ends of the range, leaf moisture.	**Known –** The species was recorded within the Study Area several times during field surveys, including a visual observation at the boundary of the upper reservoir, camera trap observation at the upper reservoir, and indirect evidence (scats) at both reservoirs.
long-nosed potoroo (northern)	*Potorous tridactylus tridactylus*	Vulnerable	Vulnerable	There is no consistent pattern to the habitat of the species; it can be found in wet eucalypt forests to coastal heaths and scrubs. The main factors would appear to be access to some form of dense vegetation for shelter and the presence of an abundant supply of fungi for food.	**Known –** The species was recorded within the Study Area during field surveys.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable	The species occurs in rainforests, open forests, woodlands and *Melaleuca* swamps. Roosting camps are usually in dense riparian vegetation.	**High –** The species has been recently observed in the immediate vicinity of the Study Area (ALA 2022) and suitable habitat occurs within the Study Area.
short-beaked echidna	*Tachyglossus aculeatus*	-	Special Least Concern	The species occupies a variety of habitat types including non-remnant vegetation in both coastal and inland regions.	**Known –** The species was recorded within the Study Area during field surveys.
Plants					
hairy-joint grass	*Arthraxon hispidus*	Vulnerable	-	In south-east Queensland, the species has been recorded growing around freshwater springs on coastal foreshore dunes, in shaded small gullies, on creek banks and on sandy alluvium in creek beds in open forests. It also occurs in bog mosses in mound springs.	**Moderate –** The species has been historically (1939) observed in the immediate vicinity of the Study Area. Suitable habitat occurs within the Study Area.
three-leaved bosistoa	*Bosistoa transversa*	Vulnerable	Least Concern	The species grows in wet sclerophyll forest, dry sclerophyll forest and rainforest up to 300 m in altitude. It is associated with *Argyrodrendon trifoliolatum, Syzygium hodgkinsoniae, Endiandra pubens, Dendrocnide phoinphylla, Amena ingens, Diploglottis australis* and *Diospyros mabacea*.	**Known –** The species has been recorded within the Study Area. Suitable habitat is present within patches of 12.11.10 and 12.12.16.
nightcap plectranthus	*Coleus torrenticola*	Endangered	Endangered	The species is associated with heathland on rocky outcrops. Eucalypt open forest communities providing dabbled shade adjacent to rainforest margins growing in shallow soils on creek lines provides suitable habitat at altitudes between 250 to 450 m. Whilst the species is often associated with water it is not exclusively associated with stream environments.	**Known –** The species has been recorded within the Study Area, within the northern extent of the upper reservoir. Suitable habitat comprises RE 12.11.3.
southern corynocarpus	*Corynocarpus rupestris* subsp. *arborescens*	-	Vulnerable	The species inhabits dry rainforest on steep, rocky, basaltic slopes on the north-eastern face of Glenugie Peak. This subspecies persists in areas where fire is excluded due to the terrain and lack of ground litter.	**Moderate –** The species has been recorded within 10 km of the Study Area. Some suitable habitat is present within the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
cossinia	*Cossinia australiana*	Endangered	Endangered	The species occurs in relict patches of araucarian vineforests or vine thickets on fertile soils in central and southern Queensland.	**Low –** Suitable habitat may occur within the Study Area; however, no records of the species occur within the desktop search extent (ALA, 2022).
leafless tongue-orchid	*Cryptostylis hunteriana*	Vulnerable	Least Concern	The species occupies a range of habitats, including heathlands, heathy woodland, sedgelands, *Xanthorrheoa* spp. Plains, dry sclerophyll forests, forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests.	**Low –** No records of the species occur within 10 km of the Study Area. In Queensland, the species has only been recorded in sandy heathland.
wedge-leaf tuckeroo	*Cupaniopsis shirleyana*	Vulnerable	Vulnerable	Occurs in Araucarian notophyll vine forest, often on red basaltic slopes.	**Low –** Suitable habitat may occur within the Study Area; however, no records of the species occur within the desktop search extent (ALA, 2022).
bluegrass	*Dichanthium setosum*	Vulnerable	Least Concern	The species occur on heavy basaltic soils and red-brown loams. It is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	**Unlikely** – No records of the species occur within 10 km of the Study Area and suitable habitat does not occur in the Study Area.
ball nut	*Floydia praealta*	Vulnerable	Vulnerable	The species occurs in riverine and subtropical rainforest, usually on soils derived from basalt or in coastal scrub.	**Known –** The species has been recorded within the Study Area. Suitable habitat is present within patches of 12.11.10 and 12.12.16.
-	*Fontainea rostrata*	Vulnerable	Vulnerable	The species occurs in notophyll vine forest on soil derived from metamorphic rock. It is known from 10 sites in the Gympie district.	**Low –** Suitable habitat may occur within the Study Area in RE 12.12.16; however, no records of the species occur within the desktop search extent (ALA, 2022).
-	*Fontainea venosa*	Vulnerable	Vulnerable	The species occurs in Araucarian microphyll vine forest with a mean annual rainfall of 1000 mm. It occurs on alluvial soils along creeks. It occurs in association with *Backhousia citriodora, Actephila lindleyi* and *Bosistoa medicinalis*.	**Low –** Marginal habitat may occur within the Study Area; however, no records of the species occur within the desktop search extent (ALA, 2022).

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
tall velvet sea-berry	*Haloragis exalata* subsp. *velutina*	Vulnerable	Vulnerable	The species occurs in eucalypt forests, from rainforest margins and grasslands from near sea-level to 1000 m. The species has been recorded growing on brown heavy clay, shallow rock loam, and basaltic soils.	**Low –** Suitable habitat may occur within the Study Area; however, no records of the species occur within the desktop search extent (ALA, 2022).
slender milkvine	*Leichhardtia coronata*	-	Vulnerable	Found in open eucalypt forest and woodland communities, the species typically occurs on hillslopes and ridge tops at altitudes of 40-780 m asl. It typically occurs on well-drained soils, amongst *Eucalyptus fibrosa* (red ironbark)*, E. carnea* (white mahogany)*, Corymbia citriodora* (lemon-scented gum)*, C. henryi* (large-leaved spotted gum)*, E. acmenoides* (yellow stringybark) *and E. propinqua* (grey gum).	**High –** The species has been recently observed in the immediate vicinity of the Study Area and suitable habitat occurs within the Study Area, associated with REs 12.11.3 and 12.12.15.
macadamia nut	*Macadamia integrifolia*	Vulnerable	Vulnerable	The species grows in remnant rainforest, including complex mixed notophyll forest and prefer partially open areas such as rainforest edges. However, this habitat is not continuously fit for the species. Vegetation communities in which the species is found range from complex notophyll mixed forest, extremely tall closed forest, simple notophyll mixed very tall closed forest to simple microphyll-notophyll mixed mid-high closed forest with *Araucaria* and *Argyrodendron* emergent.	**Moderate –** The species has been recorded within 10 km of the Study Area and suitable habitat occurs within the Study Area, associated with REs 12.11.10 and 12.12.16.
small-fruited Queensland nut	*Macadamia ternifolia*	Vulnerable	Vulnerable	The species generally occurs in fertile, basalt-derived soils on steep southern slopes. It occurs in association with *Argyrodendron trifoliatum* and *Dissilaria baloghiioides* in the Blackall Range area and Araucarian microphyll-notophyll mixed tall closed forest at Mt Pinbarren.	**High –** A historical records occurs immediately adjacent the Study Area (west of the proposed lower reservoir). Suitable habitat occurs within the Study Area, associated with REs 12.11.10 and 12.12.16.
rough-shelled bush nut	*Macadamia tetraphylla*	Vulnerable	Vulnerable	This species occurs in subtropical rainforest and notophyll vine forest in near-coastal areas. It is often found on steep slopes, especially at ecotones.	**Moderate** - The species has been historically observed approximately 9 km north of the Study Area. Suitable habitat occurs within the Study Area, associated with REs 12.11.10 and 12.12.16.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
-	*Nothoalsomitra suberosa*	-	Near Threatened	The species occurs in wet eucalypt forests. There is little available information on the habitat of the species.	**High –** The species has been historically observed in the immediate vicinity of the Study Area and suitable habitat occurs within the Study Area.
-	*Parsonsia largiflorens*	-	Endangered	The species grows in rainforest, including drier types. There is little available information on the habitat of the species.	**Moderate –** The species has been recorded from the desktop search extent and suitable habitat may occur within the Study Area, associated with REs 12.11.10 and 12.12.16.
knotweed	*Persicaria elatior*	Vulnerable	Vulnerable	The species grows in damp places, including coastal swampy areas, along watercourses, streams and lakes, swamp forests and in disturbed areas. It occurs in associated with *Melaleuca linearifolia, M. quinquenervia, Lophostemon suaveolens, Casuarina glauca, Corymbia maculata, Pseaudognaphalium luteoalbum* and *Polygonum hydropiper*.	**Low –** No records of the species occur within 10 km of the Study Area; however, some marginal habitat may occur within the Study Area. The species is known from only seven sites in Queensland.
lesser swamp-orchid	*Phaius australis*	Endangered	Endangered	The species occurs in coastal wet heath/sedge wetlands, swampy grassland or swampy forest and often where broad-leaved paperbark and swamp mahogany are found.	**Low –** No records of the species occur within 10 km of the Study Area. No suitable habitat occurs within the Study Area.
-	*Plectorrhiza beckleri*	-	Near Threatened	The species is an epiphyte that grows in rainforest, especially along creeks, on the outer twigs of trees.	**Low –** No records of the species occur within 10 km of the Study Area; however, some suitable habitat may occur within the Study Area (REs 12.11.10 and 12.12.16).
-	*Plectranthus omissus*	Endangered	Endangered	The species grows on rock outcrops in open eucalypt forest and adjacent vine forest. It is known only from four sites between Gympie and Gayndah.	**Low –** No records of the species occur within 10 km of the Study Area. The species is considered unlikely to occur due to its limited distribution.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
rib-fruited malletwood	*Rhodamnia dumicola*	-	Endangered	The species occurs in drier rainforests. There is little available information on the habitat of the species.	**Known –** The species has been recorded within the Study Area, within the upper and lower reservoir. It occurs in patches of RE 12.11.3, 12.11.10, and 12.12.15.
scrub turpentine	*Rhodamnia rubescens*	Critically Endangered	Critically Endangered	Habitat for The species includes warmer rainforest and on rainforest margins, mainly coastal. It also may occur as a pioneer in adjacent areas of dry sclerophyll and grassy woodland associations.	**Known –** The species has been recorded within the Study Area, within the upper reservoir area. It occurs in patches of RE 12.11.3, 12.11.10, 12.12.15 and 12.12.16.
-	*Sophora fraseri*	Vulnerable	Vulnerable	The species normally grows in wet sclerophyll forest and a range of rainforest types. It has been reported growing in hilly terrain on hillslopes at altitudes at altitudes from 60 to 660m, mostly shallow stony to shaly soils, of loam to clay texture derived from sandstone or basalt rocks. Associated species include: *Corymbia citriodora*, *Eucalyptus carnea*, *E. microcorys*, *E. acmenoides*, *E. propinqua* and *Lophostemon confertus*. The shrub appears to prefer growing along rainforest margins, in eucalypt forests in the vicinity of rainforests or in large canopy gaps in closed forest communities.	**High –** The species was recorded approximately 400 m south of the proposed lower reservoir. Suitable habitat occurs within the Study Area.
Austral toadflax	*Thesium australe*	Vulnerable	Vulnerable	The species occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It typically occurs on soils derived from sedimentary, igneous and metamorphic geology, on a range of soils. Habitat includes shrubland, grassland or woodland, typically on damp sites.	**High –** The species has been previously (1993) recorded within the Study Area. Suitable habitat occurs within the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
glossy spice bush	*Triunia robusta*	Endangered	Endangered	The main habitat for the species is notophyll vine forest, or mixed tall open forest developing a rainforest understorey in the absence of fire. Most populations occur within 25 m of streams, on south or south-east facing slopes or river terraces, with a few populations at higher topographic positions away from watercourses. It occurs on well-drained soil, either clayey sand, loamy sand or loams, derived from felsite substrate, alluvium or arenite mudrock.	**Low –** No records of the species occur within 10 km of the Study Area. Suitable habitat is present within the Study Area, including RE 12.11.10 and 12.12.16.
Reptiles					
common death adder	*Acanthophis antarcticus*	-	Vulnerable	The species utilises a range of well-drained habitats that include rainforest, wet sclerophyll forest, woodlands, shrublands, grasslands and coastal heath. Sites with deep fixed leaf litter appear to be a preferred habitat feature.	**Moderate –** The species is known from the desktop search extent and suitable habitat may occur within the Study Area (ALA 2022)
three-toed snake-tooth skink	*Coeranoscincus reticulatus*	Vulnerable	-	The species has been recorded in rainforest, closed forest, wet sclerophyll forest, tall open blackbutt (*Eucalyptus pilularis*) forest, tall layered open eucalypt forest and closed brush box (*Lophostemon confertus*) forest. It has been found in loose, well mulched friable soil, in and under rotting logs, in forest litter, under fallen hoop pine bark and under decomposing cane mulch.	**Low –** Suitable forest habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).

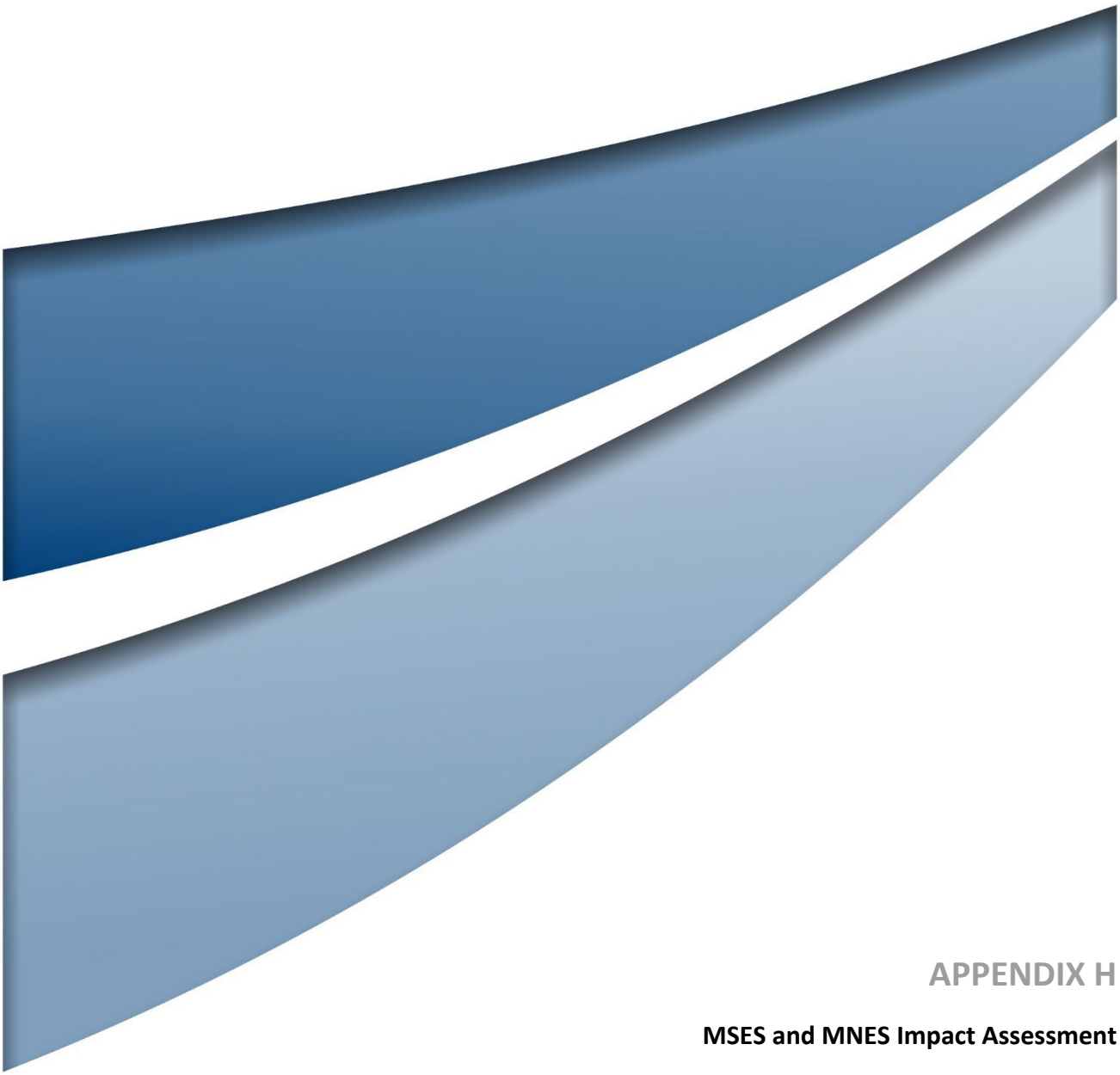
Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
collared delma	*Delma torquata*	Vulnerable	Vulnerable	The species normally inhabits eucalypt-dominated woodlands and open-forests on Queensland Regional Ecosystem (RE) Land Zones 3, 9 and 10. In the eastern parts of the species' range, suitable habitats are commonly associated with exposed rocky outcrops on ridges or slopes in vegetation communities dominated by *Eucalyptus crebra*. Other vegetation communities in this region are typically dominated by *Corymbia citriodora*. Other canopy species include *E. melanophloia*, *E. tessellaris*, *E. moluccana*, *E. microcorys*, and *E. tereticornis*. The presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick) appears to be an essential characteristic of the species' microhabitat.	**Low –** Suitable eucalypt woodland/forest habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).
yakka skink	*Egernia rugosa*	Vulnerable	Vulnerable	The species occurs in a wide variety of vegetation types within Queensland Regional Ecosystem Land Zones (LZ) 3, 4, 5, 7, 9 and 10. Whilst LZ 8 is not considered to be representative of core habitat, the species may still occur in this land zone. It is known to occur in open dry sclerophyll forest, woodland and scrub. Common woodland and open forest types include brigalow (*Acacia harpophylla*) mulga (*A. aneura*), bendee *(A. catenulata*), lancewood (*A. shirleyi*), belah (*Casuarina cristata*), poplar box (*Eucalyptus populnea*), ironbark (*Eucalyptus* spp.) and white cypress pine (*Callitris glaucophylla*). It has also been observed in ecotonal forest in rainforest and wet/dry sclerophyll forest.	**Low –** Suitable woodland/forest habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
Dunmall's snake	*Furina dunmalli*	Vulnerable	Vulnerable	The species has been found in a broad range of habitats, including: forests and woodlands on black alluvial cracking clay and clay loams dominated by brigalow (*Acacia harpophylla*), other *Acacia* spp., *Callitris* spp. or bull-oak (*Allocasuarina luehmannii*); and various lemon-scented gum (*Corymbia citriodora*), ironbark (*Eucalyptus crebra* and *E. melanophloia*), white cypress pine (*Callitris glaucophylla*) and bulloak open forest and woodland associations on sandstone derived soils. Records indicate the species prefers habitats between 200 to 500 m asl.	**Low –** Suitable woodland/forest habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).
Migratory Birds					
Migratory Marine Birds					
fork-tailed swift	*Apus pacificus*	Migratory	Special Least Concern	The species is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.
Migratory Terrestrial Species					
oriental cuckoo	*Cuculus optatus*	Migratory	Special Least Concern	The species uses a range of vegetated habitats such as monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. Frequently at edges or ecotones between habitat types.	**Moderate –** The species has been recorded from the desktop search extent (ALA 2022) and suitable habitat may occur within the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
black-faced monarch	*Monarcha melanopsis*	Migratory	Special Least Concern	The species is a wet forest specialist, occurring mainly in rainforests and riparian vegetation. In wet sclerophyll forest, the species mostly frequents sheltered gullies and slopes with a dense understorey of ferns and/or shrubs. They forage from trees and shrubs or by taking insect prey from the air (sallying).	**High –** The species has been recently recorded within the Study Area (ALA 2022) and suitable wet sclerophyll forest occurs within the Study Area.
spectacled monarch	*Monarcha trivirgatus*	Migratory	Special Least Concern	The species occurs in dense vegetation, mainly in rainforest but also in moist forest or wet sclerophyll and occasionally in other dense vegetation such as mangroves, drier forest and woodlands.	**High–** The species has been recently recorded within the Study Area (ALA 2022) and suitable wet sclerophyll forest and direr woodland/forest occurs within the Study Area.
rufous fantail	*Rhipidura rufifrons*	Migratory	Special Least Concern	In east and south-east Australia, the species mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts; usually with a dense shrubby understorey often including ferns. They also occur in subtropical and temperate rainforests. They occasionally occur in secondary regrowth, following logging or disturbance in forests or rainforests. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including spotted gum (*Eucalyptus maculata*), yellow box (*E. melliodora*), ironbarks or stringybarks, often with a shrubby or heath understorey.	**High –** The species has been historically recorded within the Study Area (ALA 2022) and suitable woodland/forest habitat occurs within the Study Area.
satin flycatcher	*Myiagra cyanoleuca*	Migratory	Special Least Concern	The species inhabits heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. They have only been recorded in other habitats as a non-breeding visitor. They are occasionally recorded in thickets of paperbarks (Melaleuca), brigalow (*Acacia harpophylla*) shrubland, coastal thickets, heathland and mangroves.	**High –** The species has been historically recorded within the Study Area (ALA 2022) and suitable woodland/forest habitat occurs within the Study Area.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
Migratory Wetlands Species					
common sandpiper	*Actitis hypoleucos*	Migratory	Special Least Concern	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. It has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags.	**Low –** The species has not been recorded from within the desktop search extent (ALA 2022) and suitable habitat is unlikely to occur within the Study Area, given the low cover of inundated/ emergent vegetation and relative absence of muddy margins/rocky shores.
sharp-tailed sandpiper	*Calidris acuminata*	Migratory	Special Least Concern	The species prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They forage at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water. They also forage among inundated vegetation of saltmarsh, grass or sedges.	**Low –** The species has not been recorded from within the desktop search extent (ALA 2022) and suitable habitat is unlikely to occur within the Study Area, given the low cover of inundated/ emergent vegetation and relative absence of muddy margins.
pectoral sandpiper	*Calidris melanotos*	Migratory	Special Least Concern	The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	**Low –** The species has not been recorded from within the desktop search extent (ALA 2022) and suitable habitat is unlikely to occur within the Study Area, given the low cover of inundated/ emergent vegetation and relative absence of muddy margins.

Common Name	Scientific Name	EPBC Act Status	NC Act Status	Habitat Descriptions	Likelihood of Occurrence
Latham's snipe	*Gallinago hardwickii*	Migratory	Special Least Concern	In Australia, the species occurs in permanent and ephemeral wetlands up to 2000 m asl. They usually inhabit open, freshwater wetlands with low, dense vegetation such as swamps, flooded grasslands or heathlands, around bogs and other water bodies. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat.	**High –** The species has been historically observed in the immediate vicinity of the Study Area and suitable wetland habitat occurs in the Study Area (ALA 2022).
osprey	*Pandion haliaetus*	Migratory	Special Least Concern	The species occurs in littoral and coastal habitats and terrestrial wetlands. They are mostly found in coastal areas but occasionally travel inland along major rivers and require extensive areas of open fresh, brackish, or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes.	**Known –** The species was recorded during surveys within the Study Area (ALA 2022).
common greenshank	*Tringa nebularia*	Migratory	Special Least Concern	The species is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees.	**Low –** Suitable wetland habitat may occur within the Study Area; however, the species has not been recorded from within the desktop search extent (ALA 2022).



APPENDIX H

MSES and MNES Impact Assessment

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1.0 MNES Significant Impact Assessment

This section provides a preliminary significant impact assessment for MNES associated with the Study Area that have previously been identified and for threatened species are known, have a high or moderate likelihood of occurring.

1.1 Threatened Ecological Communities

Three Threatened Ecological Communities (TECs) were identified from database search results as potentially occurring in the Study Area. Of these, one has been confirmed through field survey as present within the Study Area: Lowland Rainforest of Subtropical Australia. The impact assessment for this TEC is provided in **Table 1.1**.

Table 1.1 Preliminary Impact Assessment for Lowland Rainforest of Subtropical Australia Threatened Ecological Community

Impact Criteria **An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:**	**Preliminary Impact Assessment**
Reduce the extent of an ecological community	Yes – The clearing or inundation of associated vegetation will reduce the extent of the TEC
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	No
Adversely affect habitat critical to the survival of an ecological community	Yes – The loss of associated vegetation through clearing or inundation will increase edge effects and reduce availability of habitat
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Yes – the Project has potential to alter surface water and drainage patterns
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: **Assisting invasive species, that are harmful to the listed ecological community, to become established** **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community**	No
Interfere with the recovery of an ecological community	Yes – Vegetation clearance is an identified threat to the TEC. The clearing or inundation of associated vegetation will therefore interfere with the recovery of the TEC.

1.2 Listed Threatened Species

The following section provides a high-level preliminary impact assessment for nationally listed threatened flora and fauna species that are known to occur or have a high or moderate likelihood of occurring within the Study Area.

1.2.1 Critically Endangered and Endangered Species

Two flora and seven fauna species listed as Critically Endangered or Endangered have been identified as potentially occurring within the Study Area:

- Flora
    - nightcap plectranthus (*Coleus torrenticola*)
    - scrub turpentine (*Rhodamnia rubescens*).
- Fauna
    - regent honeyeater (*Anthochaera phrygia*)
    - Coxen's fig-parrot (*Cyclopsitta diophthalma coxeni*)
    - spotted-tailed quoll (*Dasyurus maculatus maculatus*)
    - cascade treefrog (*Litoria pearsoniana*)
    - Fleay's frog (*Mixophyes fleayi*)
    - greater glider (*Petauroides volans*)
    - koala (*Phascolarctos cinereus*)
    - Australian painted snipe (*Rostratula australis*).

A preliminary impact assessment for Critically Endangered and Endangered species is provided in **Table 1.2** and **Table 1.3**. It has been determined through these assessments that there is a high risk that the Project will have significant impacts to three Critically Endangered or Endangered species:

- *Coleus torrenticola*
- *Rhodamnia rubescens*
- koala.

1.2.1.1 Flora

Rhodamnia rubescens

Rhodamnia rubescens occurs in warmer rainforest and on rainforest margins, mainly in coastal areas. It may also occur as a pioneer in adjacent areas of dry sclerophyll and grassy woodland associations. A minimum of 160 individuals occur within the proposed upper reservoir within REs 12.11.3, 12.12.16 and 12.12.15. Suitable habitat within the Study Area comprises RE 12.11.3, 12.11.10, 12.12.16 and 12.12.15, as well as communities adjacent to RE 12.11.10 and 12.12.16. Given a population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, resulting in the removal of approximately 90 individuals, there is a high risk that the Project will significantly impact the species.

Coleus torrenticola

Coleus torrenticola was recorded with 38 individuals observed in the proposed upper reservoir along a rocky creek line within RE 12.11.3. A total of 212.4 ha of RE 12.11.3 occurs within the Study Area, mostly associated with the proposed upper reservoir though with pockets existing in the proposed lower reservoir. Given a population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

Table 1.2 Significant Impact Assessment: Critically Endangered or Endangered Flora

Impact Criteria	*Rhodamnia rubescens*	*Coleus torrenticola*
Lead to a long-term decrease in the size of a population	Yes	Yes
Reduce the area of occupancy of the species	Yes	Yes
Fragment an existing population into two or more populations	No	No
Adversely affect habitat critical to the survival of a species	No	No
Disrupt the breeding cycle of a population	No	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No	No
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No	No
Introduce disease that may cause the species to decline	No	No
Interfere with the recovery of the species	Yes	Yes
Significant Impact Risk:	High	High

1.2.1.2 Fauna

Regent Honeyeater

Desktop searches indicate that regent honeyeater has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging habitat exists for this species within the Study Area (dry sclerophyll forest and riparian vegetation). Any foraging habitat where the species is likely to exist is considered as habitat critical to the survival of the species. The clearing and inundation of vegetation will result in the permanent loss of critical habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project will impact critical foraging habitat, there is a moderate risk that the Project will significantly impact the species.

Coxen's Fig-Parrot

Desktop searches indicate that Coxen's fig parrot has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging and breeding habitat exists for this species within the Study Area (rainforest and vine forest, particularly alluvial areas containing *Ficus* spp.).There is no definition of habitat critical to the survival of the species, however the recovery plan indicates that the presence of abundant fig trees appears to be an important factor governing the subspecies' occurrence. At least 6 species of fig were recorded during preliminary field surveys. Therefore, the Project may result in the clearing and inundation of habitat critical to the survival of the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project will impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Spotted-tailed Quoll

Desktop searches indicate that spotted-tailed quoll has been previously recorded from the desktop search extent. Preliminary camera trap surveys did not result in the detection of the species, however suitable foraging and breeding habitat exists for this species within the Study Area (woodlands with fallen logs and rocky outcrops). The Project may result in the clearing and inundation of habitat critical to the survival of the species (large, forested areas with suitable denning resources and high prey densities). Given the species has a moderate likelihood of occurring within the Study Area and the Project will impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Cascade Treefrog

Desktop searches indicate that cascade treefrog has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging and breeding habitat exists for this species within the Study Area (flowing streams in rainforest gullies adjacent to wet sclerophyll forest). Potential habitat occurring within the Study Area may constitute habitat critical for breeding, which has been defined as: 'permanent and semi-permanent freshwater streams, between 100-1000m in altitude, in rainforest and other forest communities of the McPherson, Main, Blackall and Conondale Ranges, Mount Tamborine, the Mistake Mountains and Girraween National Park'. The clearing and inundation of vegetation may result in the permanent loss of critical habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project will impact critical habitat, there is a moderate risk that the Project will significantly impact the species.

Fleay's Frog

Desktop searches indicate that Fleay's frog has been previously recorded from just beyond the desktop search extent. Preliminary field surveys indicate that suitable habitat may exist for this species within the Study Area (higher elevation rainforest and adjoining wet sclerophyll forest and relies on permanent to semi-permanent streams). Potential habitat occurring within the Study Area may constitute habitat critical for breeding, which has been defined as: 'permanent and semi-permanent freshwater streams, between 100-1000 m in altitude, in rainforest and other forest communities of the McPherson, Main and Conondale Ranges, Mt Tamborine, and the Mistake and Bunya Mountains'. The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project has potential to impact critical habitat, there is a moderate risk that the Project will significantly impact the species.

Greater Glider

Desktop searches indicate that greater glider has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of potentially suitable foraging and breeding habitat (eucalypt woodlands and hollow bearing trees). The Project may result in the permanent loss of habitat for the species, including foraging and breeding habitat. Retention of an adequate resource of appropriately large sized trees is critical for maintaining current greater glider populations (DES, 2022). Furthermore, the loss of vegetation associated with the Project will reduce the extent of contiguous forest. These impacts have the potential to interfere with the recovery of the species and cause disruption to ecologically significant locations. Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Koala

Field surveys have determined koala presence within the Study Area through direct visual observation and indirect observation (scats). The Project will result in the clearing and inundation of koala habitat (including remnant and non-remnant woodland communities dominated by Eucalyptus species). The reduction in eucalypt woodland has the potential to reduce the area of occupancy for the species and adversely impact habitat critical to the survival of the species. Project activities have the potential to disrupt the breeding cycle of the local population. The loss of koala habitat associated with the Project has the potential to result in the decline of the species and can be expected to interfere with their recovery. Given a population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

Australian Painted Snipe

Desktop searches indicate that Australian painted snipe has been previously recorded from the desktop search extent. Construction of the proposed lower reservoir may result in the permanent loss of suitable habitat for the species (shallow terrestrial freshwater wetlands and dams with adequate vegetation cover). Habitat within areas that occur within the species' distribution mapping is considered critical to the survival of the species. However, the loss of habitat may only be temporary, and the construction of the upper reservoir may provide additional habitat. Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Table 1.3 Preliminary Significant Impact Assessment: Critically Endangered or Endangered Fauna

Impact Criteria	Preliminary Assessment							
	Regent Honeyeater	Coxen's Fig Parrot	Spotted-tailed Quoll	Cascade Treefrog	Fleay's Frog	Greater Glider	Koala	Australian Painted Snipe
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:								
Lead to a long-term decrease in the size of a population	No	Potential	Potential	No	Potential	Potential	Yes	No
Reduce the area of occupancy of the species	No	No	No	No	Potential	No	Yes	No
Fragment an existing population into two or more populations	No	No	No	No	Potential	No	No	No
Adversely affect habitat critical to the survival of a species	Potential	Potential	Potential	Potential	Potential	Potential	Yes	Potential
Disrupt the breeding cycle of a population	No	Potential	Potential	No	Potential	Potential	Yes	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No	No	No	No	Potential	No	Yes	No
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No	No	No	No	No	No	No	No
Introduce disease that may cause the species to decline	No	No	No	No	No	No	No	No
Interfere with the recovery of the species	Potential	Potential	Potential	Potential	Potential	Potential	Yes	Potential
Significant Impact Risk:	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	Moderate

1.2.2 Vulnerable Species

Eight flora and seven fauna species listed as Vulnerable have been identified as occurring or potentially occurring within the Study Area:

- Flora
    - hairy-joint grass (*Arthraxon hispidus*)
    - three-leaved bosistoa (*Bosistoa transversa*)
    - ball nut (*Floydia praealta*)
    - macadamia nut (*Macadamia integrifolia*)
    - small-fruited Queensland nut (*Macadamia ternifolia*)
    - rough-shelled bush nut (*Macadamia tetraphylla*)
    - brush sophora (*Sophora fraseri*)
    - Austral toadflax (*Thesium australe*).
- Fauna
    - glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)
    - white-throated needletail (*Hirundapus caudacutus*)
    - giant barred frog (*Mixophyes iteratus*)
    - yellow-bellied glider (southern subspecies) (*Petaurus australis australis*)
    - grey-headed flying-fox (*Pteropus poliocephalus*)
    - long-nosed potoroo (northern) (*Potorous tridactylus tridactylus*)
    - black-breasted button-quail (*Turnix melanogaster*).

A preliminary impact assessment for Vulnerable species is provided in **Table 1.4** and **Table 1.5**. It has been determined through these assessments that there is a high risk that the Project will have significant impacts to eight Vulnerable species:

- *Bosistoa transversa*
- *Floydia praealta*
- *Macadamia integrifolia*
- *Macadamia ternifolia*
- *Thesium australe*
- glossy black-cockatoo (south-eastern)
- long-nosed potoroo (northern)
- black-breasted button-quail.

1.2.2.1 Flora

Arthraxon hispidus

Arthraxon hispidus occupies a variety of habitats represented within the Study Area including vine-forest margins, wet eucalypt forest and alluvial woodlands. The species was not recorded within the Study Area, however historical records occur within 10 km of the Study Area. Given this species is commonly recorded near creeks and swamps, it is especially vulnerable to inundation from the Project. Given the species has a moderate likelihood of occurring within the Study Area and the Project will impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Bosistoa transversa

Bosistoa transversa occurs in wet sclerophyll forest, dry sclerophyll forest and rainforest up to 300 m in altitude. It has been recorded within the Study Area, within a patch of RE 12.11.10 on the southern side of the proposed lower reservoir. Suitable habitat within the Study Area includes patches of 12.3.7, 12.11.3, 12.11.9, 12.11.10, 12.11.14, 12.12.12 in the proposed lower reservoir area. Records associated with the Project are at the western limit of species' distribution making this an important population. Given an important population of the species occurs within the Study Area and the Project may impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

Floydia praealta

Floydia praealta occurs in riverine and subtropical rainforest, usually on soils derived from basalt or in coastal scrub. Six individuals were recorded within a patch of RE 12.11.10 on the northern side of the proposed lower reservoir. Suitable habitat within the Study Area comprises RE 12.11.10 and 12.12.16. The Study Area is located at the eastern extent of the mapped distribution for the species and therefore, the population present within the Study Area is considered an important population. Given an important population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

Sophora fraseri

Sophora fraseri grows in moist habitats, including wet sclerophyll forest, often in hilly terrains (60-660 m asl). Five individuals were recorded adjacent to the Study Area, approximately 400 m north of the proposed lower reservoir. The location of the Project is not at the limit of the species' range, therefore population occurring adjacent to the Study Area is unlikely to be considered an important population. Suitable habitat is present within all REs recorded within the Study Area. The Project may result in the permanent loss of suitable habitat for the species. There is also a risk of spreading *Lantana camara* (an identified threat to the species) to areas currently unaffected as a result of Project associated construction activities. Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Macadamia integrifolia

Macadamia integrifolia occurs in remnant rainforest, including notophyll forest, and prefers open areas such as ecotones on rainforest edges. The species was not recorded within the Study Area; however, records occur within 4 km of the northern boundary of the Study Area. Within the Study Area, this species may occur in notophyll vine forest (RE 12.11.10 and 12.12.16), which accounts for 110.4 ha of the Study Area. All populations are considered important for the survival of the species. Suitable habitat within the Study Area may constitute habitat critical to the survival of the species, which includes "areas of native

vegetation which provide linkages between southern macadamia species' populations". Given the species has a moderate likelihood of occurring within the Study Area and the Project will impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Macadamia ternifolia

Macadamia ternifolia generally occurs in south-facing gullies in subtropical rainforest, mostly complex notophyll vineforest of varying height and development. The species was not recorded within the Study Area; however, records occur in the immediate vicinity. Within the Study Area, this species may occur in notophyll vine forest (RE 12.11.10 and 12.12.16), which accounts for 110.4 ha of the Study Area. All populations are considered important for the survival of the species. Suitable habitat within the Study Area may constitute habitat critical to the survival of the species, which includes "areas of native vegetation which provide linkages between southern macadamia species' populations". Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Macadamia tetraphylla

Macadamia tetraphylla occurs in subtropical rainforest and notophyll vine forest in near coastal areas usually on steep slopes. The species was not recorded within the Study Area, however historical records occur within 10 km of the Study Area. Within the Study Area, this species may occur in notophyll vine forest (RE 12.11.10 and 12.12.16), which accounts for 110.4 ha of the Study Area. All populations are considered important for the survival of the species. Suitable habitat within the Study Area may constitute habitat critical to the survival of the species, which includes "areas of native vegetation which provide linkages between southern macadamia species' populations". Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact critical habitat, there is a moderate risk that the Project will significantly impact the species.

Thesium australe

Thesium australe is a semi-parasitic perennial herb that mostly occurs on the roots of kangaroo grass (*Themeda triandra*) in shrubland, grassland and woodland. Within the Study Area, this species may inhabit a range of vegetation communities including RE 12.11.14, 12.11.3, 12.11.9, 12.12.12, 12.12.15, 12.12.23 and 12.3.7. The species was not recorded within the Study Area; however, records occur in the immediate vicinity. Records associated with the Project are at the eastern limit of species' distribution, potentially satisfying criteria for an important population. Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Table 1.4 Preliminary Significant Impact Assessment: Vulnerable Flora

Impact Criteria	Preliminary Assessment							
	Arthraxon hispidus	*Bosistoa transversa*	*Floydia praealta*	*Macadamia integrifolia*	*Macadamia ternifolia*	*Macadamia tetraphylla*	*Sophora fraseri*	*Thesium australe*
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:								
Lead to a long-term decrease in the size of an important population	No	Yes	Yes	Potential	Potential	Potential	No	Potential
Reduce the area of occupancy of an important population	No	Yes	Yes	Potential	Potential	Potential	No	Potential
Fragment an existing important population into two or more populations	No	Potential	Potential	Potential	Potential	Potential	No	Potential
Adversely affect habitat critical to the survival of a species	No	Yes	Yes	Potential	Potential	Potential	Potential	Potential
Disrupt the breeding cycle of an important population	No	Potential	Potential	Potential	Potential	Potential	No	Potential
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No	Potential	Potential	Potential	Potential	Potential	No	No
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No	No	No	No	No	No	Potential	No
Introduce disease that may cause the species to decline	No	No	No	No	No	No	No	No
Interfere substantially with the recovery of the species	No	Potential	Potential	No	No	No	No	No
Significant Impact Risk:	Moderate	High	High	Moderate	High	Moderate	High	High

1.2.2.2 Fauna

Glossy Black-cockatoo (South-eastern)

Glossy black-cockatoos are known to the Study Area. The Project will result in the permanent loss of foraging and breeding habitat (*Allocasuarina torulosa* and hollow-bearing trees) and has the potential to displace individuals that utilise this habitat. Given the species is known to occur within the Study Area and the Project may impact foraging and breeding habitat, there is a high risk that the Project will significantly impact the species.

White-throated Needletail

Desktop searches indicate that white-throated needletail has been previously recorded from the desktop search extent. and potential foraging habitat (broad range of habitat types including wooded and partly cleared areas) occurs within the Study Area. Potential habitat within the Study Area is considered important habitat (DoE, 2015). The Project will result in the clearing and inundation of important habitat. However, given the aerial nature of the species and the availability and extent of forest habitat in the broader region, the Project is unlikely to decrease the availability of habitat to the extent that the species likely to decline. As such, the risk of a significant residual impact has been assessed as low.

Giant Barred Frog

Desktop searches indicate that giant barred frog has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging and breeding habitat exists within the Study Area (shallow rocky streams with permanent flow in rainforest and wet sclerophyll forest). Potential habitat occurring within the Study Area may therefore constitute habitat critical for breeding, which has been defined as: 'permanent freshwater streams from 0-700m in altitude, in rainforest and other forest communities of the McPherson, Main, D'Aguilar, Blackall and Conondale Ranges and the Bunya Mountains'. The clearing and inundation of vegetation may result in the permanent loss of critical habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact critical habitat, there is a moderate risk that the Project will significantly impact the species. Further, the location of the Project is at the northern limit of the species range. As such, if a population occurs within the Study Area it may constitute an important population. Given the species has a moderate likelihood of occurring within the Study Area and the Project will impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Yellow-bellied Glider

Yellow-bellied glider has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of potential foraging and breeding habitat (eucalypt-dominated woodland and forest). Habitat occurring within the Study Area may therefore be considered critical to the survival of the species. Furthermore, the loss of vegetation associated with the Project will reduce the extent of contiguous forest, potentially limiting dispersal opportunities. These impacts have the potential to interfere with the recovery of the species. Given the species has a high likelihood of occurring within the Study Area and the Project may impact critical habitat, there is a high risk that the Project will significantly impact the species.

Grey-headed Flying-fox

Desktop searches indicate the species has been recently recorded in the Study Area, and field surveys have confirmed that extensive suitable foraging habitat occurs within the Study Area. Furthermore, the nearest roost occurs at Imbil, indicating the species is likely to forage within the Study Area. Suitable habitat occurring within the Study Area is may be considered critical to the survival of the species as they contain important winter and spring foraging resources. The Project may result in the clearing and inundation of critical habitat, which will reduce the availability of foraging resources. Given the species has a high likelihood of occurring within the Study Area and the Project may impact critical habitat, there is a high risk that the Project will significantly impact the species.

Long-nosed Potoroo (Northern)

Long-nosed potoroo was detected during preliminary field surveys. Suitable habitat in the Study Area includes rainforest gullies with dense vegetation cover. The species is matrix-sensitive, relying on a variety of vegetation characteristics to provide sufficient shelter sites and foraging opportunities. The location of the Project is at the northern limit of the species range for southeast Qld and the population is disjunct from other populations beyond Study Area, likely fulfilling criteria of an important population. The Project would result in the loss of habitat critical to the survival of the species, which comprises occupied forested habitats larger than 0.1 km^2. Habitat loss associated with the Project has the potential to fragment the population, given the species' dispersal capabilities are limited. Individuals exhibit high site fidelity and have small home ranges (0.19 to 1 km^2). Additionally, habitat loss has the potential to cause disruption to ecologically significant locations for the species and interfere with its recovery. Given an important population of the species occurs within the Study Area and the Project may impact critical habitat for the species, there is a high risk that the Project will significantly impact the species.

Black-breasted Button-quail

Black-breasted button-quail has been previously recorded from the desktop search extent, and indirect evidence of the species (platelets) was found within the Study Area during field surveys. The Project may result in the clearing and inundation of suitable habitat for the species (vine thicket, rainforest), which is considered to be critical to the survival of the species. The Jimna-Conondale Range population of the species is also considered an important population. Given the species has a high likelihood of occurring within the Study Area and the Project will impact critical habitat, there is a high risk that the Project will significantly impact the species.

Table 1.5 Preliminary Significant Impact Assessment: Vulnerable Fauna

Impact Criteria	Preliminary Assessment						
	Glossy Black-cockatoo	White-throated Needletail	Giant Barred Frog	Yellow-bellied Glider	Grey-headed Flying-fox	Long-nosed Potoroo	Black-breasted Button-quail
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:							
Lead to a long-term decrease in the size of an important population	No	No	Potential	No	No	Yes	Potential
Reduce the area of occupancy of an important population	No	No	Potential	No	No	Potential	Potential
Fragment an existing important population into two or more populations	No	No	No	No	No	Potential	No
Adversely affect habitat critical to the survival of a species	Yes	No	Potential	Potential	Potential	Yes	Yes
Disrupt the breeding cycle of an important population	No	No	Potential	No	Potential	Potential	Potential
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No	No	Potential	No	No	Potential	Potential
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No	No	No	No	No	No	No
Introduce disease that may cause the species to decline	No	No	No	No	No	No	No
Interfere substantially with the recovery of the species	Potential	No	Potential	Potential	Potential	Potential	Potential
Significant Impact Risk:	High	Low	Moderate	High	High	High	High

1.3 Listed Migratory Species

Eight species of migratory fauna species have been identified as occurring or potentially occurring within the Study Area:

- fork-tailed swift (*Apus pacificus*)
- oriental cuckoo (*Cuculus optatus*)
- Latham's snipe (*Gallinago hardwickii*)
- white-throated needletail (*Hirundapus caudacutus*) (also listed as Vulnerable, refer to **Section 1.2.2** for a preliminary impact assessment for this species)
- black-faced monarch (*Monarcha melanopsis*)
- spectacled monarch (*Monarcha (Symposiachrus) trivirgatus*)
- satin flycatcher (*Myiagra cyanoleuca*)
- osprey (*Pandion haliaetus*)
- rufous fantail (*Rhipidura rufifrons*).

A preliminary impact assessment for Vulnerable species is provided in **Table 1.6**. It has been determined through these assessments that the Project has a high risk of significant impacts to two Migratory species:

- Latham's snipe
- osprey.

Fork-tailed Swift

The species has not been recorded within the Study Area; however potential foraging habitat is present. This habitat is may be considered to constitute important habitat (DoE, 2015); noting that the species has broad habitat preferences. The Project will result in the clearing and inundation of habitat; however, the Project is not expected to seriously disrupt the life cycle of an ecologically significant proportion of the species. Given the large population size and broad habitat requirements, the risk of significant impact has been assessed as low.

Oriental Cuckoo

The species has not been recorded within the Study Area; however potential foraging habitat is present (rainforest, wet sclerophyll forest, open woodlands, and forest edges). This habitat may be considered to constitute important habitat (DoE, 2015). The Project will result in the clearing and inundation of important habitat; however, the Project is not expected to seriously disrupt the life cycle of an ecologically significant proportion of the species. The risk of significant impact has been assessed as moderate.

Latham's Snipe

Desktop searches indicate the species has been recently recorded in the Study Area, and field surveys have confirmed that suitable foraging habitat occurs within the Study Area (wetlands). This habitat may be

considered to constitute important habitat (DoE, 2015). The clearing/inundation of vegetation may significantly affect the population if it results in the loss/degradation of fringing vegetation or reduced water quality (e.g., increased turbidity). The risk of significant impact has been assessed as high for the species.

Black-faced Monarch

Desktop searches indicate the species has been recently recorded in the Study Area, and field surveys have confirmed that suitable habitat occurs within the Study Area (rainforest, riparian vegetation, wet sclerophyll forest in sheltered gullies). This habitat may be considered to constitute important habitat (DoE, 2015). The Project will result in the clearing and inundation of important habitat; however, the Project is not expected to seriously disrupt the life cycle of an ecologically significant proportion of the species. The risk of significant impact has been assessed as moderate.

Spectacled Monarch

Desktop searches indicate the species has been recently recorded in the Study Area, and field surveys have confirmed that suitable habitat occurs within the Study Area (rainforest, wet gullies, and waterside vegetation). This habitat is considered to constitute important habitat (DoE, 2015). The Project will result in the clearing and inundation of important habitat; however, the Project is not expected to seriously disrupt the life cycle of an ecologically significant proportion of the species. The risk of significant impact has been assessed as moderate.

Satin Flycatcher

Desktop searches indicate the species has been historically recorded in the Study Area, and field surveys have confirmed that suitable habitat occurs within the Study Area (heavily vegetated gullies in eucalypt dominated forests and woodlands). This habitat is considered to constitute important habitat (DoE, 2015). The Project will result in the clearing and inundation of important habitat; however, the Project is not expected to seriously disrupt the life cycle of an ecologically significant proportion of the species. The risk of significant impact has been assessed as moderate.

Osprey

The species was recorded during field surveys at Lake Borumba and suitable foraging/breeding habitat occurs in the Study Area. No nest sites were identified during surveys, though this does not preclude their occurrence. Habitat within the Study Area may be considered to constitute important habitat (DoE, 2015). The clearing/inundation of vegetation may significantly affect the population if it results in the loss of breeding habitat (nest sites) or reduced water quality (e.g., increased turbidity resulting in low visibility when hunting). The risk of significant impact has been assessed as high for the species.

Rufous Fantail

Desktop searches indicate the species has been historically recorded in the Study Area, and field surveys have confirmed that suitable habitat occurs within the Study Area (wet sclerophyll gullies dominated by eucalypts). This habitat is may be considered to constitute important habitat (DoE, 2015). The Project will result in the clearing and inundation of important habitat; however, the Project is not expected to seriously disrupt the life cycle of an ecologically significant proportion of the species. The risk of significant impact has been assessed as moderate.

Table 1.6 Preliminary Impact Assessment: Migratory Species

Impact Criteria	Preliminary Assessment							
	Fork-tailed Swift	Oriental Cuckoo	Latham's Snipe	Black-faced Monarch	Spectacled Monarch	Satin Flycatcher	Osprey	Rufous Fantail
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No	No	No	No	No	No	No	No
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No	No	Potential	No	No	No	Potential	No
Significant Impact Risk:	Low	Moderate	High	Moderate	Moderate	Moderate	High	Moderate

2.0 MSES Significant Residual Impact Assessment

Significant residual impact assessments for prescribed matters of state environmental significance (MSES) were completed in this section and relate to the proposed Borumba Dam Study Area. This assessment was completed in accordance with the Significant Residual Impact Assessment Guideline for MSES and prescribed activities assessable under the Sustainable Planning Act 2009 and the Queensland Environmental Offsets Policy 2014 (DEHP 2014).

In summary the applicable prescribed environmental matters associated with the Study Area include:

- Regulated vegetation
- Connectivity areas
- Wetlands and watercourses
- Protected wildlife habitat
- Protected areas
- Declared fish habitat areas.

2.1 Regulated Vegetation

Regulated vegetation is a 'prescribed regional ecosystem' that:

- is an endangered or of concern regional ecosystem, as defined under the *Vegetation Management Act 1999* (VM Act), or
- intersects with an area shown on the vegetation management wetlands map, as defined under the VM Act, to remove doubt this refers to that component of a regional ecosystem that lies within a mapped wetland, or
- is located within the defined distance from the defining banks of a watercourse identified on the vegetation management watercourse map, as defined under the VM Act.

Endangered and Of Concern REs are present within the Study Area. The structural category for REs within the Study Area have been defined as dense to mid-dense. Clearing within wetland REs (associated with the proposed lower reservoir) and clearing of REs that are within a defined distance of a watercourse is expected for the Project.

2.1.1 Endangered or Of Concern Regional Ecosystems

Three REs are listed as of concern while none are listed as endangered under the VM Act. The total area of Category B regulated vegetation listed as of concern within the Study Area is outlined in along with a breakdown of each corresponding RE.

Table 2.1 Endangered or Of Concern REs within the Study Area

Regional Ecosystem	VM Act Status	Area (ha) within the Study Area
12.11.9	Of Concern	9.7
12.11.14	Of Concern	254.7
12.12.12	Of Concern	21.1
Total		**285.6**

2.1.2 Vegetation Intersecting a Wetland

Wetland areas have been mapped within the Study Area and are associated with the proposed lower reservoir. Riverine wetlands are associated with Kingaham and Yabba Creeks, shore banks of Borumba Lake and the downstream receiving environment of Yabba Creek beyond the current dam wall. Borumba Lake is mapped as a lacustrine wetland.

2.1.3 Vegetation within the Defined Distance of a Watercourse

Watercourses within the Study Area are typically mapped as stream order 1 or 2 at higher elevations, while larger creeks are mapped as stream order 3 to 5. Lake Borumba is mapped as a stream order 6 watercourse.

The following watercourse features are mapped within the proposed upper reservoir:

- Stream order 1 – 4 total
- Stream order 2 – 1 total

The following watercourse features are mapped within the proposed lower reservoir:

- Stream order 1 – 51 total
- Stream order 2 – 12 total
- Stream order 3 – 2 total
- Stream order 4 – 2 total
- Stream order 5 – 2 total
- Stream order 6 – 1 total

The status of regulated vegetation within a defined distance from watercourse is provided in **Table 2.2**.

Table 2.2 Regulated Vegetation Within a Defined Distance from a Watercourse

Watercourse Stream Order	Distance from Defining Bank (m)	Area (ha) of Category B Remnant Vegetation^
1 or 2	10	40.6
3 or 4	25	3.3
5 or greater	50	168.2

^ based on field verified RE mapping

2.1.4 Impact Table

The preliminary significant impact assessment for regulated vegetation is provided in . For a prescribed activity to have a significant residual impact on an of concern or endangered regional ecosystem, criteria 1 must be exceeded. For a prescribed activity to have a significant residual impact on a regional ecosystem that lies within a mapped wetland, criteria 1 and 2 must be exceeded. For a prescribed activity to have a significant residual impact on a regional ecosystem that is within the defined distance of watercourses, criteria 1 and 3 must be exceeded.

Based on the preliminary assessment, it is likely that Project activities will result in a significant residual impact to all three categories of regulated vegetation.

Table 2.3 Significant Residual Impact Test: Regulated Vegetation

Criteria		Clearing in a regional ecosystem that is: endangered, or of concern	Clearing in the portion of a regional ecosystem that lies within a mapped wetland	Clearing in a regional ecosystem that is within the defined distance of a watercourse
1	For clearing other than clearing for linear infrastructure: - area greater than 5 ha where in a grassland (structural category) regional ecosystem; or - area greater than 2 ha where in a sparse (structural category) regional ecosystem; or - area greater than 0.5 ha where in a dense to middense (structural category) regional ecosystem.	Yes – clearing or inundation will occur in three endangered or of concern REs: 12.11.9, 12.11.14, 12.12.12.	Yes – clearing or inundation will occur	Yes – clearing or inundation will occur
2	Clearing within 50 m of the defining bank	N/A	Yes – clearing or inundation	N/A
3	Clearing within 5 m of the defining bank	N/A	N/A	Yes – clearing or inundation

2.2 Connectivity Areas

Ecological connectivity is critical for the connection between ecosystems and habitat to allow fauna to cross landscapes in search of shelter, food, and breeding. Connectivity areas are areas of remnant vegetation outside of urban areas that are required for ecosystem functioning, including facilitating fauna movement.

In deciding if a significant residual impact is likely to occur on a connectivity area, DES has developed a Landscape Fragmentation and Connectivity (LFC) tool. The LFC tool can be used to support decisions by identifying and quantifying any significant impact on connectivity for an individual impact area.

Use of the LFC tool determined the impact on connectivity areas is **not significant** based on the proposed disturbance and loss of remnant vegetation.

2.3 Wetlands and Watercourses

An offset may be required for the following wetlands:

- wetland in a wetland protection area as shown on the Map of referrable wetlands under schedule 12, part 2 of the *Environmental Protection Regulation 2008*
- wetlands of high ecological significance (HES) as shown on the Map of referrable wetlands under schedule 12, part 2 of the *Environmental Protection Regulation 2008*, and
- wetland or watercourse in a high ecological value waters as identified under the *Environmental Protection (Water) Policy 2009*, schedule 2.

Within the Study Area, HES wetlands associated with Yabba Creek are mapped downstream of the existing dam wall.

2.3.1 Impact Table

The significant impact criteria for regulated vegetation are outlined in **Table 2.4**. Based on a preliminary assessment, there is potential that Project activities will result in a significant residual impact to wetlands and watercourses.

Table 2.4 Significant Residual Impact Assessment for Wetlands and Watercourses

Impact Criteria	Significant Residual Impact Assessment
An action is likely to have a significant residual impact on prescribed wetlands or watercourses if it is likely that the action will result in environmental values being affected in any of the following ways:	
Areas of the wetland or watercourse being destroyed or artificially modified	No
A measurable change in water quality of the wetland or watercourse—for example a change in the level of the physical and/or chemical characteristics of the water, including salinity, pollutants, or nutrients in the wetland or watercourse, to a level that exceeds the water quality guidelines for the waters, or	Potential – A HES wetland exists within the Study Area, downstream of the existing dam wall. Project activities are likely to result in a measurable change in water quality of the wetland or watercourse.
The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected, or	Potential – A HES wetland exists within the Study Area, downstream of the existing dam wall. Project activities may result in indirect impacts to habitat for native species as a result of altered water quality.
A substantial and measurable change in the hydrological regime or recharge zones of the wetland, e.g. a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland, or	Potential – A HES wetland exists within the Study Area, downstream of the existing dam wall. Project activities may result in a measurable change in the hydrological regime of the wetland.
An invasive species that is harmful to the environmental values of the wetland being established (or an existing invasive species being spread) in the wetland.	No

2.4 Protected Wildlife Habitat

This section applies to the following MSES prescribed in the *Environmental Offsets Regulation 2014*:

- an area of essential habitat on the essential habitat map for an animal or plant that is endangered or vulnerable wildlife
- an area that is shown as a high-risk area on the flora survey trigger map and that contains plants that are endangered or vulnerable wildlife
- an area that is not shown as a high-risk area on the flora survey trigger map, to the extent the area contains plants that are endangered or vulnerable wildlife
- an area of habitat (e.g. foraging, roosting, nesting or breeding habitat) for an animal that is endangered, vulnerable or a special least concern animal.

A preliminary significant residual impact assessment was undertaken for protected wildlife habitat, as detailed in **Section 2.4.1** to **Section 2.4.5** below. The assessment is high level and is based on the preliminary findings derived from field surveys described in **Section 3.2** of the main report. This assessment aims to provide an indication of the potential impacts to state-listed threatened and Special Least Concern species and the offset obligations associated with the Project. These findings can also be used to inform and direct future targeted survey effort for the Project.

2.4.1 Essential Habitat

A total of 472.8 ha of Essential Habitat is mapped within the Study Area. The following Endangered and Vulnerable species are associated with mapped essential habitat:

- Flora
    - bopple nut (*Macadamia ternifolia*)
    - macadamia nut (*Macadamia integrifolia*)
- Fauna
    - black-breasted button-quail (*Turnix melanogaster*)
    - cascade treefrog (*Litoria pearsoniana*)
    - Coxen's fig-parrot (*Cyclopsitta diophthalma coxeni*)
    - Giant barred frog (*Mixophyes iteratus*)
    - glossy-black cockatoo (*Calyptorhynchus lathami*)
    - greater glider (*Petauroides volans*)
    - koala (*Phascolarctos cinereus*)
    - long-nosed potoroo (northern) (*Potorous tridactylus tridactylus*)

- marbled frogmouth (*Podargus ocellatus plumiferus*)
- powerful owl (*Ninox strenua*)
- spotted-tailed quoll (southern subspecies) (*Dasyurus maculatus maculatus*)
- tusked frog (*Adelotus brevis*).

A significant residual impact assessment for essential habitat associated with these species has been considered in the assessment of impacts on protected wildlife habitat for each species, in accordance with the SRI Guideline (DEHP, 2014). Refer to **Section 1.4.3** and **Section 1.4.4** for preliminary assessments for Protected Wildlife Habitat.

2.4.2 High Risk Protected Plants

Nine high risk areas for protected plants are mapped within the Study Area.

2.4.3 Habitat for Endangered and Vulnerable Flora

A total of 12 flora species listed as Endangered or Vulnerable have been identified as occurring or potentially occurring within the Study Area:

- Known to Occur
  - nightcap plectranthus (*Coleus torrenticola*)
  - ball nut (*Floydia praealta*)
  - rib-fruited malletwood (*Rhodamnia dumicola*)
  - scrub turpentine (*Rhodamnia rubescens*)
- High Likelihood of Occurring
  - slender milkvine (*Leichhardtia coronata*)
  - macadamia nut (*Macadamia integrifolia*)
  - small-fruited Queensland nut (*Macadamia ternifolia*)
  - brush sophora (*Sophora fraseri*)
  - Austral toadflax (*Thesium australe*)
- Moderate Likelihood of Occurring
  - southern corynocarpus (*Corynocarpus rupestris* subsp. *arborescens*)
  - rough-shelled bush nut (*Macadamia tetraphylla*)
  - *Parsonsia largiflorens*.

A preliminary significant residual impact assessment for Endangered and Vulnerable flora species is provided in **Table 2.5.**

2.4.3.1 Known to Occur

Coleus torrenticola

A total of 38 *Coleus torrenticola* individuals were recorded in the proposed upper reservoir along a rocky creek line within RE 12.11.3. The clearing and inundation of vegetation will result in the permanent loss of suitable habitat for the species. Given a population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

Floydia praealta

Six *Floydia praealta* individuals were recorded within a patch of RE 12.11.10 on the northern side of the proposed lower reservoir. The clearing and inundation of vegetation will result in the permanent loss of suitable habitat for the species. Given a population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

Rhodamnia dumicola

Rhodamnia dumicola was recorded within both reservoirs within REs 12.11.3, 12.11.10 and 12.12.15. The clearing and inundation of vegetation will result in the permanent loss of suitable habitat for the species. Given a population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

Rhodamnia rubescens

A minimum of 160 *Rhodamnia rubescens* individuals were recorded within the proposed upper reservoir within REs 12.11.3, 12.12.16 and 12.12.15. The clearing and inundation of vegetation will result in the permanent loss of suitable habitat for the species. Given a population of the species occurs within the Study Area and the Project will impact suitable habitat for the species, there is a high risk that the Project will significantly impact the species.

2.4.3.2 High Likelihood of Occurrence

Leichhardtia coronata

Preliminary field surveys recorded *Leichhardtia coronata* approximately 1 km south of the proposed lower reservoir. Surveys also indicated that suitable habitat exists for this species within the Study Area (vine forest). The clearing and inundation of vegetation will result in the permanent loss of suitable habitat for the species. Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Macadamia ternifolia

Desktop searches indicate that *Macadamia ternifolia* has been previously recorded the immediate vicinity of the Study Area. Preliminary field surveys indicate the presence of suitable habitat within the Study Area (vine forest). The clearing and inundation of vegetation will result in the permanent loss of suitable habitat

for the species. Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Sophora fraseri

Five individuals of *Sophora fraseri* were recorded adjacent to the Study Area, approximately 400 m north of the proposed lower reservoir. Suitable habitat (moist habitats, including wet sclerophyll forest, often in hilly terrains) is present within all REs within the Study Area. The clearing and inundation of vegetation will result in the permanent loss of suitable habitat for the species. There is also a risk of spreading *Lantana camara* (an identified threat to the species) to areas currently unaffected as a result of Project associated construction activities. Given the species has a high likelihood of occurring within the Study Area and the Project will impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Thesium australe

Desktop searches indicate that *Thesium australe* has been previously recorded the immediate vicinity of the Study Area. Suitable habitat for the species (roots of kangaroo grass (*Themeda triandra*) in shrubland, grassland and woodland) may occurs within the Study Area. The clearing and inundation of vegetation will result in the permanent loss of suitable habitat for the species. Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

2.4.3.3 Moderate Likelihood of Occurrence

Corynocarpus rupestris* subsp. *arborescens

Desktop searches indicate that *Corynocarpus rupestris* subsp. *arborescens* has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of suitable habitat within the Study Area (drier rainforest). The clearing and inundation of vegetation may result in the loss of suitable habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Macadamia integrifolia

Desktop searches indicate that *Macadamia ternifolia* has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of suitable habitat within the Study Area (vine forest). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Macadamia tetraphylla

Desktop searches indicate that *Macadamia tetraphylla* has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of suitable habitat within the Study Area (rainforest, vine forest). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Parsonsia largiflorens

Desktop searches indicate that *Parsonsia largiflorens* has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of suitable habitat within the Study Area (rainforest, vine forest). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. Given the species has a moderate likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a moderate risk that the Project will significantly impact the species.

Table 2.5 Preliminary Significant Residual Impact Assessment: Endangered and Vulnerable Wildlife Habitat for Flora (including Essential Habitat)

Criteria	*Coleus torrenticola*	*Corynocarpus rupestris* subsp. *arborescens*	*Floydia praealta*	*Leichhardtia coronata*	*Macadamia integrifolia*	*Macadamia ternifolia*	*Macadamia tetraphylla*	*Parsonsia largiflorens*	*Rhodamnia dumicola*	*Rhodamnia rubescens*	*Sophora fraseri*	*Thesium australe*
An action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to:												
Lead to a long-term decrease in the size of a local population, or	Yes	No	Yes	Potential	Potential	Potential	No	No	Yes	Yes	Potential	Potential
Reduce the extent of occurrence of the species, or	Potential	No	Potential	Potential	Potential	Potential	No	No	Potential	Yes	Potential	Potential
Fragment an existing population, or	No	No	No	Potential	Potential	Potential	No	No	Potential	Yes	No	No
Result in genetically distinct populations forming as a result of habitat isolation; or	No	No	No	No	No	No	No	No	No	No	No	No
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat, or	No	No	No	No	No	No	No	No	No	No	No	No
Introduce disease that may cause the population to decline, or	No	No	No	No	No	No	No	No	No	No	No	No
Interfere with the recovery of the species, or	Potential	No	Potential	Potential	Potential	Potential	No	No	Potential	Yes	Potential	Potential
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	Potential	No	Potential	Potential	Potential	Potential	No	No	Yes	Yes	Potential	Potential
Significant Residual Impact Risk:	High	Moderate	High	High	Moderate	High	Moderate	Moderate	High	High	High	High

2.4.4 Habitat for Endangered and Vulnerable Fauna

A total of 19 fauna species listed as Endangered or Vulnerable have been identified as occurring or potentially occurring within the Study Area:

- Known to Occur
    - glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*)
    - koala (*Phascolarctos cinereus*)
    - long-nosed potoroo (northern) (*Potorous tridactylus tridactylus*)
- High Likelihood of Occurrence
    - tusked frog (*Adelotus brevis*)
    - yellow-bellied glider (southern subspecies) (*Petaurus australis australis*)
    - grey-headed flying-fox (*Pteropus poliocephalus*)
    - black-breasted button-quail (*Turnix melanogaster*)
- Moderate Likelihood of Occurrence
    - common death adder (*Acanthophis antarcticus*)
    - regent honeyeater (*Anthochaera phrygia*)
    - spotted-tailed quoll (*Dasyurus maculatus maculatus*)
    - white-throated needletail (*Hirundapus caudacutus*)
    - cascade treefrog (*Litoria pearsoniana*)
    - Fleay's frog (*Mixophyes fleayi*)
    - giant barred frog (*Mixophyes iteratus*)
    - powerful owl (*Ninox strenua*)
    - Richmond birdwing (*Ornithoptera richmondia*)
    - greater glider (*Petauroides volans*)
    - marbled frogmouth (*Podargus ocellatus plumiferus*)
    - Australian painted snipe (*Rostratula australis*).

2.4.4.1 Known to Occur

A preliminary significant residual impact assessment for Endangered and Vulnerable fauna species known to occur within the Study Area is provided in **Table 2.6.**

Glossy Black-Cockatoo

Glossy black-cockatoos are known to the Study Area. The Project may result in the permanent loss of habitat for the glossy black-cockatoo and has the potential to displace individuals that utilise this habitat. Furthermore, the Project is likely to cause disruption to foraging and breeding habitat (*Allocasuarina torulosa* and hollow-bearing trees). Given the species is known to occur within the Study Area and the Project may impact foraging / breeding habitat, there is a high risk that the Project will significantly impact the species.

Koala

Field surveys have determined koala presence within the Study Area through direct observation and indirect evidence via SAT surveys. The Project will result in the clearing and inundation of koala habitat (including remnant and non-remnant woodland communities dominated by Eucalyptus species). The reduction in eucalypt woodland has the potential to reduce the area of occupancy for the species Construction and operation activities have the potential to disrupt the breeding cycle of the local population through ongoing disturbance. The loss of koala habitat associated with the Project may result in the decline of the population and interfere with the species' recovery. Given the species is known to occur within the Study Area and the Project will impact foraging / breeding habitat, there is a high risk that the Project will significantly impact the species.

Long-Nosed Potoroo (Northern)

Long-nosed potoroo was detected during preliminary field surveys. Suitable habitat in the Study Area includes rainforest gullies with dense vegetation cover. The species is matrix-sensitive, relying on a variety of vegetation characteristics to provide sufficient shelter sites and foraging opportunities. The species distribution is fragmented throughout its range, making populations susceptible to long-term decrease through loss of suitable habitat. The size of the Project and associated habitat loss has the potential to fragment the population given the species' dispersal capabilities are limited. Individuals exhibit high site fidelity and have small home ranges (0.19 to 1 km^2). Additionally, habitat loss has the potential to cause disruption to ecologically significant locations for the species and interfere with the recovery of the species. Given the species is known to occur within the Study Area and the Project will impact suitable habitat, there is a high risk that the Project will significantly impact the species.

2.4.4.2 High Likelihood of Occurring

A preliminary significant residual impact assessment for Endangered and Vulnerable fauna species known assessed as having a high likelihood of occurring within the Study Area is provided in **Table 2.6.**

Tusked Frog

Desktop searches indicate that tusked frog has been previously recorded the immediate vicinity of the Study Area. Preliminary field surveys indicate that suitable foraging and breeding habitat exists for this species within the Study Area (slow-moving streams in rainforest, wet eucalypt forest and occasionally dry forest). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Yellow-Bellied Glider

Yellow-bellied glider has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of potential foraging and breeding habitat (eucalypt-dominated woodland and forest) including hollow bearing trees, which may provide ecologically significant breeding habitat for the species. The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. Furthermore, the loss of vegetation associated with the Project may reduce the extent of contiguous forest in the region. These impacts have the potential to interfere with the recovery of the species and cause disruption to ecologically significant locations. Given the species has a high likelihood of occurring within the Study Area and the Project will impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Grey-Headed Flying-Fox

Grey-headed flying-fox has been previously recorded from the desktop search extent and the nearest mapped flying fox roost occurs at Imbil. Suitable foraging habitat (flowering eucalypts) occurs extensively within the Study Area. This habitat provides an important winter and spring foraging resource. The loss of vegetation associated with the Project may reduce the extent of foraging habitat for the species. These impacts have the potential to interfere with the recovery of the species and cause disruption to ecologically significant locations. Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Black-Breasted Button-Quail

Desktop searches indicate that black-breasted button-quail has been previously recorded from the desktop search extent. Indirect evidence of the species (platelets) was recorded within the Study Area during field surveys. The Project may result in the clearing and inundation of suitable habitat for the species (vine thicket, rainforest). Given the species has a high likelihood of occurring within the Study Area and the Project may impact suitable habitat, there is a high risk that the Project will significantly impact the species.

Table 2.6 Preliminary Significant Residual Impact Assessment: Endangered and Vulnerable Wildlife Habitat for Fauna (including Essential Habitat) – Known to Occur or High Likelihood of Occurrence

Criteria	Preliminary Assessment						
	Glossy-Black-Cockatoo	Koala	Long-Nosed Potoroo	Tusked Frog	Yellow-Bellied Glider	Grey-Headed Flying-Fox	Black-Breasted Button-Quail
An action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to:							
Lead to a long-term decrease in the size of a local population, or	Potential	Yes	Potential	Potential	Potential	Potential	Potential
Reduce the extent of occurrence of the species, or	No	No	No	No	No	No	No
Fragment an existing population, or	No	Potential	Yes	Potential	Potential	Potential	Potential
Result in genetically distinct populations forming as a result of habitat isolation; or	No	No	No	No	No	No	No
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat, or	No	No	No	No	No	No	No
Introduce disease that may cause the population to decline, or	No	No	No	No	No	No	No
Interfere with the recovery of the species, or	Potential	Yes	Yes	Potential	Potential	Potential	Potential
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	Yes	Yes	Yes	Potential	Potential	Potential	Potential
Significant Residual Impact Risk:	High	High	High	High	High	High	High

2.4.4.3 Moderate Likelihood of Occurring

A preliminary significant residual impact assessment for Endangered and Vulnerable fauna species assessed as having a moderate likelihood of occurring within the Study Area is provided in **Table 2.7.**

Common Death Adder

Desktop searches indicate that common death adder has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging and breeding habitat exists for this species within the Study Area (rainforest, wet sclerophyll forest, and woodland). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Regent Honeyeater

Desktop searches indicate that regent honeyeater has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging habitat exists for this species within the Study Area (dry sclerophyll forest and riparian vegetation). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Coxen's Fig Parrot

Desktop searches indicate that Coxen's fig parrot has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging and breeding habitat exists for this species within the Study Area (rainforest and vine forest, particularly alluvial areas containing *Ficus* spp.). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Spotted-tailed Quoll

Desktop searches indicate that spotted-tailed quoll has been previously recorded from the desktop search extent. Preliminary camera trap surveys did not result in the detection of the species, however suitable foraging and breeding habitat exists for this species within the Study Area (woodlands with fallen logs and rocky outcrops). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

White-throated Needletail

Desktop searches indicate that white-throated needletail has been previously recorded from the desktop search extent. The Project is likely to result in the permanent loss of potential foraging habitat (a range of habitat types including wooded areas). However, this species is migratory and there is sufficient vegetation cover in the surrounding landscape to provide foraging habitat. As such, the risk of a significant residual impact has been assessed as low.

Cascade Treefrog

Desktop searches indicate that cascade treefrog has been previously recorded from the desktop search extent. Preliminary field surveys indicate that potential foraging and breeding habitat exists for this species within the Study Area (flowing streams in rainforest gullies adjacent to wet sclerophyll forest). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Fleay's Frog

Desktop searches indicate that Fleay's frog has been previously recorded from the desktop search extent. Preliminary field surveys indicate that potentially suitable habitat exists for this species within the Study Area (higher elevation rainforest and adjoining wet sclerophyll forest and relies on permanent to semi-permanent streams). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Giant Barred Frog

Desktop searches indicate that giant barred frog has been previously recorded from the desktop search extent. Preliminary field surveys indicate that potentially suitable foraging and breeding habitat exists within the Study Area (shallow rocky streams with permanent flow in rainforest and wet sclerophyll forest). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Powerful Owl

Desktop searches indicate that powerful owl has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of suitable foraging/breeding habitat (open forests and woodlands, and sheltered gullies in wet forests). The Project may result in the permanent loss of potential habitat for the species and will cause disruption to potential ecologically significant breeding locations (hollow bearing trees). The risk of significant residual impact has been assessed as moderate.

Richmond Birdwing

Desktop searches indicate that Richmond birdwing butterfly has been previously recorded from the desktop search extent. Preliminary field surveys indicate that suitable foraging and breeding habitat exists within the Study Area (subtropical rainforest below 600 m ASL on basaltic slopes, creek banks, or volcanic alluvial soils near watercourses). The Richmond birdwing vine (*Pararistolochia praevenosa*) was not recorded during field surveys; however, this does not preclude its presence as it is known to occur in the region (e.g., Conondale National Park). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Greater Glider

Desktop searches indicate that greater glider has been previously recorded from the desktop search extent. Preliminary field surveys indicate the presence of suitable foraging and breeding habitat (eucalypt woodlands and hollow bearing trees). The Project may result in the permanent loss of habitat for the species, including foraging and breeding habitat. Furthermore, the loss of vegetation associated with the Project may reduce the extent of contiguous forest. These impacts have the potential to interfere with the recovery of the species and cause disruption to ecologically significant locations. The risk of significant residual impact has been assessed as moderate.

Marbled Frogmouth

Desktop searches indicate that marbled frogmouth has been previously recorded from the desktop search extent including from nearby Little Yabba Creek. Preliminary field surveys indicate the presence of suitable habitat (rainforest and wet sclerophyll forest). The clearing and inundation of vegetation may result in the permanent loss of suitable habitat for the species. The risk of significant residual impact has been assessed as moderate.

Australian Painted Snipe

Desktop searches indicate that Australian painted snipe has been previously recorded from the desktop search extent. Construction of the proposed lower reservoir will result in the permanent loss of suitable habitat for the species (shallow terrestrial freshwater wetlands and dams with adequate vegetation cover). However, the loss of habitat may only be temporary, and the construction of the upper reservoir may provide additional habitat. The risk of significant residual impact has been assessed as moderate.

Table 2.7 Preliminary Significant Residual Impact Assessment: Endangered and Vulnerable Wildlife Habitat for Fauna (including Essential Habitat) – Moderate Likelihood of Occurrence

Criteria	Preliminary Assessment												
	Common Death Adder	Regent Honeyeater	Coxen's Fig -Parrot	Spotted-tailed Quoll	White-throated Needletail	Cascade Treefrog	Fleay's Frog	Giant Barred Frog	Powerful Owl	Richmond Birdwing	Greater Glider	Marbled Frogmouth	Australian Painted Snipe
An action is likely to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to:													
Lead to a long-term decrease in the size of a local population, or	No	No	No	No	No	No	No	No	No	No	No	No	No
Reduce the extent of occurrence of the species, or	No	No	No	No	No	No	No	No	No	No	No	No	No
Fragment an existing population, or	No	No	No	No	No	No	No	No	No	No	No	No	No
Result in genetically distinct populations forming as a result of habitat isolation; or	No	No	No	No	No	No	No	No	No	No	No	No	No
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat, or	No	No	No	No	No	No	No	No	No	No	No	No	No
Introduce disease that may cause the population to decline, or	No	No	No	No	No	No	No	No	No	No	No	No	No
Interfere with the recovery of the species, or	No	No	Potential	Potential	No	No	No	No	Potential	No	Potential	Potential	No
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	Potential	Potential	Potential	Potential	No	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential
Significant Residual Impact Risk:	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

2.4.5 Habitat for Special Least Concern (Non-Migratory) Fauna

One Special Least Concern (non-migratory) fauna species have been identified as occurring or potentially occurring within the Study Area:

- short-beaked echidna (*Tachyglossus aculeatus*).

A preliminary significant residual impact assessment for short-beaked echidna is provided in **Table 2.8**. It has been determined through the assessment that the Project has a low risk of significant impacts to the species.

Short-beaked Echidna

The Project will result in the permanent loss of suitable habitat for short-beaked echidna; however, it utilises a range of remnant and non-remnant habitat types and extensive suitable habitat exists adjacent to the Study Area. As such, the risk of significant residual impact has been assessed as low.

Table 2.8 Preliminary Residual Impact Assessment: Special Least Concern (Non-Migratory) Animal Wildlife Habitat

Impact Criteria	Preliminary Assessment for Short-beaked Echidna
An action is likely to have a significant impact on a special least concern (non-migratory) animal wildlife habitat if it is likely that it will result in:	
A long-term decrease in the size of a local population, or	No
A reduced extent of occurrence of the species, or	No
Fragmentation of an existing population, or	No
Genetically distinct populations forming as a result of habitat isolation, or	No
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	Yes
Significant Impact Risk:	Low

2.5 Koala Habitat in Southeast Queensland

Offset obligations will apply to significant residual impact to koalas in the southeast Queensland planning area as identified in the Southeast Queensland Regional Plan. This includes habitat that is:

- an area of Essential Habitat as identified on the essential habitat map, as defined under the *Vegetation Management Act 1999*
- an area that is not mapped as habitat, but which contains, or is known to contain koalas.

The Study Area occurs within the Gympie and Somerset Regional Council Local Government Areas (LGAs), both of which are not listed LGAs under the Southeast Queensland Regional Plan. Therefore, this MSES is not relevant to the Project.

2.6 Protected Areas

An offset may be required for the following classes of protected areas declared under the *Nature Conservation Act 1992*:

- national parks
- national parks (Aboriginal land)
- national parks (Torres Strait Islander land)
- national parks (Cape York Peninsula Aboriginal land)
- regional parks
- nature refuges.

The high-water level associated with the proposed lower reservoir will inundate parts of Conondale National Park. As such, the Project is likely to trigger a significant residual impact to protected areas.

Table 2.9 Significant Residual Impact Assessment for Wetlands and Watercourses

Impact Criteria	Preliminary Significant Residual Impact Assessment
An impact on a protected area is significant if a prescribed activity results, or will or is likely to result, in one or more of the following:	
The authorised clearing or inundation of all or part of the protected area for the construction of private or publicly owned infrastructure on the area, or	Yes – The project involves the clearing/inundation of part of Conondale National Park
The exclusion of, or reduction in, the public use or enjoyment of all or part of the protected area, or	Potential
A reduction in the natural or cultural values of all or part of the protected area.	Potential – The project involves the clearing/inundation of part of Conondale National Park

2.7 Legally Secured Offset Areas

No legally secured offset areas occur within the Study Area. Therefore, this MSES is not relevant to the Project.

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Briefing Note

To: Nirvana Searle

E: Nirvana.Searle@qldhydro.com.au

From: David Gatfield

Date: 16 November 2022

Subject: Exploratory Works – Ecology Surveys

Purpose

The purpose of this briefing note is to provide a summary of the ecological surveys undertaken in the exploratory works' footprint in November 2022. The surveys were undertaken to inform Project approvals and decision making, as well as subsequent impact assessment or reporting required under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Outcomes/Key Messages

Key ecological values recorded include:

- Matters of National Environmental Significance recorded:
  - Lowland Rainforest of Subtropical Australia threatened ecological community: five patches were recorded.
  - Three threatened flora species, comprising:
    - *Coleus torrenticola*
    - *Rhodamnia rubescens* (Scrub turpentine)
    - *Sophora fraseri* (Brush sophora).
  - Habitat for invertebrate fauna species listed under the EPBC Act was recorded
    - *Argynnis hyperbius inconstans* (Australian fritillary).
- Matters of State Environmental Significance
  - Four threatened flora species, comprising three MNES flora (listed above) and *Leichhardtia coronata* (Slender milkvine);
  - One amphibian species within creek line habitat (upper reservoir).
    - *Adelotus brevis* (Tusked frog).
  - Eight Regional Ecosystems were recorded, comprising seven Least Concern and one Of Concern community as listed under the QLD *Vegetation Management Act 1999.*

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Data Transmittal

The findings of this briefing note are supported by the following spatial data files:

- Survey locations (22257_Survey Locations_Umwelt_20221116).
- Ground-truthed RE (22257_GTRE_Umwelt_20221116).
- Tracks (22257_Tracks_Umwelt_20221116).
- Threatened flora (22257_Threatened Species_Umwelt_20221116).

1.0 Introduction

Umwelt was commissioned by Queensland Hydro to undertake terrestrial ecological survey within the exploratory works' footprint for the Borumba Pumped Hydro Project (BPHP). A summary of findings are detailed below.

1.1 Scope of Works

The ecological field survey was undertaken from 7 to 11 November 2022 and included the following areas, herein referred as the exploratory works' footprint.

The following areas were assessed in the lower reservoir:

- Tunnel Spoil Location and Spoil Road.
- New Borumba Lower Dam Disturbance Buffer (25 m).
- National Park Revocation Area.
- Alternative Portal Areas.

The following areas were assessed in the upper reservoir:

- Access Tracks (10 m width), associated with:
    - Upper Reservoir geotechnical access tracks, excluding Imbil State Forest
    - MAT ECVT Portal Platform and Tunnel area 1
    - Explosive Magazine Store
    - Helipad East and West
    - National Park Revocation Areas associated with TR01 and TR02.
- Water infrastructure including water pipe, pump pads and water tanks.
- Geotechnical Disturbance Zones, including:
    - UQ Area
    - Powerhouse Cavern 1, 2 and 3

- Tunnel Area 1, 2,4
- Tailrace ET01
- Pressure Shaft.

- Explosive Magazine Store.
- Emergency Helipad East and West.
- MAT and ECVT Portal Platform (AFRY (20221006)).
- Alternate Portal Locations.
- Dam Disturbance Buffer Areas, including:
  - Upper Reservoir Main Saddle Dam (25 m)
  - Upper Reservoir Secondary Saddle Dam (25 m)
  - Upper Reservoir Main Dam and Spillway (25 m)
  - Upper Reservoir Secondary Saddle Dam B1, B2, B3 (25 m).

2.0 Methodology

The field survey incorporated a range of methodologies at each scope of works location, as detailed below. The locations of each survey methodology have also been provided as data files (ESRI Shapefile).

- An assessment of vegetation status and regional ecosystems (REs) as per *Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland* (Neldner et al., 2020).
  - 154 quaternary surveys and 1 secondary survey were undertaken within the exploratory works' footprint.
- Verification of threatened ecological communities (TECs), listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):
  - A random meander was undertaken through synonymous REs to determine if the patches supported ≥40 native woody species from Appendix A of listing advice (TSSC 2011).
- Threatened flora searches using a random meander technique in areas of suitable habitat.
- 28 Fauna habitat assessments were undertaken.

3.0 Field Survey Results

3.1 Vegetation Communities

3.1.1 Regional Ecosystem

Table 1 provides details of the REs recorded within the exploratory works' footprint, as shown in **Figure 1**.

Table 1 Regional Ecosystems Recorded within Exploratory Works' Footprint

RE ID	Short descriptions	VM Act[1]	Remnant Status
12.3.7	*Eucalyptus tereticornis*, *Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland.	Least concern	Regrowth
12.11.3	*Eucalyptus siderophloia*, *E. propinqua* +/- *E. microcorys*, *Lophostemon confertus*, *Corymbia intermedia*, *E. acmenoides* open forest on metamorphics +/- interbedded volcanics.	Least concern	Remnant
12.11.10	Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics.	Least concern	Remnant
12.11.14	*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics.	Of concern	Remnant
12.12.15	*Corymbia intermedia* +/- *Eucalyptus propinqua*, *E. siderophloia*, *E. microcorys*, *Lophostemon confertus* open forest on Mesozoic to Proterozoic igneous rocks.	Least concern	Remnant
12.12.15b	*Lophostemon confertus* open forest +/- *Eucalyptus microcorys*, *E. siderophloia*, *E. carnea*, *E. propinqua* and vine forest species often present in understorey. Occurs in gullies and exposed ridges on Mesozoic to Proterozoic igneous rocks often amongst vine forest.	Least concern	Remnant
12.12.16	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks.	Least concern	Remnant
12.12.23	*Eucalyptus tereticornis* subsp. *tereticornis* or *E. tereticornis* subsp. *basaltica* +/- *E. eugenioides* woodland to open forest on crests, upper slopes and elevated valleys and plains on Mesozoic to Proterozoic igneous rocks.	Least concern	Remnant
Non-remnant	Predominantly comprises cleared pasture, not representative remnant or regrowth vegetation.	-	-

3.1.2 Threatened Ecological Communities

One TEC listed under the EPBC Act was verified within the exploratory works footprint; Lowland Rainforest of Subtropical Australia. This TEC is listed as critically endangered. The extent of the TEC within the exploratory works' footprint is shown in **Figure 1.**

A summary of the TEC verification results is outlined below:

- RE 12.11.10 associated with lower reservoir national park revocation area was verified as TEC.
- RE 12.12.16 within the central alternative portal area did not meet key diagnostic characteristics (species diversity).
- Portions of RE 12.12.16 within the upper reservoir main saddle dam were verified as TEC. Areas of RE 12.12.16 did not meet key diagnostic characteristics (dominated by *Eucalyptus grandis*).

[1] *Vegetation Management Act 1999*

Targeted surveys were not undertaken in two patches that intersected the exploratory works' footprint (national park revocation area and tunnel area 1). Both are assumed to be the TEC based on the proximal outcomes of similar TEC assessments in the upper reservoir.

An assessment of the patches against the key diagnostic characteristics and condition thresholds is provided in **Table 2** and **Table 3** respectively.

Table 2 Assessment Against Lowland Rainforest of Subtropical Australia Key Diagnostic Characteristics

Key Diagnostic Characteristics	Site Results
Distribution of the ecological community is primarily in the NSW North Coast and South Eastern Queensland bioregions, according to Interim Biogeographic Regionalisation for Australia (IBRA) version 6.1 (2004).	**Yes**, the patches occur within the South Eastern Queensland bioregion.
The ecological community occurs on: soils derived from basalt or alluvium; or enriched rhyolitic soils; or basaltically enriched metasediments.	**Yes**, the patches occur on soils derived from basalt or alluvium.
The ecological community generally occurs at an altitude less than 300 m ASL.	**Yes**, patches in the lower reservoir are below 300 m ASL. Patches in the upper reservoir occur between 350–500 m ASL, however, this does not preclude them from being the TEC.
The ecological community typically occurs in areas with high annual rainfall (>1300 mm).	**Yes**, average annual rainfall 1,483 mm (weather station 040861, 50 km east of Study Area (BoM 2022).
The ecological community is typically more than 2 km inland from the coast.	**Yes**, the patches are greater than 2 km from the coast.
The structure of the ecological community is typically a tall (20 m–30 m) closed forest, often with multiple canopy layers.	**Yes**, the patches typically comprise a canopy ranging from 20–30 m tall and is a closed forest with multiple canopy layers. However, there are patches with canopy ranging from 15–20 m.
Patches of the ecological community typically have high species richness (at least 30 woody species from Appendix A of the listing advice (TSSC 2011)).	**No (Feature ID 128)** – 27 species recorded. **Yes**, remaining patches had at least 30 woody species. See **Appendix B**.

Table 3 Assessment Against Lowland Rainforest of Subtropical Australia Condition Thresholds

Patch Type	A	B	C
Evidence of remnant vegetation and regeneration status	Natural remnant evident by the persistence of mature residual trees from Appendix B of the listing advice (TSSC 2011) **AND**	Some residual trees from Appendix B are present plus evidence of either; natural regeneration **AND/OR** regeneration with active management **AND**	A non-remnant patch that has recovered through: a) natural regeneration **AND/OR** b) supplementary planting that has stature and quality that is reflective of the 'Description' **AND**
Patch Size (excludes buffer zone)	≥ 0.1 ha **AND**	≥ 1 ha **AND**	≥ 2 ha **AND**
Canopy Cover (over entire patch)	Emergent/canopy/subcanopy cover is ≥ 70% **AND**		
Species Richness (over entire patch)	Contains ≥ 40 native woody species from Appendix A of listing advice (TSSC 2011). **AND**	Contains ≥ 30 native woody species from Appendix A of the listing advice (TSSC 2011). **AND**	
Percent of total vegetation cover that is native (use sample plot)	≥70% of vegetation is native	≥50% of vegetation is native	

3.2 Flora Diversity

A total of 305 flora species from 86 families and 231 genera were recorded within the exploratory works' footprint. The plant families represented by ten or more taxa included *Asteraceae* (18), *Leguminosae* (Papilionoideae) (22), *Moraceae* (10), *Myrtaceae* (20), *Poaceae* (22) and *Rutaceae* (10). Genera represented by five or more species included *Acacia* (5), *Eucalyptus* (8), *Ficus* (7) and *Solanum* (5).

The full list of flora species recorded during field surveys is provided in **Appendix A**.

3.2.1 Threatened Flora Species

Table 4 provides details of the threatened flora species found within the exploratory works' footprint.

Table 4 Threatened Flora Species

Scientific Name	Common Name	EPBC Act Listing	NC Act[2] Listing
Coleus torrenticola	-	Endangered	Endangered
Leichhardtia coronata	Slender milkvine	-	Vulnerable
Rhodamnia rubescens	Scrub turpentine	Critically endangered	Critically endangered
Sophora fraseri	Brush sophora	Vulnerable	Vulnerable

3.2.2 Introduced Flora

Of the 297 flora species recorded, 27 (9%) are introduced species. One of these are listed as Category 3 Restricted Plants under the Biosecurity Act and also a Weed of National Significance (WoNS):

- Lantana (*Lantana camara*) – Category 3 Restricted Plant and WoNS.

Two of the recorded introduced flora species are listed as 'Other Invasive Plants' by the Queensland Government (2016) including corky passionflower (*Passiflora suberosa*) and noogoora burr (*Xanthium occidentale*).

3.3 Fauna

3.3.1 Fauna Habitat

The following habitat types were recorded within the exploratory works' footprint:

- Notophyll vine forests on foothills and ranges (RE 12.11.10 and RE 12.12.16).
- Moist to dry open woodlands on metamorphic and volcanic rocks (RE 12.11.3, RE 12.12.15, RE 12.12.15b).
- Dry to moist eucalypt woodlands and open forests on undulating to hilly terrain of metamorphic and volcanic rocks (RE 12.11.14).
- Eucalyptus open forests and woodland on drainage lines and alluvial plains (RE 12.3.7).
- Non-remnant pasture.

Full descriptions of these habitat types are available in *Borumba Pumped Hydro Project: Terrestrial Ecology Technical Report* (Umwelt 2022).

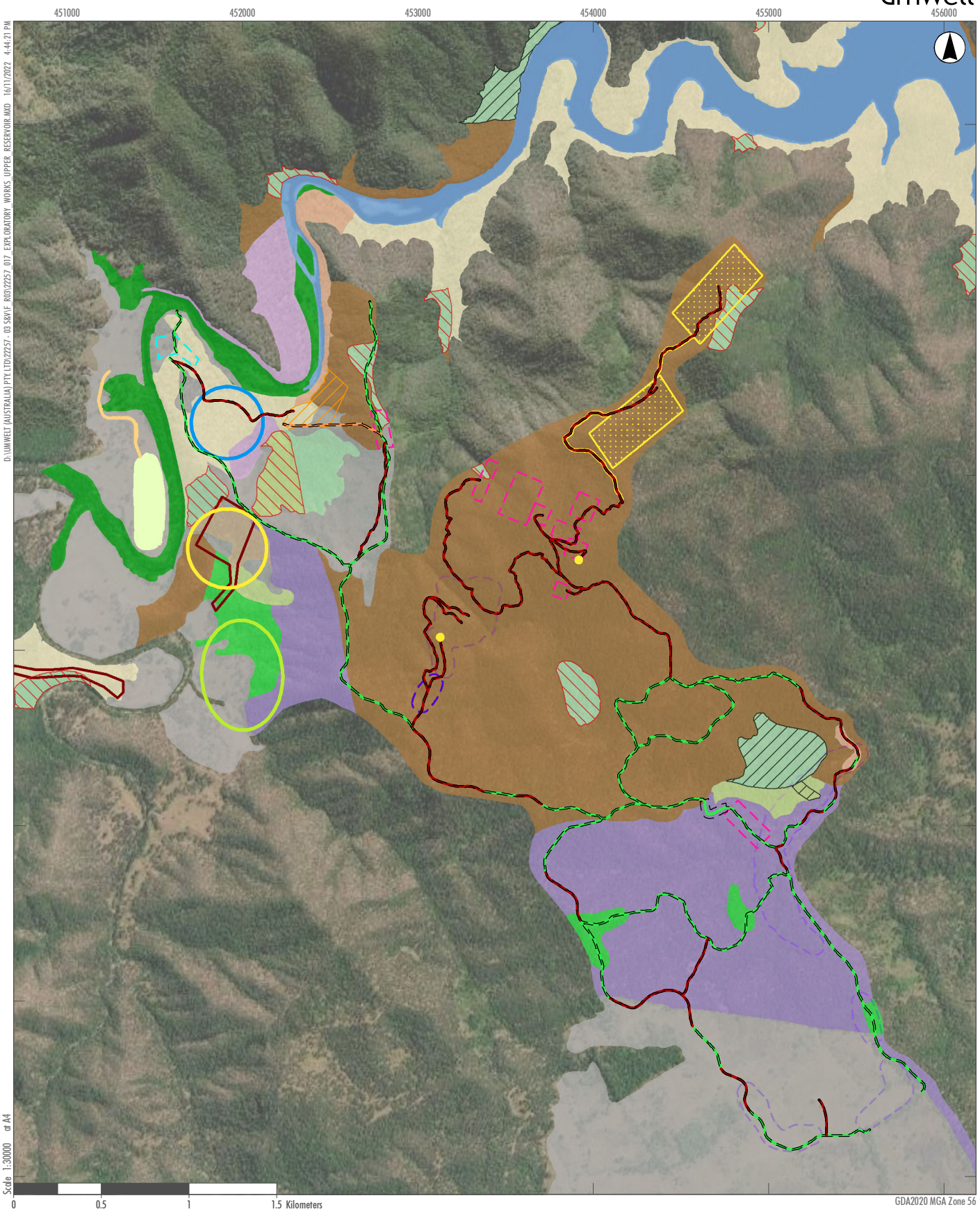
3.3.2 Incidental Fauna

Table 5 provides the details of the threatened fauna species or suitable habitat for threatened fauna species found within the exploratory works' footprint.

[2] Nature Conservation Act 1992

Table 5 Threatened Fauna Species

Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Comment
Adelotus brevis	Tusked frog	-	Vulnerable	Heard calling within a patch of RE 12.11.10.
Argynnis hyperbius inconstans	Australian fritillary	Critically endangered	Endangered	Species was not recorded but larval food plant (*Viola betonicifolia*) recorded adjacent footprint.



Legend

- Exploratory Works Areas
- 50m Dam Buffers
- Alternative Blue Portal
- Alternative Green Portal
- Alternative Yellow Portal
- Disturbance Zones Geotech
- Helipad
- MAT and ECVT Portal Platform
- National Park Revocation Areas
- Portal Lower Staging Area
- Spoil Road Disturbance Area
- Tunnel Spoil Disturbance Areas
- Potential Tracks Disturbance Area Buffer
- Existing Tracks
- Proposed Tracks
- Proposed Tracks

Threatened Ecological Communities

- Not assessed
- Verified

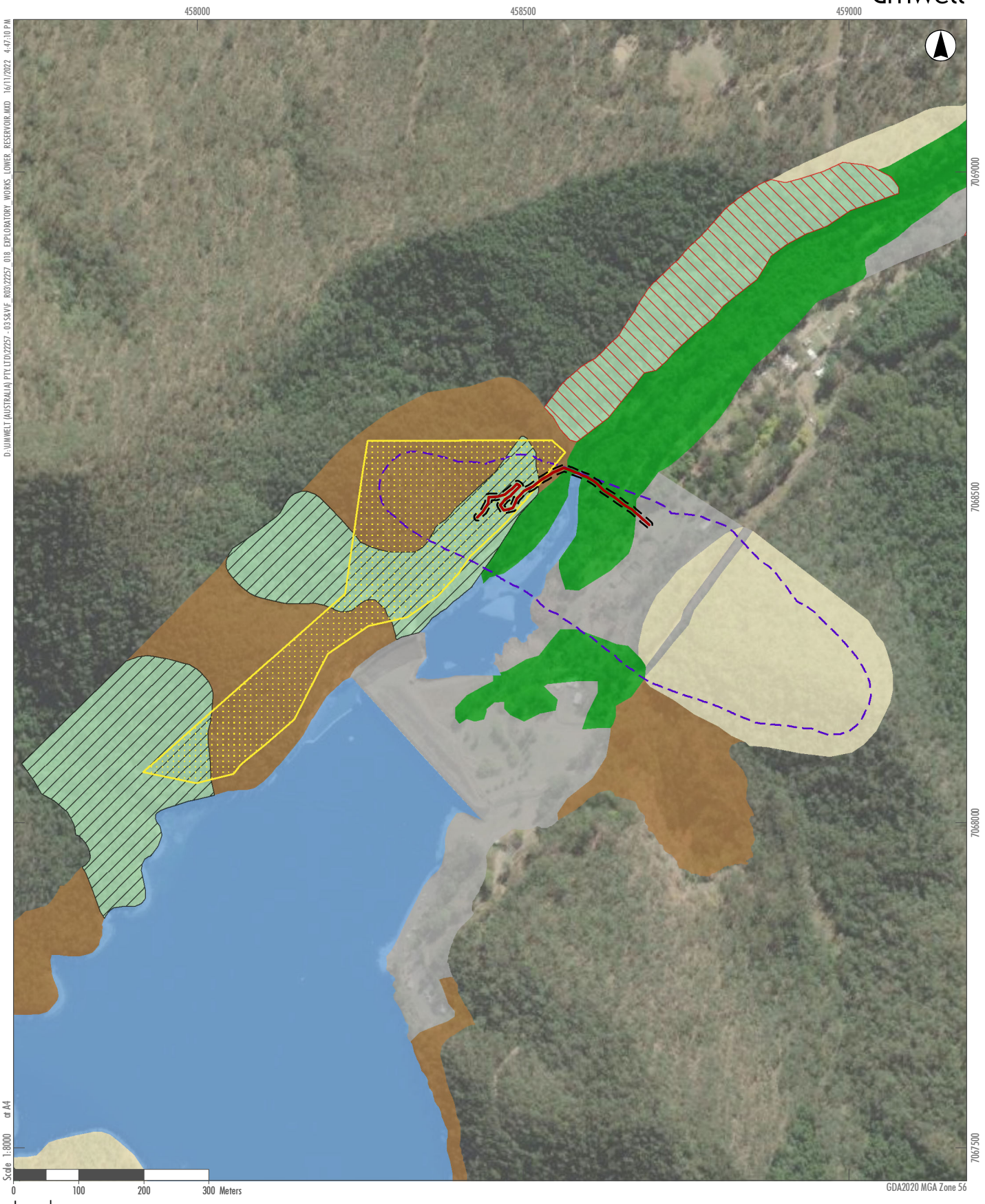
Ground-truthed REs

- 12.11.10
- 12.11.14
- 12.11.3
- 12.11.9
- 12.12.12
- 12.12.15
- 12.12.15b
- 12.12.16
- 12.12.23
- 12.3.7
- Non-remnant
- Water

FIGURE 1A

Exploratory Works Footprint Upper Reservoir

Image Source: ESRI Basemap (2022) Data source: QLD Department of Resources (2022)



Legend

- 50m Dam Buffers
- National Park Revocation Areas
- Potential Tracks Disturbance Area Buffer
- Proposed Tracks

Threatened Ecological Communities

- Not assessed
- Verified

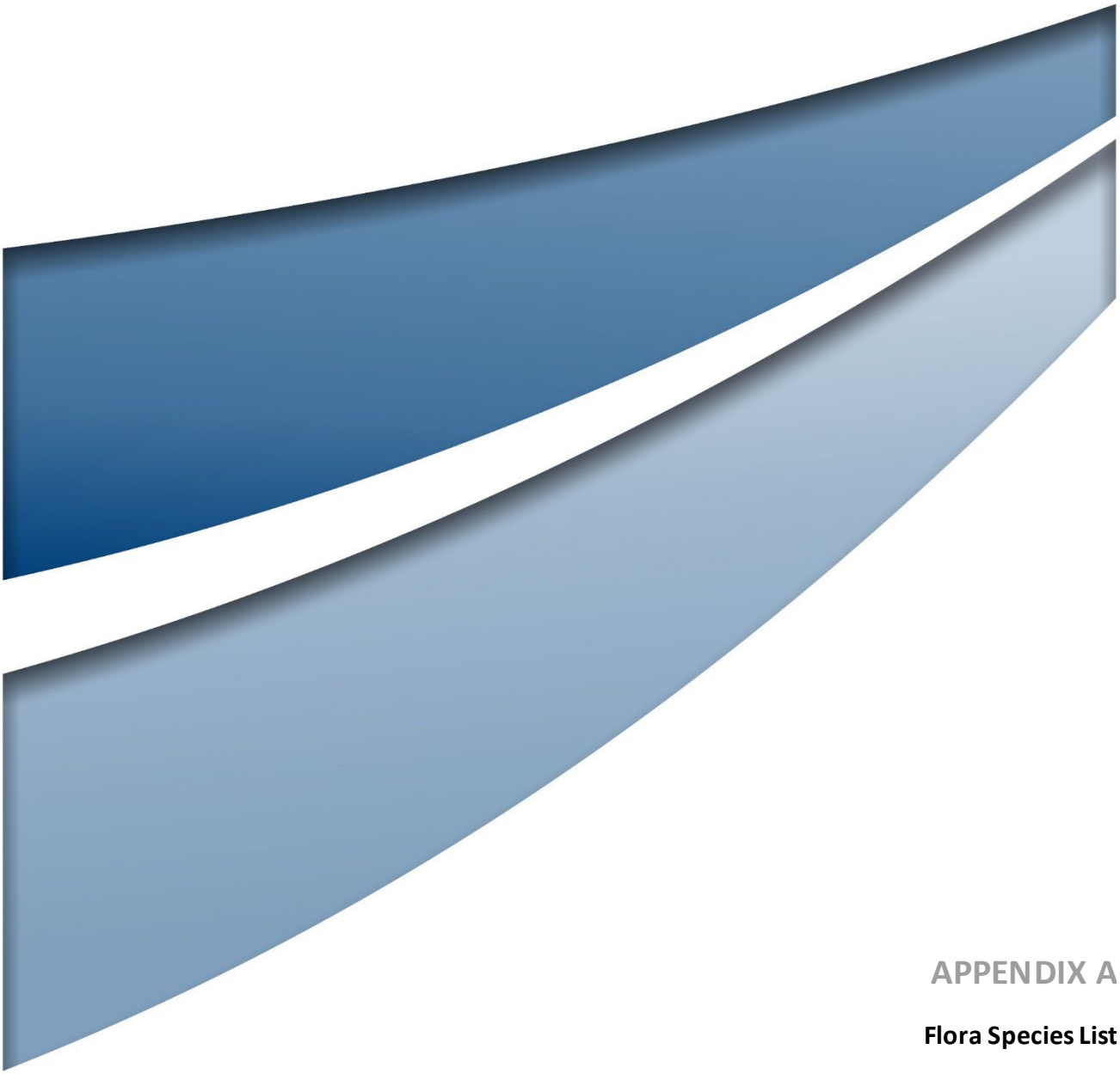
Ground-truthed REs

- 12.11.10
- 12.11.14
- 12.11.3
- 12.3.7
- Non-remnant
- Water

FIGURE 1B

Exploratory Works Footprint Lower Reservoir

Image Source: ESRI Basemap (2022) Data source: QLD Department of Resources (2022)



APPENDIX A

Flora Species List

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
Acanthaceae	*Pseuderanthemum tenellum*	--	Least concern	-
Amaranthaceae	*Nyssanthes diffusa*	Barbed-wire weed	Least concern	-
Anacardiaceae	*Euroschinus falcatus* var. *falcatus*	-	Least concern	-
	Pleiogynium timorense	Burdekin plum	Least concern	-
	Rhodosphaera rhodanthema	Tulip satinwood	Least concern	-
Apocynaceae	*Alstonia constricta*	Bitterbark	Introduced	-
	Gomphocarpus physocarpus	Balloon cottonbush	Least concern	-
	Hoya australis subsp. *australis*	-	Least concern	-
	Leichhardtia coronata	Slender milkvine	Vulnerable	-
	Leichhardtia hemiptera	Rusty vine	Least concern	-
	Leichhardtia lloydii	-	Least concern	-
	Tabernaemontana pandacaqui	Banana bush	Least concern	-
Araceae	*Gymnostachys anceps*	Settler's flax	Least concern	-
Araliaceae	*Hydrocotyle laxiflora*	Stinking pennywort	Least concern	-
	Polyscias elegans	Celery wood	Least concern	-
Araucariaceae	*Araucaria bidwillii*	Bunya pine	Least concern	-
	Araucaria cunninghamii	Hoop pine	Least concern	-
	Araucaria cunninghamii var. *cunninghamii*	-	Least concern	-
Arecaceae	*Archontophoenix cunninghamiana*	Piccabeen palm	Least concern	-
	Calamus muelleri	Lawyer vine	Least concern	-
Aspleniaceae	*Asplenium australasicum*	-	Least concern	-
Asteraceae	*Ageratum conyzoides*	Billygoat weed	Introduced	-
	Ageratum houstonianum	Blue billygoat weed	Introduced	-
	Bidens pilosa	-	Introduced	-
	Carduus sp.	-	Least concern	-
	Centratherum riparium	-	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Chrysocephalum apiculatum	Yellow buttons	Least concern	-
	Cirsium vulgare	Spear thistle	Introduced	-
	Cyanthillium cinereum	-	Least concern	-
	Emilia sonchifolia	-	Introduced	-
	Erigeron bonariensis	-	Introduced	-
	Euchiton sphaericus	-	Least concern	-
	Glossocardia bidens	Native cobbler's pegs	Least concern	-
	Praxelis clematidea	-	Least concern	-
	Pterocaulon redolens	-	Least concern	-
	Senecio amygdalifolius	-	Least concern	-
	Sigesbeckia orientalis	Indian weed	Introduced	-
	Tagetes minuta	Stinking roger	Introduced	-
	Tridax procumbens	Tridax daisy	Introduced	-
	Xanthium occidentale	-	Introduced	-
Bignoniaceae	*Pandorea floribunda*	-	Least concern	-
	Tecoma stans var. *stans*	-	Introduced	-
Blechnaceae	*Blechnum neohollandicum*	-	Least concern	-
	Blechnum sp.	-	Least concern	-
Byttneriaceae	*Commersonia bartramia*	Brown kurrajong	Least concern	-
Campanulaceae	*Lobelia concolor*	-	Least concern	-
	Lobelia purpurascens	White root	Least concern	-
	Wahlenbergia glabra	Native bluebell	Least concern	-
	Wahlenbergia gracilis	Sprawling bluebell	Least concern	-
Capparaceae	*Capparis arborea*	Brush caper berry	Least concern	-
	Capparis sarmentosa	Scrambling caper	Least concern	-
Casuarinaceae	*Allocasuarina torulosa*	-	Least concern	-
	Casuarina cunninghamiana	-	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
Celastraceae	*Denhamia bilocularis*	-	Least concern	-
	Elaeodendron australe var. *australe*	-	Least concern	-
Chenopodiaceae	*Einadia nutans*	-	Least concern	-
Commelinaceae	*Commelina diffusa*	Wandering jew	Least concern	-
	Murdannia graminea	Murdannia	Least concern	-
Cunoniacea	*Caldcluvia paniculosa*	Rose-lead marara	Least concern	-
Cyperaceae	*Cyperus gracilis*	-	Least concern	-
	Cyperus sp.	-	Least concern	-
	Fimbristylis dichotoma	Common fringe-rush	Least concern	-
	Lepidosperma laterale	-	Least concern	-
Dennstaedtiaceae	*Pteridium esculentum*	Common bracken	Least concern	-
Dicksoniaceae	*Calochlaena dubia*	-	Least concern	-
Dilleniaceae	*Hibbertia aspera*	-	Least concern	-
	Hibbertia linearis	-	Least concern	-
Dioscoreaceae	*Dioscorea transversa*	Native yam	Least concern	-
Ebenaceae	*Diospyros australis*	Black plum	Least concern	-
	Diospyros fasciculosa	Grey ebony	Least concern	-
	Diospyros pentamera	Myrtle ebony	Least concern	-
Elaeocarpaceae	*Elaeocarpus obovatus*	Blueberry ash	Least concern	-
	Sloanea australis	-	Least concern	-
Ericaceae	*Leucopogon* sp.	-	Least concern	-
	Trochocarpa laurina	Tree heath	Least concern	-
Euphorbiaceae	*Acalypha capillipes*	Small-leaved acalypha	Least concern	-
	Alchornea ilicifolia	Native holly	Least concern	-
	Baloghia inophylla	Scrub bloodwood	Least concern	-
	Croton insularis	Queensland cascarilla	Least concern	-
	Excoecaria dallachyana	Scrub poison tree	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Mallotus claoxyloides	Green kamala	Least concern	-
	Mallotus philippensis	Red kamala	Least concern	-
	Ricinocarpos linearifolius	-	Least concern	-
Gentianaceae	*Schenkia australis*	-	Least concern	-
Geraniaceae	*Geranium homeanum*	-	Least concern	-
	Geranium solanderi	-	Least concern	-
Goodeniaceae	*Goodenia rotundifolia*	-	Least concern	-
Hemerocallidaceae	*Dianella caerulea*	-	Least concern	-
	Dianella longifolia	-	Least concern	-
	Geitonoplesium cymosum	Scrambling lily	Least concern	-
Hypoxidaceae	*Hypoxis pratensis* var. *pratensis*	-	Least concern	-
Johnsoniaceae	*Tricoryne elatior*	Yellow autumn lily	Least concern	-
Lamiaceae	*Ajuga australis*	Australian bugle	Least concern	-
	Anisomeles sp.	-	Least concern	-
	Clerodendrum floribundum	-	Least concern	-
	Coleus australis	-	Least concern	-
	Coleus torrenticola	-	Least concern	Endangered
	Gmelina leichhardtii	White beech	Least concern	-
	Mentha satureioides	Native pennyroyal	Least concern	-
	Vitex lignum-vitae	-	Least concern	-
Lauraceae	*Beilschmiedia elliptica*	Grey walnut	Least concern	-
	Cinnamomum oliveri	Oliver's sassafras	Least concern	-
	Cryptocarya laevigata	-	Least concern	-
	Cryptocarya obovata	Pepperberry	Least concern	-
	Cryptocarya triplinervis	-	Least concern	-
	Endiandra pubens	Hairy walnut	Least concern	-
	Neolitsea dealbata	White bolly gum	Least concern	-
Laxmanniaceae	*Cordyline petiolaris*	Large-leaved palm lily	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Cordyline rubra	Red-fruited palm lily	Least concern	-
	Eustrephus latifolius	Wombat berry	Least concern	-
	Lomandra confertifolia	-	Least concern	-
	Lomandra hystrix	-	Least concern	-
	Lomandra longifolia	-	Least concern	-
	Lomandra multiflora	-	Least concern	-
	Thysanotus tuberosus	-	Least concern	-
Leguminosae (Caesalpinioideae)	*Chamaecrista* sp.	-	Introduced	-
	Senna acclinis	-	Least concern	-
	Senna artemisioides	-	Least concern	-
	Senna pendula	-	Introduced	-
Leguminosae (Caesalpinioideae, mimosoid clade)	*Acacia disparrima*	-	Least concern	-
	Acacia disparrima subsp. *disparrima*	-	Least concern	-
	Acacia fimbriata	Brisbane golden wattle	Least concern	-
	Acacia implexa	Lightwood	Least concern	-
	Acacia irrorata	-	Least concern	-
	Acacia leiocalyx	-	Least concern	-
	Acacia maidenii	Maiden's wattle	Least concern	-
	Acacia melanoxylon	Blackwood	Least concern	-
	Pararchidendron pruinosum	-	Least concern	-
Leguminosae (Papilionoideae)	*Austrosteenisia blackii*	Bloodvine	Least concern	-
	Castanospermum australe	Black bean	Least concern	-
	Clitoria ternatea	Butterfly pea	Introduced	-
	Crotalaria montana	-	Least concern	-
	Desmodium brachypodum	Large ticktrefoil	Least concern	-
	Desmodium gunnii	-	Least concern	-
	Desmodium rhytidophyllum	-	Least concern	-
	Flemingia parviflora	Flemingia	Least concern	-
	Glycine clandestina	-	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Glycine tabacina	Glycine pea	Least concern	-
	Glycine tomentella	Woolly glycine	Least concern	-
	Hardenbergia violacea	-	Least concern	-
	Hovea longipes	Brush hovea	Least concern	-
	Indigofera hirsuta	Hairy indigo	Least concern	-
	Jacksonia scoparia	-	Least concern	-
	Macrotyloma axillare var. *axillare*	-	Least concern	-
	Podolobium ilicifolium	-	Least concern	-
	Rhynchosia minima	-	Least concern	-
	Sophora fraseri	Brush sophora	Vulnerable	Vulnerable
	Swainsona brachycarpa	-	Least concern	-
	Tephrosia brachyodon	-	Least concern	-
	Vigna sp.	-	Least concern	-
	Zornia muriculata	-	Least concern	-
Leguminosar	*Derris involuta*	Native derris	Least concern	-
Malvaceae	*Abutilon oxycarpum*	-	Least concern	-
	Hibiscus heterophyllus	-	Least concern	-
	Sida cordifolia	-	Introduced	-
	Sida hackettiana	-	Least concern	-
Meliaceae	*Anthocarapa nitidula*	Incense cedar	Least concern	-
	Dysoxylum rufum	-	Least concern	-
	Melia azedarach	White cedar	Least concern	-
	Toona ciliata	Red cedar	Least concern	-
	Turraea pubescens	Native honeysuckle	Least concern	-
Menispermaceae	*Legnephora moorei*	-	Least concern	-
	Stephania japonica	-	Least concern	-
Monimiaceae	*Wilkiea macrophylla*	Large-leaved wilkiea	Least concern	-
Moraceae	*Ficus coronata*	Creek sandpaper fig	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Ficus fraseri	White sandpaper fig	Least concern	-
	Ficus macrophylla	-	Least concern	-
	Ficus macrophylla forma macrophylla	Moreton Bay fig	Least concern	-
	Ficus obliqua	-	Least concern	-
	Ficus opposita	-	Least concern	-
	Ficus watkinsiana	Green-leaved Moreton Bay fig	Least concern	-
	Maclura cochinchinensis	Cockspur thorn	Least concern	-
	Streblus brunonianus	Whalebone tree	Least concern	-
	Trophis scandens	-	Least concern	-
Myrsinaceae	*Embelia australiana*	Embelia	Least concern	-
Myrtaceae	*Acmena smithii*	Lillypilly satinash	Least concern	-
	Angophora leiocarpa	Rusty gum	Least concern	-
	Angophora subvelutina	-	Least concern	-
	Corymbia intermedia	Pink bloodwood	Least concern	-
	Corymbia tessellaris	Moreton Bay ash	Least concern	-
	Eucalyptus acmenoides	-	Least concern	-
	Eucalyptus crebra	Narrow-leaved red ironbark	Least concern	-
	Eucalyptus grandis	Flooded gum	Least concern	-
	Eucalyptus microcorys	-	Least concern	-
	Eucalyptus moluccana x *E. siderophloia*	-	Least concern	-
	Eucalyptus propinqua	Small-fruited grey gum	Least concern	-
	Eucalyptus siderophloia	-	Least concern	-

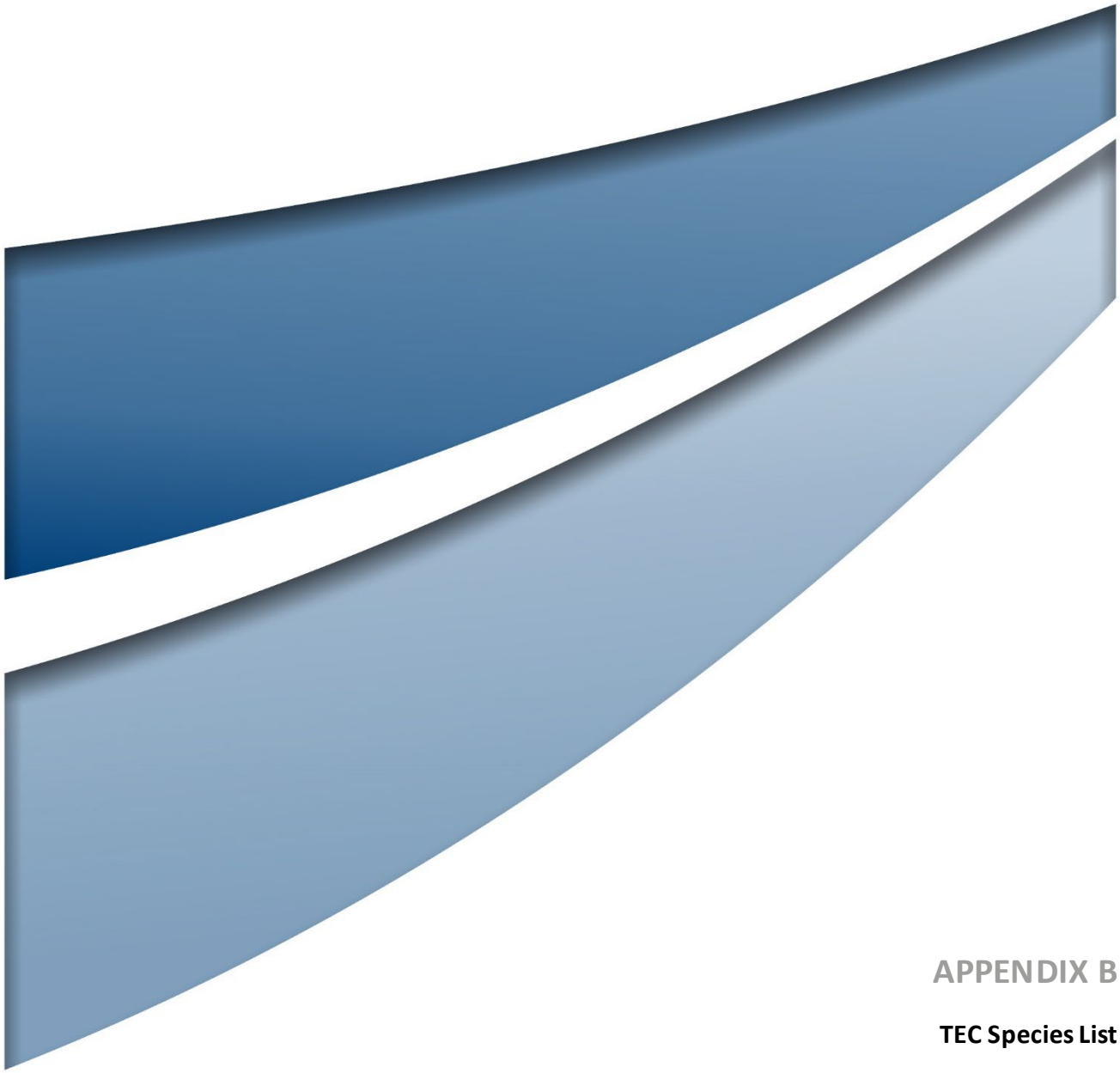
Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Eucalyptus tereticornis	-	Least concern	-
	Gossia bidwillii	-	Least concern	-
	Lophostemon confertus	Brush box	Least concern	-
	Lophostemon suaveolens	Swamp box	Least concern	-
	Melaleuca viminalis	-	Least concern	-
	Rhodamnia rubescens	Scrub turpentine	Critically endangered	Critically endangered
	Syzygium australe	Scrub cherry	Least concern	-
	Syzygium francisii	Giant watergum	Least concern	-
Oleaceae	*Notelaea longifolia*	-	Least concern	-
	Notelaea ovata	Forest olive	Least concern	-
Orchidaceae	*Cymbidium suave*	-	Least concern	-
Oxalidaceae	*Oxalis corniculata*	-	Introduced	-
	Oxalis perennans	-	Least concern	-
Passifloraceae	*Passiflora suberosa*	Corky passion flower	Introduced	-
Petiveriaceae	*Rivina humilis*	-	Introduced	-
Phyllanthaceae	*Breynia oblongifolia*	-	Least concern	-
	Bridelia leichhardtii	-	Least concern	-
	Cleistanthus cunninghamii	Omega	Least concern	-
	Glochidion ferdinandi	-	Least concern	-
	Phyllanthus virgatus	-	Least concern	-
	Poranthera microphylla	Small poranthera	Least concern	-
Picrodendraceae	*Dissiliaria baloghioides*	Hauer	Least concern	-
Pittosporaceae	*Bursaria spinosa subsp. spinosa*	-	Least concern	-
	Pittosporum multiflorum	-	Least concern	-
	Pittosporum revolutum	Yellow pittosporum	Least concern	-
Plantaginaceae	*Veronica plebeia*	Trailing speedwell	Least concern	-
Poaceae	*Alloteropsis semialata*	Cockatoo grass	Least concern	-
	Aristida sp.	-	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Austrostipa sp.	-	Least concern	-
	Chrysopogon fallax	-	Least concern	-
	Cymbopogon refractus	Barbed-wire grass	Least concern	-
	Entolasia stricta	Wiry panic	Least concern	-
	Eragrostis sororia	-	Least concern	-
	Heteropogon contortus	Black speargrass	Least concern	-
	Imperata cylindrica	Blady grass	Least concern	-
	Megathyrsus maximus	-	Introduced	-
	Melinis repens	Red natal grass	Introduced	-
	Oplismenus aemulus	Creeping shade grass	Least concern	-
	Ottochloa gracillima	Pademelon grass	Least concern	-
	Panicum effusum	-	Least concern	-
	Panicum sp.	-	Least concern	-
	Paspalidium distans	Shotgrass	Least concern	-
	Paspalum conjugatum	Sourgrass	Least concern	-
	Poa labillardierei var. labillardierei	Tussock grass	Least concern	-
	Sarga leiocladum	-	Least concern	-
	Sporobolus sp.	-	Least concern	-
	Themeda triandra	Kangaroo grass	Least concern	-
	Urochloa decumbens	-	Least concern	-
Polygonaceae	*Persicaria* sp.	-	Least concern	-
Polypodiaceae	*Drynaria rigidula*	-	Least concern	-
	Platycerium superbum	Staghorn fern	Least concern	-
Proteaceae	*Banksia integrifolia*	-	Least concern	-
	Banksia serrata	Red honeysuckle	Least concern	-
	Grevillea robusta	-	Least concern	-
Pteridaceae	*Adiantum aethiopicum*	-	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Adiantum atroviride	-	Least concern	-
	Adiantum hispidulum	-	Least concern	-
	Cheilanthes sieberi subsp. *sieberi*	-	Least concern	-
	Pellaea paradoxa	Heart fern	Least concern	-
Putranjivaceae	*Drypetes deplanchei*	Grey boxwood	Least concern	-
Rhamnaceae	*Alphitonia excelsa*	Soap tree	Least concern	-
Rosaceae	*Rubus moluccanus*	-	Least concern	-
	Rubus parvifolius	Pink-flowered native raspberry	Least concern	-
	Rubus rosifolius	-	Least concern	-
Rubiaceae	*Atractocarpus chartaceus*	-	Least concern	-
	Psychotria daphnoides	-	Least concern	-
	Spermacoce sp.	-	Least concern	-
Rutaceae	*Acronychia pauciflora*	Soft acronychia	Least concern	-
	Bouchardatia neurococca	Union nut	Least concern	-
	Citrus australis	-	Least concern	-
	Flindersia collina	Broad-leaved leopard tree	Least concern	-
	Flindersia schottiana	Bumpy ash	Least concern	-
	Melicope micrococca	White evodia	Least concern	-
	Pentaceras australe	Bastard crow's ash	Least concern	-
	Sarcomelicope simplicifolia	-	Least concern	-
	Zanthoxylum brachyacanthum	-	Least concern	-
	Zieria smithii	-	Least concern	-
Santalaceae	*Exocarpos cupressiformis*	Native cherry	Least concern	-
Sapindaceae	*Alectryon subdentatus*	-	Least concern	-
	Alectryon tomentosus	-	Least concern	-
	Arytera distylis	Twin-leaved coogera	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
	Cupaniopsis serrata	Smooth tuckeroo	Least concern	-
	Diploglottis australis	Native tamarind	Least concern	-
	Elattostachys nervosa	Green tamarind	Least concern	-
	Guioa semiglauca	Guioa	Least concern	-
	Harpullia sp.	-	Least concern	-
	Jagera pseudorhus	-	Least concern	-
Sapotaceae	*Planchonella australis*	-	Least concern	-
Simaroubaceae	*Ailanthus triphysa*	White siris	Least concern	-
Smilacaceae	*Smilax australis*	Barbed-wire vine	Least concern	-
Solanaceae	*Solanum mauritianum*	Wild tobacco	Introduced	-
	Solanum nigrum	-	Introduced	-
	Solanum seaforthianum	Brazilian nightshade	Introduced	-
	Solanum stelligerum	Devil's needles	Least concern	-
	Solanum torvum	Devil's fig	Introduced	-
Sparrmanniaceae	*Grewia latifolia*	Dysentery plant	Least concern	-
Sterculiaceae	*Argyrodendron* sp. (Kin Kin W.D.Francis AQ81198)	Rusty tulip oak	Least concern	-
	Argyrodendron trifoliolatum	Booyong	Least concern	-
	Brachychiton discolor	-	Least concern	-
Stylidiaceae	*Stylidium graminifolium*	Grassy-leaved trigger-flower	Least concern	-
Thymelaeaceae	*Pimelea latifolia*	-	Least concern	-
Ulmaceae	*Aphananthe philippinensis*	-	Least concer	-
	Trema tomentosa	-	Least concern	-
Urticaceae	*Dendrocnide excelsa*	Giant stinging tree	Least concern	-
	Dendrocnide photinophylla	Shiny-leaved stinging tree	Least concern	-

Family	Scientific Name	Common Name	NC Act Status	EPBC Act Status
Verbenaceae	*Lantana camara*	Lantana	Introduced	-
	Verbena sp.	-	Introduced	-
Violaceae	*Pigea stellarioides*	-	Least concern	-
	Viola hederacea	-	Least concern	-
Vitaceae	*Cayratia acris*	Hairy grape	Least concern	-
	Cissus antarctica	-	Least concern	-
	Cissus hypoglauca	-	Least concern	-
	Tetrastigma nitens	Shining grape	Least concern	-
Xanthorrhoeaceae	*Xanthorrhoea johnsonii*	-	Least concern	-
	Xanthorrhoea latifolia	-	Least concern	-
Zamiaceae	*Macrozamia* sp.	-	Least concern	-
Zingiberaceae	*Alpinia caerulea*	Wild ginger	Least concern	-



APPENDIX B

TEC Species List

Family	Scientific Name	Common Name	Feature 62 and 94	Feature 20 and 21	Feature 128
Apocynaceae	*Tabernaemontana pandacaqui*	Banana bush	-	-	x
Araliaceae	*Polyscias elegans*	Celery wood	x	x	x
Araucariaceae	*Araucaria cunninghamii*	Hoop pine	x	x	x
Arecaceae	*Archontophoenix cunninghamiana*	Piccabeen palm	x	x	-
	Calamus muelleri	Lawyer vine	-	x	-
Aspleniaceae	*Asplenium australasicum*	-	-		x
Bignoniaceae	*Pandorea floribunda*	-	-	x	-
Byttneriaceae	*Commersonia bartramia*	Brown kurrajong	x	-	-
Capparaceae	*Capparis arborea*	Brush caper berry	x	x	x
Cunoniaceae	*Caldcluvia paniculosa*	Rose-leaf marara	x	x	-
Ebenaceae	*Diospyros pentamera*	Myrtle ebony	x	x	-
Elaeocarpaceae	*Elaeocarpus obovatus*	Blueberry ash	x		-
	Sloanea australis	-	-	x	-
Euphorbiaceae	*Baloghia inophylla*	Scrub bloodwood	x	x	-
	Mallotus philippensis	Red kamala	x	x	x
Lamiaceae	*Clerodendrum floribundum*	-	-	x	-
	Gmelina leichhardtii	White beech	x	x	-
Lauraceae	*Beilschmiedia elliptica*	Grey walnut	x	x	-
	Cinnamomum oliveri	Oliver's sassafras	-	x	-
	Cryptocarya obovata	Pepperberry	x	x	-
	Endiandra pubens	Hairy walnut	-	x	x
	Neolitsea dealbata	White bolly gum	x	-	-
Laxmanniaceae	*Cordyline rubra*	Red-fruited palm lily	x	x	-
	Eustrephus latifolius	Wombat berry	-	-	x
Leguminosae (Caesalpinioideae, mimosoid clade)	*Pararchidendron pruinosum*	-	-	x	-
Leguminosae (Papilionoideae)	*Castanospermum australe*	Black bean	x	-	x
Meliaceae	*Anthocarapa nitidula*	Incense cedar	x	x	-
	Dysoxylum rufum	-	x	-	-

Family	Scientific Name	Common Name	Feature 62 and 94	Feature 20 and 21	Feature 128
	Melia azedarach	White cedar	x	-	x
	Toona ciliata	Red cedar	x	-	x
Menispermaceae	*Stephania japonica*	-	-	-	x
Moraceae	*Ficus coronata*	Creek sandpaper fig	-	x	-
	Ficus fraseri	White sandpaper fig	x	-	-
	Ficus macrophylla	-	x	-	x
	Ficus obliqua	-	x	-	-
	Ficus watkinsiana	Green-leaved Moreton Bay fig	x	x	-
	Streblus brunonianus	Whalebone tree	x	x	x
Myrtaceae	*Acmena smithii*	Lillypilly satinash	x	x	-
	Gossia bidwillii	-	x	x	-
	Lophostemon confertus	Brush box	x	x	x
	Rhodamnia rubescens	Scrub turpentine	-	x	-
	Syzygium australe	Scrub cherry	x	x	-
	Syzygium francisii	Giant watergum	-	x	-
Oleaceae	*Notelaea longifolia*	-	x	-	-
Phyllanthaceae	*Breynia oblongifolia*	-	x	x	-
	Cleistanthus cunninghamii	Omega	x	x	x
	Glochidion ferdinandi	-	-	x	-
Pittosporaceae	*Pittosporum multiflorum*	-	x	x	x
	Pittosporum revolutum	Yellow pittosporum	x	x	-
Polypodiaceae	*Platycerium superbum*	Staghorn fern	-	-	x
Proteaceae	*Grevillea robusta*	-	x	-	-
Rhamnaceae	*Alphitonia excelsa*	Soap tree	x	x	x
Rubiaceae	*Atractocarpus chartaceus*	-	x	x	x
Rutaceae	*Flindersia schottiana*	Bumpy ash	x	-	-
	Melicope micrococca	White evodia		x	-
	Pentaceras australe	Bastard crow's ash	x	x	-

Family	Scientific Name	Common Name	Feature 62 and 94	Feature 20 and 21	Feature 128
	Sarcomelicope simplicifolia	-	x	x	-
Sapindaceae	*Arytera distylis*	Twin-leaved coogera	x		-
	Cupaniopsis serrata	Smooth tuckeroo	x	x	-
	Diploglottis australis	Native tamarind	x	x	x
	Elattostachys nervosa	Green tamarind	x	-	-
	Guioa semiglauca	Guioa	x	-	-
	Jagera pseudorhus	-	x	x	x
Sapotaceae	*Planchonella australis*	-	-	x	-
Smilacaceae	*Smilax australis*	Barbed-wire vine	-	-	x
Sterculiaceae	*Argyrodendron trifoliolatum*	Booyong	x	x	x
Ulmaceae	*Aphananthe philippinensis*	-	x	x	x
Urticaceae	*Dendrocnide excelsa*	Giant stinging tree	x	x	x
Vitaceae	*Cissus antarctica*	-	x	x	x
	Cissus hypoglauca	-	x	x	-

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