Matters of National Environmental Significance Assessment

Glass Manufacturing and Recycling Facility 222 & 298 Stapylton Jacobs Well Road, Stapylton

Visy Glass Operations (Australia) Pty Ltd

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Executive summary

Visy Glass Operations (Australia) Pty Ltd (referred to as Visy) propose to develop a Glass Recycling and Manufacturing Facility (the proposed development) in South East Queensland. The proposed development will comprise a glass recycling cullet plant, container glass manufacturing facility, and finished goods warehouse combined as a single facility. The proposed development is for a greenfield site on Lot 2 WD4654 and partly on a brownfield site Lot 2 SP189558. The proposed development will include construction of the following key components:

– A highbay warehouse
– Glass manufacturing building and batch house
– Recycled glass beneficiation plant and storage bunkers
– Production building
– Batch house and cullet (waste glass) silos
– Fire pumps and tanks
– Transformer yard
– Canteen and amenities room
– Equipment parking area
– Workshop
– Visitor and staff parking
– Ancillary office space
– Landscaping.

The proposed development is located in the suburb of Stapylton, within the City of Gold Coast local government area (LGA). The proposed development is proposed over the following two properties, which have a combined area of 29 hectares:

– Lot 2 SP189558 (freehold tenure) – 298 Stapylton Jacobs Well Road, Stapylton
– Lot 2 WD4654 (freehold tenure) – 222 Stapylton Jacobs Well Road, Stapylton.

Visy has existing operations on Lot 2 SP189558, which includes two large warehouses and several smaller buildings, with access via Quinns Hill Road East and Stapylton Jacobs Well Road. The proposed development will involve an expansion of Visy's existing operations on Lot 2 SP189558 onto the neighbouring Lot 2 WD4654, which is a greenfield site with mature vegetation.

This report has been prepared to identify and assess matters of national environmental significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that are likely to be impacted by the proposed development.

Several sites for the proposed development have been considered by Visy during their due diligence and feasibility assessments. The proposed development site has been chosen for several reasons including its proximity to an existing Visy operation, access to existing or planned transport routes, and proximity to major customers, which supports efficient, cost-effective and reduced emissions transport for glass bottle beverages.

The construction and operation of the proposed development will result in the removal of vegetation, including potential habitat for the *Phascolarctos cinereus* (koala) and *Pteropus poliocephalus* (grey-headed flying-fox), and disturbance of existing ground conditions. The assessment of impacts to MNES determined that the following impacting processes have potential to occur:

– Loss of habitat
– Injury or mortality
– Fragmentation of habitat and loss of connectivity
– Disturbance to habitat from noise, light, and vibration

– Habitat degradation and increased erosion
– Spread of invasive species.

The findings of ecological assessment have shown that the proposed action will result in the removal of approximately 11.95 ha (4.80 ha moderate value and 7.15 ha is low value) of local koala habitat from a local landscape in which koala habitat has been extensively cleared and fragmented by historical land-clearing. The proposed action will also result in the clearing of potential foraging habitat (4.80 ha) for the grey-headed flying-fox.

A significance of impact assessment was undertaken of the proposed developments potential impacts on MNES that are considered likely to occur within the project area. The assessment was made against the EPBC Act Significant Impact Guidelines 1.1 (DoE 2013) and determined that the proposed development has potential to result in significant impacts on the koala (*Phascolarctos cinereus*), which is listed as endangered under the EPBC Act, due to the adverse effects on habitat critical to the survival of the koala and the possible decrease in the size of a population.

Extensive ecological assessment completed for the project area by GHD determined that whilst the koala was not observed during field ecological surveys of the project area, the proposed development proposes to clear an area of approximately 11.95 ha of low to moderate value koala habitat. This loss of habitat within a landscape that is becoming increasingly fragmented, combined with the method of clearing (i.e., clear-felling), determined that the proposed development has potential to have a significant impact on the koala if present. Therefore, the proposed development will be referred to DAWE and undergo the referral and assessment process under the EPBC Act.

The proposed development will also result in the loss of approximately 4.80 ha of suitable foraging habitat for the grey-headed flying-fox. However, due to the low current utilisation of the project area by the species and the lack of suitable breeding habitat within the project area, the proposed development is unlikely to significantly impact grey-headed flying-fox habitat. The proposed localised clearing within the project area is not considered to restrict movement at a scale that could fragment the population into two or more populations.

Visy is the largest manufacturer of glass containers in Australia-New Zealand, making around 3.4 billion bottles and jars each year. The proposed Glass Recycling and Manufacturing Facility at Stapylton will replace Visy's existing South Brisbane glass manufacturing plant and integrate glass recycling and warehousing with manufacturing as a single facility. The design of the proposed development has considered the outcomes of the ecological assessments to propose design measures to reduce/minimise adverse impacts to ecological values. As part of the design, Visy has also incorporated a vegetation buffer on the western boundary of the proposed development area and the natural vegetation will be retained in this area (referred to as the vegetation buffer area). Landscaping is also proposed within the proposed development area which will incorporate native vegetation.

Mitigation measures have also been developed for the construction phase and will be captured in a Construction Environmental Management Plan (CEMP). The key mitigation measures include:

– A Flora and Fauna Management Plan to be developed and implemented and will include a Koala Management Plan.
– A tree survey plan has been undertaken for the project development to quantify impacts to non-juvenile koala habitat trees and koala habitat values and to identify the location of trees to be retained and removed.
– A High-Risk SMP will be required for tampering with special least concern breeding places in accordance with the requirements of Section 332 of the Nature Conservation (Wildlife Management) Regulation 2006.
– Pre-clearance surveys for animal breeding places and resident animals by a qualified fauna spotter-catcher, with relocation of animals to suitable habitat areas in the region.
– Clearing will be undertaken in accordance with the Nature Conservation (Koala) Conservation Plan 2017. Sequential clearing practices and the use of suitably qualified koala spotters will ensure koalas (if present) are given the opportunity to move out of the area prior to commencement of clearing.

Visy has agreed with State Government and Brisbane City Council to support their planning preference to use Visy's glass manufacturing site in South Brisbane for the Brisbane Olympics in 2032. As a result, Visy needs to develop a new glass manufacturing facility in South East Queensland and propose to develop a modern glass manufacturing facility integrated with glass recycling and warehousing facilities, which are currently located at other sites around the greater Brisbane area. This will ensure continuity of container glass supply for customers in

South East Queensland and the investment will also ensure local glass manufacturing capacity can cater for sustainable growth as the Queensland market continues to expand.

The project area is recognised as an ideal location to develop the glass recycling and manufacturing facility, given that is located adjacent to Visy's existing can manufacturing and cardboard box manufacturing facilities, located in an industrial zone and is within the Yatala-Stapylton-Beenleigh Regional Economic Cluster (REC) which the *Shaping SEQ* identifies "*represents a significant manufacturing cluster, with specialisation in priority sectors of integrated food and beverage supply chains, and transport and logistics.*"

The proposed development will provide strong employment opportunities within the Yatala and Stapylton region, contributing to the local economy with jobs focused on modern manufacturing. Employment that is consistent and reliable, given the 24/7 needs of the facility, also contribute to stability for a workforce.

The establishment of the glass recycling and manufacturing facility will secure glass manufacture as a sustainable packaging substrate in South East Queensland for the long term. The size and scale of the proposed development is consistent with a commitment by Visy over many decades to meet beverage customer needs and growth aspirations.

The investment represents a transformation for glass manufacturing in Queensland. By its nature it is long term, with significant benefits on a socio-economic basis for the region, whilst also contributing to Visy's commitment to continue to Close the Loop on Glass and increase the average recycled content of container glass from the current 30% to 70%. This will support Qld's strategy to move towards a circular economy for waste as outlined in the *Waste Management and Resource Recovery Strategy (Queensland Government 2019)*.

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Abbreviations and acronyms

Abbreviation/acronym	Definition
CEMP	Construction Environmental Management Plan
DAWE	Department of Agriculture, Water and the Environment
DES	(Queensland) Department of Environment and Science
DoR	(Queensland) Department of Resources
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NC Act	(Queensland) *Nature Conservation Act 1999*
PMST	Protected Matters Search Tool
RE	Regional Ecosystem
TEC	Threatened Ecological Community
Visy	Visy Glass Operations (Australia) Pty Ltd

1. Introduction

1.1 Proposed action

Visy Glass Operations (Australia) Pty Ltd (referred to as Visy) intends to develop a combined greenfield glass container manufacturing, finished goods warehouse, and glass recycling facility in South East Queensland (the proposed development). The proposed development is to be located over a vacant greenfield site at 222 Stapylton Jacobs Well Road, Stapylton (Lot 2 on WD4654) and part of the adjoining brownfield site located at 298 Stapylton Jacobs Well Road (Lot 2 SP189558) (the project area), which has existing Visy packaging manufacturing facilities for beverage cans and cardboard boxes and a storage and logistics operation. Both properties are located on freehold lots, with a combined area of 29 hectares.

The proposed development would initially process approximately 145,000 tonnes per annum of recycled glass waste into furnace ready cullet and would manufacture approximately 200,000 tonnes (960,000,000) in containers per annum. The development design is staged to expand glass container output by 40 to 50 percent over the long term to meet the growth in the market, with future expansion of the glass manufacturing facility and warehouse (> 10-year).

The proposed development will include construction of the following components:

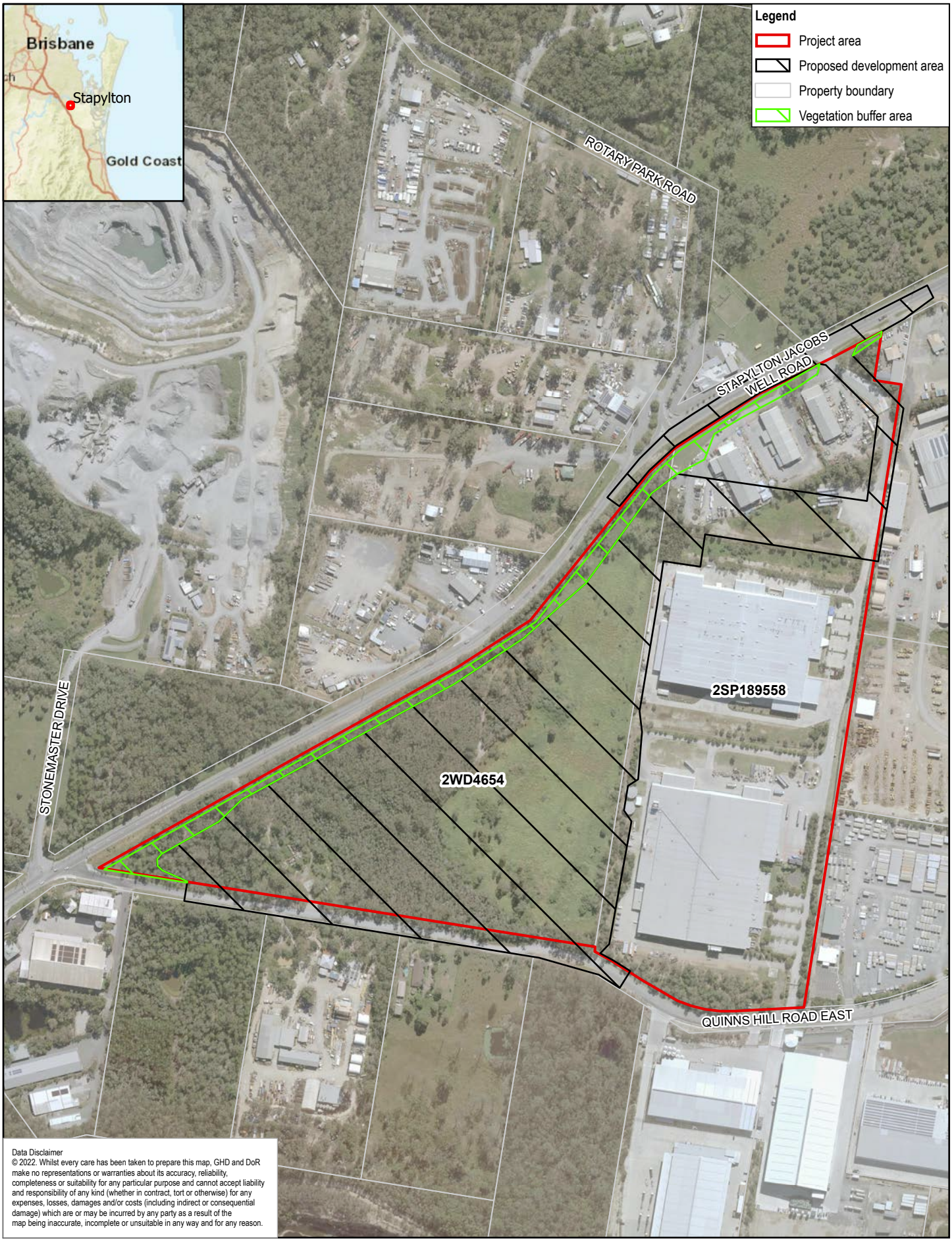
– A highbay warehouse
– Glass manufacturing building and batch house
– Recycled glass beneficiation plant and storage bunkers
– Fire pumps and tanks
– Transformer yard
– Canteen and amenities room
– Equipment parking area
– Workshop
– Visitor and staff parking
– Ancillary office space
– Landscaping and vegetation buffer area

1.2 Definitions

For the purposes of this report, the following definitions are used:

– **Proposed development area**– The proposed development area includes the construction footprint and extent of the proposed works, which includes all land within the boundary of the Lot 2 WD4654 and the northern section of Lot 2 SP189558. Road works are also proposed on part of Stapylton Jacobs Well Road reserve and Quinns Hill Road East reserve as required by City of Gold Coast and the Department of Transport and Main Roads.
– **Project area** – The project area includes all land within the boundary of the Lot 2 WD4654 and Lot 2 SP189558. The project area was that target of the field survey.
– **Study area –** The study area represents the extent of the desktop assessment, which encompassed the project area plus a 2 km buffer.
– **Vegetation buffer area** – The area of existing vegetation to be retained. An area of vegetation buffer will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve. The vegetation buffer area has a total area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the area.

Refer to locality map in Figure 1-1 which further delineates between the project area and the proposed development area.



Data Disclaimer
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Paper Size ISO A4

0 30 60 90 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

Visy Glass Operations (Australia) Pty Ltd
Glass Recycling and Manufacturing Facility

Project Area

Project No. **12550313**
Revision No. **1**
Date **1/04/2022**

FIGURE 1-1

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Print date: 01 Apr 2022 - 10:09

Data source: GHD: Project Area, Proposed development area (2021); DoR: Roads, Cadastre (2021), Queensland Imagery Latest State Program Public Basemap Service: World Street Map: Esri, HERE, Garmin, NGA, USGS (2019). Created by: schen4

1.3 Purpose of this report

Under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), development involving actions that are likely to result in a significant impact on any matters of national environmental significance (MNES) must be referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for assessment and approval under the environmental assessment provisions of the EPBC Act (as per the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DotE, 2013). MNES (or controlling provisions) protected under the EPBC Act include:

– World Heritage properties
– National Heritage properties
– Wetlands of international importance (Ramsar wetlands)
– Listed threatened species and ecological communities
– Migratory species
– Commonwealth marine areas
– The Great Barrier Reef Marine Park
– Nuclear actions (including uranium mining)
– A water resource, in relation to coal seam gas development and large coal mining development.

This report has been prepared to identify and assess any potential impacts to MNES from activities association with construction and operation of the proposed development. This report specifically determines whether any activities associated with the proposed development are likely to have a significant impact on MNES.

The findings of desktop and field-based ecological assessments are presented in this report. These findings demonstrate that the development of the proposed development can avoid, minimise or mitigate impacts to MNES to an acceptable level. Where impacts are predicted on MNES, a significance of impact assessment was undertaken in accordance with the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DotE 2013).

The conservation status of the *Phascolarctos cinereus* (koala) has recently been changed from vulnerable to endangered under the EPBC Act. Consequently, the EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory (DotE, 2014) has been withdrawn. It is understood that DAWE is in the process of developing a koala policy statement and guidance document. In the interim, the significance of impact assessment for the koala has been undertaken in accordance with the Significant Impact Guidelines 1.1 and the updated koala conservation advice (dated February 2022). Ecological assessments undertaken for the proposed development identified that the MNES that required assessment in accordance with the provisions of the EPBC Act are:

– Listed threatened species and ecological communities (sections 18 and 18A).

The likelihood of occurrence assessment (Section 2.4) identified the following two mammal species as likely to occur (based on the presence of suitable habitat):

– *Phascolarctos cinereus* (koala) (Endangered)
– *Pteropus poliocephalus* (grey-headed flying-fox) (Vulnerable).

1.4 Overview of the proposed development

Visy proposes to construct three new state-of-the-art operations integrated as a single facility, being:

– recycled glass cullet plant (furnace ready recycled glass)
– container glass manufacturing facility
– finished goods warehouse and distribution centre.
– A summary of the process by which the facility operates is shown in Figure 1-2.

Visy's existing South East Queensland glass operations are located across three separate sites with recycled glass and finished goods transported by road between sites. The glass beneficiation plant at Crestmead processes

used glass from recycling streams into cullet, which are then transported to South Brisbane for manufacture into glass containers, which is then typically transported to warehousing at other locations and then distributed to customers. A single site for the three-step process will provide significant efficiencies.

The project is for a vacant greenfield site located at 222 Stapylton Jacobs Well Road, Stapylton and part of the adjoining brownfield site located at 298 Stapylton Jacobs Well Road which has existing Visy manufacturing facilities and other industrial businesses.

The proposed development is an integrated glass recycling and manufacturing facility comprising a recycled cullet plant, container glass manufacturing, and finished goods warehouse.

Glass is infinitely recyclable and can be remanufactured again and again. Visy is the largest manufacturer of glass bottles and containers in Australia-New Zealand and is closing the loop on glass with integrated services and facilities across glass recycling and manufacturing.

Each facility operation onsite will largely involve the following:

Recycling:

– Waste glass recovered from co-mingled kerbside recycling bins, including via Visy's network of Material Recovery Facilities (MRFs), or collected from source separated recycling, such as container deposit schemes and merchants, is received at the facility.
– Beneficiation of waste glass involves sizing, drying, and cleaning to remove non-glass contaminants, including lids and labels.
– Cleaned glass cullet (4-50 mm) is colour sorted into flint (clear), green and amber using optical technology and sent to outdoor storage bunkers.
– Glass glass fines (<4mm) is sent offsite to convert to end-of-life construction materials such as for use in road works.

Manufacturing:

– Cullet is conveyed to the batch house where it is mixed with sand, soda ash and limestone to create a glass batch mix.
– The batch mix is conveyed to the glass furnaces and heated to create molten glass, then flows into a refiner to cool slightly.
– Cooled molten glass moves into the feeder which shears glass 'gobs' that are dropped into a mould in the forming machine and expanded with compressed air into a glass container.
– Glass containers are annealed, via gradual cooling, and coated to ensure glass integrity.
– Every glass container undergoes automated quality assurance inspection for defects using laser, light and digital technology.
– Glass containers not meeting specification are rejected to the basement and recycled back into the process as cullet.
– New glass containers are packaged onto pallets and sent to the warehouse.

Warehousing and distribution:

– Pallets of new glass containers are stored in the fully automated warehouse, where an Automated Storage and Retrieval System (ASRS) moves pallets to the high bay racking.
– Customer orders are retrieved via the ASRS and readied for dispatch.
– Glass container orders are loaded onto trucks in the dispatch dock via roll on-roll off either automated or manual.

1. *Access:*
1Ai: Interim access for all heavy vehicles to the site and for limited light vehicles routed to the recycled glass cullet plant parking.
1Au: Ultimate access to replace interim access.
1B: Main site access for light vehicles.
1C: Emergency access point for fire brigade.

2. *Weighbridges:* All heavy vehicles transporting waste and raw materials travel over dedicated inbound and outbound weighbridges to record material weight.

3. *Waste glass storage:* Waste glass is delivered to designated receival bunkers. Front end loader transfers waste glass into hoppers which feed material at a metered rate into the beneficiation plant via a conveyor system

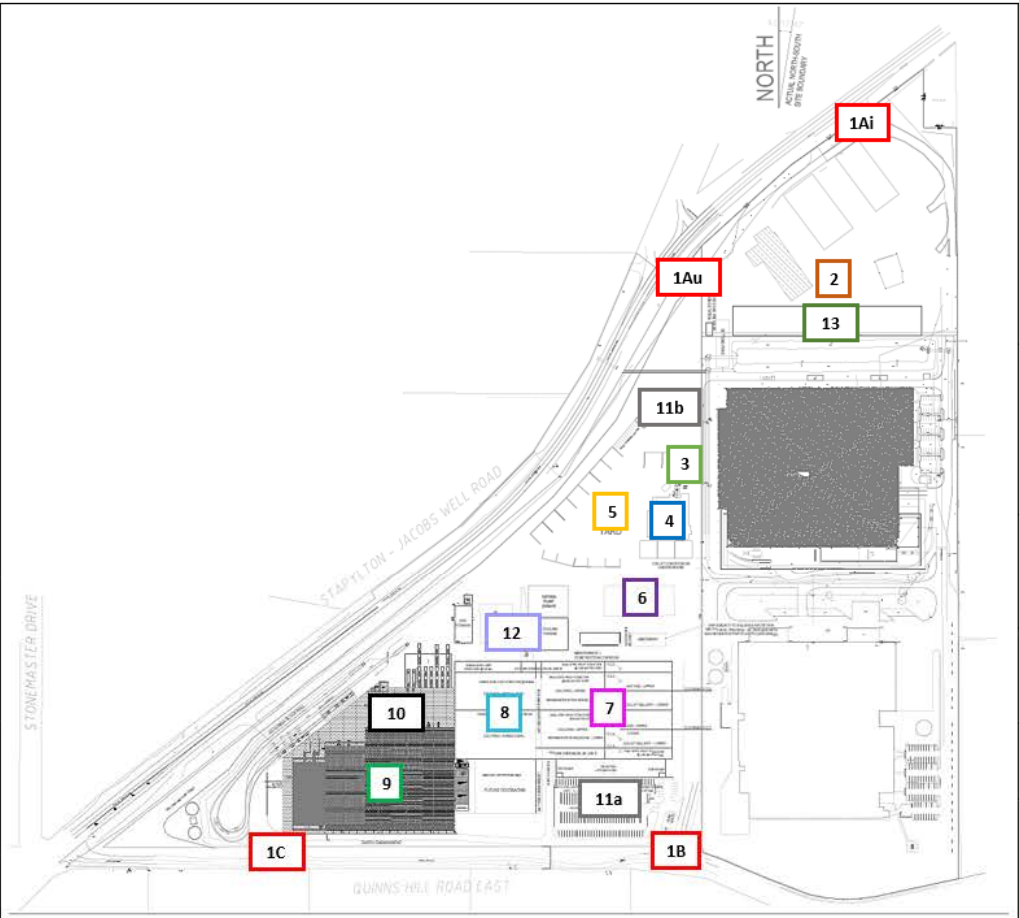
4. *Glass beneficiation (cullet) plant:*
Waste glass is sized, cleaned and colour sorted (beneficiated) to produce glass cullet (3-60mm) in flint, green, and amber and glass fines (<3mm). These glass products exit the plant into designated bunkers and are transferred by front end loader to storage bunkers in the cullet yard. Ferrous and non-ferrous metals cleaned from the glass through the process exit the plant into designated skip bins and are taken offsite for further recycling. Reject waste cleaned from the glass through the process exits the plant into a designated bunker and is transferred by front end loader to tipper trucks and is taken offsite for disposal to landfill.

5. *Outdoor Cullet Yard:* Glass cullet and glass fines are stored in a series of 3 sided bunkers with circa 5m high walls. Front end loader transfers cullet into hoppers which feed material into the batch house cullet silos or loads glass fines into bulk haul trucks for transport offsite for further processing and reuse.

6. *Storage and batch mix:* Raw materials are received into silos (ie. sand, soda ash, cullet) or stored in bulker bags (ie. carbon, iron chromite) and are discharged via metering and weigh scales into batch mix silos. A batch mix is transferred by covered conveyor to glass furnace silos.

7. *Glass Manufacturing Plant – Hot End*
The batch mixture enters a furnace and is heated to create molten glass. The molten glass flows into a refiner to cool slightly and remove air bubbles, then on to the forehearth which removes temperature variations. The molten glass moves into the feeder which shears glass 'gobs', each of which becomes a glass container.

Each glass 'gob' is dropped into a mould in the forming machine and compressed air is used to expand the gob into a glass container. The glass container then goes to the annealing section where it is heat treated and gradually cooled to strengthen the glass.



8. *Glass Manufacturing Plant – Cold End*
Cooled glass containers continue to the cold end coater where a thin coating of tin oxide is applied to ensure glass integrity.

Finally containers undergo quality assurance testing and inspection to ensure each container meets required specifications.

New glass containers are packaged onto pallets and sent to the warehouse.

Glass containers not meeting specification through the manufacturing process are rejected to the basement and are transferred back to the cullet plant waste glass receival bays.

9. *Highbay Warehouse:*
Pallets of new glass containers are stored in the finished goods warehouse.

The warehouse is fully automated, with an Automated Storage and Retrieval System (ASRS) moving pallets to and retrieving them from high bay racking.

10. *Distribution centre:*
Customer orders of glass containers are retrieved via the ASRS and made ready for dispatch in the loading area. The order is loaded onto trucks via roll on roll off (RORO) either automated or manual.

11. *Offices, amenity and car parking*
11a: Main office and amenity space and car parking for the site.
11b: Secondary office and amenity space and car parking for cullet plant employees only.

12. *Glass raw materials and fuel storage:*
Furnace fuel, raw materials, and process chemicals are stored in bunded bulk tanks or on secondary containment pallets.

13. *Stormwater treatment and attenuation*
Stormwater from the site flows into a bioswale which attenuates flow and treats water to improve quality prior to offsite discharge.

Figure 1-2 Proposed development summary

1.5 Development staging

The proposed development will involve a phased approach to constructing the facility and increasing production capacity to achieve an end state production of glass containers. The expected stages and timing of development are outlined below in Table 1-1.

The EPBC Act referral relates to Stage 1 of the process only, as Stage 1 involves the clearing of vegetation within the project area.

For Stage 1 the total disturbance area within the project area is:

– Lot 2 WD4654 =11.95 ha
– Lot 2 SP189558 = 1.012 ha

In addition to the disturbance area, an area of vegetation buffer will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve (referred to as vegetation buffer area). The vegetation buffer area has a total area of area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the project area and surrounding area.

Table 1-1 Development staging

Stage	Timing	Aspects of development
Stage 1	Late 2022	Construction of integrated glass facility to process 145,000 tonnes per year of waste container glass, manufacture 200,000 tonnes glass (960,000,000 containers) per year on 4 production lines, and warehouse 80,000 pallets of glass containers. This stage will involve the following key activities: – Erosion and sediment control, clearing and grubbing. – Bulk earthworks, excavation and filling. – Installation of infrastructure – Concreting for footings, slabs and roadways. – Construction of building packages (warehouse, production building etc.). – Process equipment installation and building fit outs. – Landscaping.
Stage 2	A 5 year timeframe is anticipated for Stage 2 (Approx. 2027)	Construction of an extension to glass manufacturing facility and warehouse to process up to 175,000 tonnes per year of waste container glass, manufacture 250,000 tonnes glass (1,200,000,000 containers) per year on 5 production lines, and warehouse 95,000 pallets of glass containers.
Stage 3	A 10+ year timeframe is anticipated for Stage 3, depending on market demand and commercial factors (Approx. 2032)	Construction of an extension to glass manufacturing facility and upgrade of glass cullet plant to process up to 240,000 tonnes per year of waste container glass, manufacture 300,000 tonnes glass (1,440,000,000 containers) per year on 6 production lines, and warehouse 96,000 pallets of glass containers.

1.6 Project rationale

1.6.1 Project Need and Objectives

As part of the Queensland State Government and the Brisbane City Council's success in securing the Olympics for Brisbane in 2032, Visy's site in South Brisbane had been identified in planning as the preferred site for an International Broadcasting Centre. Visy recognises the priority given to planning for the Olympics and engaged with the State Government and the Brisbane City Council to achieve a mutually agreed solution in acquiring Visy's site.

Visy's existing glass manufacturing facility in South East Queensland is located on the South Brisbane site. The sale of the site to the Brisbane City Council will see Visy's existing glass manufacturing facility remain on the site for at least the next 2 ½ to 3 years to enable the construction of a new facility at Stapylton. This will promote a smooth and managed transition for our customers.

The existing South Brisbane site has been a glass manufacturing operation since at least 1920 with various development and modernisation upgrades of the facility occurring over time. One of the two existing glass furnaces, which produce molten glass and are therefore fundamental to glass production, is approaching end-of-working-life and must undergo a standard glass furnace complete refurbishment in a couple of years to maintain its production capacity. A glass furnace refurbishment cost is of the order $60-70 million.

The fundamental need for the proposed modern Glass Recycling and Manufacturing Facility is therefore to relocate Visy's existing South Brisbane glass manufacturing facility, in particular, to ensure continuity of container glass supply for customers in South East Queensland. The investment will also ensure local glass manufacturing capacity can cater for sustainable growth as the Queensland market continues to expand.

Beyond this fundamental need, the proposed facility will also integrate an existing Visy glass recycling operation in Crestmead to provide strategic logistic and commercial efficiencies through the co-located operations. The proposed site is adjacent to existing Visy can manufacturing and cardboard box manufacturing facilities and will create a beverage container precinct.

The key objectives of the proposed development are to:

– Develop a state of the art glass recycling and manufacturing facility in SE Qld to improve local container glass manufacturing performance and productivity and ensure continuity of supply to Qld based beverage customers
– Integrate glass recycling and manufacturing into a single facility to provide strategic logistic, commercial and environmental efficiencies
– Invest in local glass manufacturing to facilitate a path to support and enable anticipated growth in the Queensland beverage market.
– Enable Visy to continue to Close the Loop on Glass and increase the average recycled content of container glass from the current 30% to 70%, supporting Qld's strategy to move towards a circular economy for waste[1]
– Future proof glass recycling in Qld with modern oxy fired glass furnace technology with potential to utilise hydrogen fuel and modern glass beneficiation technology to maximise cullet yield and quality with potential to increase throughput
– Realise the infinite recycling potential of glass and keep container glass circulating in Australia in line with national recycling regulations[2] which aim to reduce the impacts of waste material and build capacity to turn recyclable waste into high-value, recycled commodities.

1.6.2 Alternative Sites

Visy's existing South Brisbane glass manufacturing operation supplies Queensland's iconic beverage makers and beyond with glass containers. Due to the age and changed urban environment of the current site, the prospect of a new facility at an alternative site has been investigated for a number of years. Key criteria for the site included:

– Location in South East Queensland in proximity to major customers
– Zoning appropriate to allow the activity of high impact industry
– Purchase or ownership by Visy to support security of investment
– Sufficient size to allow integrated glass recycling and manufacturing operations
– Road network access to allow for and support up to A-double truck movements
– Location in an industrial zone where 24/7 operations can proceed whilst being responsive to sensitive receivers

Several different sites have been considered through due diligence and feasibility assessments. 222 Stapylton Jacobs Well Road, Stapylton was chosen as the preferred site due to the following key factors:

– Location supports efficient, cost effective, and reduced emissions transport for glass beverage bottles to major customers and for waste glass feedstock

[1] Waste Management and Resource Recovery Strategy, Queensland Government, June 2019.
[2] Recycling and Waste Reduction Act 2020, Australian Government.

– Zoning is currently medium impact industry which permits development for industrial activities including recycling, processing, and manufacturing with consent
– Land is owned by Visy and adjacent to existing Visy can and cardboard box manufacturing facilities enabling creation of a beverage precinct
– Available land area allows integration of glass recycling operation and warehouse and distribution centre with the glass manufacturing operation to realise a modern and efficient beverage precinct
– Future road network upgrades including Coomera Connector and Stapylton Jacobs Well Road widening and signalised intersections providing transport route options and efficiencies.

1.6.3 Alternative designs

Final detailed design of the facility is ongoing, with the proposed development currently progressed to a preliminary design to support a business case. A number of concept designs for the site have been considered through several iterations of site layout, key landform, access, and equipment options. The design responses have systematically addressed key matters and constraints of the existing site, and pre-lodgement matters of stakeholder authorities including access consistent with future intent for state-controlled and local roads and built form visual amenity from the street frontages.

Common across site layout options is the need to utilise the entirety of the available site for the proposed development and therefore remove existing vegetation from the entire site excluding the state-controlled road corridor gazetted land.

1.6.4 Do nothing option

Visy needs to relocate their South Brisbane glass manufacturing operation. The do nothing option would result in Visy not having a glass manufacturing facility in Qld.

Some portion of glass cullet could be diverted to Visy's glass manufacturing facility's interstate in NSW, Victoria and South Australia within the recycled glass capacity for each of these sites but would involve a significant impact on glass manufacturing and glass recycling in Qld. Collections of Container Refund Scheme glass, kerbside recycling glass and other glass collections. beyond the capacity of the interstate plants would not be able to be recycled within Australia and, after June 2025 following the glass export ban, would be sent to landfill for disposal.

Recent reporting identified an estimated 57% (102,035 tpa) of Qld's glass is recycled. Without a new glass manufacturing and recycling facility in south east Qld, Visy could not continue to provide its current volume of glass recycling and manufacturing services.

Some portion of glass not able to be taken to another Visy facility may be able to be absorbed by other glass manufacturers, though with Visy being the largest glass manufacturer in Australia, this would account for a small portion only. The remaining portion may be eligible to be exported overseas under licence for manufacture and reimported to Australia as glass containers. Glass not eligible for these options would be sent to landfill for disposal.

The 'do nothing option' will have a significant impact on glass recycling in Qld when the current Visy glass manufacturing facility at South Brisbane closes to make way for the Olympics and on the Qld Government's recycling targets.

1.6.5 Benefits

The proposed development location is within the Yatala-Stapylton-Beenleigh Regional Economic Cluster (REC) which the *Shaping SEQ* identifies "*represents a significant manufacturing cluster, with specialisation in priority sectors of integrated food and beverage supply chains, and transport and logistics*[3]."

The facility will provide strong employment opportunities within the Yatala and Stapylton region, contributing to the local economy with jobs focused on modern manufacturing. Employment that is consistent and reliable, given the 24/7 needs of the facility, also contribute to stability for a workforce.

[3] Shaping SEQ - South East Queensland Regional Plan 2017, Department of Infrastructure, Local Government and Planning, August 2017.

The establishment of a Glass Recycling and Manufacturing Facility will secure glass manufacture as a sustainable packaging substrate in south east Queensland for the long term. The size and scale of the proposed development is consistent with a commitment by Visy over many decades to meet beverage customer needs and growth aspirations.

The investment represents a transformation for Glass manufacturing in Queensland. By its nature it is long term, with significant benefits on a socio-economic basis for the region, whilst also contributing to Visy's commitment to continue to Close the Loop on Glass and increase the average recycled content of container glass from the current 30% to 70%. This will support Qld's strategy to move towards a circular economy for waste as outlined in the *Waste Management and Resource Recovery Strategy (Queensland Government 2019)*.

Integrating three operations onto the site represents an important logistics step change for glass container supply chain in south east Queensland by reducing the embedded number of transport legs between recycled cullet processing, glass manufacture, warehousing and distribution. This will enable Visy to reduce the impact of logistics in its glass manufacturing

1.7 Scope and limitations

This report: has been prepared by GHD for Visy Glass Operations (Australia) Pty Ltd and may only be used and relied on by Visy Glass Operations (Australia) Pty Ltd for the purpose agreed between GHD and Visy Glass Operations (Australia) Pty Ltd as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than Visy Glass Operations (Australia) Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Methodology

2.1 Approach and terminology

The ecological assessment for the proposed development included a desktop review of environmental databases and mapping layers, and a field assessment of the terrestrial flora and fauna values within the project area and surrounding area. The desktop and field methodologies are detailed separately in Sections 2.2 and 2.3 respectively.

For the purposes of this report, the following terminology is used:

– Project area refers to the land parcel at 222 Stapylton Jacobs Well Road (real property description Lot 2 WD4654)
– Proposed development area refers to the construction footprint which includes all land within the boundary of the Lot 2 WD4654 and the north section of Lot 2 SP189558.
– Study area refers to the project area plus a buffer of 2 km used to undertake desktop searches.

Refer to locality map in Figure 1-1 which further delineates between the project area and the proposed development area.

2.2 Desktop assessment

A desktop review was undertaken to identify and collate existing information on the ecological values within the study area and surrounding landscape. Desktop searches were undertaken for the study area to provide location-specific information on potential conservation significant species, threatened ecological communities (TECs) and regional ecosystems (REs). For most database sources, the desktop search extent included areas within a 2 km buffer of the project area. Databases and desktop mapping used for the desktop assessments is summarised in Table 2-1.

Table 2-1 Data sources used during desktop assessment

Desktop search	Agency	Search extent	Description
Commonwealth			
Protected Matters Search Tool (PMST)	Department of Agriculture, Water and Environment (DAWE)	-27.72469 153.2495 plus a 2 km buffer.	The PMST search was conducted to identify MNES protected under the EPBC Act that have the potential to occur within the study area.
Species Profile and Threats Database (SPRAT)	DAWE		Species profiles were assessed to determine habitat requirements and ecology of potentially occurring conservation significant species.
State			
Wildlife Online	Department of Environment and Science (DES)	-27.72469 153.2495 plus a 2 km buffer.	The Wildlife Online database was assessed to identify historical records of conservation significant species within the study area.
Vegetation Management Report	Department of Resources (DoR)	Lot 2 WD4654 and 2 SP189558	The DoR Vegetation Management Report was retrieved to identify the occurrence and distribution of remnant vegetation, regional ecosystems (REs) and protected plant trigger areas within the study area.
WildNet species search	Biomaps	-27.72469 153.2495 plus a 2 km buffer.	The WildNet online database was assessed through Biomaps to identify the location and date of historical records of conservation significant species within the study area.

Desktop search	Agency	Search extent	Description
Essential habitat mapping	DoR	Lot 2 WD4654 and 2 SP189558	The DES Essential Habitat Map spatial layer (version 9.13) was viewed to determine if vegetation within the study area has been identified as essential habitat for a conservation significant species listed under provisions of the NC Act.
Koala habitat mapping	DES	Lot 2 WD4654 and 2 SP189558	The current DES koala habitat mapping was viewed to identify the presence and distribution of core koala habitat, koala priority areas, locally refined koala habitat and koala habitat restoration areas. This mapping supports the implementation of the *South East Queensland Koala Conservation Strategy 2020–2025.*
Gold Coast City Plan Overlay maps	City of Gold Coast	Lot 2 WD4654 and 2 SP189558	The Gold Coast City Plan and Interactive Mapping was reviewed for overlay mapping of environmental significance
Queensland Wetlands Mapping	DES	Lot 2 WD4654 and 2 SP189558	The DES wetlands mapping data (version 5.0) was viewed to identify lacustrine, riverine and palustrine water bodies or REs through point features, major and minor watercourses lines, and polygons of wetland waterbodies and wetland REs.
Waterways for Waterways for Waterway Barrier Works	Department of Agriculture and Fisheries (DAF)	Lot 2 WD4654 and 2 SP189558	This mapping layer was viewed to identify waterways with a risk of impact to fish passage, which may require approvals under the *Fisheries Act 1994.*
DoR Watercourse mapping	DoR	Lot 2 WD4654 and 2 SP189558	This mapping layer was viewed to identify watercourses (including rivers, creeks, streams and drainage features) that are defined under the *Water Act 2000*, along with watercourse hierarchy, hydrological regime and names where available
Public			
Atlas of Living Australia (ALA) Database	ALA	-27.72469 153.2495 plus a 2 km buffer.	The ALA database was searched to retrieve historical records of conservation significant flora and fauna species assessed as likely to occur within the study area.

2.3 Field assessment

2.3.1 Summary of survey effort

Field ecology surveys were conducted by GHD on 31 August 2021 (fauna survey) and 2 September 2021 (flora survey). A third survey was conducted 7th March 2022. The initial field surveys were conducted by GHD ecologists over two days (31st August and 2nd September 2021) between 6:30 am and 3 pm. Fauna surveys were conducted on 31st August 2021, whilst flora surveys were conducted on 2nd September 2021. These surveys were conducted on Lot 2 WD4654. A third survey was conducted 7th March 2022 which focussed on the wetland community and the additional survey areas of Lot 2 SP189558. The wetland assessment was conducted with guidance from the Soil indicators of Queensland wetlands – Statewide assessment and methodology (Bryant *et al.,* 2008) and DES Wetland Indicator species list (DES, 2013). The survey effort is shown in Figure 2-1.

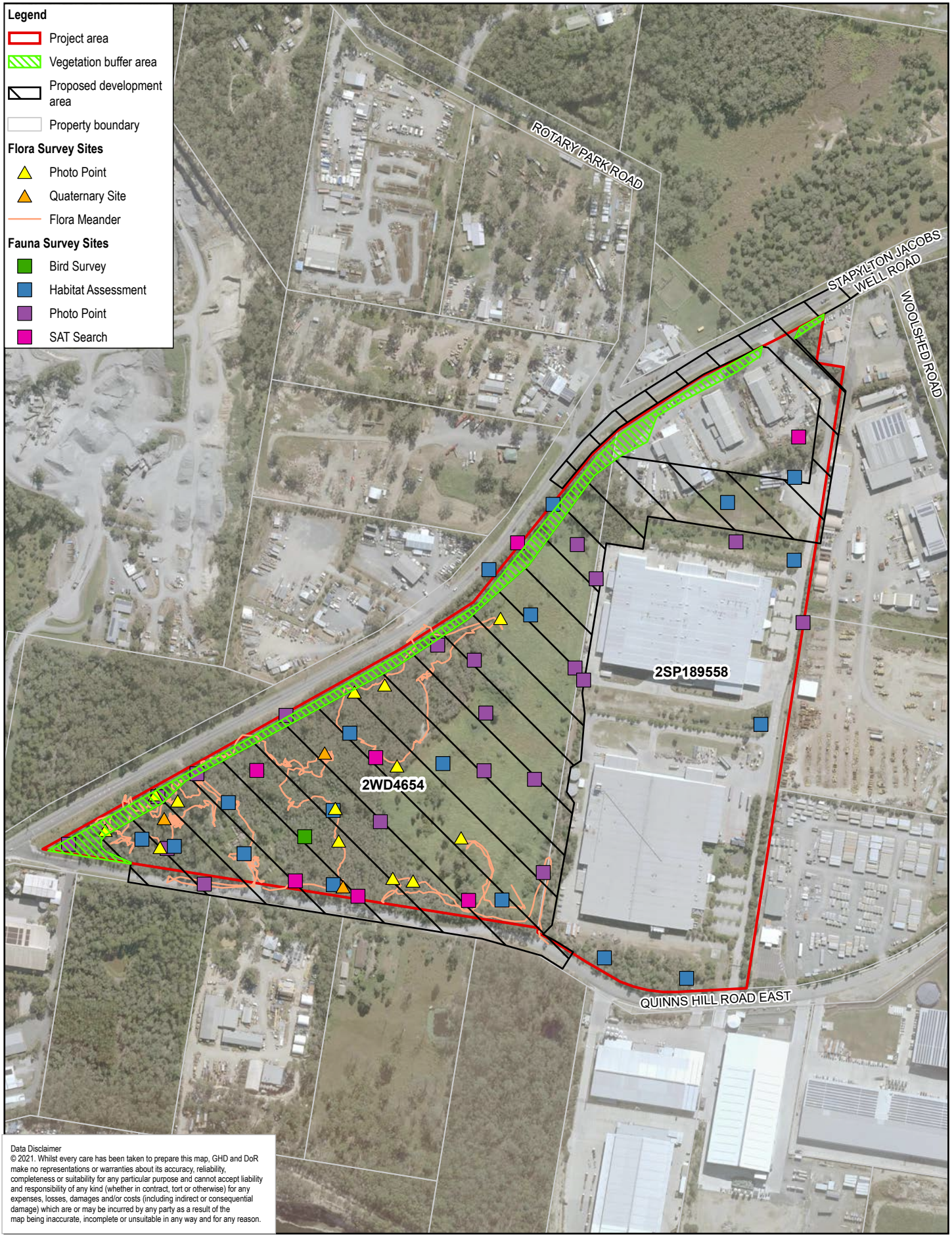
In addition to the ecological assessment completed for the project, koala habitat tree surveys were conducted by GHD ecologists over the course of 7 days (30th & 31st March and 1st, 7th, 8th, 11th & 12th April). The survey efforts is shown in Figure 2-2.

Survey methods are further described in the following sections.

2.3.2 Survey guidelines

Fauna and flora surveys were designed to meet the requirements of the following guidelines:

– Queensland Terrestrial Vertebrate Fauna Survey Guidelines, Version 3 (Eyre et al. 2018)
– Flora Survey Guidelines - Protected Plants, Version 2.0 (DES, 2020a).



Paper Size ISO A4

0 30 60 90 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Visy Glass Operations (Australia) Pty Ltd
Glass Recycling and Manufacturing Facility

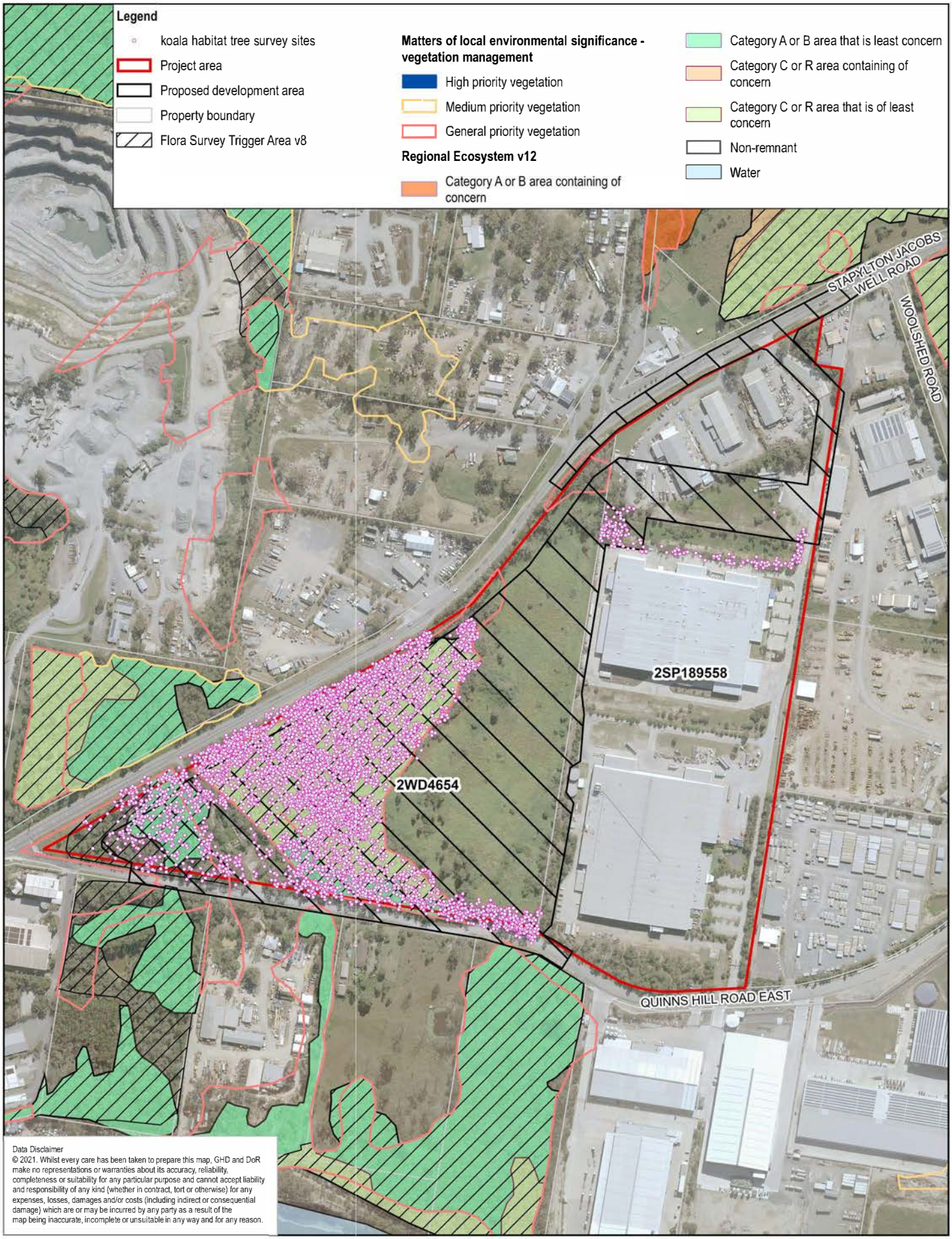
Distribution of survey sites within the Project area

Project No. **12550313**
Revision No. **1**
Date **1/04/2022**

FIGURE 2-1

\\ghdnet\ghd\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_P2_3_S1_Ecol\12550313_P2_3_S1_Ecol_Update_31032022.aprx\12550313_P2_3_S1_002_SurveySites_Rev0
Print date: 01 Apr 2022 - 10:31

Data source: GHD: Project Area, Proposed development area, Survey Sites (2021); DoR: Roads, Cadastre (2021), Queensland Imagery Latest State Program Public Basemap Service: (2019). Created by: schen4,



Paper Size ISO A4

0 30 60 90 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

Visy Glass Operations (Australia) Pty Ltd Glass Recycling and Manufacturing Facility

Koala habitat tree surveys

Project No. **12550313**
Revision No. **0**
Date **29/04/2022**

FIGURE 2-2

\\ghdnetlghd\AU\Mackay\Projects\42\12550313\GIS\Maps\Working\12550313_Ecology\Ecology_Apr2022.aprx\12550313_010_FloraValues_Desktop_Rev0
Print date: 29 Apr 2022 - 20:36

Data source: GHD: Project Area, Proposed development area, Ecology field samples (2021); CoGC: MLES Vegetation Management (2021); DES: Flora Survey Trigger Area v8 (2021); DoR: Roads, Cadastre, Regional Ecosystems v12 (2021), Queensland Imagery Latest State Program Public Basemap Service: (2019). Created by: jcmatic

2.3.3 Description of terrestrial flora survey methods

Flora surveys involved a combination of vegetation community assessments and targeted surveys for conservation significant flora species. Terrestrial flora surveys were undertaken at 16 sites within the project area. At these sites, one or more of the following survey methods were applied.

2.3.3.1 Regional Ecosystem verification

Verification of mapped RE communities was undertaken using quaternary level assessments in accordance with the methods detailed in Neldner et al. (2020). Three quaternary sites were assessed within the project area. Data collected included dominant species, and structural estimation of height and cover of the ecologically dominant layer. Information on geology and landscape attributes was also collected. The characteristics of each assessed vegetation community type were compared to descriptions provided by the Regional Ecosystem Description Database (REDD) (Version 12) (Queensland Herbarium, 2021) to assign an RE identity.

2.3.3.2 Protected plant surveys

The flora survey trigger map identifies high-risk areas for threatened or near threatened plants under the Queensland *Nature Conservation Act 1992*. Targeted searches for conservation significant flora species were undertaken in high risk trigger mapping areas, adjacent buffers and additional areas where suitable habitat for a conservation significant flora species was identified. Species identified as being most likely to be recorded included *Macadamia integrifolia* and *Cupaniopsis newmanii*.

Protected plant surveys were conducted in accordance with the Flora Survey Guidelines - Protected Plants, Version 2.0 (DES, 2020a).

2.3.3.3 Recording of invasive species

Prohibited or restricted invasive species as defined under the *Biosecurity Act 2014* and listed as Weeds of National Significance were recorded and characteristics of the species' occurrence were documented. Invasive and pest flora species, including local environmental weeds, were noted during Quaternary level assessments (described above) and opportunistically during meandering field surveys. These included areas accessible at the time of the survey events that were targeted due to proposed disturbance footprints, environmental sensitivities and access requirements.

2.3.4 Description of terrestrial fauna surveys

Fauna surveys undertaken in 2021 involved a suite of habitat assessments and targeted searches for conservation significant species. Terrestrial fauna surveys were undertaken at 17 sites within the project area, as shown in Figure 2-1. Sites were selected in accessible locations in representative vegetation communities and habitat types within a spread of geographic locations across the project area. This allowed a representative assessment of fauna species present and maximised the chances of detecting conservation significant species. At each survey site, a combination of the survey techniques described below were employed.

2.3.4.1 Habitat assessment surveys

Habitat assessments were undertaken at 18 sites to assess the value of habitat for terrestrial fauna. This was based on the presence of key resources and habitat features including:

- Structural complexity of vegetation at canopy, shrub and ground layers
- Substrate type and the structural complexity of ground level microhabitats
- Presence of refuges and resources including fallen timber, leaf litter, hollow-bearing trees and stags, rocks/boulder piles and outcrops, caves and overhangs, nests, termite mounds and waterbodies.
- Habitat condition based on existing land use and associated disturbance due to vegetation clearing, fragmentation, grazing, fire, weed and pest infestation.
- Presence of key resources for targeted conservation significant species.

2.3.4.2 Active searches for reptiles and frogs

At each of the fauna survey sites, a 20-minute active search was undertaken to detect reptile and amphibian species by actively searching beneath rocks, logs, bark, leaf litter and other microhabitats.

2.3.4.3 Bird census surveys

At each fauna survey site, area-based bird surveys were undertaken in accordance with the Birds Australia census technique developed by Loyn (1986). This technique involves recording all birds seen or heard within a 20-minute period. This survey technique targeted a number of conservation significant bird species that have the potential to occur with the project area.

2.3.4.4 Opportunistic searches for wildlife and traces

All incidental observations of fauna during surveys were recorded. All secondary fauna traces were recorded including bones, feathers, skulls, sloughed skins, faecal pellets, tracks, burrows and scratches.

2.3.4.5 Spot Assessment Technique

Searches for koala faecal pellets were undertaken at 12 sites using the Spot Assessment Technique (Phillips and Callaghan, 2011).

2.3.4.6 Deployment of remote surveillance cameras

Remote surveillance cameras were deployed at four representative locations within the project area, as presented in Figure 2-1. Cameras were deployed in four locations to target conservation significant species, nocturnal or cryptic fauna species. Each camera was left in situ for three nights.

2.3.4.7 Microbat utilisation surveys

One anabat was set to record the echolocations of microbat species (Figure 2-1). The anabat detector was left in situ for three nights in an area of optimal habitat, with a local abundance of roosting sites (dead stags). The anabat results were analysed by specialist subconsultant Greg Ford.

2.3.4.8 Koala habitat tree surveys

An ecologist and botanist undertook koala habitat tree surveys on Lot 2 on WD4654 across the entire site and the vegetation surrounding the dam on Lot 2 on SP189558. The koala habitat tree surveys targeted all species within the genera of Corymbia, Eucalyptus, Angophora, Melaleuca and Lophostemon within the mapped koala habitat area. The koala habitat tree surveys methodically traversed the entirety of the project area; as illustrated Figure 2-2. During the survey, the ecologist and botanist used spray paint to mark the koala habitat trees. Tree height was estimated using a Nikon Forestry Pro II Rangefinder. Diameter at breast height (DBH) was measured using a diameter measuring tape. Marking paint was applied to surveyed trees to ensure survey accuracy.

The information collected from the tree survey was required by the Queensland Department of Environment and Science (DES) in the pre-lodgement correspondence Ref: 2202-27308 SPL dated 18 March 2022.

All individuals within the genera of significance (Corymbia, Eucalyptus, Angophora, Melaleuca and Lophostemon) were allocated a unique tree designation and marked with GPS coordinates using portable GPS devices. For each individual tree, the following data was documented:

– Tree species (identified in the field or via samples collected for later identification)
– Tree height (m)
– Diameter Breast Height (DBH) (cm)
– Special features (if relevant) (nests, scratches, termitaria, etc.)

Findings from the koala habitat tree surveys have been captured in the Koala habitat values assessment – Tree Survey Plan for the Glass Manufacturing and Recycling Facility 222 & 298 Stapylton Jacobs Wells Road, Stapylton (GHD 2022) and they have been used to inform this report.

2.3.5 Description of wetland surveys

A wetland assessment of mapped wetlands over the project area was undertaken using the criteria in the Queensland wetland definition and delineation guidelines 2011. The intent of the assessment was to verify the presence of the wetland in the project area.

2.3.6 Description of water feature survey

A waterway assessment of existing drainage features was undertaken at the project area. The following information was collected:

– Waterway characteristics (including existing disturbances, existing infrastructure in the waterway, water flow, surrounding land uses)
– Upstream waterway characteristics
– Downstream waterway characteristics
– Conditions of the bed and banks of the waterway
– Riparian and aquatic habitats.

2.3.7 Animal ethics and legislative permits

GHD field surveys were conducted in accordance with the following permits and approvals:

– Department of Employment, Economic Development and Innovation Scientific Users Registration Certificate (Registration Number 132)
– DES Scientific Purposes Permit (permit number WISP15723315)
– Animal Researcher Authority issued by the accredited GHD Animal Ethics Committee
– Australian Code of Practice for the Care and Use of Animals for Scientific Purposes.

In accordance with Part 13 of the EPBC Act, no killing, injuring, taking, trading, keeping or moving of a member of the following occurred as a part of the survey efforts:

– Listed threatened species or ecological community (refer to sections 196 and 196A-196E of the EPBC Act).
– Listed migratory species (sections 211, 211A-211E).

2.4 Likelihood of occurrence assessment and significance of impact assessment

An assessment was conducted to attribute a 'likelihood of occurrence' to conservation significant species (i.e. species listed under the EPBC Act) that have been previously recorded or are predicted to occur within the desktop search extent. The likelihood of occurrence assessment was based on a review of species distributions and habitat requirements, historical records for the region, and the results of habitat assessments and information recorded during field surveys. The likelihood of occurrence ranking was based on the framework outlined in Table 2-2.

The results of the likelihood of occurrence assessment are presented in Appendix B.

Table 2-2 Likelihood of occurrence assessment criteria

Survey technique	Detailed survey methodology
Confirmed present	Species recorded during field surveys in the project area.
Likely to occur	Species has been recorded in the study area and suitable habitat is present in the project area (species determined to be 'likely to occur' are otherwise known to occur within the study area or surrounding landscape.
May occur	Species has not been recorded in the study area although species' distribution incorporates the study area and potentially suitable habitat occurs in the project area (but may not be particularly abundant or optimal habitat).
Unlikely to occur	Species has not been recorded in the study area and/or current known distribution does not encompass the proposed development study area and/or suitable habitat is generally lacking from the proposed development study area.

3. Existing environment

3.1 Threatened ecological communities

Three Threatened Ecological Communities (TECs) are predicted to occur within the study area. These being:

– Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and southeast Queensland ecological community
– Lowland rainforest of Subtropical Australia
– Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland.

The listing advice for the *Lowland Rainforest of Subtropical Australia* (TSSC, 2011), the Conservation Advice for the Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland and the approved conservation advice (incorporating listing advice) for the *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and Southeast Queensland ecological community* (DoEE, 2018) provides a list of corresponding REs for the TECs.

No regional ecosystems mapped within the project area correspond to the lists provided in the TEC listing advice.

No EPBC Act listed TECs were observed in the project area during surveys.

3.2 Aquatic values

3.2.1 MNES Wetlands

No Ramsar wetland of international importance, Directory of Important Wetlands in Australia (DIWA) or Matter of State Environmental Significance (MSES) wetlands / wetland values occur within the project area. The Moreton Bay Ramsar wetland is located 7.5 km east, or approximately 20 km downstream, from the project area. This area is protected under the EPBC Act. Moreton Bay is also a Marine Park protected under the Queensland *Marine Parks Act 2004*.

The nearest wetland to the proposed development is a MSES wetland of high ecological significant which occurs along the eastern bank of the Albert River, approximately 1.2 km west of the proposed development. This wetland is hydrologically connected by the unnamed drainage line which originates in the southwestern corner of the project area.

Additionally, two lacustrine wetlands are mapped 300 m northwest and 500 m southwest of the project area, whilst a palustrine wetland is mapped approximately 450 m east of the project area. Neither wetland is hydrologically connected to the project area, however the wetland to northwest converges with a drainage 1 km southeast of the proposed development. The drainage line originates in the southwestern corner of the project area. One lacustrine wetland is also mapped approximately 350 m south of the project area; however this mapped area relates to a constructed dam. These wetlands are not listed as MNES or MSES but are mapped under the Queensland Wetlands mapping layer (DES, 2019).

3.2.2 Waterways and watercourses

No major watercourses occur within the project area, with the nearest major watercourse being the Albert River which is situated 1.2 km west. No Queensland waterways for waterway barrier works are mapped over the project area.

There is one unnamed non-perennial drainage line extends across the southwestern corner of the project area, which has been previously subjected to filling (refer to Figure 3-1). According to the Queensland Department of Regional Development, Manufacturing and Water, it is an unmapped feature that is not defined as a watercourse under the Water Act 2000. This drainage line flows south / southwest before joining the Albert River approximately 2 km downstream. This is also mapped as a Vegetation Management Watercourse/Drainage line on the MSES mapping. Pre-lodgement advice received from the Department of Regional Development, Manufacturing and Water on 18.3.22 has determined that the unmapped feature is a drain under the Queensland *Water Act 2000.*

There are also a number of waterbodies within 300 m of the project area with the closest waterbody located approximately 100 m south. This waterbody connects to the non-perennial waterway which traverses the project area and is considered to be down-gradient due to the general downward slope of the land and its connection to Albert River downstream. Existing overland flow indicates that overflow is naturally directed into local watercourses and waterbodies and likely to be diverted south beneath Quinns Hill Road East, or east beneath the main site road.

An additional drainage line is present along the north-eastern corner of Lot 2 WD4654. This constructed drainage channel diverts water east and across Lot 2 SP189558 towards the Woolshed Parklands. A bioswale located to the north of the beverage can manufacturing facility within Lot 2 SP189558 also diverts water south across Lot 2 SP189558 towards the Woolshed Parklands.

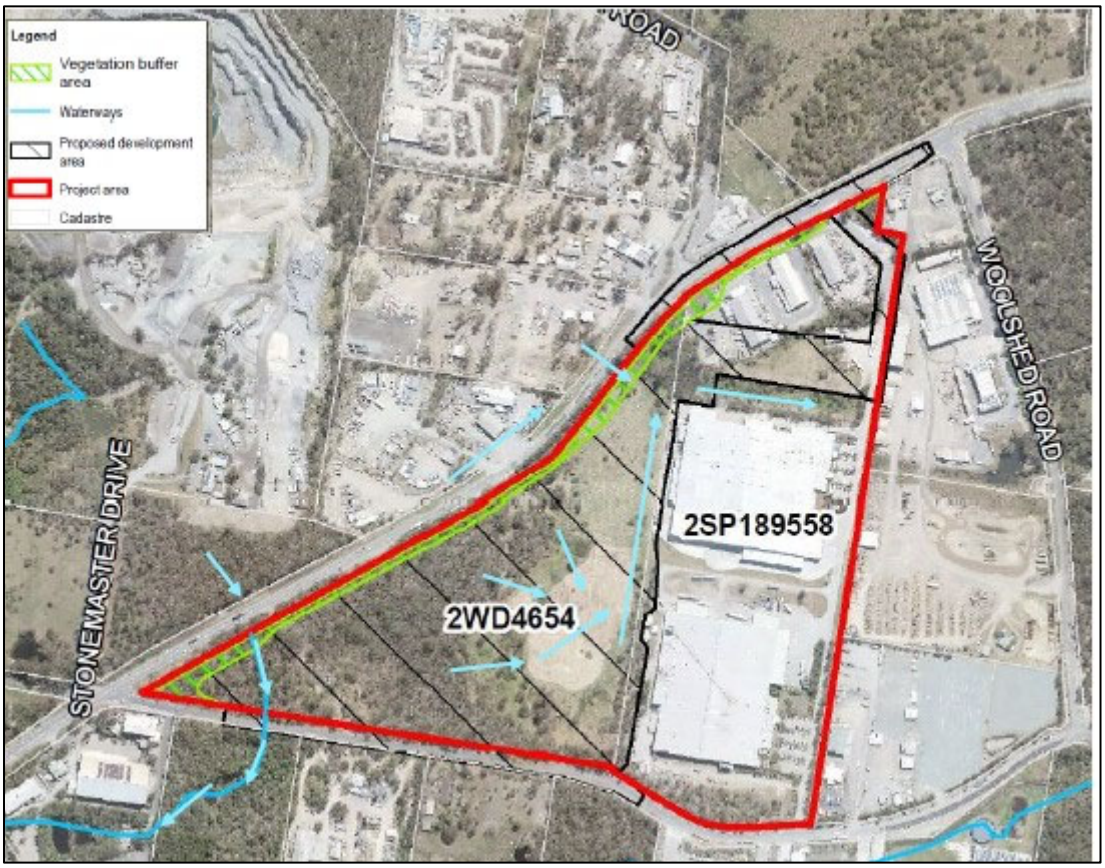


Figure 3-1 The general drainage direction

3.2.3 Flood assessment

A flood assessment has been completed by GHD for the project area to understand the flood impacts to the site and development and understand the changes to flood volumes across the wider catchment in the pre- and post-development scenarios. It was found that:

– Regional flood assessment: Referable dam and Probable Maximum Flood event does encroach on the eastern boundary of the project area. However, these studies are unlikely to have been completed at a high enough resolution to accurately represent the flood risk. these events are typically significantly larger and rarer than the 1 % AEP events.
– Local flood assessment: For the 1% AEP critical event, the proposed development will not cause significant impact on flooding to the surrounding areas of the project site.

The project area is located near the floodplain of the Albert and Logan Rivers, which are significant waterways in the vicinity. The Albert and Logan River flood extents from the 2017 rainfall event did not reach the project area (Queensland Globe). This event is the highest flood event in the catchment in recent memory, well above the major flood level at Waterford and Maclean Bridge gauges along the Logan River.

3.3 Conservation significant flora

Protected plants trigger areas identify high-risk areas where State-listed endangered, vulnerable or near threatened native plants are present or are likely to be present. Within the centre and western extent of the project area, protected plants trigger areas are mapped across the majority of the remnant and regrowth vegetation. This covers approximately 50% of the project area, excluding only areas of open grasslands and previously cleared areas.

The PMST search identified the potential presence of 20 conservation significant flora species within 2 km of the project area, based on bioclimatic modelling, knowledge of species' distributions and habitat preferences (Table 3-1 and Appendix A). Of these, none have been historically recorded within the project area (Biomaps, 2021: DES, 2021).

One MNES species, Queensland nut (*Macadamia integrifolia*) has been recorded within the study area (based on a search of the Wildlife Online database with a 2 km buffer). This species has been historically recorded approximately 980 m northwest of the project area's closest boundary.

Table 3-1 Conservation significant flora potentially occurring within the project area

Species name	Common name	Conservation status		Source
		EPBC Act	NC Act	
Acronychia littoralis	Scented Acronychia	E	E	PMST
Arthraxon hispidus	Hairy-joint grass	V	V	PMST
Baloghia marmorata	Marbled balogia	V	V	PMST
Corchorus cunninghamii	Native jute	E	E	PMST
Cryptocarya foetida	Stinking cryptocarya	V	V	PMST
Cryptostylis hunteriana	Leafless tongue-orchid	V	LC	PMST
Cupaniopsis shirleyana	Wedge-leaf tuckeroo	V	V	PMST
Endiandra floydii	Floyd's walnut	E	E	PMST
Gossia gonoclada	Angle-stemmed myrtle	E	E	PMST
Lepidium peregrinum	Wandering pepper-cress	E	NL	PMST
Macadamia integrifolia	Macadamia nut	V	V	PMST, WO
Macadamia tetraphylla	Rough-shelled bush nut	V	V	PMST
Persicaria elatior	Tall knotweed	V	V	PMST
Phaius australis	Lesser swamp-orchid	E	E	PMST
Planchonella eerwah	Shiny-leaved condoo	E	E	PMST
Rhodamnia rubescens	Scrub turpentine	C.E	C.R	PMST
Rhodomyrtus psidioides	Native guava	C.E	C.R	PMST
Samadera bidwillii	Quassia	V	V	PMST
Thesium austral	Toadflax	V	V	PMST
Tylophora woollsii	-	E	E	PMST

Key to table: C.E/C.R – Critically Endangered, E – Endangered, V – Vulnerable, Mig – Migratory, NT – Near threatened, SL – Special least concern, NL – Not Listed, WO – Wildlife Online

A meandering flora survey method was undertaken in accordance with the Flora Survey Guidelines - Protected Plants (DES, 2020a), encompassing the mapped high risk trigger areas and 100 m buffer areas that occurred within and adjacent to the project area. The flora survey covered all the habitat types present within the clearing extent and clearing impact area.

No conservation significant flora species listed under the EPBC Act or NC Act were observed within the project area during the protected plant flora surveys.

No conservation significant flora species are considered likely to occur within the project area, based on the habitat preferences of conservation significant flora that have potential to occur within the 2 km search area. There are five conservation significant flora species that may occur within the project area, based on previous records within the desktop search area. However, with no suitable habitat present, or without previous records but with marginal habitat present within the project area, the conservation significant flora species are unlikely to be present within the project area.

3.4 Conservation significant fauna

The PMST search identified 33 conservation significant fauna species that have the potential to occur in the location of the project area based on bioclimatic modelling, knowledge of species' distributions and habitat preferences (Table 3-2 and Appendix A). This included:

– 16 birds
– 8 mammals
– 2 reptiles
– 1 amphibian, and
– 2 insects

Of these, three species have been historically recorded within the study area, with historical records of the swift parrot (*Lathamus discolor*) (dated 1923) and koala (*Phascolarctos cinereus*) (dated 1990 and 2004) occurring 1.2 km northwest and 1.5 km northeast of the proposed development respectively (DES, 2021; Biomaps, 2021). Despite the presence of a historical record of the white-throated needletail in the Wildlife Online database, the location of the record is not shown in the DES Biomaps or Species Profile Search.

No conservation significant fauna have been historically recorded within the project area.

Table 3-2 Conservation significant fauna potentially occurring within the project area

Species name	Common name	Conservation status		Source
		EPBC Act	NC Act	
Birds				
Anthochaera phrygia	Regent honeyeater	CE	E	PMST
Botaurus poiciloptilus	Australasian bittern	E	E	PMST
Calidris canutus	Red knot	E	E	PMST
Calidris ferruginea	Curlew sandpiper	CE	E	PMST
Cyclopsitta diophthalma coxeni	Coxen's Fig-Parrot	E	E	PMST
Erythrotriorchis radiatus	Red goshawk	V	E	PMST
Falco hypoleucos	Grey falcon	V	V	PMST
Geophaps scripta scripta	Squatter pigeon (southern)	V	V	PMST
Grantiella picta	Painted honeyeater	V	V	PMST
Hirundapus caudacutus	White-throated needletail	V, Mig	V	PMST; WO
Lathamus discolor	Swift parrot	C.E	E	WO
Limosa lapponica baueri	Western-Alaskan bar-tailed godwit	V	V	PMST
Numenius madagascariensis	Eastern curlew	CE	E	PMST
Pachyptila turtur subantarctica	Fairy prion (southern)	V	NL	PMST
Rostratula australis	Australian painted snipe	E	E	PMST

Species name	Common name	Conservation status		Source
		EPBC Act	NC Act	
Sternula nereis nereis	Australian fairy tern	V	E	PMST
Turnix melanogaster	Black-breasted button quail	V	V	PMST
Mammals				
Chalinolobus dwyeri	Large-eared pied bat	V	V	PMST
Dasyurus maculatus maculatus	Spot-tailed quoll	E	LC	PMST
Marcoderma gigas	Ghost bat	V	E	PMST
Petaurus australis australis	Yellow-bellied glider	V	V	PMST
Petauroides volans	Greater glider	V	V	PMST
Phascolarctos cinereus	Koala	V	V	PMST; WO
Potorous tridactylus tridactylus	Long-nosed potoroo	V	V	PMST
Pseudomys novaehollandiae	New Holland mouse	V	V	PMST
Pteropus poliocephalus	Grey-headed flying fox	V	LC	PMST
Xeromys myoides	Water mouse	V	V	PMST
Reptiles				
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	V	NL	PMST
Delma torquata	Collared delma	V	V	PMST
Amphibians				
Mixophyes fleayi	Fleay's frog	E	E	PMST
Insects				
Argynnis hyperbius inconstans	Australian fritillary	C.E	E	PMST
Phyllodes imperialis smithersi	Pink underwing moth	E	NL	PMST
Fish				
Maccullochella mariensis	Mary River cod	E	E	PMST
Key to table: E – Endangered, V – Vulnerable, Mig – Migratory, NT – Near threatened, SL – Special least concern, NL – Not Listed, WO – Wildlife Online				

The PMST search identified 17 migratory species that are predicted to occur within the project area based on bioclimatic modelling, knowledge of species' distributions and habitat preferences (Table 3-3 and Appendix A). Of these, five species have been previously recorded within the study area (DES, 2021a; Biomaps, 2021).

No migratory species have been historically recorded within the project area.

Table 3-3 Migratory species potentially occurring within the project area

Species name	Common name	Conservation status		Source
		EPBC Act	NC Act	
Migratory marine species				
Apus pacificus	Fork-tailed swift	Mig	SL	PMST
Migratory terrestrial species				
Cuculus optatus	Oriental cuckoo	Mig	SL	PMST
Hirundapus caudacutus	White-throated needletail	V, Mig	V	PMST; WO
Monarcha melanopsis	Black-faced monarch	Mig	SL	PMST
Symposiachrus trivirgatus	Spectacled monarch	Mig	SL	PMST

Species name	Common name	Conservation status		Source
		EPBC Act	NC Act	
Myiagra cyanoleuca	Satin flycatcher	Mig	SL	PMST
Rhipidura rufifrons	Rufous fantail	Mig	SL	PMST; WO
Migratory wetland species				
Actitis hypoleucos	Common sandpiper	Mig	SL	PMST
Calidris acuminata	Sharp-tailed sandpiper	Mig	SL	PMST
Calidris canutus	Red knot	E, Mig	E	PMST
Calidris ferruginea	Curlew sandpiper	C.E, Mig	CE	PMST
Calidris melanotos	Pectoral sandpiper	Mig	SL	PMST
Gallinago hardwickii	Latham's snipe	Mig	SL	PMST
Limosa lapponica	Bar- tailed Godwit	Mig	V	PMST
Numenius madagascariensis	Eastern curlew	C.E, Mig	E	PMST
Pandion haliaetus	Eastern osprey	Mig	SL	PMST; WO
Tringa nebularia	Common greenshank	Mig	SL	PMST
Key to table: E – Endangered, V – Vulnerable, Mig – Migratory, NT – Near threatened, SL – Special least concern, NL – Not Listed, WO – Wildlife Online				

No conservation significant fauna were recorded during the field surveys.

However, two conservation significant species, the koala and grey-headed flying-fox, were assessed as likely to occur based on the proximity to historical records and the presence of suitable habitat on the project area and within with the surrounding landscape (refer to Appendix B).

4. Matters of National Environmental Significance Impact Assessments

4.1 Ramsar Wetlands

No Ramsar wetland of international importance, Directory of Important Wetlands in Australia (DIWA) or Matter of State Environmental Significance (MSES) wetlands / wetland values occur within or are adjacent to the project area. The Moreton Bay Ramsar wetland is located 7.5 km east, or approximately 20 km downstream, from the project area. The proposed development is not considered to have direct and/or indirect impacts to Ramsar wetlands for the following reasons:

– The proposed development will not result in wetlands of international importance being destroyed or substantially modified. No Ramsar wetland of international importance, DIWA or Matter of State Environmental Significance (MSES) wetlands / wetland values occur within the project area. The Moreton Bay Ramsar wetland is located 7.5 km east, or approximately 20 km downstream, from the project area. The nearest wetland to the proposed development is a MSES wetland of high ecological significant which occurs along the eastern bank of the Albert River, approximately 1.2 km west of the proposed development. The mapped locally significant wetland in the eastern portion of the project area consists mainly of weedy grasses and shrubs with scattered trees, with only a small area of inundated swamp in the south-western edge. The locally significant wetland will be impacted by the proposed development and to address this impact a expanded bioretention basin is proposed within the project area and will be landscaped with native wetland vegetation.
– The proposed development is not considered to result in a substantial and measurable change in the hydrological regime of the wetland as the Moreton Bay Ramsar wetland is located 7.5 km east, or approximately 20 km downstream, from the project area. The nearest wetland to the proposed development is a MSES wetland of high ecological significant which occurs along the eastern bank of the Albert River, approximately 1.2 km west of the proposed development. A stormwater management plan and erosion and sediment control plan have been development and will be implemented during the relevant phases of the project.
– The proposed development is not considered to result in adverse impacts to the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland. As the Moreton Bay Ramsar wetland is located 7.5 km east, or approximately 20 km downstream, from the project area. The nearest wetland to the proposed development is a MSES wetland of high ecological significant which occurs along the eastern bank of the Albert River, approximately 1.2 km west of the proposed development. A stormwater management plan and erosion and sediment control plan have been development and will be implemented during the relevant phases of the project. Visy will also implement a Flora and Fauna Management Plan during the construction phase which will include:
    - Details relevant to the general management of flora and fauna
    - Protocols to limit injury and mortality to fauna
    - A wildlife incident response procedure
    - Contact details for local wildlife carers and veterinary practices
    - Protocols for management of risks associated with open excavations and trenching.
– The proposed development is not considered to result in a substantial and measurable change in the water quality of the wetland, a stormwater management plan and erosion and sediment control plan have been development and will be implemented during the relevant phases of the project.
– The proposed development is not considered to result an invasive species that is harmful to the ecological character of the wetland being established in the wetland. Pest and weed management measures will be captured in the construction environmental management plan that will be implemented during construction.

4.2 Migratory species

The PMST search identified 17 migratory species that are predicted to occur within the project area based on bioclimatic modelling, knowledge of species' distributions and habitat preferences. Of these, five species have been previously recorded within the study area (DES, 2021a; Biomaps, 2021). However, no migratory species have been historically recorded within the project area. A likelihood of occurrence assessment was undertaken for migratory species and was based on a review of species distributions and habitat requirements, historical records for the region, and the results of habitat assessments and information recorded during field surveys and details. The proposed development is not considered to have a direct or indirect impact on migratory species for the following reasons:

– The proposed development will result in the clearing of vegetation, however it is not considered to be optimal habitat for the five species have been previously recorded within the study area. Due to the low current utilisation of the project area by the species, the lack of suitable habitat within the project area, and suitable foraging habitat is more widely distributed within the wider surrounding landscape, the project is unlikely to have any significant impact to migratory species. To address the loss of vegetation within the project area, an area of vegetation will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve and vegetation within this area will be retained. The vegetation buffer area has a total area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the area. Visy will also implement a Flora and Fauna Management Plan during the construction phase which will include:
    - Details relevant to the general management of flora and fauna
    - Protocols to limit injury and mortality to fauna
    - A wildlife incident response procedure
    - Contact details for local wildlife carers and veterinary practices
    - Protocols for management of risks associated with open excavations and trenching.
– While activities during construction have the potential to facilitate establishment of invasive species, management measures will be implemented to mitigate the risk of invasive species introduction and/or spread of invasive species and this will be addressed by a construction environmental management plan.
– The proposed development is not considered to disrupt the lifecycle of the migratory species. Of the 5 migratory species that may occur the project area there is sub-optimal habitat within the project area and the species are not considered to use the project area to forage or nest. Furthermore, any disturbance during construction will be highly localised and therefore unlikely to impact an ecologically significant proportion of the migratory species population. An area of vegetation will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve and vegetation within this area will be retained. The vegetation buffer area has a total area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the area. Visy will also implement a Flora and Fauna Management Plan during the construction phase which will include:
    - Details relevant to the general management of flora and fauna
    - Protocols to limit injury and mortality to fauna
    - A wildlife incident response procedure
    - Contact details for local wildlife carers and veterinary practices
    - Protocols for management of risks associated with open excavations and trenching.

4.3 Koala

4.3.1 Conservation status and documentation

The conservation status of the koala in Queensland, New South Wales and the Australian Capital Territory was changed from vulnerable to endangered under the EPBC Act in February 2022. As per guidelines and publicly available information on the koala up listing, GHD undertook an impact assessment on the koala utilising the Significant Impact Assessment Guidelines and an assessment against the Draft National Recovery Plan for the Koala.

In Queensland, the koala is widely distributed along the east coast, from Cairns in the north, to the Queensland border in the south (DAWE, 2021). Throughout its distribution, the koala occurs within dry eucalypt woodlands and open forests (Melzer et al., 2018; DAWE, 2021). The koala is regarded as a specialist feeder, feeding exclusively on the leaves of various *Eucalyptus, Corymbia, Lophostemon, Angophora* and *Melaleuca* species (Martin and Handasyde, 1999). Under the Commonwealth Guidelines, koala habitat is defined as 'any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees' (DotE, 2014). This is inclusive of both remnant and non- remnant vegetation throughout natural, agricultural, urban and peri-urban environments, and regardless of whether the species is recorded to be present (DotE, 2014). The species' food tree preference is known to vary with locality, with koalas exhibiting foraging preference towards the tree species and individuals with the highest nutritional content. On average, the species consumes 500 g of leaves per day and can obtain approximately 50 percent of their water requirements from their food. Therefore, areas with high moisture availability (i.e. riparian woodlands) provide optimal habitat for the species, particularly in arid regions. Key threats include habitat loss and fragmentation, dog attacks, vehicle strikes, disease and drought (DAWE, 2021).

4.3.2 Survey effort

A summary of ecological survey effort is provided in Section 2.3.4 and shown in Figure 2-1 and Figure 2-2.

Targeted surveys for the koala were based on:

– Targeted searches for faecal pellets using the Spot Assessment Technique (Phillips and Callaghan 2011). This was undertaken at 12 sites within the project area.
– Assessment of koala habitat value undertaken at 18 sites.
– Koala habitat tree surveys targeted all species within the genera of Corymbia, Eucalyptus, Angophora, Melaleuca and Lophostemon within the mapped koala habitat area within the project area.

4.3.3 Criteria used to map koala habitat

4.3.3.1 Commonwealth habitat definition

National Recovery Plan for the vulnerable koala

In assessing koala habitat values for the proposed development, consideration has been given to the description of koala habitat currently presented within the Draft National Recovery Plan for the Koala (DAWE 2021a), which was released for public comment in June 2021 and may therefore be subject to change.

The definition of koala habitat presented in the Recovery Plan for the vulnerable koala (DAWE 2021a) includes: '*Forests or woodlands; roadside and railway vegetation and paddock trees; safe intervening ground matrix for travelling between trees and patches to forage and shelter and reproduce; and access to vegetated corridors or paddock trees to facilitate movement between patches'*.

While precise requirements vary regionally, koala habitat can be considered in terms of the following resource requirements:

– The selection by koalas of individual trees for food and shelter and other resources within their home range
– Patch size, form and context of home ranges within the landscape
– At larger scales, the regional landscape in which a metapopulation exists
– The geographic range of the koala.

4.3.3.2 Conservation Advice for Koala

Prior to conducting the significant impact assessment, an assessment to identify whether the project area represented 'habitat critical to the survival of the species' was conducted using the criteria outlined in the species' Conservation Advice (DAWE, 2022b).

4.3.3.3 Essential habitat definition

Essential habitat is defined by the VM Act as areas of habitat for conservation significant species (protected wildlife) prescribed under the NC Act. Essential habitat means an area of vegetation shown on the Regulated Vegetation Management Map that contains either:

– three or more essential habitat factors for a species, or
– a conservation significant species at any stage of its life cycle.

Essential habitat for the koala is broadly mapped across the middle of the project area as displayed in Figure 4-2. This area coincides with the mapped high value regrowth regulated vegetation. A summary of essential habitat requirements for the koala species relevant to the Project area is provided in Table 4-1, being for the vegetation community and regional ecosystem.

Table 4-1 Summary of essential habitat requirements

Species	Conservation status		Regional Ecosystem	Essential habitat requirements
	EPBC Act	NC Act		
Koala	V	V	Most of land zone 12 is mandatory, including: 12.11.5 and 12.11.24	Open eucalypt forest and woodland that has: a) multiple strata layers containing *Eucalyptus, Corymbia, Angophora, Lophostemon* or *Melaleuca* trees that-at 1.3 metres above the ground-have a diameter that is greater or less than 30 centimetres; and b) at least 1 of the following species: *Eucalyptus tereticornis, E. fibrosa, E. propinqua; E. umbra, E. grandis, E. microcorys, E. tindaliae, E. resinifera, E. populnea, E. robusta, E. nigra, E. racemosa, E. crebra, E. exserta, E. seeana, Lophostemon confertus, L. suaveolens, Melaleuca quinquenervia.*

4.3.3.4 South East Queensland Koala Conservation Strategy definition

Definitions of the koala habitat categories, mapped under the South East Queensland Koala Conservation Strategy 2020–2025 (DES, 2020b), are presented in Table 4-2.

Table 4-2 Koala habitat definitions (DES, 2020b).

Mapping category	Definition of mapping category
Koala priority areas	Large, connected areas that focus habitat protection, habitat restoration and threat mitigation to areas that have the highest likelihood of safeguarding koala populations in South-East Queensland. Clearing of core and locally refined koala habitat areas within koala priority areas is prohibited, subject to certain exemptions.
Core koala habitat	The best quality koala habitat areas, based on modelling of biophysical measures including climate, suitable vegetation for both food and shelter, and koala sighting records.
Locally refined koala habitat areas	Areas of mature vegetation that might not meet the Queensland Government's criteria for core koala habitat areas (see Spatial modelling for koalas in South-East Queensland). However, these areas may contain locally important vegetation for koalas, including some areas previously protected under local government planning schemes.
Koala habitat restoration areas	Land that could be restored and established as koala habitat areas. These areas feature low threats or constraints, and high conservation opportunities.

4.3.4 Desktop results

The koala was identified within the PMST (Appendix A) as 'known to occur' within a 2 km radius of Lot 2 WD4654.

Two historical records of the koala are known from within a 2 km radius of the project area. The records are from 1.2 km north-west of the project area and from 1.5 km north-east of the project area, recorded in 1990 and 2004, respectively. According to Atlas of Living Australia 2022 all previous recorded occurrences of koalas were found mainly to the west of the Pacific Highway (refer to Figure 4-1).

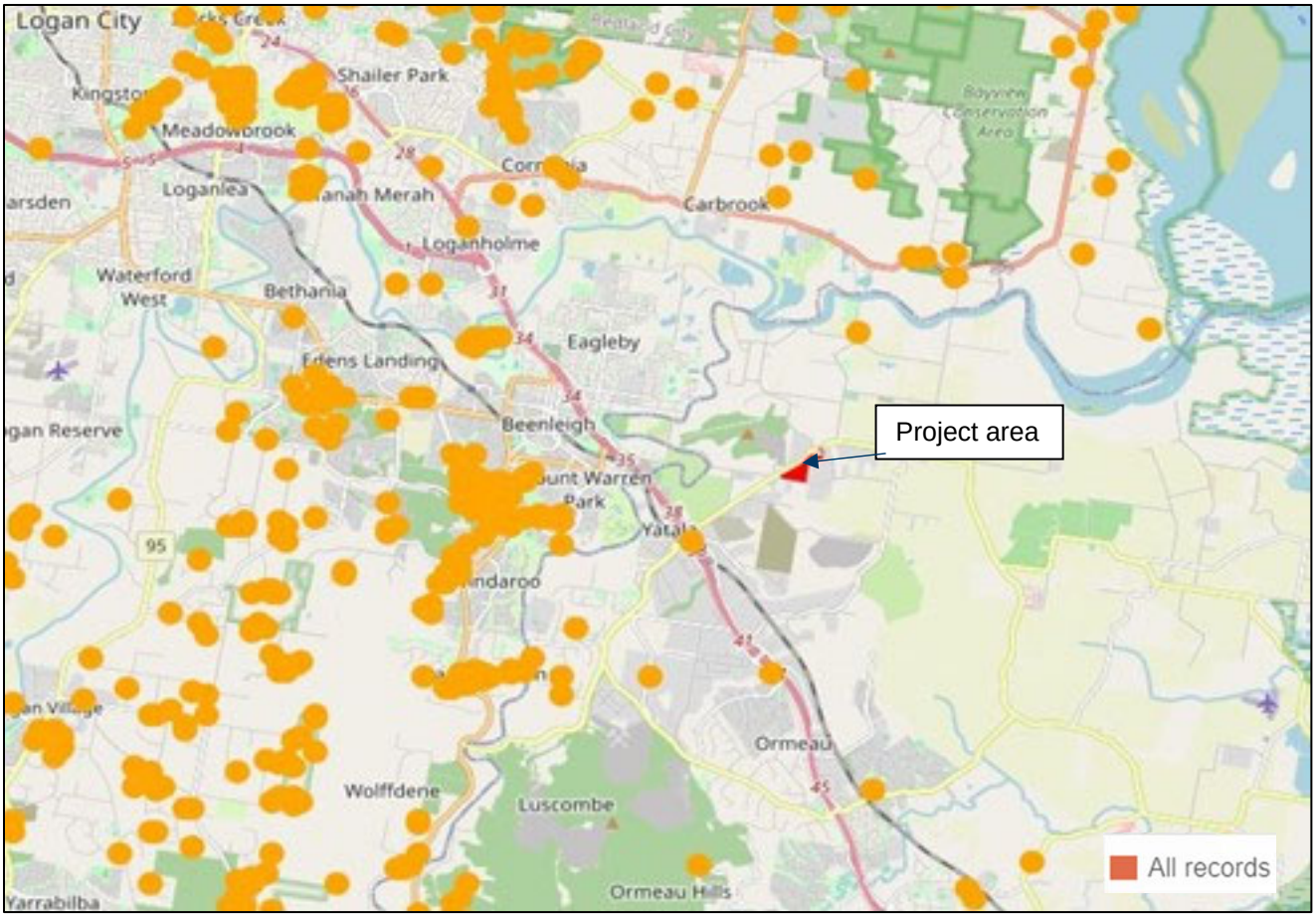
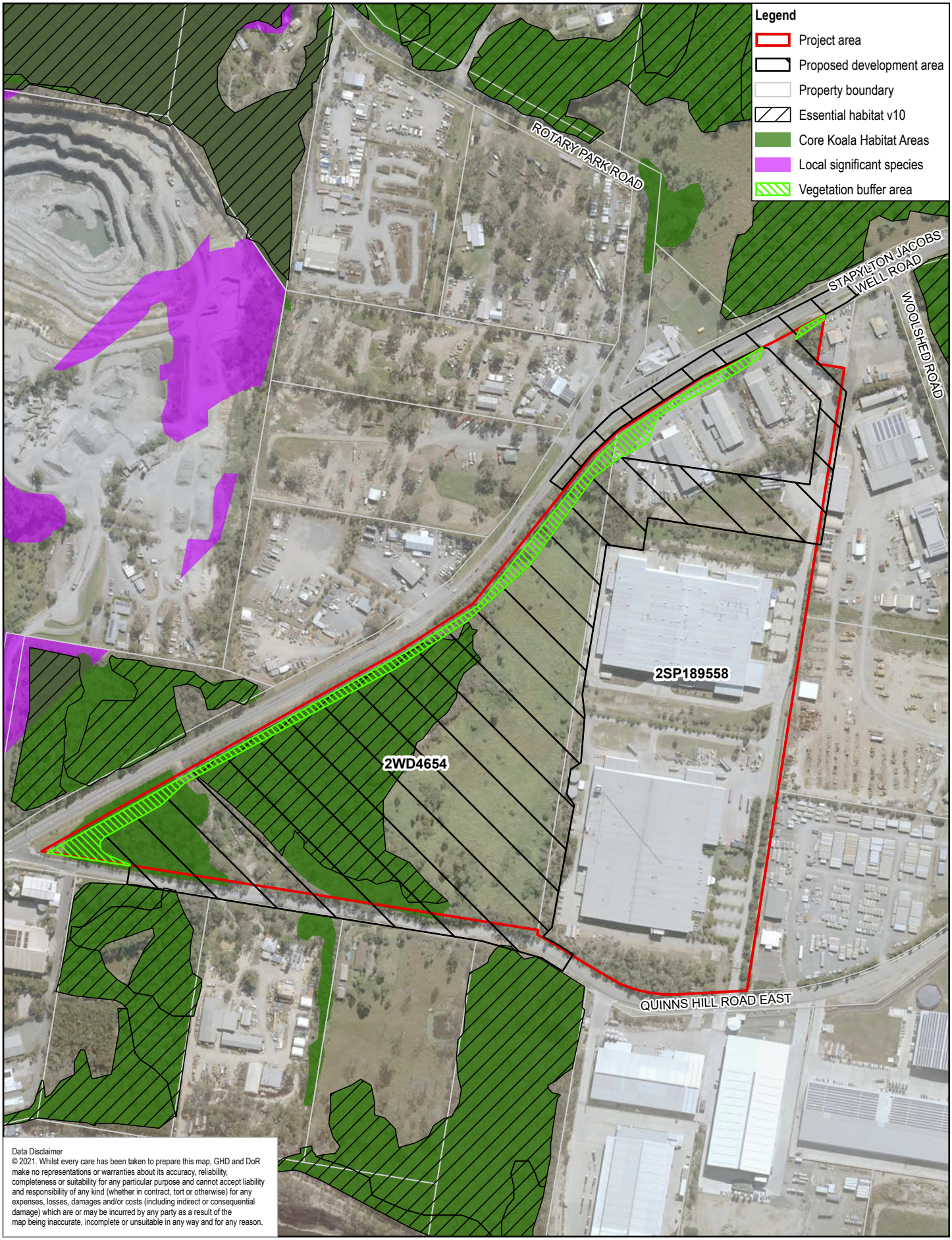


Figure 4-1 ***Map showing recorded occurrences of koalas surrounding the project area and wider surrounds (sourced from Atlas of Living Australia, 2022)***

The DoR mapped essential habitat for the koala, as defined in Table 4-1, exists broadly across the eucalypt vegetation within the middle of the project area, where regulated vegetation is mapped (Figure 4-2).

Current DES koala habitat mapping shows core koala habitat is mapped throughout the remnant and regrowth woodland communities within the project area. These areas occur within the centre and western corners of the project area (Figure 4-2). The proposed development area is not mapped within a Koala Priority Area and no locally-refined koala habitat areas or koala habitat restoration areas are present in the project area.



Paper Size ISO A4

0 30 60 90 120

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Fauna values identified within the desktop assessment

FIGURE 4-2

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Print date: 01 Apr 2022 - 10:34

Data source: GHD: Project Area, Proposed development area (2021); CoGC: Local Significant Species (2021); DES: Essential Habitat v10, Core Koala Habitat Area (2021); DoR: Roads, Cadastre, (2021), Queensland Imagery Latest State Program Public Basemap Service: (2019). Created by: schen4

4.3.5 Survey results

4.3.5.1 Vegetation communities

The field survey confirmed the following REs are present within the project area:

– Least concern RE 12.11.5 – *Corymbia citriodora* subsp. Variegata woodland to open forest +/- *Eucalyptus siderophloia*/*E. crebra*, *E. carnea*, *E. acmenoides*, *E. propinqua* on metamorphics +/- interbedded volcanics
– Least concern RE 12.11.24 – *Eucalyptus carnea* or *E. tindaliae*, *Corymbia intermedia* +/- *E. siderophloia* or *E. crebra* woodland on metamorphics +/- interbedded volcanics

The onsite vegetation communities are described in Table 4-3 and shown in Figure 4-3. Vegetation communities were dominated by eucalypt open forest, with areas of lower and more dense regrowth from past clearing.

There are disturbances across the project area from clearing, access tracks, an abandoned house, fences, weed infestations (particularly relating to road verges, clearings and areas lacking vegetation structure), and dumped rubbish.

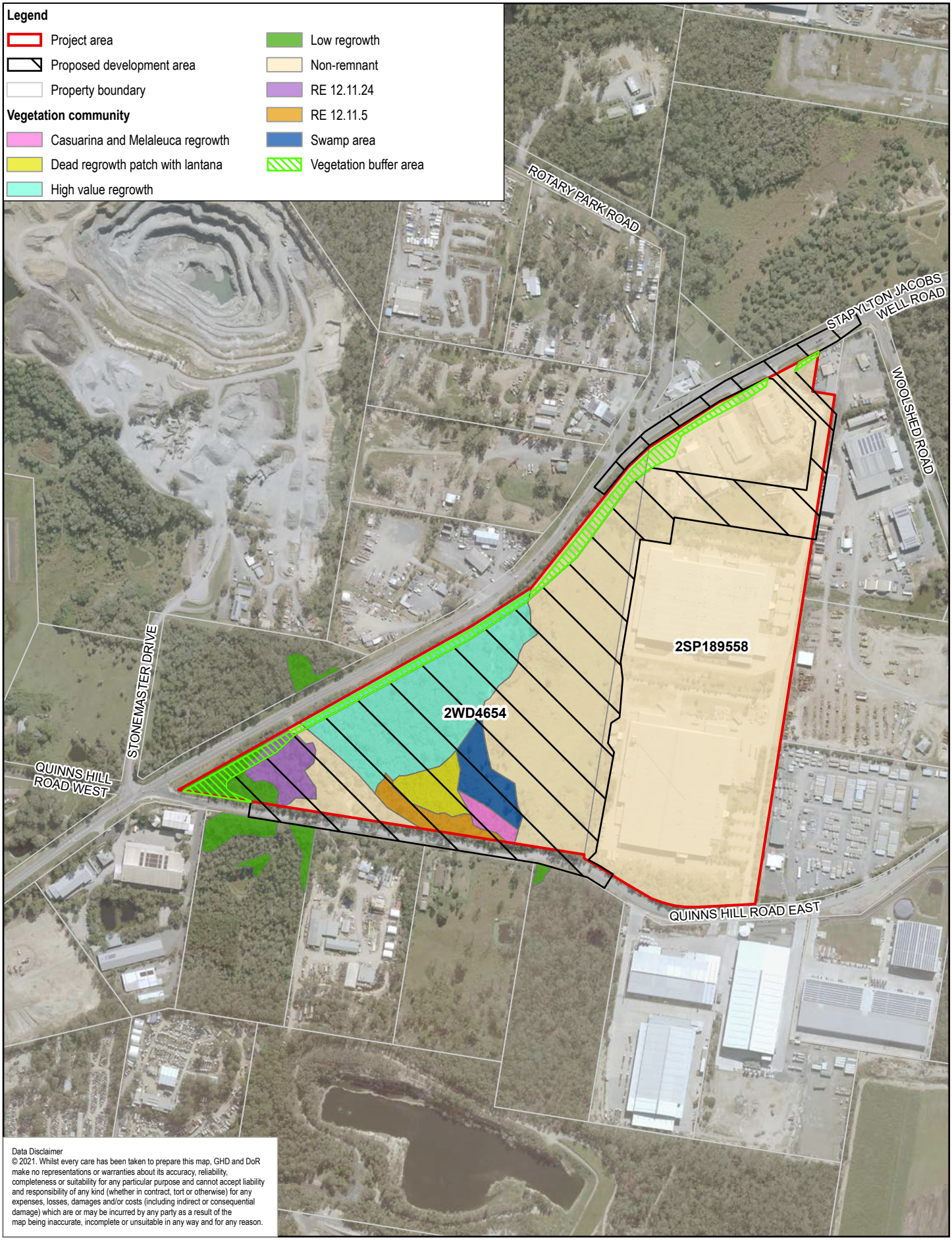
Table 4-3 Description of vegetation communities within the project area

Community type	Description of vegetation characteristics	Mapped RE	Representative photo
Remnant eucalypt open forest Shown on Figure 4-3 as RE 12.11.24.	**Quaternary site 1 (western patch):** Open forest community to approx. 18 m height with estimated canopy cover of 20%, which is dominated by *Corymbia intermedia* and *Eucalyptus siderophloia*, with associated *E. propinqua* and *Corymbia tessellaris*. The subcanopy layer to 10 m height and 40% cover is dominated by *E. propinqua, Pinus elliotii** (slash pine), *Alphitonia excelsa, Lophostemon suaveolens* and *Acacia disparrima*. The shrub layer to 6 m height is dominated by *Acacia* species, with a lower shrub layer comprising *Lantana camara** (lantana), *Agave americana** (agave) and *Wikstroemia indica*. The ground layer to 1 m height is dominated by weedy grasses and herbs, including *Megathyrsus maximus** (guinea grass), *Sida cordifolia** (flannel weed), *Ageratum houstonianum** (blue billygoat bush), *Oplismenus aemulus*. Landform is gradual, east-facing upper slope within an undulating landscape. Surface soils are light brown sandy loam, with some quartz boulders and rocks upslope. There is a drainage line gully through this community, however no associated riparian vegetation structure. This patch is disturbed by two narrow tracks through and fence lines along the property boundaries. **Consistent with mapped Least concern RE 12.11.24**	12.11.5 / 12.11.24 (85% / 15%) Remnant (Category B) - Least concern status	

Community type	Description of vegetation characteristics	Mapped RE	Representative photo
Regrowth with mature trees Shown on Figure 4-3 as RE 12.11.5 and dead regrowth patch with lantana.	**Quaternary site 3 (southern patch):** Open forest community to 16 m height with estimated canopy cover of 30%, dominated by *Corymbia citriodora* subsp*. variegata* and *Eucalyptus siderophloia*. The subcanopy layer to 8 m height and 40% cover contains canopy species as well as *Lophostemon suaveolens, Alphitonia excelsa, Allocasuarina littoralis* and *Acacia disparrima*. The shrub layer to 4 m height and 40% cover comprises *Lophostemon confertus*, *Allocasuarina littoralis* and *Acacia disparrima.* The ground layer to 1 m height and 40% cover contains *Dianella brevipedunculata, Goodenia rotundifolia, Pultenaea villosa, Daviesia ulicifolia*. Landform is a gradual, upper slope within an undulating landscape. Surface soils are light brown loam. This patch is disturbed by a previously cleared track through the centre of it and by the road edge with dumped rubbish present. **Consistent with mapped Least concern RE 12.11.5**	12.11.5 / 12.11.24 (85% / 15%) Remnant (Category B) – Least concern status	
Regrowth with mature trees Shown on Figure 4-3 as high value regrowth.	**Quaternary site 2 (northern patch):** Partially cleared open forest to 12 m height with estimated canopy cover of 40%, dominated by *Corymbia intermedia, C. citriodora* subsp*. variegata, Eucalyptus siderophloia*, *E. acmenoides, Lophostemon suaveolens* and *Acacia disparrima*. There is an emergent layer of mature eucalypts to 18 m height and 10% cover, including *C. citriodora* subsp*. variegata*, *Eucalyptus siderophloia*, *E. acmenoides* and *C. intermedia*. The subcanopy layer to 8 m height and 20% cover comprises *L. suaveolens* and *Acacia disparrima*. The shrub layer to 3 m height and 20% cover is dominated by *Acacia species* and *Lantana camara**. The ground layer contains 30% cover of herb and grass species to 0.3 m height, including *Lomandra species*, *Goodenia rotundifolia*, *Polymeria calycina*. Landform is a gradual, east-facing mid-slope within an undulating landscape. Surface soils are dark brown loamy clay. **Consistent with mapped Least concern RE 12.11.5**	12.11.5 / 12.11.24 (85% / 15%) High value regrowth (Category C) – Least concern status	

Community type	Description of vegetation characteristics	Mapped RE	Representative photo
Low or disturbed regrowth Shown on Figure 4-3 as non-remnant and low regrowth.	**South-western corner of project area:** *Corymbia intermedia* and *Eucalyptus siderophloia* canopy with subcanopy of *Allocasuarina littoralis, Acacia leiocalyx and A. disparrima*. Shrub layer of *Lantana camara** with scattered *Breynia oblongifolia* and *Acacia* spp. Ground layer comprises very sparse weedy grasses and herbs such as *Ageratum houstonianum**. Cleared in 1997 aerial imagery. **Consistent with disturbed regrowth or non-remnant**	Non-remnant (Category X)	
	Southern patch of regrowth: Some patches of Acacia regrowth with canopy dieback and dense lantana understorey. **Consistent with disturbed regrowth or non-remnant**	High value regrowth	

Community type	Description of vegetation characteristics	Mapped RE	Representative photo
Cleared land Shown on Figure 4-3 as non-remnant, casuarina and melaleuca regrowth and swamp area.	**Eastern portion of project area and around the abandoned house:** Previously cleared and disturbed land with dense grass groundcover and scatter eucalypt trees and weedy shrubs and herbs. Trees around the edges of the cleared land included *Corymbia citriodora* subsp*. variegata, Allocasuarina littoralis, Melaleuca quinquenervia, Acacia disparrima* and *Eucalyptus propinqua*. Includes an area on the south-western side of the cleared patch of inundated swamp with dense grasses and *Phragmites australis*. Areas in the north of the clearing have been slashed. The eastern portion of the project area cleared between 1997 and 2001, based on historical imagery. **Consistent with non-remnant mapping**	Non-remnant (Category X)	 



Paper Size ISO A4

0 30 60 90 120 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Flora values confirmed within the project area

Project No. **12550313**
Revision No. **1**
Date **1/04/2022**

FIGURE 4-3

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Print date: 01 Apr 2022 - 10:33

Data source: GHD: Project Area, Proposed development area, Flora Values (2021); DoR: Roads, Cadastre (2021), Queensland Imagery Latest State Program Public Basemap Service: (2019). Created by: schen4

4.3.5.2 General fauna habitat

The project area is situated within an industrial and semi-rural landscape with the surrounding land uses including resource extraction, industry / manufacturing, conservation and agriculture (mostly sugar cane). The eastern side of the project area has been historically cleared and now supports introduced grass species. Large trees were generally absent from that area, with only a few scattered stags remaining in the northern eastern corner (shown in second photograph in first row of Plate 4-1). This area had also recently been mown and discussions with site personnel implied this was routinely conducted. The northern, southern and western boundaries of the project area were well vegetated and supported mixed woodlands of eucalypts, acacias and allocasuarinas (shown in first photograph in second row of Plate 4-1).

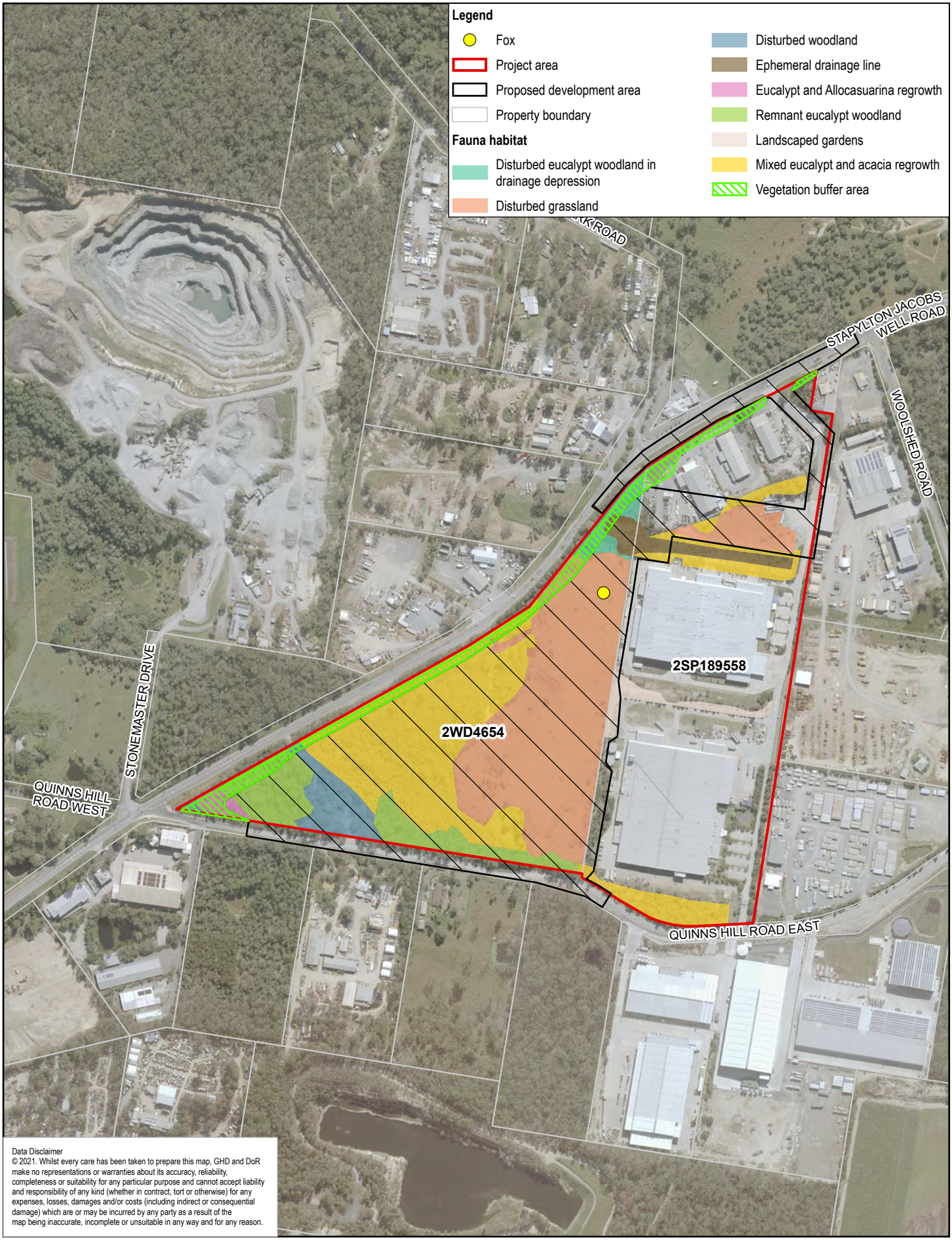
The woodland community occurring along the northern boundary (adjacent to Staplyton Jacobs Well Road) is located outside of the proposed development footprint and will be retained as part of the proposed development. A large remnant woodland patch also exists within the centre of the project area which contained a mix of mature eucalypts species and supported high avian diversity. This community provided foraging habitat for a diverse range of fauna and suitable nesting habitat for an array of woodland birds. Despite the presence of mature eucalypts, few tree hollows were observed within the project area. Regrowth woodland was also present, distinguished by a dense midstory or acacias and casuarinas and a number of large, mature eucalypts (shown in first photograph in first row of Plate 4-1). Fallen woody debris was abundant within this community and is likely to provide suitable microhabitats for small reptiles and ground-dwelling mammals. High leaf deposition from the regenerating acacias added further complexity to the ground layer within this habitat type. In the southwestern corner, the remains of an old residential dwelling have been overgrown by lantana and left in disarray (shown in second photograph in first row of Plate 4-1). This area was heavily infested by lantana and other invasive species, as were the access tracks on the northern proposed development boundary.

In total, six fauna habitat types were identified within the project area:

– Remnant eucalypt woodland
– Mixed eucalypt and acacia regrowth
– Ephemeral drainage line
– Eucalypt and Allocasuarina regrowth
– Disturbed woodland
– Disturbed grass land, disturbed eucalypt woodland in drainage depression and landscaped gardens.

The distribution of habitat types within the project area is presented in Figure 4-4 and discussed in Table 4-4.

Plate 4-1 *Representative photographs of fauna habitat types within the project area*



Paper Size ISO A4

0 30 60 90 120 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Visy Glass Operations (Australia) Pty Ltd
Glass Recycling and Manufacturing Facility

Distribution of fauna habitat types within the project area

Project No.	**12550313**
Revision No.	**1**
Date	**1/04/2022**

FIGURE 4-4

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Print date: 01 Apr 2022 - 10:38

Data source: GHD: Project Area, Proposed development area, Fauna Habitat, Fox Site (2021); DoR: Roads, Cadastre, Wetland v5 (2021), Queensland Imagery Latest State Program Public Basemap Service: (2019). Created by: schen4

Table 4-4 Terrestrial fauna habitat types

Habitat type	Structure and distribution	Ecological value
Remnant eucalypt woodland 	– Contained a mix of eucalypt species, i.e., pink bloodwood (*C. intermedia*), narrow-leaved ironbark (*C. crebra*) and white mahogany (*Eucalyptus acmenoides*). – Supported a high canopy (8 -12 m) with – Abundance of fallen timber. – Mid story contained black she-oak (*A. littoralis*) and red ash (*Alphitonia excelsa*). – Occurred in the western extent of the project area – Occasional presence of hollows – Presence of logs, woody debris, rocks and other complex ground-level microhabitats.	– Large eucalypts provided nesting habitat for hollow-dependent and woodland bird species. – Suitable foraging habitat for arboreal mammals. – High ecological value. – Fallen debris provided suitable microhabitats for reptiles and ground-dwelling mammals. – Provided habitat continuity and movement/dispersal pathways for fauna. – Potential foraging resource for the glossy black-cockatoo (*Calyptorhynchus lathami*) and the koala (*Phascolarctos cinereus*). Potential habitat for the short-beaked echidna (*Tachyglossus aculeatus*).
Mixed eucalypt and acacia regrowth 	– Dense midstory dominated by *Acacia* and Eucalypt species – Lantana established in shrub layer – Supported occasional patches of black-she-oak. – Hollows mostly absent – High rates of leaf deposition from acacias. – Presence of logs, woody debris, rocks and other complex ground-level microhabitats. – Low, closed canopy with high recruitment.	– Suitable nesting habitat for a variety of woodland birds – Black she-oak provide potential foraging resource for the glossy black-cockatoo. – Provided habitat continuity and movement/dispersal pathways for fauna. – Abundance of fallen woody debris provided habitat for reptiles and small ground-dwelling mammals. – Potential foraging resource for the koala (*Phascolarctos cinereus*). Potential habitat for the short-beaked echidna (*Tachyglossus aculeatus*).
Ephemeral drainage line 	– Mixed eucalypts present on upper banks – Broad-leafed paperback (*Melaleuca quinquenervia*) present in inundated soils. – Groundlayer dominated by Singapore daisy. – Presence of shallow, standing water of poor quality. – Received storm water flow from surrounding areas via a culvert. – Occurred along the north-western boundary. – Soft, sandy sediment with absence of rocks and gravel. – Subject to periodic inundation and localized flooding. – Canopy trees often touching due to dense vine community (i.e., monkey rope - *Parsonsia straminea*).	– Suitable foraging and breeding habitat for amphibians. – Provide foraging habitat for frog-eating reptiles, i.e., keelbacks (*Tropidonophis mairii)*. – Burrowing habitat for burrowing birds, mammals and fossorial reptiles. – Denning habitat for arboreal mammals. – Drinking sites for mammals and birds. – Provided habitat continuity and movement/dispersal pathways for fauna. – Generally lower ecological value than remnant vegetation communities.

Habitat type	Structure and distribution	Ecological value
Eucalypt and Allocasuarina regrowth 	– Presence of logs, woody debris, rocks and other complex ground-level microhabitats. – Groundlayer and shrub layer mostly absent. – Dense ground layer of accumulated organic material. – High deposition of casuarina needles and spines. – High recruitment rates by juvenile casuarinas. – Low canopy with no mature, emergent trees. – Hollow absent. – Low floristic diversity due to high density of black she-oak (*Allocasuarina littoralis*).	– Black she-oak provide potential foraging resource for the glossy black-cockatoo. – Provided habitat continuity and movement/dispersal pathways for fauna. – Abundance of fallen woody debris provided habitat for reptiles and small ground-dwelling mammals. – Suitable nesting habitat for a variety of woodland birds. – Potential foraging resource for the glossy black cockatoo (*Calyptorhynchus lathami*). Potential habitat for the short-beaked echidna (*Tachyglossus aculeatus*).
Disturbed eucalypt woodland in drainage depression 	– Vegetation community dominated by invasive species, notably Lantana camara. – Occasional young eucalypt present. – Dense ground layer of accumulated organic material. – Low floristic diversity with no canopy layer. – Occurred around the previous residential areas and access tracks. – High accumulation of rubbish and building debris.	– Dense shrub layer provided suitable habitat for finches and wrens. – High leaf depositions provided cover for small reptiles, i.e., skinks. – Residential ruins provided basking habitat for reptiles. – Generally lower ecological value than remnant vegetation communities. – Suitable foraging habitat for herbivorous mammals.
Disturbed grassland, disturbed eucalypt woodland in drainage depression and landscaped gardens 	– Largely void of mature canopy trees. – Occasional isolated dead stag in the northern end of the habitat type. – Contained isolated clusters of lantana. – Ground layer composition heavily altered and dominated by Singapore daisy. – Routinely managed and mown. – Heavily degraded by invasive species, notably lantana and Singapore daisy. – Supported wetland indicator flora species around the periphery of the community. – There is a drainage depression – Supported soils prone to temporary inundation and with a high organic matter content.	– Dense lantana patches provided suitable habitat for finches and wrens. – Suitable foraging habitat for herbaceous mammals. – Complex ground-level microhabitats provide suitable shelter habitat for small reptiles. – Suitable foraging habitat for insectivorous fauna species. – Foraging habitat for pipits, quails and other grass-dwelling birds. – Open landscape provides foraging habitat for raptors and snakes. – Generally lower ecological value than remnant vegetation communities.

4.3.5.4 Koala habitat

No evidence of koalas was recorded during targeted surveys undertaken within the project area. However, the koala was assessed as likely to occur due to the proximity of historical koala records within the surrounding landscape and the presence of suitable foraging and shelter habitat within the project area (Plate 4-2). Several known food and shelter tree species including *Eucalyptus siderophloia, E. propinqua, Corymbia intermedia, C. tessellaris* and *Lophostemon suaveolens* were present within the remnant and regrowth woodlands within the project area and surrounding landscape. Habitats within the project area form part of a mosaic of existing habitats that are becoming increasing fragmented by development in the northern Gold Coast region.

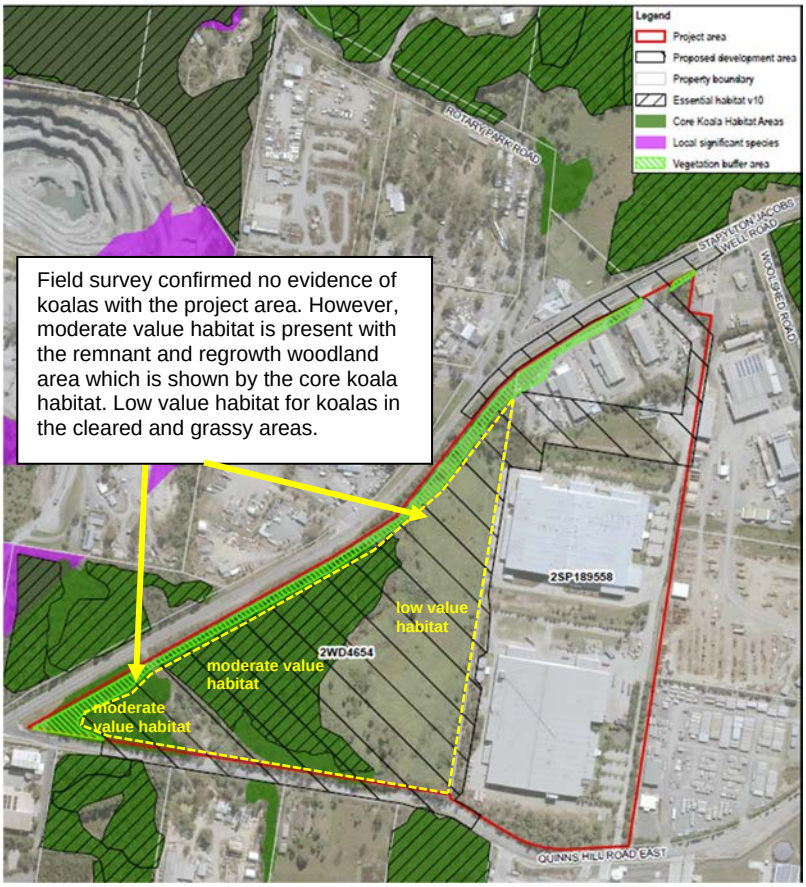
The quality of habitat for koala varies across the site, with moderate value habitat present within the remnant and regrowth woodland areas, and low value habitat in the cleared and dense grassy areas, which is suitable for movement only. The areas containing the abandoned house and the inundated swamp area do not hold habitat value for the koala. The value of the koala habitats is substantially undermined by their fragmented nature and the high levels of existing threats from surrounding land uses (i.e. busy roads, domestic dogs, multiple sources of noise and activities potentially causing stress). While adjacent roads would present a local mortality risk, they are unlikely to present a barrier to koala movement. Based on the number of historical records within the surrounding landscape, transient koalas are likely to move through the area and are expected to periodically utilise habitats in the project area.

Plate 4-2 Suitable koala habitat within the project area

4.3.5.5 Field verified potential impact

Table 4-5 shows the area of impact (permanent and temporary) that has been calculated using field survey results to identify where the proposed development area intersects koala habitat.

Table 4-5 Potential impacts to Commonwealth Environmental Matter – Koala habitat

Environmental Matter	**Proposed development area (**excluding vegetation buffer area)		
Commonwealth Environmental Matter	Mapped	Field verified area	Field verified methodology and associated figures
Koala habitat	Not applicable	11.95 ha (4.8 ha moderate value and 7.15 ha is low value)	 No evidence of koalas was recorded during targeted surveys undertaken within the project area. However, the koala was assessed as likely to occur due to the proximity of historical koala records within the surrounding landscape and the presence of suitable foraging and shelter habitat within the project area. Moderate value habitat (4.80 ha) represented the remnant and regrowth woodland areas that support suitable foraging, dispersal, and resting habitat for the species. These areas reflect the core koala habitat mapping. Low value habitat (7.15 ha) is mapped across the cleared and grassy areas, which have the potential to function as dispersal habitat for the species. Whilst low value habitat was generally devoid of mature vegetation, the Commonwealth definition of koala habitat it relatively broad and includes all areas in proximity to suitable habitat.

4.3.6 Significance of project area

This section assesses the significance of koala habitats within the project area, whether they constitute habitat critical to the survival of the species, their importance in the context of the local population and whether the local population is important at a national level.

4.3.6.1 Status as an important population

The concept of 'important populations' has not been applied to the koala, given the lack of sufficient information on regional population status throughout its national range (DoE 2014a). The absence of evidence of koalas during field surveys and the limited area of koala habitat identified within the project area suggests that whilst koalas may move through the area, there is unlikely to be a local population in the vicinity of the project area. The proposed development area is within a highly fragmented landscape and it is more likely that koala populations with regional significance in sustaining koala numbers are found elsewhere in the region.

4.3.6.2 Status as habitat critical to the survival of the species

The Draft National Recovery Plan for the Koala defines habitat critical to the survival of a species as the area that the species relies on to halt decline and promote the recovery of the species, that can be unambiguously identified (DAWE, 2021a). The Draft National Recovery Plan for the Koala recommends the following factors and any other relevant factors to be considered under the EPBC Act when identifying habitat critical to the survival of the species:

– Whether the habitat is used during periods of stress (e.g. floods, fire, drought)
– Whether the habitat is used to meet essential life cycle requirements (e.g. foraging, breeding)
– The extent to which the habitat is used by important populations
– Whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development
– Whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements
– Whether habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation
– Any other way in which habitat may be critical to the survival of a listed threatened species or a listed threatened ecological community (DAWE, 2021a).

Such areas include habitat occupied or currently unoccupied; however the Draft National Recovery Plan for the Koala identifies that it is not practicable to identify habitat critical to the survival of the koala by describing and providing spatial information due to insufficient knowledge and data to unambiguously identify habitat critical to the survival of the koala (DAWE, 2021a). The functional ecology of the koala and its habitat is likely to form the basis of habitat critical to the survival of the koala.

Prior to conducting the significant impact assessment, an assessment to identify whether the project area represented 'habitat critical to the survival of the species' was conducted using the criteria outlined in the specie's Conservation Advice (DAWE, 2022b).

The outcomes of the assessment deemed the project area is likely to support habitat critical to the survival of the species. This assessment is present in Table 4-6.

Table 4-6 Assessment of habitat critical to the survival of the koala

Consideration	Assessment
Under the EPBC Act, the following factors and any other relevant factors may be considered when identifying habitat that is critical to the survival of a species:	
Whether the habitat is used during periods of stress (examples flood, drought or fire)	The project area is not located within a flood prone area. In the surrounding landscape, the majority of the Coomera River floodplain has been converted into cane farming and residential development. The remaining area of suitable habitat for the koala are not listed as flood prone areas. Additionally, the project areas utilisation by the koala following a bushfire event is unknown. Whilst several barriers to fire spread occur in the surrounding landscape (mostly major roads) the project area could function as refugia habitat if a fire was ignited in the woodland communities adjacent to the proposed development.
Whether the habitat is used to meet essential life cycle requirements (examples foraging, breeding, nesting, roosting, social behaviour patterns or dispersal processes)	The koala is likely to temporarily utilise the project area for foraging and dispersal. No evidence of koala is present in the project area and only two records are reported within 2 km of the proposed development. (2004 being the most recent). However, as the proposed development.is likely to support foraging and dispersal pathways, habitat within the project area has the potential to represent habitat critical to the survival of the species.

The extent to which the habitat is used by important populations	The project area is relatively isolated in the landscape, surrounded by extensive agriculture to the east and roads and industrial and residential development to the west, north and south. Local koala habitats are relatively small and fragmented and would not represent a source population. The project area is unlikely to support a permanent koala population due the small spatial scale, limited availability of foraging resources and presence of multiple threats. Rather, the species is likely to occur in a temporary nature or as a dispersal pathway to alternative areas of habitat. There was no evidence of koala utilisation within the project area during surveys and there is a lack of documented historical records in the area. While important koala populations are likely to occur at Daisy Hill/Venman to the north, Coomera/Coombabah to the south and Ormeo Hills/Cedar Creek to the south-west, these populations are located up to ten kilometres away with limited habitat connectivity to the project area. As such, the project area is unlikely to be highly utilised by an important population.
Whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development	The proposed development is unlikely to be necessary to maintain genetic diversity and long-term evolutionary development. Whilst the proposed development is likely to be utilised for dispersal, alternative routes are available to surrounding areas of suitable habitat. These areas include the Woolshed Parklands and the Yellowood Reserve which are situated to the east and north of the project, respectively. Due to the low densities at which koalas occur locally, the local population is unlikely to be of substantial value in maintaining genetic diversity at a species level.
Whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements	The project area is likely to be utilised as a local dispersal corridor for the species as the project area supports remnant vegetation occurring between several larger pockets of suitable koala habitat (i.e., the Woolshed Parklands and the Yellowood Reserve). These areas support larger areas of habitat and are likely to facilitate essential life-cycles requirements for the koala. While these are locally constrained and not connected to extensive koala habitat areas such as Daisy Hill/Venman and Coomera/Coombabah, they do provide an important refuge for local koalas. As the project area potentially representing an important dispersal corridor for local koala movement, the project area is likely to support habitat critical to the survival of the koala. Utilisation of these habitats is already substantially constrained by existing roads, that are located around the periphery of the project area, including a major road on the proposed development's northern and southern boundary. Whilst these roads remain unfenced, high vehicle traffic poses a significant threat to the koala and the project area provides limited safe koala movement opportunities.
Whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation	The proposed development is unlikely to represent habitat necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation. This is owing to a long history of disturbance within the project area (clearing beginning in 1971), sub-optimal condition of vegetation, spatial isolation of the project area from larger habitat areas and presence of multiple threats within the surrounding landscape.
Any other way in which habitat may be critical to the survival of a listed threatened species or a listed threatened ecological community	No additional ways identified.

4.3.7 Threatening processes

Koala populations within eastern Australia have suffered decline due to a number of threats, which include (DAWE, 2020):

– Habitat loss, fragmentation and degradation
– Mortality from vehicles strikes and dog attacks
– Spread of disease
– Drought impacts.

4.3.8 Potential impacts

Potential impacts on koala populations and koala habitat (as defined in Section 4.3.3) within the project area include:

– Loss of habitat
– Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement
– Injury and mortality
– Habitat degradation by increased dust run-off and sedimentation

– Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation
– Increased spread and proliferation of invasive and intrusive species.

Potential impacts are discussed in sections below. Mitigation and management control measures are provided in Section 4.3.9.

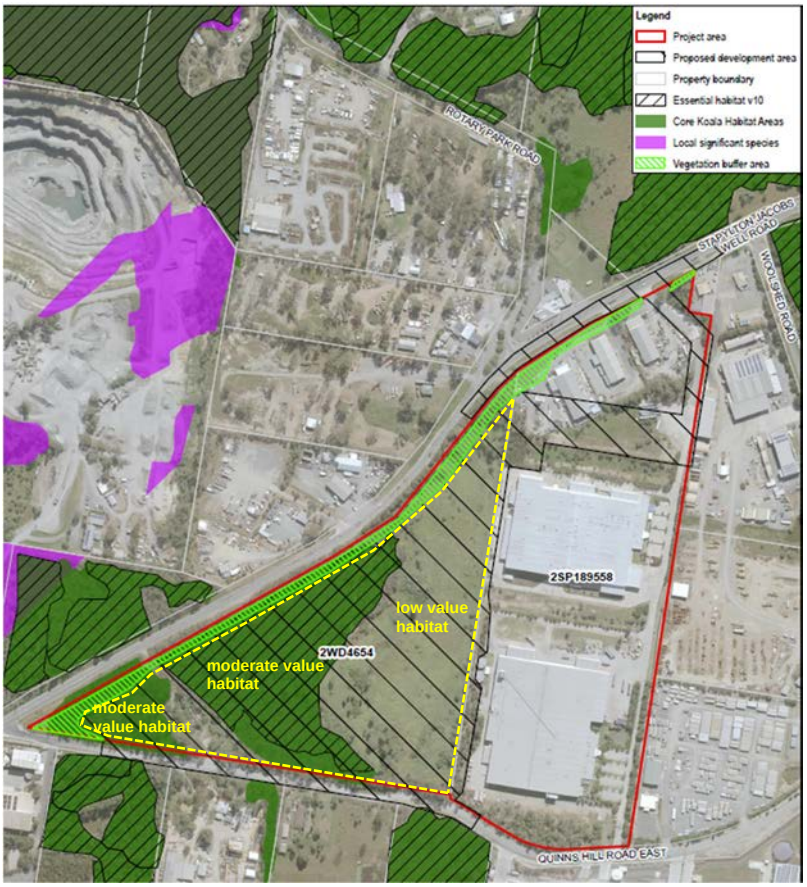
4.3.8.1 Loss of habitat

In total, 11.95 ha of koala habitat, representing possible habitat critical to the survival of the species, is mapped within the project area comprising:

– 4.80 ha of moderate value koala habitat
– 7.15 ha of low value movement habitat with either absent or scattered koala food trees within cleared and grassy areas.

Refer to Table 4-7.

Table 4-7 Loss of habitat for koala within the proposed development area

Environmental Matter	**Proposed development area** (excluding vegetation buffer area)		
Commonwealth Environmental Matter	Mapped	Field verified area	Field verified methodology and associated figures
Koala habitat	Not applicable	11.95 ha (4.80 ha moderate value and 7.15 ha is low value)	 No evidence of koalas was recorded during targeted surveys undertaken within the project area, despite thorough searching of individual trees for scratches and faecal pellets over the entire project area.

Environmental Matter	Proposed development area (excluding vegetation buffer area)		
			However, the koala was assessed as likely to occur due to the proximity of historical koala records within the surrounding landscape and the presence of suitable foraging and shelter habitat within the project area. Moderate value habitat (4.80 ha) represented the remnant and regrowth woodland areas that support suitable foraging, dispersal, and resting habitat for the species. These areas reflect the core koala habitat mapping. Low value habitat (7.15 ha) is mapped across the cleared and grassy areas, which have the potential to function as dispersal habitat for the species. Whilst low value habitat was generally devoid of mature vegetation, the Commonwealth definition of koala habitat it relatively broad and includes all areas in proximity to suitable habitat.

4.3.8.2 Increased fragmentation of remaining koala habitat and restriction of koala movement

Koala habitat within the project area forms part of a mosaic of existing habitats within an already fragmented landscape in the region. Habitat loss within the project area is likely to increase fragmentation of remaining koala habitat and restriction of koala movement. Whilst no evidence of koalas was found during field surveys, the presence of suitable habitat and the historical records within the surrounding area indicate that transient koalas have potential to move through the area and periodically use habitat within the project area.

Although the area is already largely fragmented and there are heavily trafficked roads and developed industrial areas along each project area boundary, the habitat within the project area provides some connectivity to larger areas of habitat both north (Yellowood Reserve) and south.

4.3.8.3 Injury and mortality

Vegetation clearance during construction of the proposed development has the potential to cause injury and mortality to koalas. The koala has a heightened risk of injury or mortality during construction activities as a result of increased traffic movements combined with the koala's relatively slow movement. Entrapment within excavations poses an additional threat to the koala. These risks can be effectively mitigated by implementing strict controls during construction.

4.3.8.4 Habitat degradation by increased dust, run-off and sedimentation

Construction activities have the potential to generate localised dust, erosion, run-off and sedimentation through increased vehicle movements, clearance of vegetation and earthworks. This can reduce the abundance and diversity of adjacent terrestrial and aquatic habitats by physically smothering vegetation, changing nutrient levels, impeding the growth and germination of plant species, encouraging weed incursions and altering the movement and behaviour of fauna species. Impacts from increased levels of dust, runoff, or sedimentation are likely to be localised at the proposed development footprint and can be managed through the proposed mitigation and management measures.

The proposed development will have no substantial impact on hydrology that could degrade the quality of koala habitat. The only waterway in proximity to the project area is an unnamed non-perennial drainage line in the south-western corner of the project area. The drainage line originates in the north-western boundary adjacent to Stapylton Jacobs Well Road and traverses the south-western corner of the project area to a culvert that facilitates flow under Quinns Hill Road East towards the Albert River. All works within the vicinity of watercourses or in areas with potential for run-off will be subject to routine erosion and sediment control measures.

4.3.8.5 Deterrent to koala movement from increased noise, light and vibration

Clearance of vegetation has the capacity to cause indirect degradation of adjacent habitats due to an increase in the exposure to light, noise and vibration. Consequentially, this has the potential to adversely impact native wildlife through the disruption of foraging, breeding and nesting behaviours (Longcore and Rich, 2004; Slabbekoorn et al.

2010; Popper and Hawkins, 2016). Construction will result in a small, localised increase in vehicle movements in the short-term. This will cause a minor increase in light, noise and vibration disturbance on local wildlife. Increased light, noise and vibration can alter individual species' behaviours, and disrupt the balance of inter-species interactions. Such disruptions typically favour feral predators and generalist species that owe their success to broad ecological tolerances and possess the ability to tolerate or actively exploit disturbed environments (Hero et al. 2004).

4.3.8.6 Increased spread and proliferation of invasive and intrusive species

Construction activities have the potential to introduce and/or spread exotic pests throughout the construction area. This can result in substantial disruption to natural ecosystem functioning by altering the balance of inter-species competition and predation. Inappropriate waste disposal and provision of water has the capacity to attract higher local concentrations of feral predators and domestic dogs, which are a key threat to the koala.

During field surveys, one species of invasive fauna, the European fox, was identified from the presence of scats. Other pest fauna species that are likely to occur within the project area include feral cats, cane toads, dogs, and various invasive dove species.

The risks from invasive species can be mitigated through routine control measures.

4.3.9 Measures to avoid, reduce or mitigate impacts

This section outlines the mitigation measures to be adopted by Visy during the design, construction, and operational phase to mitigate potential impacts associated with:

– Loss of habitat
– Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement
– Injury and mortality
– Habitat degradation by increased dust run-off and sedimentation
– Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation
– Increased spread and proliferation of invasive and intrusive species.

Refer to Table 4-8 below.

Table 4-8 Mitigation measures to adverse potential impacts to koalas and koala habitat

Mitigation Measure	**Potential impact addressed**					
	Loss of habitat	Injury and mortality	Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement	Habitat degradation by increased dust run-off and sedimentation	Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation	Increase spread and proliferation of invasive and introduced species
Erosion and sediment controls will be developed as part of the CEMP.				X		
Routine dust suppression and monitoring will be undertaken throughout construction.				X		
Inspections/observations of air quality conditions will be undertaken during construction.						
Weather conditions will be monitored during the construction stage and temporary controls will be established during extreme weather events. Construction activities during adverse weather conditions will be managed in accordance with the CEMP.				X		
A Flora and Fauna Management Plan to be developed and include: – Details relevant to the general management of flora and fauna – Protocols to limit injury and mortality to fauna – A wildlife incident response procedure – Contact details for local wildlife carers and veterinary practices – Protocols for management of risks associated with open excavations and trenching – It will include a Koala Management Plan.	X	X				
Restricting clearing to daylight hours only during the koala breeding season (September – November).		X	X		X	
Adverse incident response procedures will be developed to detail actions to be taken in the event of wildlife injury or mortality during clearing and included in the CEMP.		X				

Mitigation Measure	Potential impact addressed					
	Loss of habitat	Injury and mortality	Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement	Habitat degradation by increased dust run-off and sedimentation	Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation	Increase spread and proliferation of invasive and introduced species
A Traffic Management Plan is to be developed as part of the CEMP, which will include designated access routes, speed limits and identified sensitive ecological areas. Appropriate signage indicating traffic movements and speed restrictions will be erected during operation of the proposed development. A Traffic Management Plan will also manage vehicle movements and reduce unnecessary generation of vehicular noise.		X		X	X	
All construction vehicles will comply with maintenance schedules and operational restrictions designed to limit noise impacts during construction.					X	
The extent of vegetation clearing will be clearly identified on construction plans and in the field using high visibility fencing or flagging. Exclusion fencing should be established between remaining buffer vegetation and cleared areas of the construction site. The clearing extent will be communicated to construction supervisors. If fencing or flagging is in poor condition, it will be replaced as soon as practicable to reduce the potential of accidental clearing.	X	X				
Pre-clearance surveys are to be conducted in areas of koala habitat to identify any individual animals that may be impacted. Koalas must be allowed to move out of the clearing footprint of their own accord.	X	X				
A Waste Management Plan will be prepared as part of the CEMP. This will detail the location and specifications for disposal and removal of waste from the construction site.						X
Educate all workers onsite regarding the presence of the EPBC Act and NC Act listed species, particularly species with increased risk of injury and mortality such as the koala. Areas identified for vegetation clearance are to be clearly defined and detailed in site inductions.	X	X	X		X	

Mitigation Measure	**Potential impact addressed**					
	Loss of habitat	Injury and mortality	Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement	Habitat degradation by increased dust run-off and sedimentation	Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation	Increase spread and proliferation of invasive and introduced species
Responsible waste management practices (e.g. not leaving out food waste and not feeding wildlife) will be implemented and followed by all construction personnel. All waste will be stored in secure temporary holding containers and transported off site. A suitable quantity of waste receptacles will be made available to contain rubbish and food scraps to restrict access by animals.		X				X
Mapping of weed and pest hotspots prior to construction will be undertaken to develop effective management protocols and establish baseline information on existing weed and pest distribution.						X
All construction personnel shall attend environmental training as part of site inductions, which will include weed and pest management. As part of this training, all personnel will be instructed on their responsibilities related to avoiding and minimising the introduction/attraction to the construction site of feral animals.						X
Employees will not bring domestic animals to the site.		X				
Fencing will be established between remaining buffer vegetation and cleared areas of the site.		X	X			
Employment of sequential clearing practices and use of suitably qualified koala spotters in accordance with the Queensland Nature Conservation (Koala) Conservation Plan 2017 for reducing impact on koalas, including: – Clearing of koala habitat trees is carried out in a way that ensures koalas in the area being cleared have enough time to move out of the clearing site without human intervention, including, in particular, for clearing sites with an area of more than 3 ha, by carrying out the clearing in stages; and ensuring not more than the following is cleared in any one stage: • For a clearing site with an area of 6 ha or less – 50 percent of the site's area	X	X	X			

Mitigation Measure	Potential impact addressed					
	Loss of habitat	Injury and mortality	Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement	Habitat degradation by increased dust run-off and sedimentation	Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation	Increase spread and proliferation of invasive and introduced species
• For a clearing site with an area of more than 6 ha – 3 ha or three percent of the site's area, whichever is the greater • Ensuring that between each stage and the next there is at least one period of 12 hours starting at 6 p.m. on a day and ending at 6 a.m. on the following day during which no trees are cleared on the site • Clearing of the koala habitat trees is carried out in a way that ensures, while the clearing is carried out, appropriate habitat links are maintained within the clearing site and between the site and its adjacent area, to allow koalas living on the site to move out of the site • No koala habitat tree in which a koala is present, and no koala habitat tree with a crown overlapping a tree in which a koala is present, is cleared.						
Enforce on-site speed limits to restrict the incidence of vehicle strike.		X				
Temporary construction infrastructure will be located outside areas of linear connectivity where koalas are likely to move to avoid any barrier effects.			X			
An area of vegetation buffer will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve. The vegetation buffer area has a total area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the area.	X	X	X			
Artificial site lighting will be kept to the minimum (security) required for safety. Placement and orientation of lighting to be directed away from sensitive fauna habitat.					X	
Restricted access and protocols will be implemented for works near waterways, wetlands and other areas of high weed infestation.						X

Mitigation Measure	**Potential impact addressed**					
	Loss of habitat	Injury and mortality	Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement	Habitat degradation by increased dust run-off and sedimentation	Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation	Increase spread and proliferation of invasive and introduced species
Machinery and vehicle weed wash down and certification procedures will be enforced for access to or movement between high risk areas.						

4.3.9.1 Loss of habitat

The proposed development requires removal of vegetation within Lot 2 WD4654, which includes the unavoidable loss of areas of koala habitat. To minimise the potential impact to koalas the mitigation measures are outlined in Table 4-8. An area of vegetation buffer will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve. The vegetation buffer area has a total area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the area.

4.3.9.2 Increased fragmentation of remaining koala habitat and restriction of koala movement

The mitigation measures outlined in Table 4-8 will be implemented to minimise fragmentation of habitat and restriction of koala movement during construction of the proposed development.

4.3.9.3 Injury and mortality

The mitigation measures in Table 4-8 will be implemented to minimise injury and mortality to koalas during construction.

4.3.9.4 Habitat degradation by dust, run-off and sedimentation

The mitigation measures in Table 4-8 will minimise the impacts of dust, run off and sedimentation for the proposed development.

4.3.9.5 Deterrent to koala movement from increase noise and light

Routine mitigation measures should be undertaken to minimise the impact that noise, light, vibration and disturbance have on local koala populations, particularly in the vicinity of known koala habitat. The mitigation measures are outlined in Table 4-8 will be used to minimise the impacts of light, noise and vibration.

4.3.9.6 Introduction and spread of pest fauna species

The mitigation measures outlined in Table 4-8 will minimise the introduction and spread of pest fauna species for the proposed development.

4.4 Grey-headed flying-fox

4.4.1 Conservation status and documentation

The grey-headed flying-fox is listed as Vulnerable under the EPBC Act.

The grey-headed flying-fox is Australia's only endemic flying-fox and only occurs on the east coast of Australia from Rockhampton in central Queensland south to Melbourne in Victoria (Tidemann 1998). The species selectively forages for food where it is readily available hence only utilises a small proportion of its range at any given time. Patterns of occurrence and relative abundance for the species fluctuate between seasons and years in line with food availability (Tidemann 1998).

The species maintains one intermixing population throughout Australia. The grey-headed flying-fox requires foraging habitat and roosting sites, with it being a canopy-feeding frugivore and nectarivore. The species roosts in camps typically associated with water sources, in vegetation communities including rainforest, Melaleuca, mangroves and riparian vegetation (Nelson 1965; Van der Ree et al. 2005). The species feeds in a variety of habitats ranging from rainforests, open forest, open and closed woodlands and vegetation dominated by Melaleuca and Banksia species (DAWE, 2021). The primary food source is Eucalyptus blossom and related genera (Eby 1998). The species' food sources are not continuously available throughout the year. As a result, the species continually migrates throughout its range to access food resources that are patchily distributed and seasonally available (Nelson 1965; Spencer et al. 1991; Parry-Jones and Augee 1992; Eby 1996).

The grey-headed flying-fox experiences winter and spring bottlenecks in food resources within south-east Queensland and northern New South Wales (Parry-Jones and Augee 1991, Eby et al. 1999). Winter foraging

habitat is particularly limiting in southern Queensland and northern New South Wales, as this typically occurs in coastal lowlands that are subject to high levels of land clearing for agriculture and urban development (Eby et al. 1999, Eby and Lunney 2002).

Important winter and spring foraging habitat includes woodlands with *Eucalyptus tereticornis, E. albens, E. crebra, E. fibrosa, E. melliodora, E. paniculata, E. pilularis, E. robusta, E. siderophloia, Banksia integrifolia, Castanospermum australe, Corymbia citriodora, C. eximia, C. maculata* (south from Nowra), *Grevillea robusta* and *Melaleuca quinquenervia* (DECCW 2009).

Grey-headed flying-foxes roost in groups of various sizes on exposed limbs of large trees, with a preference for roosting sites near water such as lakes, rivers or the coast (van der Ree et al. 2005). Roosting sites typically comprise of rainforest patches, Melaleuca stands, mangroves and riparian habitats (Nelson 1965a). The species typically utilise the same roosting site for longs periods of time (Lunney & Moon 1997). The species commutes daily to foraging sites, which are usually within 15 km of the roosting site (Tidemann 1998), however can travel up to 50 km at night-time to different feeding areas as food resources change (Eby, 1991 in DAWE, 2021).

Mating of grey-headed flying-foxes occurs in early autumn followed by the larger roosting camps tending to disperse in pursuit of available food resources (Hall and Richards 2000). Males and females segregate in October, when females give birth. Females give birth to their young following six months of gestation (Hall and Richards 2000).

As most adult grey-headed flying-foxes conceive one young annually, there is a low maximum rate of population growth for their size (DAWE, 2021). Females have a high tendency for aborting or abandoning their young in response to environmental stress such as a lack of food or high temperatures (Dukelow et al. 1990, Tidemann, 1998, Hall et al. 1991 in DAWE, 2021).

4.4.2 Survey effort

Surveys for the grey-headed flying-fox included habitat assessments and opportunistic searches as described in section 2.3.4.

The distribution of survey effort for the grey-headed flying-fox is shown in Figure 2-1. Surveys were undertaken in conditions suitable for detecting the species and assessing the value and distribution of their habitat.

4.4.3 Criteria used to map grey-headed flying-fox habitat

The definition of habitat for grey-headed flying-fox is provided within the National Recovery Plan (DAWE 2021b) for the species, being the habitat on which it relies as a continuous sequence of productive foraging habitats, the migration corridors or stopover habitats that link them, and suitable roosting habitat within nightly commuting distance of foraging areas (Fleming and Eby 2003).

It is considered that all foraging habitat has the potential to be productive during general food shortages and provides a critical resource (DAWE 2021b).

The National Recovery Plan (DAWE 2021b) defines nationally important roosting camps as:

– A camp used for more than one year in the last 10 years (beginning in 1995) by more than 10,000 individuals
– A camp that has been occupied permanently or seasonally by more than 2,500 individuals every year for the last 10 years (beginning in 1995), including reproductive females during the final stages of pregnancy, during lactation, or during the period of conception (i.e. September to May).

4.4.4 Desktop results

The grey-headed flying-fox was identified within the PMST (Appendix A) as ‘known to occur’ within a 2 km radius of Lot 2 WD4654. No historical records of the species have been recorded within 2 km of the project area.

Roosting camps do not occur within the project area. The nearest roosting camp for the grey-headed flying-fox is at Mt Warren Park, approximately 5 km west of the project area.

4.4.5 Survey results

The species was not recorded within the project area during the field surveys undertaken for the proposed development. However, vegetation representing suitable foraging habitat was present within the project area. The grey-headed flying-fox is likely to forage within remnant and regrowth eucalypt woodland habitats across the project area. Woodland containing *Corymbia citriodora* and *Eucalyptus siderophloia* is among the important winter and spring foraging habitats for the grey-headed flying-fox. There is also *Melaleuca quinquenervia* present in a small area of the site.

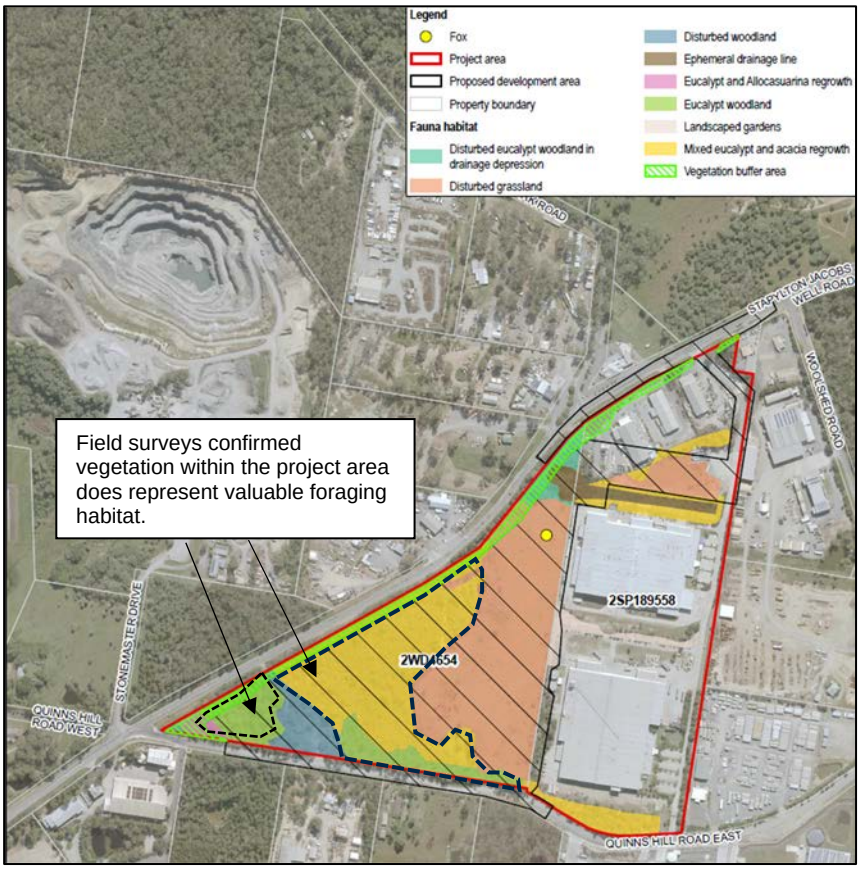
A known roosting camp that has been continuously used by the grey-headed flying-fox is located 5 km west of the project area at Mt Warren Park. No roost camps occur within or adjacent to the project area and the vegetation within the project area does not constitute potential roosting habitat.

The distribution of foraging habitat for grey-headed flying-fox is shown in Figure 4-4.

4.4.5.1 Field verified potential impact

Table 4-9 shows the area of impact (permanent and temporary) that has been calculated using field survey results to identify where the proposed development area intersects grey-headed flying fox habitat.

Table 4-9 Potential impacts to Commonwealth Environmental Matter – Grey-headed flying fox

Environmental Matter	**Proposed development area (**excluding vegetation buffer area)		
Commonwealth Environmental Matter	Mapped	Field verified area	Field verified methodology and associated figures
Grey-headed flying fox	Not applicable	4.80 ha suitable foraging habitat	 The field verified area was determined by the following fauna and flora survey methods being adopted during the field surveys for the ecological assessment targeting grey-headed flying fox and associated habitat: – Habitat assessments were undertaken at 12 sites to assess the value of habitat for terrestrial fauna.

Environmental Matter	Proposed development area (excluding vegetation buffer area)		
			– Opportunist searches for wildlife and traces – Regional ecosystem verification The grey-headed flying fox was not recorded within the project area during field surveys for the proposed development. However, suitable foraging habitat was present and a known roost camp that has been continuously utilised by the grey-headed flying-fox is located 5 km to the west at Mt Warren Park. No roost camps occur on or adjacent to the project area, and the vegetation on the project area would not constitute a potential roosting habitat. Vegetation within the project area does however represent valuable foraging habitat. The grey-headed flying-fox is likely to forage within remnant and regrowth eucalypt woodland habitats across the project area. There is also *Melaleuca quinquenervia* present in a small area of the project area, which may also represent foraging habiat.

4.4.6 Significance of project area

This section assesses the significance of grey-headed flying-fox habitats within the project area, whether they constitute habitat critical to the survival of the species, their importance in the context of the local population and whether the local population is important at a national level.

4.4.6.1 Status as an important population

The grey-headed flying-fox is considered to be one national intermixing population (DoE 2018). As such, the concept of 'important populations' does not apply.

4.4.6.2 Status as habitat critical to the survival of the species

Foraging habitat critical to the survival of the species includes Eucalypt woodland that is productive in winter and spring, when foraging bottlenecks have been identified (Parry-Jones and Augee 1991, Eby et al. 1999). Roosting habitat critical to the survival of the species includes known camps that have been used consistently, as defined in the National Recovery Plan for the species (DECCW 2009).

Woodland areas within the project area contained winter and spring flowering food tree species including *Corymbia citriodora* and *Eucalyptus siderophloia*. A small area also included *Melaleuca quinquenervia*.

Accordingly, all predicted foraging habitat is considered habitat critical to the survival of the species.

No suitable roosting habitat is present within the project area, with the nearest roosting camps being located approximately 5 km west of the project area at Mt Warren Park (Figure 4-4).

4.4.7 Threatening processes

Threatening processes for the grey-headed flying-fox include (DoE, 2020):

– Habitat loss and fragmentation
– Exploitation, particularly in commercial fruit growing areas
– Competition and hybridisation
– Pollutants, electrocution and pathogens.

4.4.8 Potential impacts

Potential impacts on grey-headed flying-fox populations and habitat within the proposed development include:

– Loss of habitat
– Injury and mortality
– Habitat degradation by increased dust run-off and sedimentation
– Disturbance to wildlife through increased light, noise and vibration

These are discussed below.

4.4.8.1 Loss of habitat

The proposed development is anticipated to result in the loss of 4.80 ha of grey-headed flying-fox foraging habitat.

Due to the presence of winter and spring flowering food tree species, habitat is considered habitat critical to the survival of the species.

4.4.8.2 Injury and mortality

Vegetation clearance during construction has the potential to cause injury and mortality of local fauna foraging in trees. Increased traffic during the construction phase may also increase local incidence of fauna injury and mortality. These risks are unlikely to represent a substantial impact for the grey-headed flying-fox, given the species does not roost within the project area and vegetation clearing will be restricted to daylight hours.

4.4.8.3 Disturbance to wildlife through increased light, noise and vibration

Clearance of vegetation has the capacity to cause indirect disturbance to wildlife due to an increase in the exposure to light, noise and vibration. Consequentially, this has the potential to adversely impact native wildlife through the disruption of foraging, breeding and nesting behaviours (Longcore and Rich, 2004; Slabbekoorn et al. 2010; Popper and Hawkins, 2016). Construction will result in a small, localised increase in vehicle movements in the short-term. This will cause a minor increase in light, noise and vibration disturbance on local wildlife. Given no grey-headed flying-fox camps are known to occur within or adjacent to the project area, it is unlikely that there will be major impacts from daytime construction activities to the species.

4.4.8.4 Habitat degradation by increased dust, run-off and sedimentation

Construction activities have the potential to generate localised dust, erosion, run-off and sedimentation through increased vehicle movements, clearance of vegetation and earthworks. This can reduce the abundance and diversity of adjacent terrestrial and aquatic habitats by physically smothering vegetation, changing nutrient levels, impeding the growth and germination of plant species, encouraging weed incursions and altering the movement and behaviour of fauna species. Foraging habitats for the grey-headed flying-fox are considered habitat critical to the survival of the species. Localised degradation of that habitat would have the potential to reduce the quality and availability of local foraging habitats within the construction period.

4.4.9 Measures to avoid, reduce or mitigate impacts

This section outlines the mitigation measures to be adopted by Visy during the design, construction, and operational phase to mitigate potential impacts associated with:

– Loss of habitat
– Increased fragmentation of remaining koala habitat in the local region and restriction of koala movement
– Injury and mortality
– Habitat degradation by increased dust run-off and sedimentation
– Deterrent to koala movement through the landscape through an increase in noise, light and vibration and operation
– Increased spread and proliferation of invasive and intrusive species.

Refer to Table 4-10 below.

Table 4-10 Mitigation measures to adverse potential impacts to grey-headed flying fox

Mitigation measures	Potential impact addressed			
	Loss of habitat	Injury and mortality	Habitat degradation by increased dust run-off and sedimentation	Disturbance to wildlife through increased noise, light and vibration
Erosion and sediment controls will be developed as part of the CEMP.			X	
Routine dust suppression and monitoring will be undertaken throughout construction.			X	
Inspections/observations of air quality conditions will be undertaken during construction.			X	
Weather conditions will be monitored during the construction stage and temporary controls will be established during extreme weather events. Construction activities during adverse weather conditions will be managed in accordance with the CEMP.			X	
A Flora and Fauna Management Plan to be developed and include: – Details relevant to the general management of flora and fauna – Protocols to limit injury and mortality to fauna – A wildlife incident response procedure – Contact details for local wildlife carers and veterinary practices – Protocols for management of risks associated with open excavations and trenching	X	X		
All clearing must be supervised by a suitably qualified and experienced fauna spotter-catcher. This will involve searching areas of potential habitat prior to clearing and relocating any resident fauna to the nearest, suitable, safe habitat outside the clearing footprint.	X	X		
Clearing will be restricted to daylight hours to avoid impact on nocturnal species		X		X
Adverse incident response procedures will be developed to detail actions to be taken in the event of wildlife injury or mortality during clearing and included in the CEMP.		X		
A Traffic Management Plan is to be developed as part of the CEMP, which will include designated access routes, speed limits and identified sensitive ecological areas. Appropriate signage indicating traffic movements and speed restrictions will be erected during operation of the proposed development. A Traffic Management Plan will also manage vehicle movements and reduce unnecessary generation of vehicular noise.		X	X	X
Noise dampening devices are to be used on machinery wherever practicable. Equipment is to be turned off when not in use. Acoustic shielding should be maximised from existing topography and buildings and from structures and buildings associated with Visy. Onsite fabrication should be avoided where possible. The use of enclosures (e.g. well-sealed shed) may be an alternative, but ventilation should be adequate and not degrade the acoustic performance of the enclosure.				X
All construction vehicles will comply with maintenance schedules and operational restrictions designed to limit noise impacts during construction.				X
The extent of vegetation clearing will be clearly identified on construction plans and in the field using high visibility fencing or flagging. Exclusion fencing should be established between remaining buffer vegetation and cleared areas of the construction site. The clearing extent will be communicated to construction supervisors. If fencing or flagging is in poor condition, it will be replaced as soon as practicable to reduce the potential of accidental clearing.	X	X		

Pre-clearance surveys will be undertaken to mark the locations of potential grey-headed flying-fox habitat trees and will target specific areas of known and predicted habitat.	X	X		
A Waste Management Plan will be prepared as part of the CEMP. This will detail the location and specifications for disposal and removal of waste from the construction site.		X		
Educate all workers onsite regarding the presence of the EPBC Act and NC Act listed species, particularly species with increased risk of injury and mortality. Areas identified for vegetation clearance are to be clearly defined and detailed in site inductions.	X	X		X
Responsible waste management practices (e.g. not leaving out food waste and not feeding wildlife) will be implemented and followed by all construction personnel. All waste will be stored in secure temporary holding containers and transported off site. A suitable quantity of waste receptacles will be made available to contain rubbish and food scraps to restrict access by animals.		X		
Mapping of weed and pest hotspots prior to construction will be undertaken to develop effective management protocols and establish baseline information on existing weed and pest distribution.				
All construction personnel shall attend environmental training as part of site inductions, which will include weed and pest management. As part of this training, all personnel will be instructed on their responsibilities related to avoiding and minimising the introduction/attraction to the construction site of feral animals.			X	
Employees will not bring domestic animals to the site.		X		
Fencing will be established between remaining buffer vegetation and cleared areas of the site.	X	X		
Enforce on-site speed limits to restrict the incidence of vehicle strike.		X		
An area of vegetation buffer will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve. The vegetation buffer area has a total area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the area.	X	X		
Artificial site lighting will be kept to the minimum (security) required for safety. Placement and orientation of lighting to be directed away from sensitive fauna habitat.				X
Restricted access and protocols will be implemented for works near waterways, wetlands and other areas of high weed infestation. Machinery and vehicle weed wash down and certification procedures will be enforced for access to or movement between high risk areas.			X	
Rehabilitation/ landscaping of temporary construction areas will be undertaken as soon as practicable after clearing once these facilities are no longer required.			X	

4.4.9.1 Loss of habitat

The proposed development requires removal of vegetation within Lot 2 WD4654, which includes the unavoidable loss of areas of grey-headed flying-fox foraging habitat. The mitigation measures outlined in Table 4-10 will be used to minimise the potential impact to grey-headed flying-foxes. An area of vegetation buffer will be retained along the boundary of the project area adjoining Stapylton Jacobs Well Road reserve. The vegetation buffer area has a total area of 1.15 ha. Landscaping is also proposed in this area and will consist of native species endemic to the area.

4.4.9.2 Injury and mortality

The mitigation measures outlined in Table 4-10 will be implemented to minimise injury and mortality to the grey-headed flying-fox during construction of Project.

4.4.9.3 Habitat degradation by dust, run-off and sedimentation

The mitigation measures outlined in Table 4-10 will be used to minimise the impacts of dust, run off and sedimentation for the proposed development.

4.4.9.4 Disturbance to wildlife through increased light, noise and vibration

Routine mitigation measures should be undertaken to minimise the impact that noise, light, vibration and disturbance have on local grey-headed flying-fox populations, particularly in the vicinity of known grey-headed flying-fox habitat. The mitigation measures outlined in Table 4-10 will be used to minimise the impacts of light, noise and vibration.

5. Significance of impact assessment

This section presents the findings of the significant impact assessment for the koala and the grey-headed flying fox based on the potential impacts during the construction and operational phase and the mitigation measures to be adopted for the proposed development.

5.1 Koala

The significance of the proposed development's impacts on the koala has been assessed against the Significant Impact Guidelines 1.1 (DotE 2013) and is presented in Table 5-1. The proposed development is expected to result in the loss of approximately 4.80 ha of moderate value koala habitat and approximately 7.15 ha of low value movement habitat with either absent or scattered koala food trees within the cleared and grassy areas.

While the existing quality of habitat and the density of koalas is low to moderate, with no evidence of koalas across the project area, the severity and magnitude of impact is expected to increase the significance of the impact. In the context of the local landscape, where koala habitat is declining, habitat loss of this magnitude has the potential to constitute a significant impact to the species.

The proposed development has the potential to have a significant impact on the koala due to the loss of habitat within a landscape that is becoming increasingly fragmented. The method of clearing (i.e. clear-felling) and the intermediate magnitude of vegetation loss also increases the significance of the impact, such that the proposed development is considered to potentially have a significant impact on the koala.

Table 5-1 Significance of impact on the koala

Impact criteria	Potential to occur
Lead to a long-term decrease in the size of a population of the species	**Possible** The proposed development will result in the clear-felling of 4.80 ha of moderate value habitat (4.80 ha) represented the remnant and regrowth woodland areas that support suitable foraging, dispersal, and resting habitat for the species. These areas reflect the core koala habitat mapping. The proposed development will also involve the clear felling of low value habitat (7.15 ha) which is associated with the cleared and grassy areas, which have the potential to function as dispersal habitat for the species. Whilst low value habitat was generally devoid of mature vegetation, the Commonwealth definition of koala habitat it relatively broad and includes all areas in proximity to suitable habitat. The local landscape surrounding the project area has been extensively cleared and fragmented by historical land-clearing. Local koala habitats, including larger habitat remnants within Woolshed Parklands and Yellowood Reserve are highly constrained by surrounding development, with negligible connectivity to important koala populations to the north, south and west and exposure to high threat levels from vehicle collisions and dog attacks. While the magnitude of habitat loss is small and the value of habitats is considered low, (reduced by the abundance of dense Acacia regrowth and invasive species (i.e., lantana), in the context of the landscape, where local habitat is limited, the loss of habitat has the potential to reduce the viability of local koala populations.
Reduce the area of occupancy of the species	**Unlikely** The proposed development is unlikely to reduce the area of occupancy for the koala. A species area of occupancy is defined as the area within its 'extent of occurrence' which is occupied by a taxon, excluding cases of vagrancy (IUCN, 2012). Under the IUCN Guidelines a 2 km^2 grid-size is recommended to calculate area of occupancy. Using these guidelines, the proposed development is unlikely to reduce the species area of occupancy. The proposed development resides within 1 grid square, with impacts to only a small amount of suboptimal suitable habitat (11.95 ha). Whilst this represents the removal of all vegetation within the project area, this loss is relatively small when assessed at a landscape scale. Large patches of remnant vegetation exist within the Yellowood Reserve and south along Sandy Creek. Considering movement between these two areas is maintained by alternative corridors, the proposed works are unlikely to reduce the extent of occurrence of the species.
Fragment an existing population into two or more populations	**Unlikely** As previously mentioned, the project area contains a mix of sub-optimal foraging and resting habitat for the koala, degraded mostly by invasive species, dense acacia regrowth, introduced predators and a busy road network. Furthermore, patches of neighbouring vegetation remain connected at various locations within the surrounding landscape. Eucalypt regrowth situated along the northern boundary of the proposed development (along Staplyton Jacobs Well Road) will be retained to facilitate ongoing dispersal for the species. Therefore, although the removal of vegetation is likely to reduce the species dispersal capabilities, the proposed works are unlikely to fragment an existing important population into two or more populations.

Impact criteria	Potential to occur
Adversely affect habitat critical to the survival of a species	**Likely** The proposed development is likely to have an adverse impact on habitat critical to the survival of the species. The proposed development will result in the clear-felling of approximately 11.95 ha of habitat critical to the survival of the koala. This includes areas that represent suitable foraging habitat for the species, as well as areas that contain low value habitat for koala, such as the cleared land with dense grass cover and absent or scattered trees, which would serve as movement habitat only. Considering the proposed development will require the removal of all vegetation within the proposed development footprint (11.95 ha moderate value and low value), the proposed works are likely to adversely affect habitat critical to the survival of a species.
Disrupt the breeding cycle of a population	**Unlikely** The proposed development is not expected to disrupt the breeding cycle of the population. The koala breeding season is generally between September and March, with females giving birth to single young between October and May (DAWE, 2022a). During the breeding season, males actively seek females and koala movements are more extensive. Potential disruption to breeding will be addressed with clearing planned to occur outside of peak breeding season (if possible) and standard best practice sequential clearing using suitable qualified koala spotters will be exercised.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** Although clearing will generate additional habitat fragmentation and reduce the area of available habitat at a local level, the extent of habitat disturbance is not likely to decrease the availability or quality of habitat available to the local population to the extent that the species will decline. Furthermore, increases in the level of noise at a local scale are anticipated to be short-term. Given the method of clearing, incorporating a mix of selective and sequential clearing under the direction of koala-specialist spotter-catchers, extent of historical clearing and lack of koala evidence within the proposed development area it is considered unlikely to have a significant adverse impact on habitat critical to the survival of the species in the context of the existing receiving environment.
Result in invasive species that are harmful to an endangered species becoming established in the endangered specie's habitat	**Unlikely** The project area already supports invasive species (e.g. domestic dogs) that are harmful to the local koala population. Feral animal control measures are recommended to be implemented throughout the duration of the proposed development and have been designed to mitigate such risks. There is also potential for the spread of invasive weeds during the construction phase. This potential will be addressed within the Environmental Management Plan (Construction) (EMP(C)) and could provide the opportunity to enhance the quality of the environment utilised by the koala by providing mitigation measures to combat introduced species. If mitigation measures are implemented correctly, the proposed development is unlikely to result in the introduction of invasive species that are harmful to the koala.
Introduce disease that may cause the species to decline	**Unlikely** The proposed development is not anticipated to introduce new diseases that may cause the species to decline. However, stress may lead to an increase in the expression of chlamydia in nearby koala populations. A recent study by Biolink (2019) in the neighbouring Redland City Council LGA reported disease to be the largest contributed to koala reductions in the past three years, with large numbers (n = 2,292) euthanised between 1997 and 2014. Mitigation measures have been recommended to reduce stress during proposed developments construction and operation, including sequential clearing, speed limits, the use of an experienced spotter-catcher during clearing and the requirement to allow koalas to self-disperse. Together, these measures are designed to reduce disturbance-related stress and risk of disease emergence and transmission. Additionally, the species is susceptible to *Phytophthora cinnamomi* due the soil fungus's ability to infect eucalypt species. Biosecurity requirements will be implemented throughout the proposed development footprint, and thus, this risk has been assessed as low.
Interfere with the recovery of the species	**Unlikely** The proposed development is not situated at the edge of the species distribution and is anticipated to result in only a relatively small reduction in the species habitat. Whilst this could be to the detriment of the local population (due to habitat loss and indirect impacts to habitat quality), the impacts are unlikely to be significant and will not interfere with the recovery of the species. The risk of koala mortality of injury will be managed by the mitigation measures contained within the EMP(C), and an experienced and suitably qualified fauna spotter-catcher will be employed during clearing of koala habitat. Given the low quality of habitat within the project area and the relative abundance of suitable habitat remaining within the region, the proposed development is not expected to interfere with the recovery of the species.

5.2 Grey-headed flying fox

An assessment of the significance of the proposed development's impacts on the grey-headed flying-fox were assessed against the Significant Impact Guidelines 1.1 (DoE, 2013) and outcomes provided in Table 5-2.

Based on the outcomes of the significant impact assessment, the proposed development is considered **unlikely** to have a significant impact on the grey-headed flying-fox.

Table 5-2 Significance of impact on the grey-headed flying-fox

Impact criteria	Potential to occur
Lead to a long-term decrease in the size of an important population of the species	**Unlikely** For the purposes of assessment under the EPBC Act, the grey-headed flying-fox is considered to be one national intermixing population (DoE 2018). As such, the concept of 'important populations' does not apply. The project area provides suitable foraging habitat for the grey-headed flying-fox but does not support a resident breeding colony. Three flying-fox camps are known to occur within the region, which is situated in Warren Park (approx. 5 km northwest of the project area). Flying foxes from these camps are likely to periodically move through and forage within the project area.
Reduce the extent of occurrence of the species	**Unlikely** The proposed development will cause the direct loss of approximately 7.22 ha of predicted foraging habitat for the grey-headed flying-fox. This represents only a small amount of habitat available within a 2 km radius of the project area. Whilst the removal of a maximum 7.22 ha of potential foraging habitat will reduce the availability of foraging resources on a localised scale, this would not cause the species to disappear from an area of sufficient size to reduce the area of occupancy of the species (i.e., from a 2 km x 2 km area).
Fragment an existing important population into two or more populations	**Unlikely** The grey-headed flying-fox is considered to be one, national intermixing population, with the capacity to overfly open areas of cleared land when migrating or foraging locally. As a result, any localised clearing within the project area would have no capacity to restrict movement at a scale that could fragment the population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Unlikely** Winter and spring flowering species are noted as critical habitat to the survival of the species. No communities dominated by winter / spring flowering eucalypts were reported within the project area, however *Eucalyptus siderophloia* (northern grey ironbark) was recorded within the remnant woodland in low densities. Although this species is known to flowering during winter / spring, it was present in low densities and the project area is unlikely to represent critical habitat for the grey-headed flying fox.
Disrupt the breeding cycle of an important population	**Unlikely** The proposed development is not expected to disrupt the breeding cycle of the local population. No breeding colonies occur within the project area. The nearest breeding camps occurs at Warren Park, 5 km northwest north of the project area. Mating commences in early autumn, with young produced in October. Although construction will likely be timed for this period to avoid other environmental impacts (including fauna breeding cycles), no breeding habitat has been recorded within the project area.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** The proposed development will result in the loss of approximately 7.22 ha of suitable foraging habitat for the grey-headed flying-fox. However, due to the low current utilisation of the project area by the species and the lack of suitable breeding habitat within the project area, the proposed development is unlikely to significantly impact grey-headed flying-fox habitat to the extent the species is likely to decline.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species habitat	**Unlikely** No invasive species are known or considered likely to present a threat to the ecology of the grey-headed flying-fox. No feral predators are known to adversely impact the species. The proposed development is therefore not expected to result in establishment of invasive species that have the potential to harm the grey-headed flying-fox.
Introduce disease that may cause the population to decline	**Unlikely** Disease is not a listed threat for this species. The proposed development is not expected to introduce any diseases that may cause the species to decline.
Interfere with the recovery of the species	**Unlikely** Given that the species is highly mobile and moves with the availability of resources, and the loss of predicted foraging habitat represents such a small percentage of regional available habitat, the proposed development is not expected to interfere with the recovery of the species.

6. Conclusion

This report has been prepared to identify and assess any potential impacts to MNES from activities associated with the construction and operation of the proposed development. This report specifically determines whether any activities associated with the proposed development are likely to have a significant impact on MNES. The findings of ecological assessment have shown that the proposed action will result in the removal of approximately 11.95 ha (4.80 ha moderate value and 7.15 ha is low value) of local koala habitat from a local landscape in which koala habitat has been extensively cleared and fragmented by historical land-clearing. The proposed action will also result in the clear of foraging habitat (4.80 ha) of grey-headed flying-fox. The EPBC Act referral relates to Stage 1 of the process only, as Stage 1 involves the clearing of vegetation within the project area.

A significance of impact assessment was undertaken of the proposed development's potential impacts on MNES that are considered likely to occur within the project area. The assessment was made against the EPBC Act Significant Impact Guidelines 1.1 (DoE 2013) and determined that the proposed development has potential to result in significant impacts on the koala (*Phascolarctos cinereus*), which is listed as endangered under the EPBC Act. Therefore, the proposed development will be referred to DAWE and undergo the referral and assessment process under the EPBC Act.

Extensive ecological assessment was completed for the project area and determined that whilst the koala was not observed during field ecological surveys of the project area, the proposed development proposes to clear an area of approximately 11.95 ha of low to moderate value koala habitat. This loss of habitat within a landscape that is becoming increasingly fragmented, combined with the method of clearing (i.e. clear-felling), determined that the proposed development has potential to have a significant impact on the koala.

The proposed development will also result in the loss of approximately 4.80 ha of suitable foraging habitat for the grey-headed flying-fox. However, due to the low current utilisation of the project area by the species and the lack of suitable breeding habitat within the project area, the proposed development is unlikely to significantly impact grey-headed flying-fox habitat to the extent the species is likely to decline. The proposed localised clearing within the project area is not considered to restrict movement at a scale that could fragment the population into two or more populations.

Visy is the largest manufacturer of glass containers in Australia-New Zealand, making around 3.4 billion bottles and jars each year. The proposed Glass Recycling and Manufacturing Facility at Stapylton will replace Visy's existing South Brisbane glass manufacturing plant and integrate glass recycling and warehousing with manufacturing as a single facility. The design of the proposed development has considered the outcomes of the ecological assessments to propose design measures to reduce/minimise adverse impacts to ecological values. As part of the design Visy has also incorporated a vegetation buffer on the western boundary of the proposed development area and the natural vegetation will be retained in this area (referred to as the vegetation buffer area). Landscaping is also proposed within the proposed development area which will incorporate native vegetation. The vegetation buffer area has a total area of 1.15 ha.

Mitigation measures have also been developed for the construction phase and will be captured in a Construction Environmental Management Plan (CEMP). The key mitigation measures include:

– A Flora and Fauna Management Plan to be developed and implemented and will include a Koala Management Plan.
– A tree survey plan has been undertaken for the project development to quantify impacts to non-juvenile koala habitat trees and koala habitat values and to identify the location of trees to be retained and removed.
– A High-Risk SMP will be required for tampering with special least concern breeding places in accordance with the requirements of Section 332 of the Nature Conservation (Wildlife Management) Regulation 2006.
– Pre-clearance surveys for animal breeding places and resident animals by a qualified fauna spotter-catcher, with relocation of animals to suitable habitat areas in the region.
– Clearing will be undertaken in accordance with the Nature Conservation (Koala) Conservation Plan 2017. Sequential clearing practices and the use of suitably qualified koala spotters will ensure koalas (if present) are given the opportunity to move out of the area prior to commencement of clearing.

Visy has identified that there is a fundamental need to modernise its existing South Brisbane's glass recycling and manufacturing facility and therefore to relocate Visy's existing South Brisbane glass manufacturing facility to the project area. This will ensure continuity of container glass supply for customers in South East Queensland and the investment will also ensure local glass manufacturing capacity can cater for sustainable growth as the Queensland market continues to expand.

The project area is recognised as an ideal location to develop the glass recycling and manufacturing facility, given that is located adjacent to Visy's existing can manufacturing and cardboard box manufacturing facilities, located in an industrial zone and is within the Yatala-Stapylton-Beenleigh Regional Economic Cluster (REC) which the *Shaping SEQ* identifies "*represents a significant manufacturing cluster, with specialisation in priority sectors of integrated food and beverage supply chains, and transport and logistics.*"

The proposed development will provide strong employment opportunities within the Yatala and Stapylton region, contributing to the local economy with jobs focused on modern manufacturing. Employment that is consistent and reliable, given the 24/7 needs of the facility, also contribute to stability for a workforce.

The establishment of the glass recycling and manufacturing facility will secure glass manufacture as a sustainable packaging substrate in South East Queensland for the long term. The size and scale of the proposed development is consistent with a commitment by Visy over many decades to meet beverage customer needs and growth aspirations.

The investment represents a transformation for glass manufacturing in Queensland. By its nature it is long term, with significant benefits on a socio-economic basis for the region, whilst also contributing to Visy's commitment to continue to Close the Loop on Glass and increase the average recycled content of container glass from the current 30% to 70%. This will support Qld's strategy to move towards a circular economy for waste as outlined in the *Waste Management and Resource Recovery Strategy (Queensland Government 2019)*.

7. References

Department of Agriculture, Water and the Environment (DAWE) (2020) *Species Profile and Threats Database*, Accessed May 2020. Department of Agriculture, Water and the Environment Available from: http://www.environment.gov.au/cgibin/ sprat/public/sprat.pl

Department of Agriculture, Water and the Environment (DAWE) (2021a), *National Recovery Plan for the Koala:* Phascolarctos cinereus *(combined populations of Queensland, New South Wales and the Australian Capital Territory)*, 2021. Department of Agriculture, Water and the Environment, Canberra, CC BY 4.0.,

Department of Agriculture, Water and the Environment (DAWE) (2021b), *National Recovery Plan for the Grey-headed Flying-fox 'Pteropus poliocephalus'*, Department of Agriculture, Water and the Environment, Canberra, March. CC BY 4.0.

Department of Environment and Science (DES) (2020a) Flora Survey Guidelines, Protected Plants, Version 2.0. Report prepared for the State of Queensland. Accessed August 2021.

Department of Environment and Science (DES) (2020b) South East Queensland Koala Conservation Strategy 2020–2025. Report prepared for the Commonwealth of Australia.

Department of the Environment (DotE) (2013) Significant Impact Guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia

Department of the Environment (DotE) (2014) EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory). Commonwealth of Australia.

Abbott, I. (1982). Birds recorded on 22 tropical islands of Western Australia. Corella. 6:119-122.

Bamford, M.J. (1988). Kakadu National Park: a Preliminary Survey of Migratory Waders, October/November 1987. RAOU Report Series. 41:1-34. Melbourne: Royal Australasian Ornithologists Union.

Barker, R.D. & W.J.M. Vestjens (1989). The Food of Australian Birds. 1 Non-Passerines. Lyneham, ACT: CSIRO.

Eby, P. (1996). *Interactions between the Grey-headed Flying-fox Pteropus poliocephalus (Chiroptera: Pteropodidae) and its diet plants-seasonal movements and seed dispersal*. Ph.D. Thesis. Armidale, NSW: University of New England.

Hero, Jean-Marc & Hodgkison, Simon & Hazell, Donna (2004). Winners and Losers: The impacts of modifying natural landscapes on amphibian & reptile assemblages in eastern Australia.

Longcore, T. and Rich, C. (2004). Ecological light pollution. *Frontiers in Ecology and the Environment*, Vol 2 (4), pp. 191-198.

Nelson, J.E. (1965). Movements of Australian flying foxes (*Pteropodidae: Megachiroptera*). *Australian Journal of Zoology*. 13:53-73.

Parry-Jones, K. and M. Augee (1992). Movements of Grey-headed Flying-foxes *(Pteropus poliocephalus)* to and from a Colony Site on the Central Coat of New South Wales. *Wildlife Research*. 19:331-340.

Phillips, S. and Callaghan, J. (2011). The Spot Assessment Technique: A tool for determining localised levels of habitat use by koalas *Phascolarctos cinereus*. *Australian Zoologist* 35 (3): 774-780.

Popper, A. and Hawkins, A. (2016). *The effects of noise on aquatic life* (Vol. 730). Springer Science and Business Media: New York, USA.

Queensland Government 2019, *Waste Management and Resource Recovery Strategy*, accessed 8 February 2022, https://www.qld.gov.au/__data/assets/pdf_file/0028/103798/qld-waste-management-resource-recovery-strategy.pdf

Slabbekoorn, H., Bouton, N., van Opzeeland, I., Coers, A., ten Cate, C. and Popper, A.N. (2010). A noisy spring: the impact of globally rising underwater sound levels on fish. *Trends in ecology and evolution*, Vol 25 (7), pp. 419-427.

Spencer, H.J., C. Palmer and K. Parry-Jones (1991). Movements of fruit-bats in eastern Australia, determined by using radio-tracking. *Wildlife Research*. 18:463-468.

Stewart, D., A. Rogers & D.I. Rogers (2007). Species description. In: Geering, A., L. Agnew & S. Harding, eds. Shorebirds of Australia. Page(s) 75-196. Melbourne: CSIRO Publishing.

Van der Ree, R., J. McDonnell, I. Temby, J. Nelson and E. Whittingham (2005). The establishment and dynamics of a recently established urban camp of flying foxes *(Pteropus poliocephalus)* outside their geographic range. *Journal of Zoology*. 268:177-185. The Zoological Society of London.

Appendix A

Desktop search results

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates
Buffer: 2.0Km

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Summary

Matters of National Environmental 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:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	53
Listed Migratory Species:	17

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 environment anywhere.

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 Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	23
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	40
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Moreton bay	Within 10km of Ramsar

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.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community known to occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may 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 may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
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
Limosa lapponica baueri		
Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica		
Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis		
Australian Fairy Tern [82950]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster		
Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area
Fish		
Maccullochella mariensis		
Mary River Cod [83806]	Endangered	Translocated population known to occur within area
Frogs		
Mixophyes fleayi		
Fleay's Frog [25960]	Endangered	Species or species habitat may occur within area
Insects		
Argynnis hyperbius inconstans		
Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area
Phyllodes imperialis smithersi		
Pink Underwing Moth [86084]	Endangered	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may 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 [254]	Vulnerable	Species or species habitat likely to occur within area
Petaurus australis australis		
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
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 may occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Xeromys myoides		
Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat known to occur within area
Plants		
Acronychia littoralis		
Scented Acronychia [8582]	Endangered	Species or species habitat may occur within area
Arthraxon hispidus		
Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area
Baloghia marmorata		
Marbled Balogia, Jointed Baloghia [8463]	Vulnerable	Species or species habitat may occur within area
Corchorus cunninghamii		
Native Jute [14659]	Endangered	Species or species habitat likely to occur within area
Cryptocarya foetida		
Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may 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 may occur within area
Endiandra floydii		
Floyd's Walnut, Crystal Creek Walnut [52955]	Endangered	Species or species habitat likely to occur within area
Gossia gonoclada		
Angle-stemmed Myrtle [78866]	Endangered	Species or species habitat likely to 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 tetraphylla		
Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat may occur within area
Persicaria elatior		
Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
Planchonella eerwah Shiny-leaved Condoo, Black Plum, Wild Apple [17340]	Endangered	Species or species habitat likely to occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat may 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
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Tylophora woollsii [20503]	Endangered	Species or species habitat may occur within area
Reptiles		
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

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may 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
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		

Name	Threatened	Type of Presence
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to 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
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to 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 likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.	
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to 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
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		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
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to 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
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard, Northern Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove, Spotted Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda		Species or species habitat likely to occur

Name	Status	Type of Presence
[18913]		within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-27.72469 153.2495

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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Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest
Lot: 2 Plan: SP189558

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

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The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.

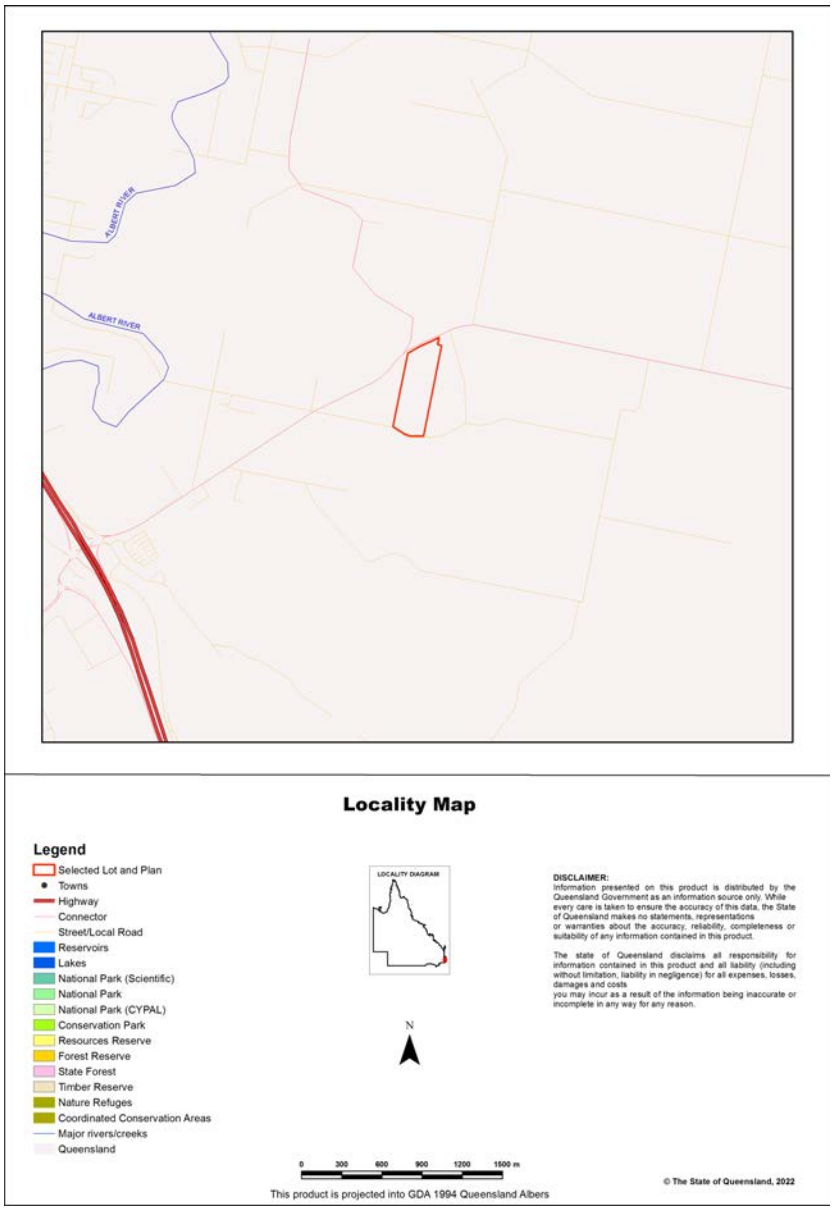
Table of Contents

Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI Lot: 2 Plan: SP189558

Size (ha)	16.05
Local Government(s)	Gold Coast City
Bioregion(s)	Southeast Queensland
Subregion(s)	Sunshine Coast - Gold Coast Lowlands, Burringbar - Conondale Ranges
Catchment(s)	Logan-Albert



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992* ;

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004* ;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

    • Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;

    • Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;

    • Category R areas on the regulated vegetation management map;

    • Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;

    • Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;

- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
1c Protected Areas- special wildlife reserves	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	0.0 ha	0.0 %
5 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways **	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0.0 ha	0.0 %
7b Special least concern animals	0.0 ha	0.0 %
7c i Koala habitat area - core (SEQ)	0.0 ha	0.0 %
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0.0 ha	0.0 %
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0.0 ha	0.0 %
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0.0 ha	0.0 %
8d Regulated Vegetation - Essential habitat	0.0 ha	0.0 %
8e Regulated Vegetation - intersecting a watercourse **	0.0 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0.0 ha	0.0 %
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 ha	0.0 %

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(no results)

1b. Protected Areas - nature refuges

(no results)

1c. Protected Areas - special wildlife reserves

(no results)

2. State Marine Parks - highly protected zones

(no results)

3. Fish habitat areas (A and B areas)

(no results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(no results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii		V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Melaleuca irbyana		E	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	V	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Xeromys myoides	Water Mouse	V	None

**For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.*

Threatened (endangered or vulnerable) wildlife species records

(no results)

Special least concern animal species records

(no results)

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:
https://www.qld.gov.au/environment/plants-animals/species-list/

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:
https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/
For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:
https://environment.ehp.qld.gov.au/regional-ecosystems/

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Not applicable

8e. Regulated Vegetation - intersecting a watercourse**

(no results)

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets

9a. Legally secured offset areas - offset register areas

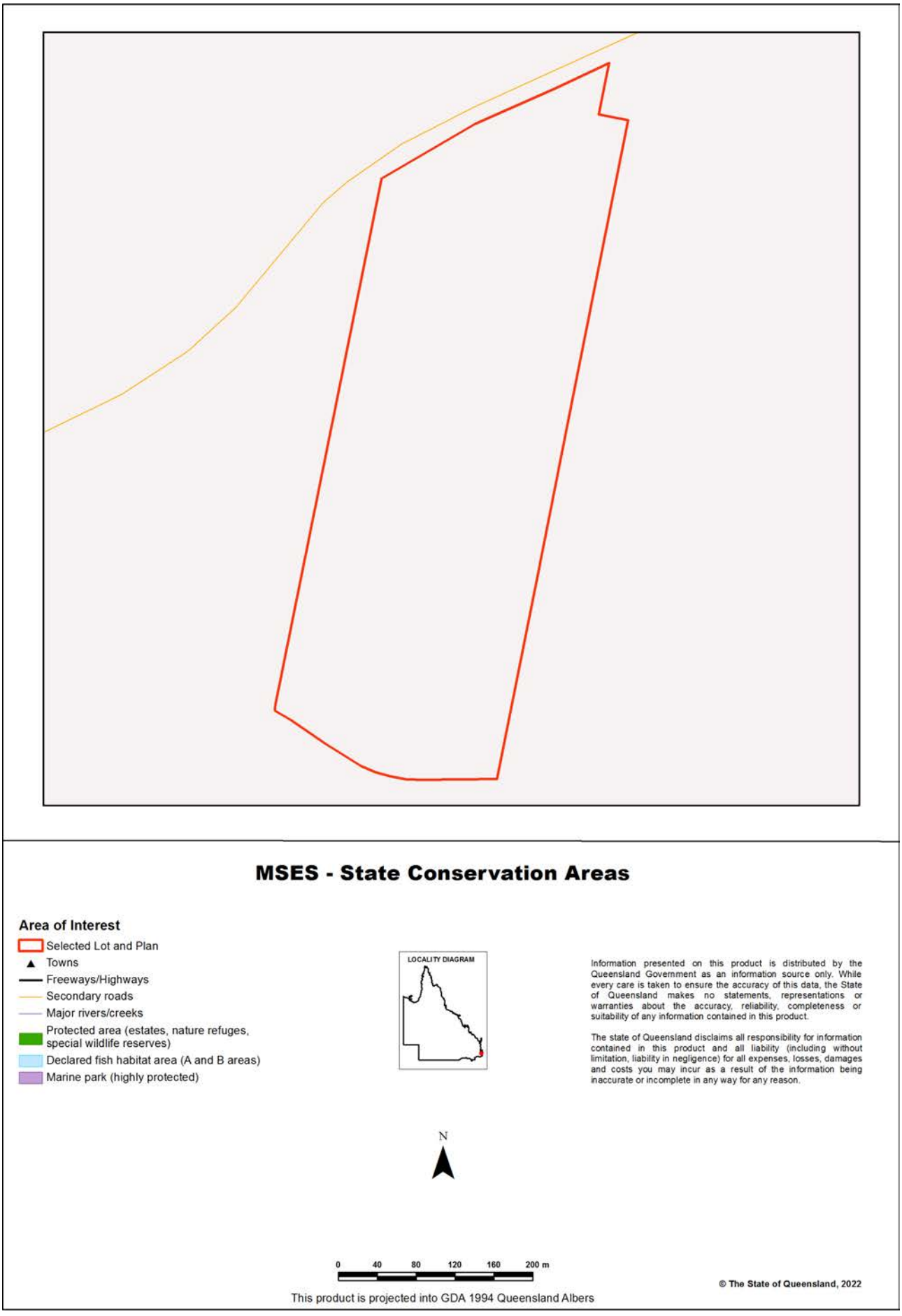
(no results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

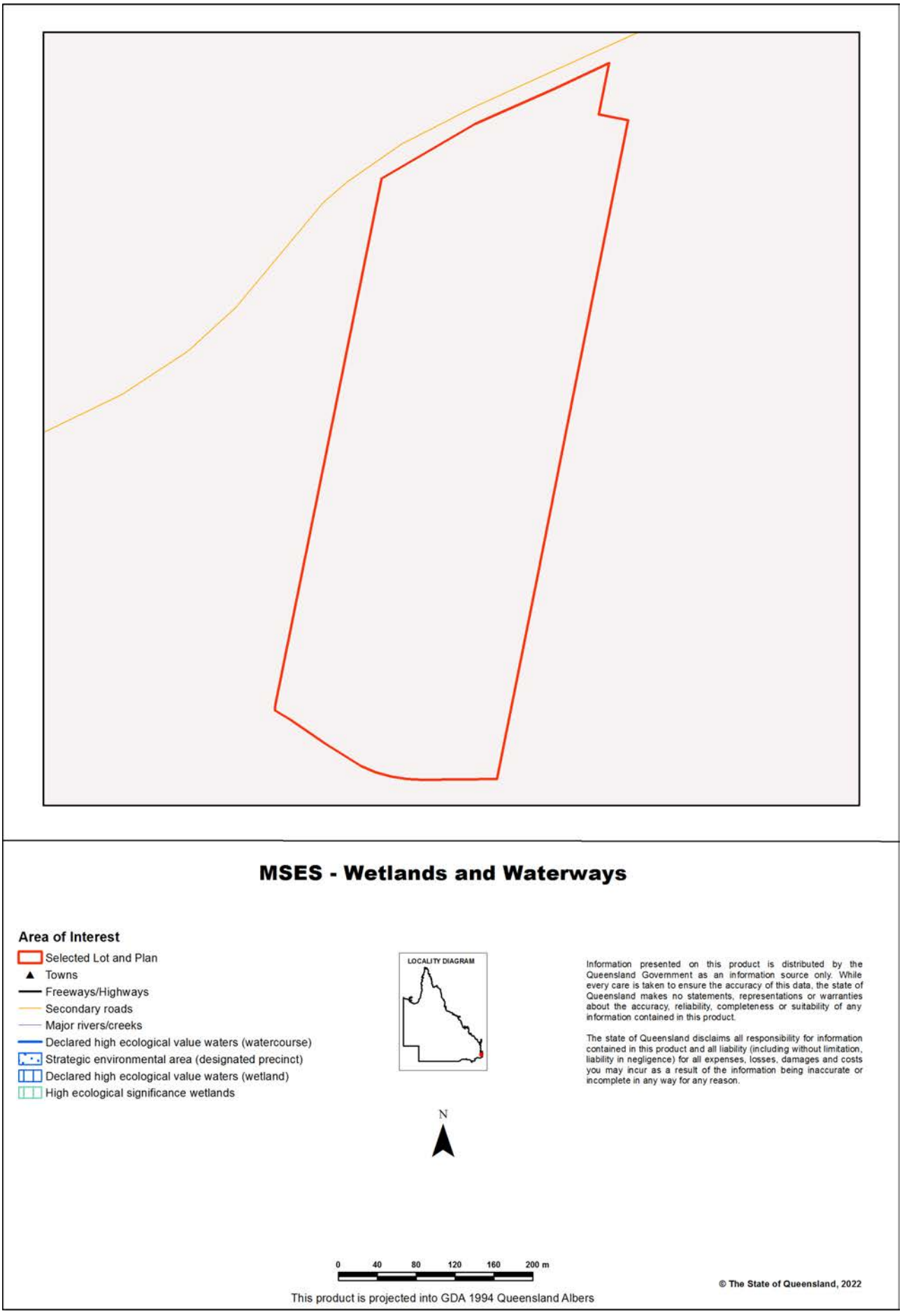
(no results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

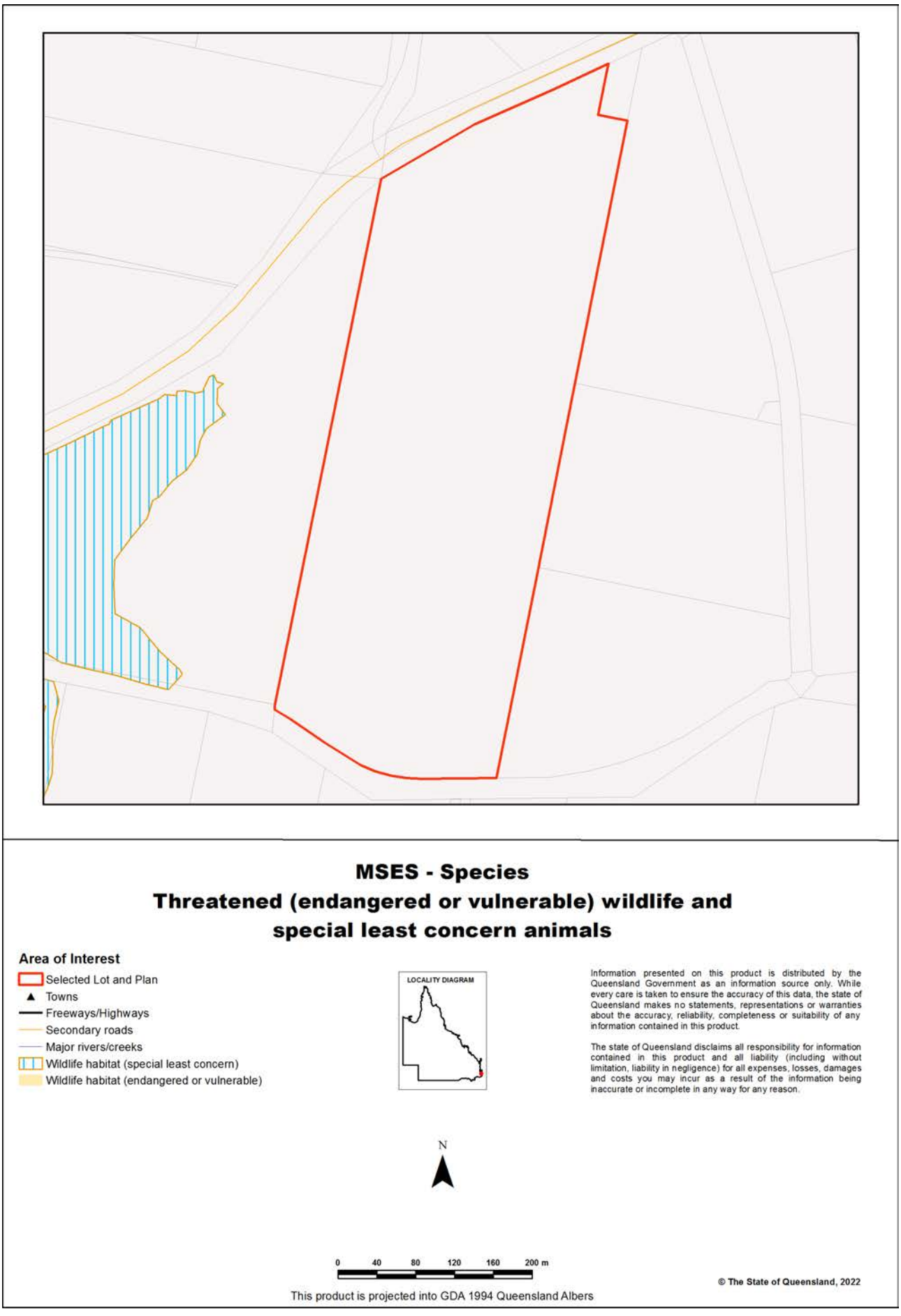
Map 1 - MSES - State Conservation Areas



Map 2 - MSES - Wetlands and Waterways



Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals

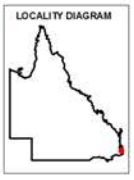


Map 3b - MSES - Species - Koala habitat area (SEQ)

MSES - Species
Koala habitat area (SEQ)

Area of Interest
- Selected Lot and Plan
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)

LOCALITY DIAGRAM



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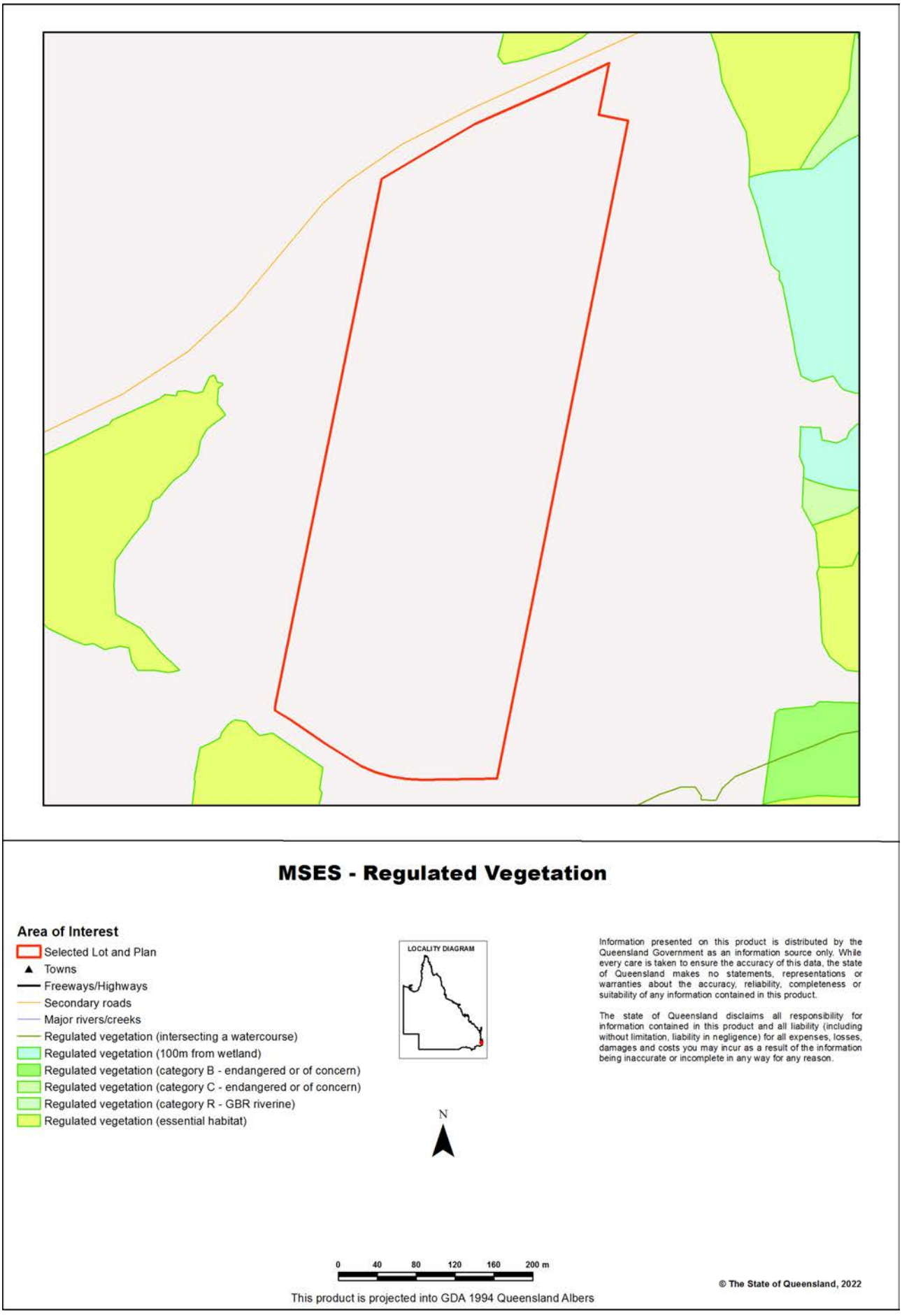
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

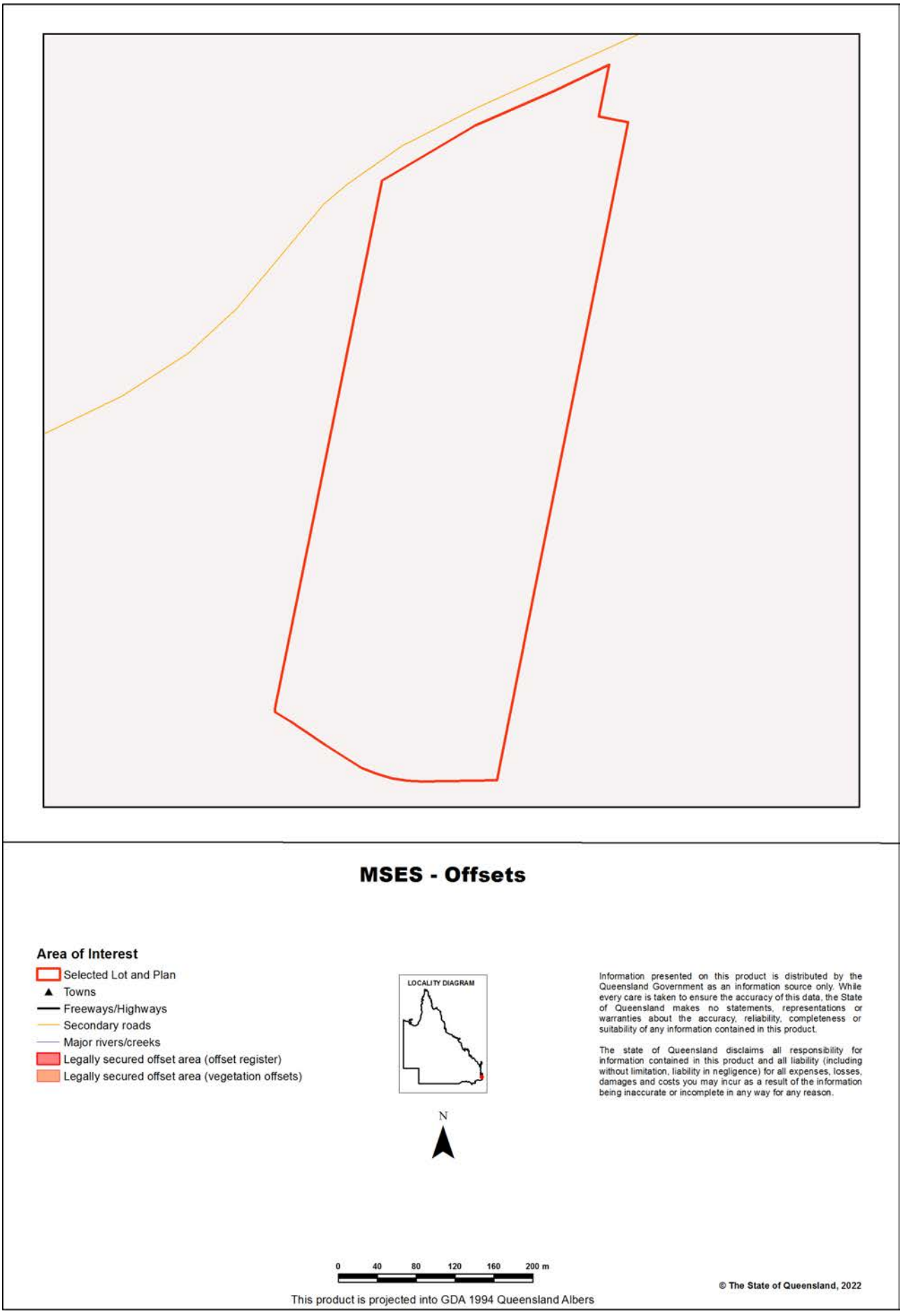
0 40 80 120 160 200 m

This product is projected into GDA 1994 Queensland Albers

Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" can be downloaded from:

http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html .

Appendix 2 - Source Data

The datasets listed below are available on request from:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DES	- Department of Environment and Science
EP Act	- *Environmental Protection Act 1994*
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- *Vegetation Management Act 1999*

Queensland Government

Department of Environment and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
Lot: 2 Plan: SP189558

Environmental Reports - General Information

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The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no matters of interest have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website https://www.dnrme.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.

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Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details: Lot: 2 Plan: SP189558

Size (ha)	16.05
Local Government(s)	Gold Coast City
Bioregion(s)	Southeast Queensland
Subregion(s)	Sunshine Coast - Gold Coast Lowlands, Burringbar - Conondale Ranges
Catchment(s)	Logan-Albert

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	0.0	0.0
No concern at present	0.0	0.0
Total remnant vegetation	0.0	0.0

Refer to **Map 2** for further information.

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

https://www.dnrme.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
non-remnant	None	None	16.05	100.03

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
non-remnant	None	None	None	None

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
non-remnant	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
None	None	16.05	100.03

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

https://publications.qld.gov.au/dataset/redd/resource/

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

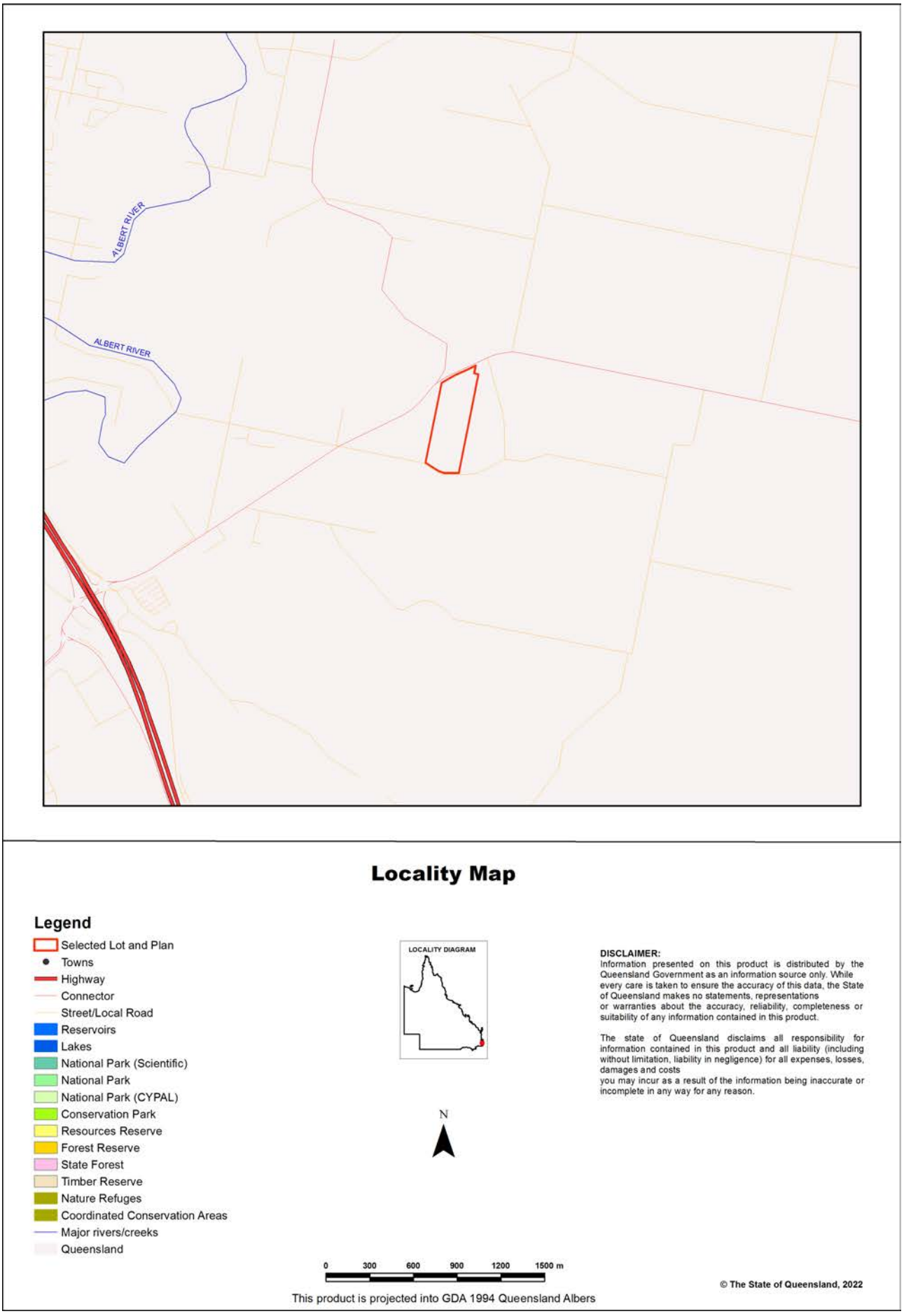
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

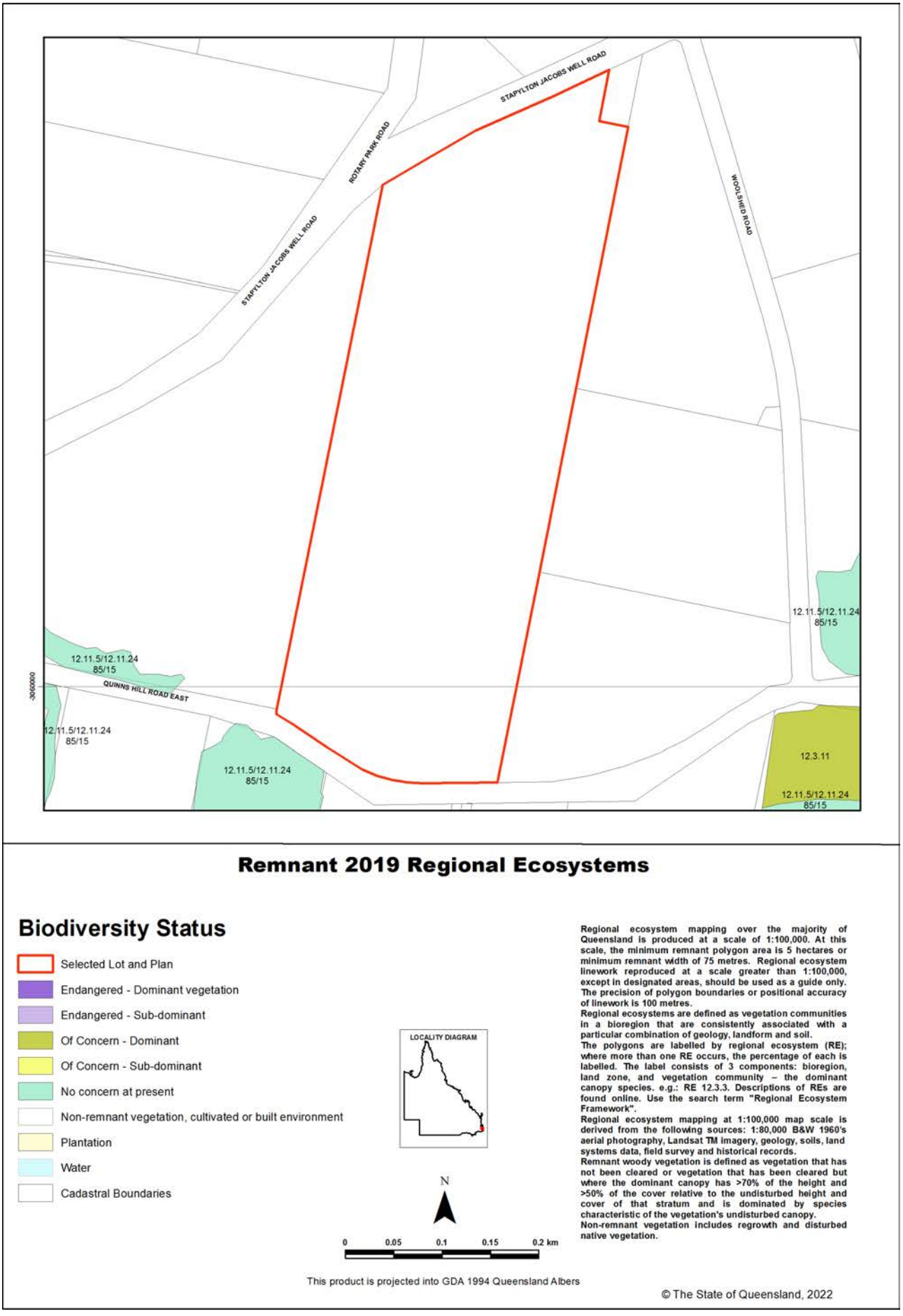
Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
non-remnant	Not currently available	Not currently available

Maps

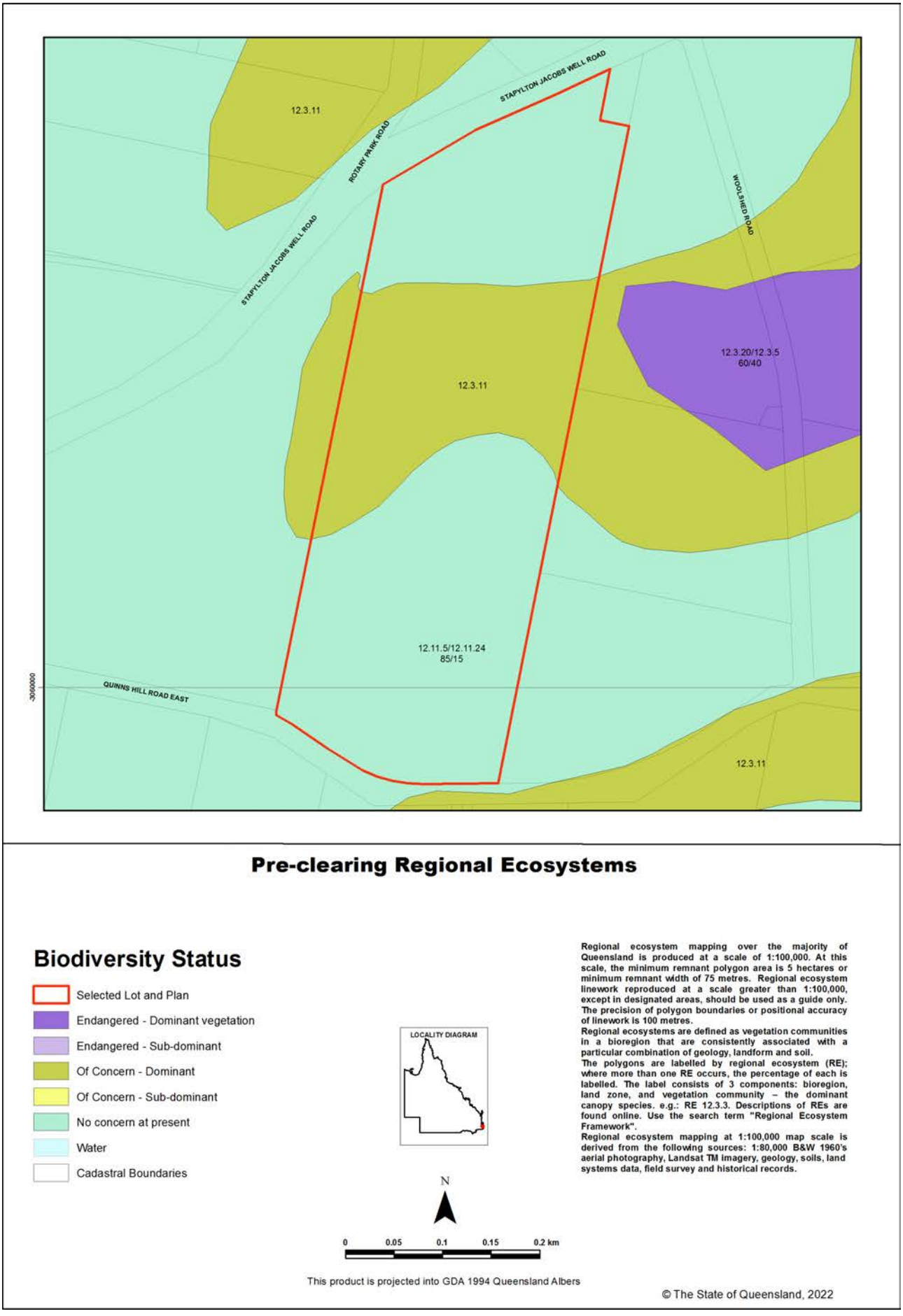
Map 1 - Location



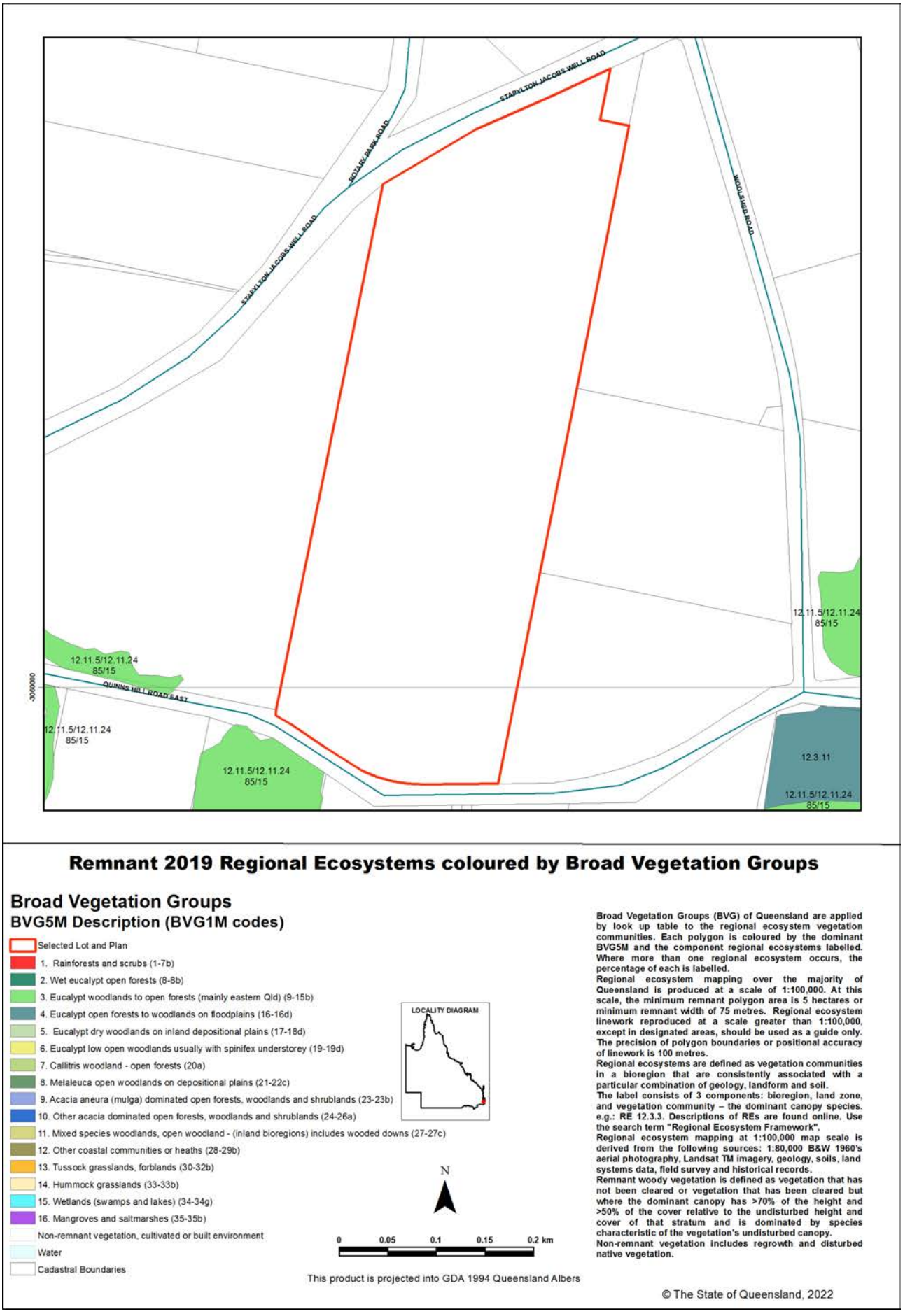
Map 2 - Remnant 2019 regional ecosystems



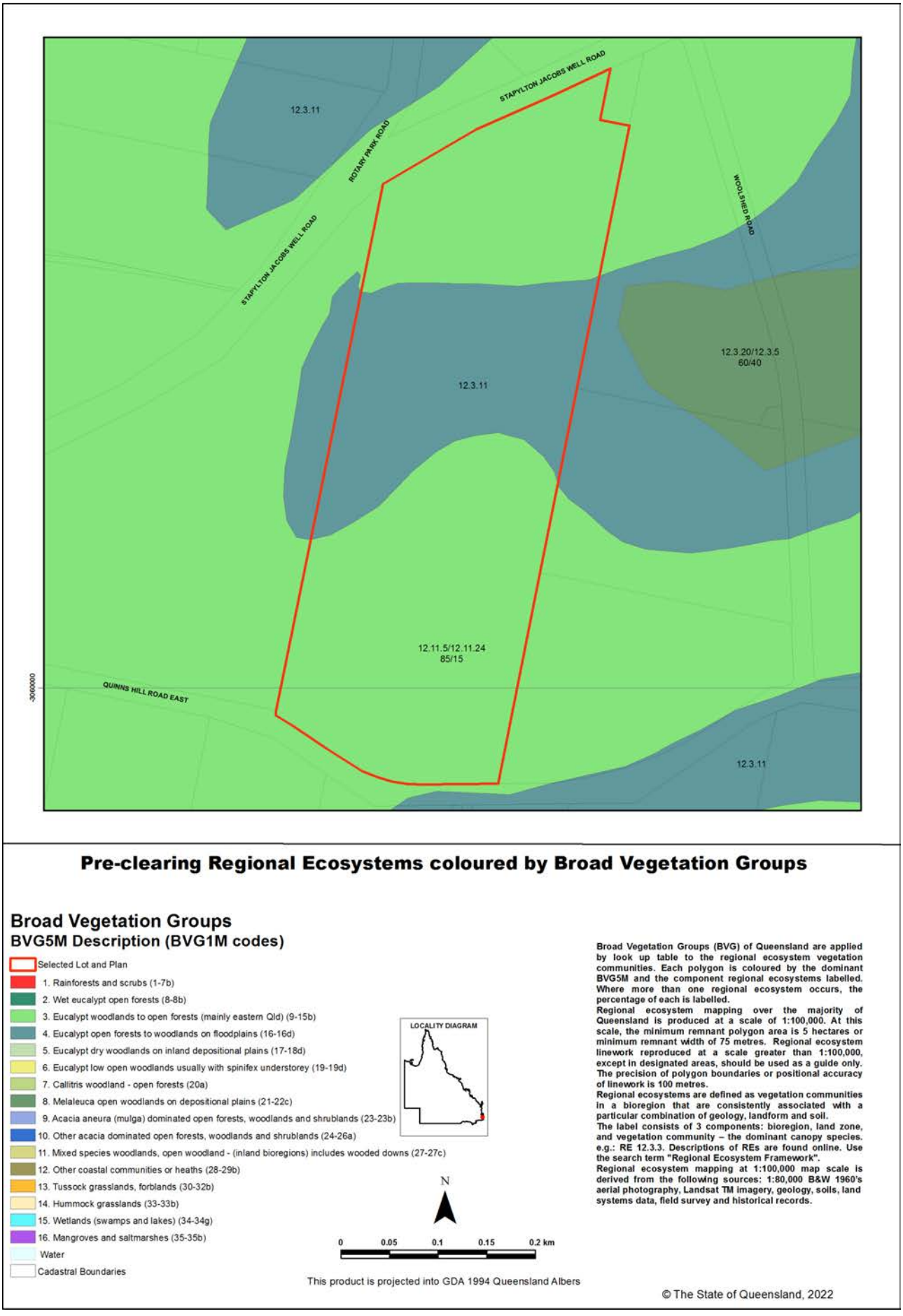
Map 3 - Pre-clearing regional ecosystems



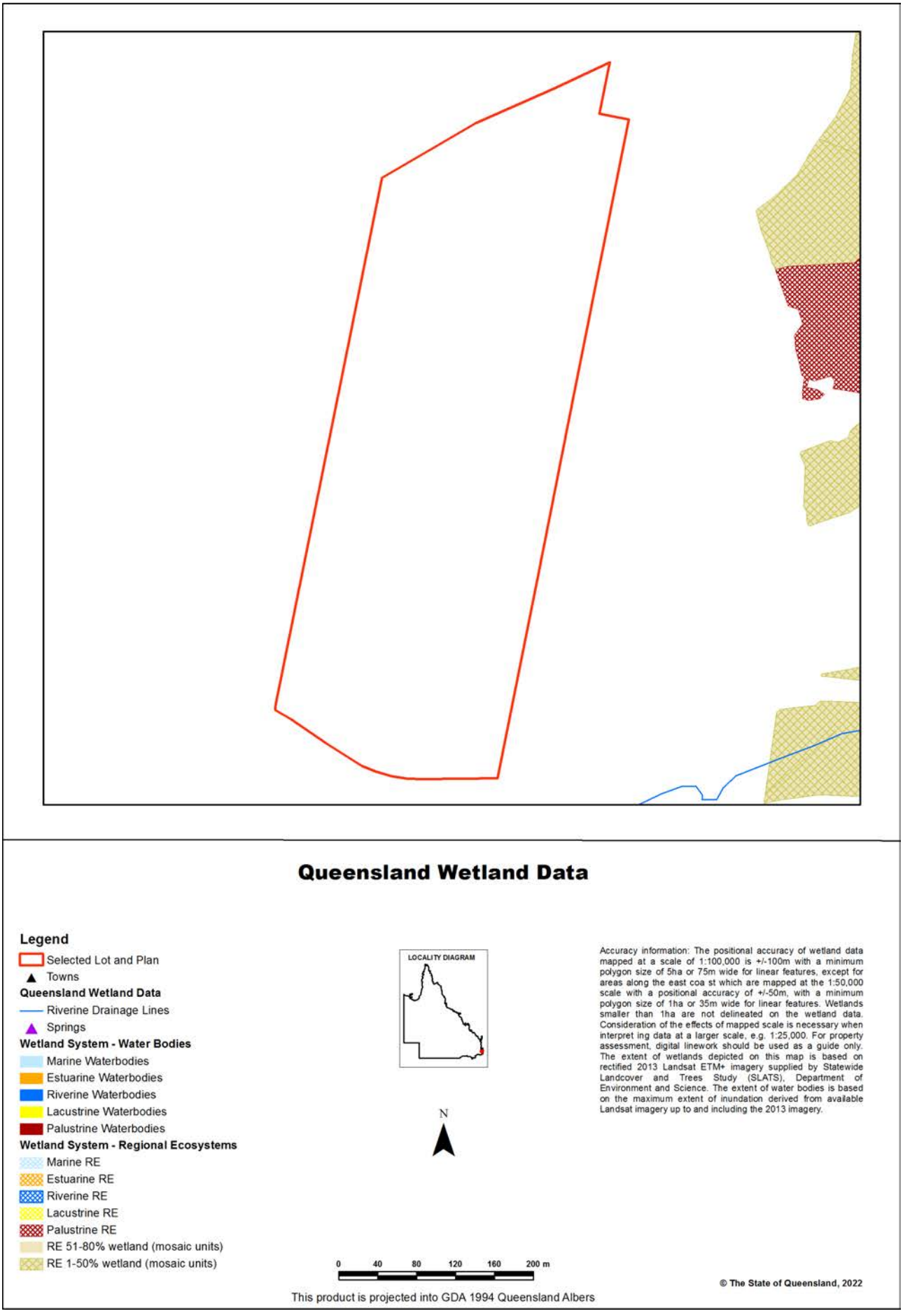
Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Map 6 - Wetlands and waterways



Links and Other Information Sources

The Department of Environment and Science's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

The methodology for mapping regional ecosystems can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

http://www.dnrm.qld.gov.au/mapping-data/queensland-globe

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

(https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

(https://publications.qld.gov.au/dataset/redd/resource/6dee78ab-c12c-4692-9842-b7257c2511e4)

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

Appendices

Appendix 1 - Source Data

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest
Lot: 2 Plan: WD4654

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

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Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

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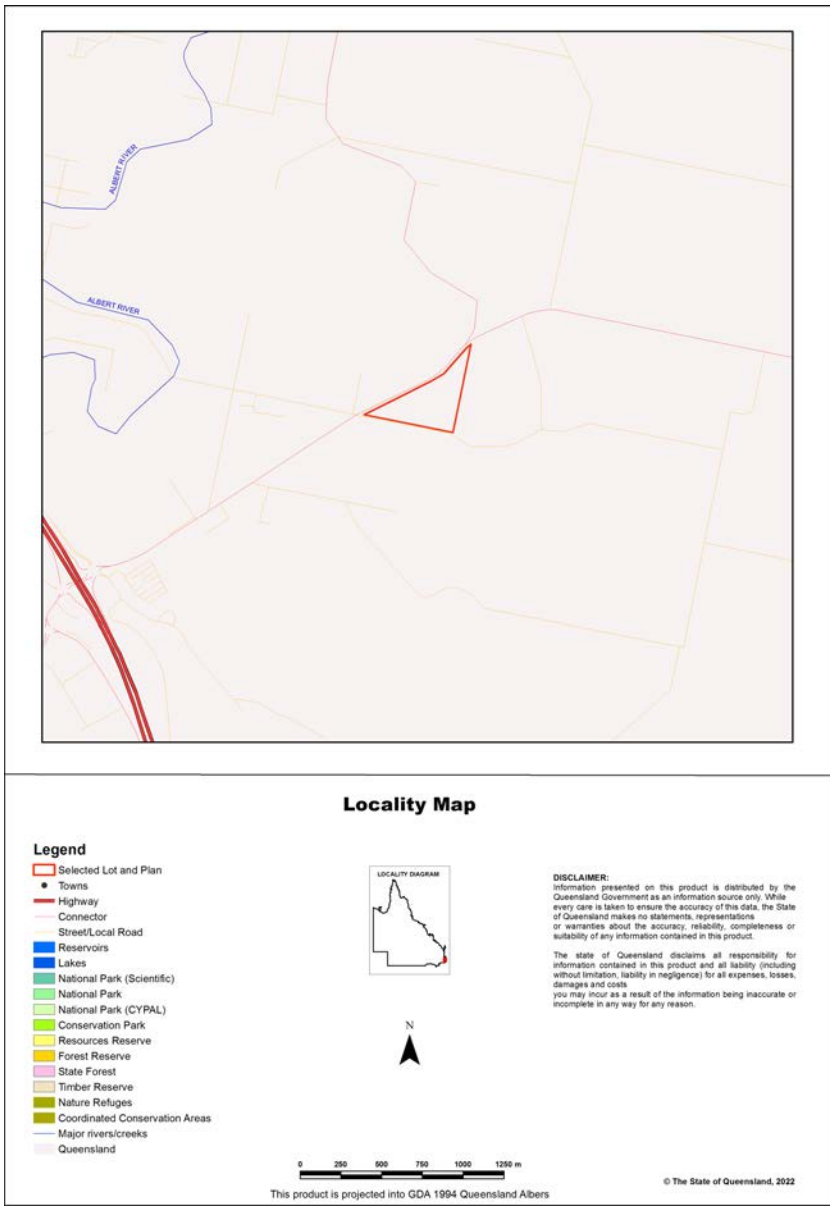
Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI Lot: 2 Plan: WD4654

Size (ha)	12.95
Local Government(s)	Gold Coast City
Bioregion(s)	Southeast Queensland
Subregion(s)	Sunshine Coast - Gold Coast Lowlands, Burringbar - Conondale Ranges
Catchment(s)	Logan-Albert



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992* ;

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004* ;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

    • Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;

    • Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;

    • Category R areas on the regulated vegetation management map;

    • Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;

    • Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;

- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
1c Protected Areas- special wildlife reserves	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	0.0 ha	0.0 %
5 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways **	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0.57 ha	4.4%
7b Special least concern animals	5.5 ha	42.5%
7c i Koala habitat area - core (SEQ)	5.5 ha	42.5%
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0.0 ha	0.0 %
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0.0 ha	0.0 %
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0.0 ha	0.0 %
8d Regulated Vegetation - Essential habitat	3.98 ha	30.7%
8e Regulated Vegetation - intersecting a watercourse **	0.2 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0.0 ha	0.0 %
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 ha	0.0 %

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(no results)

1b. Protected Areas - nature refuges

(no results)

1c. Protected Areas - special wildlife reserves

(no results)

2. State Marine Parks - highly protected zones

(no results)

3. Fish habitat areas (A and B areas)

(no results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(no results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Values are present

7b. Special least concern animals

Values are present

7c i. Koala habitat area - core (SEQ)

Values are present

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii		V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Melaleuca irbyana		E	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	V	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Xeromys myoides	Water Mouse	V	None

**For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.*

Threatened (endangered or vulnerable) wildlife species records

Scientific name	Common name	NCA status	EPBC status	Migratory status
Macadamia integrifolia	macadamia nut	V	V	

Special least concern animal species records

Scientific name	Common name	Migratory status
Tachyglossus aculeatus	short-beaked echidna	

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

https://www.qld.gov.au/environment/plants-animals/species-list/

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:
https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/
For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:
https://environment.ehp.qld.gov.au/regional-ecosystems/

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Values are present

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets

9a. Legally secured offset areas - offset register areas

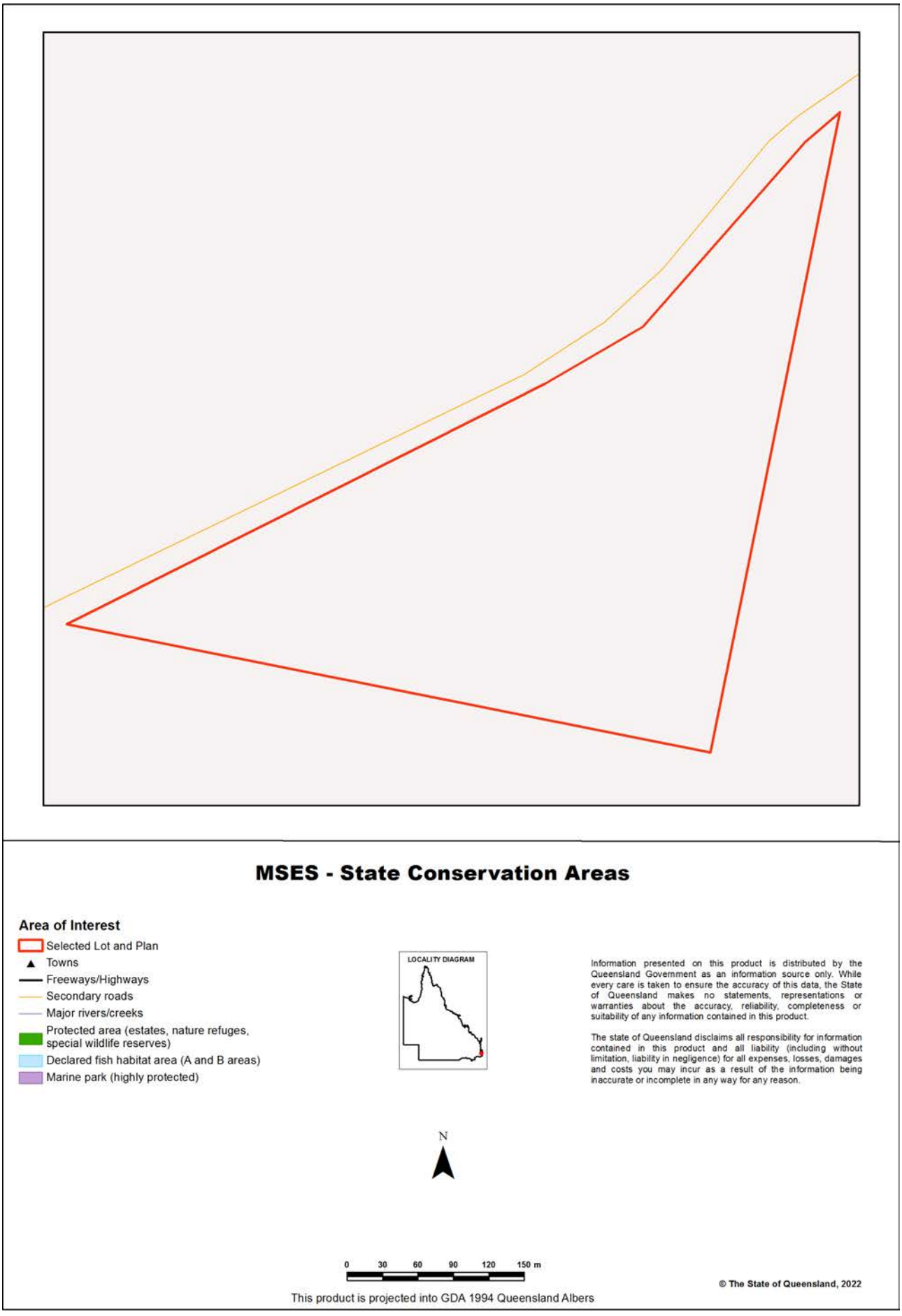
(no results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

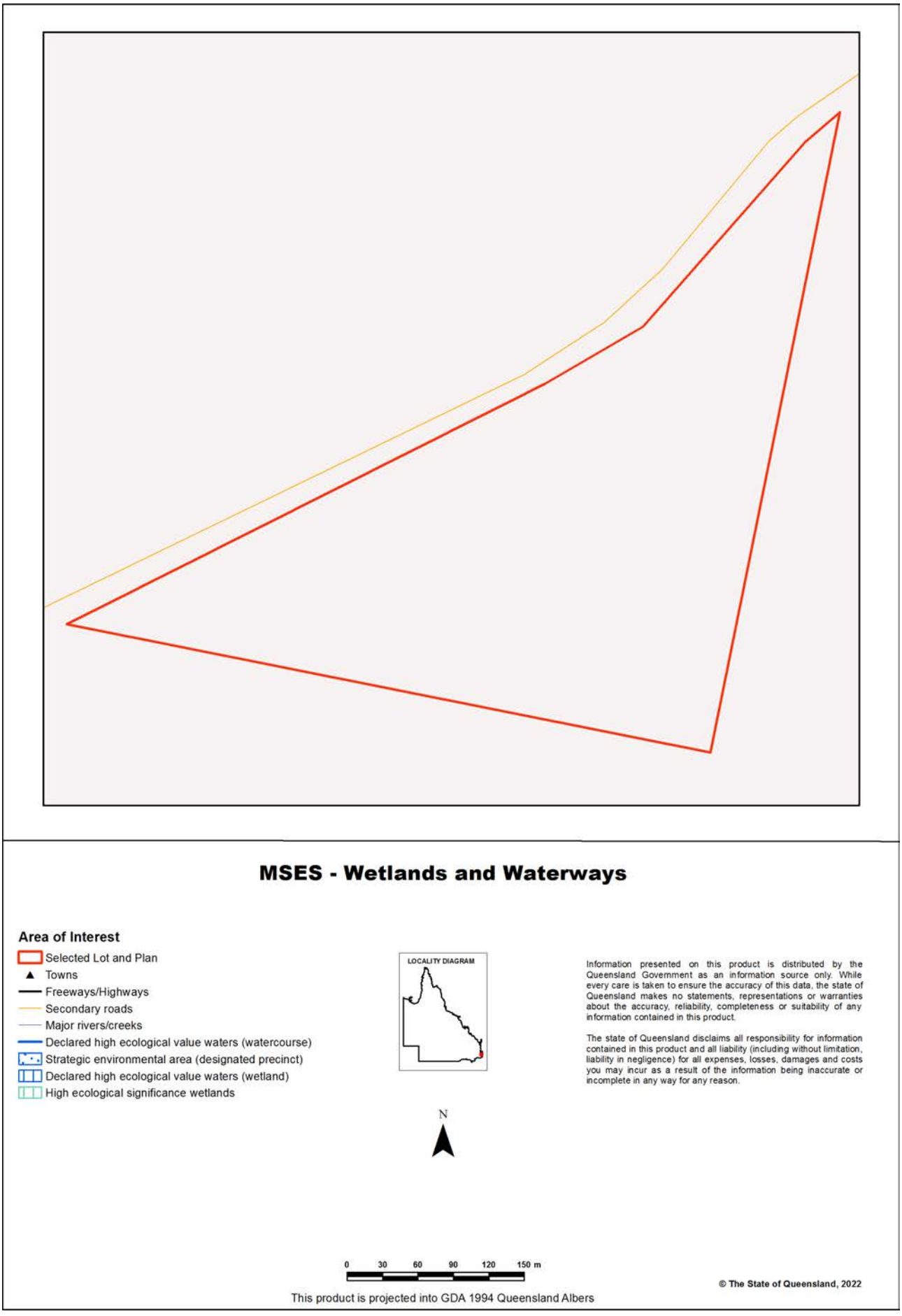
(no results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

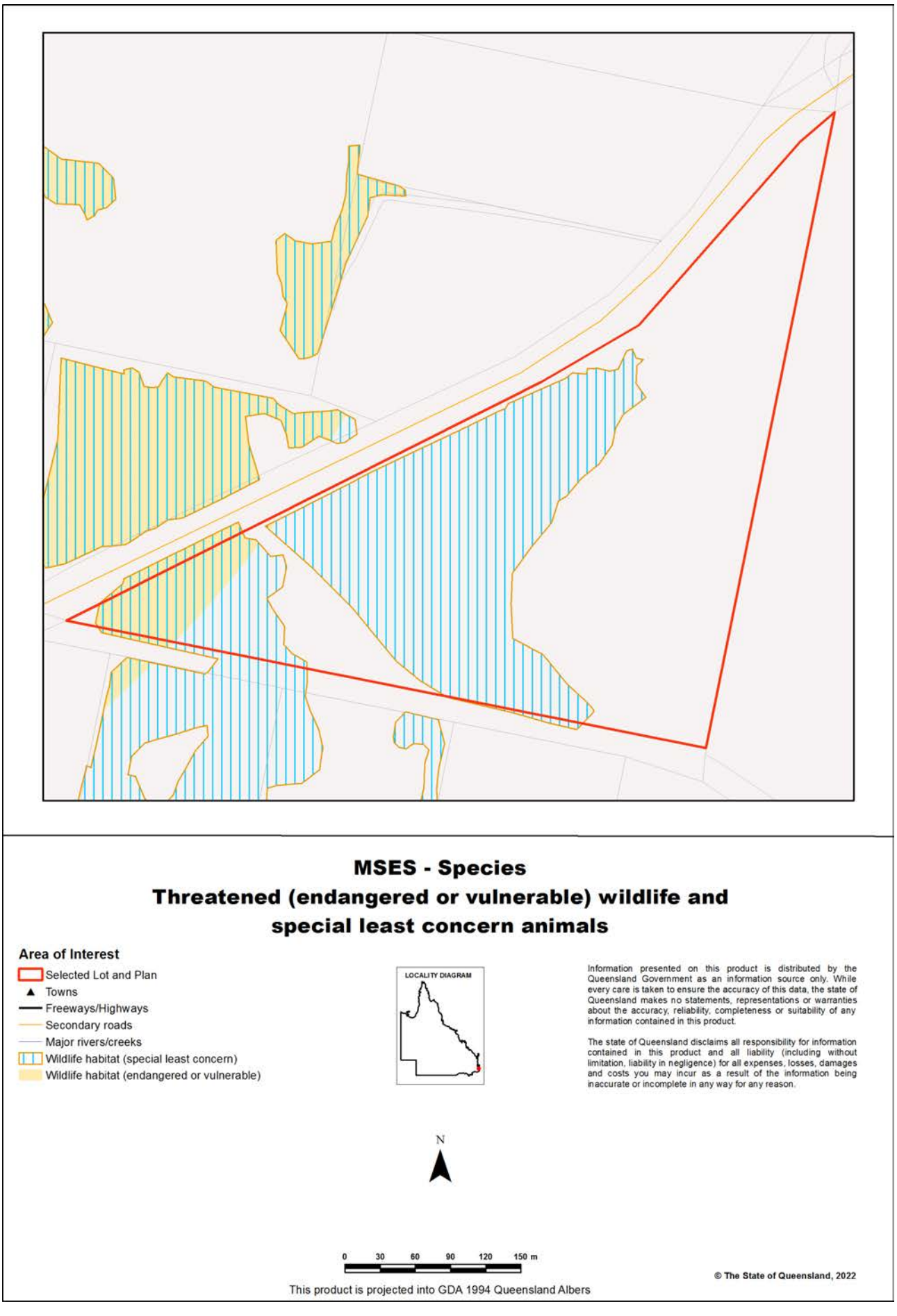
Map 1 - MSES - State Conservation Areas



Map 2 - MSES - Wetlands and Waterways

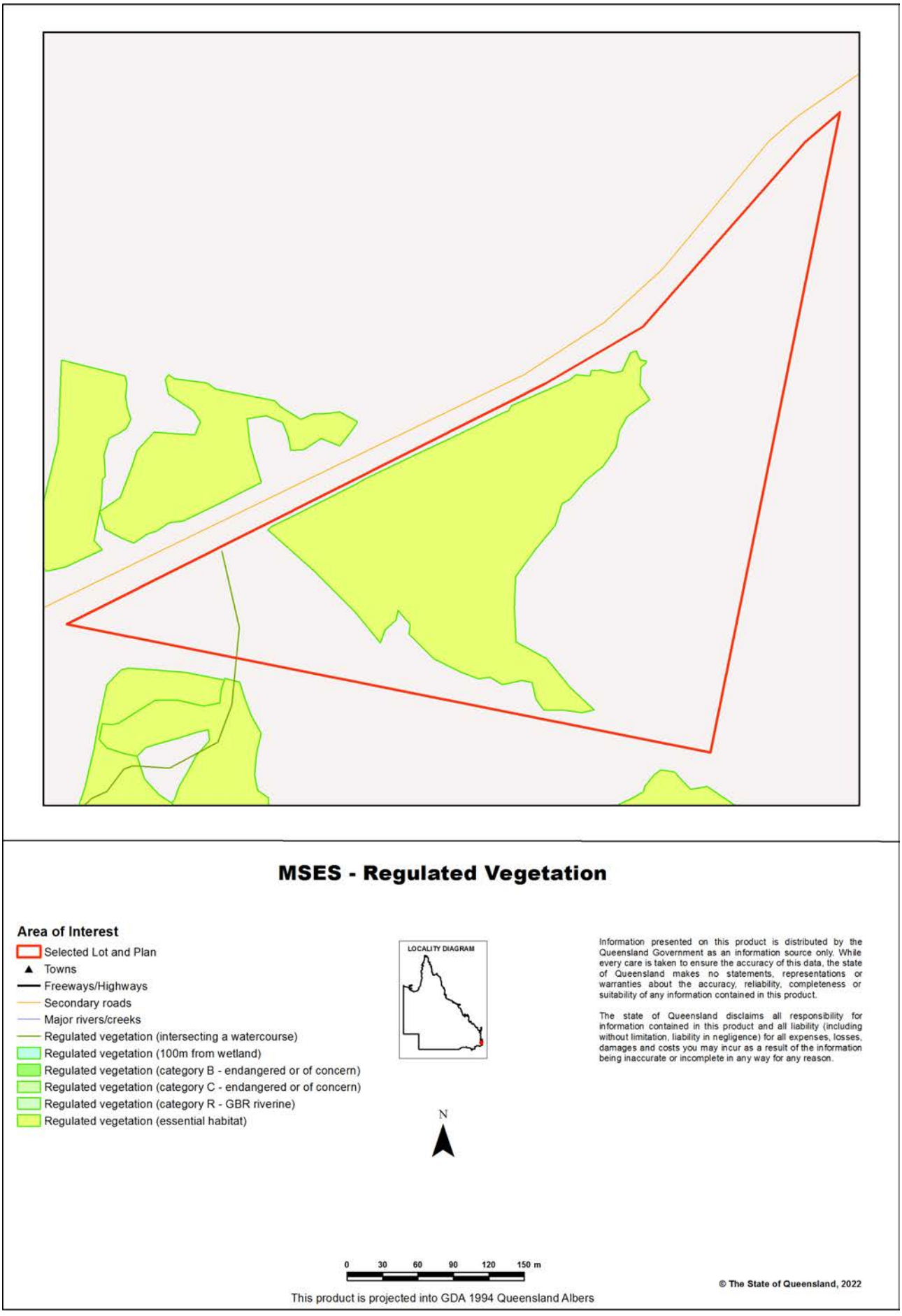


Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



Map 3b - MSES - Species - Koala habitat area (SEQ)

Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas

Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" can be downloaded from:

http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html .

Appendix 2 - Source Data

The datasets listed below are available on request from:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DES	- Department of Environment and Science
EP Act	- *Environmental Protection Act 1994*
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- *Vegetation Management Act 1999*

Queensland Government

Department of Environment and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest
Lot: 2 Plan: WD4654

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the input coordinates.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no matters of interest have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website https://www.dnrme.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.

Table of Contents

Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details: Lot: 2 Plan: WD4654

Size (ha)	12.95
Local Government(s)	Gold Coast City
Bioregion(s)	Southeast Queensland
Subregion(s)	Sunshine Coast - Gold Coast Lowlands, Burringbar - Conondale Ranges
Catchment(s)	Logan-Albert

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	0.0	0.0
No concern at present	1.01	7.8
Total remnant vegetation	1.01	7.8

Refer to **Map 2** for further information.

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

https://www.dnrme.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
12.11.24	Eucalyptus carnea or E. tindaliae, Corymbia intermedia +/- E. siderophloia or E. crebra woodland on metamorphics +/- interbedded volcanics	No concern at present	0.15	1.17
12.11.5	Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics	No concern at present	0.86	6.63
non-remnant	None	None	11.94	92.22

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
12.11.24	Pre-clearing 28000 ha; Remnant 2019 14000 ha	9g	Not a Wetland	Medium
12.11.5	Pre-clearing 86000 ha; Remnant 2019 53000 ha	10b	Not a Wetland	High
non-remnant	None	None	None	None

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
12.11.24	Potential habitat for NCA listed species: Corchorus cunninghamii, Endiandra floydii and Eucalyptus curtisii. This ecosystem is known to provide suitable habitat for koalas (Phascolarctos cinereus).
12.11.5	Habitat for listed plant species including Cycas megacarpa and Sophora fraseri. This ecosystem is known to provide suitable habitat for koalas (Phascolarctos cinereus). 12.11.5a: Habitat for listed flora species including Sophora fraseri. 12.11.5e: Habitat for listed flora species including Cycas megacarpa and Sophora fraseri. 12.11.5h: Habitat for listed flora species including Sophora fraseri. 12.11.5j: Habitat for listed flora species including Sophora fraseri. 12.11.5k: Habitat for listed flora species including Sophora fraseri.
non-remnant	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
None	None	11.94	92.22
10b	Moist open forests to woodlands dominated by Corymbia citriodora (spotted gum). (land zones 12, 11, 9, 5, 8) (SEQ, CQC, EIU, WET)	0.86	6.63
9g	Moist woodlands dominated by Eucalyptus tindaliae (Queensland white stringybark) or E. racemosa or E. tereticornis (blue gum) and Corymbia intermedia (pink bloodwood) on remnant Tertiary surfaces. (land zone 5) (SEQ)	0.15	1.17

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural

disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

https://publications.qld.gov.au/dataset/redd/resource/

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

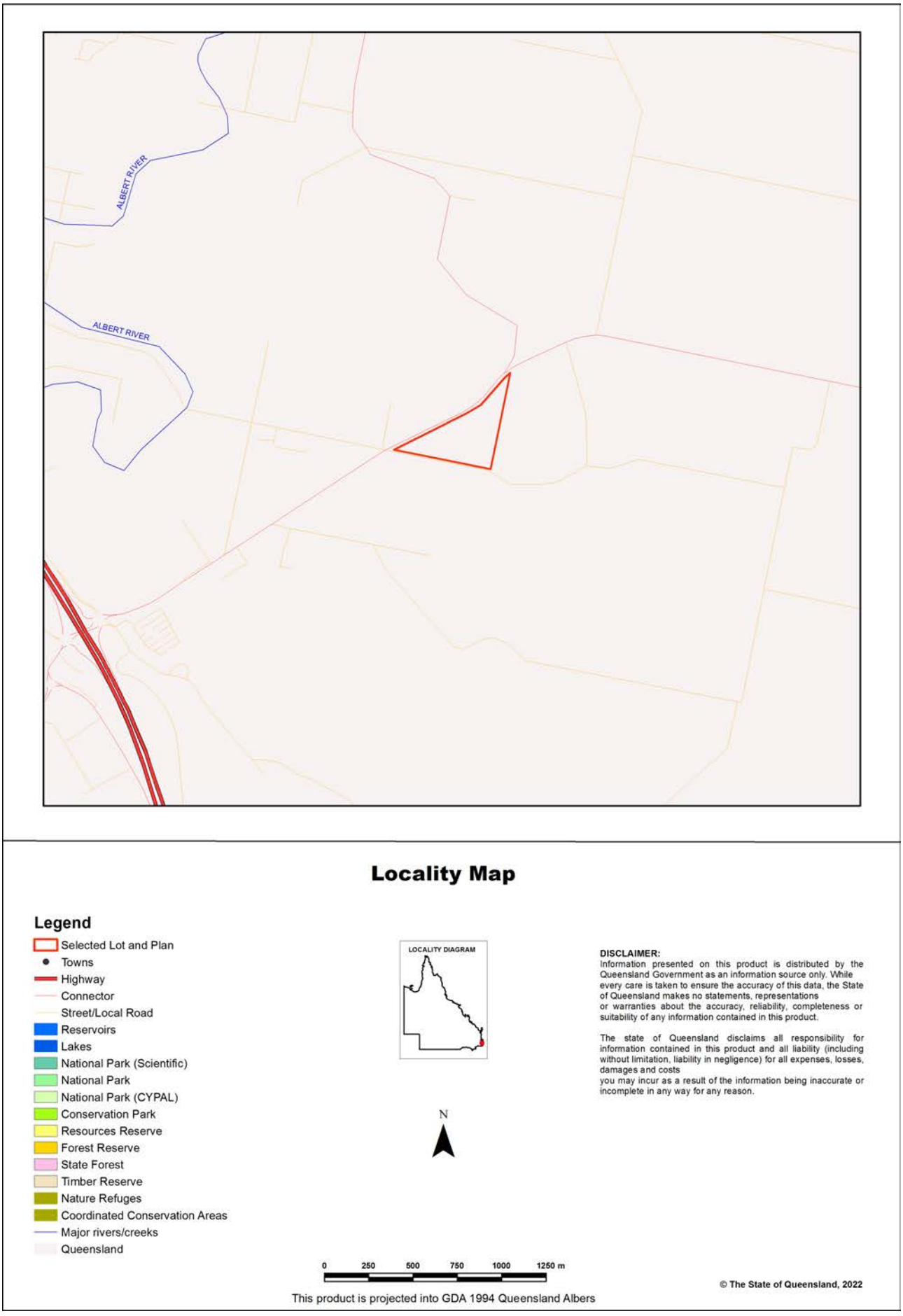
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

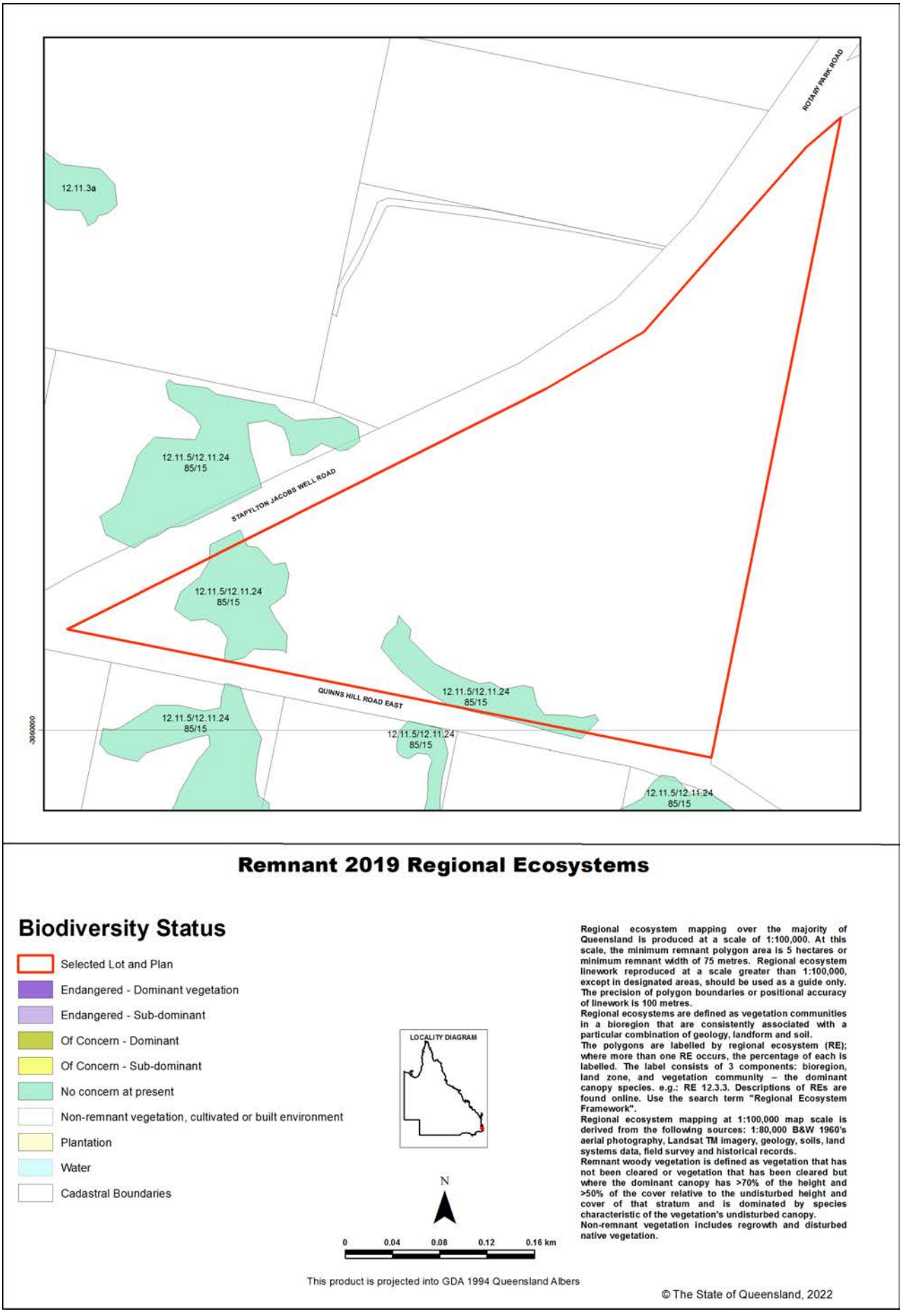
Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
12.11.24	Not currently available	Available
12.11.5	Not currently available	Available
non-remnant	Not currently available	Not currently available

Maps

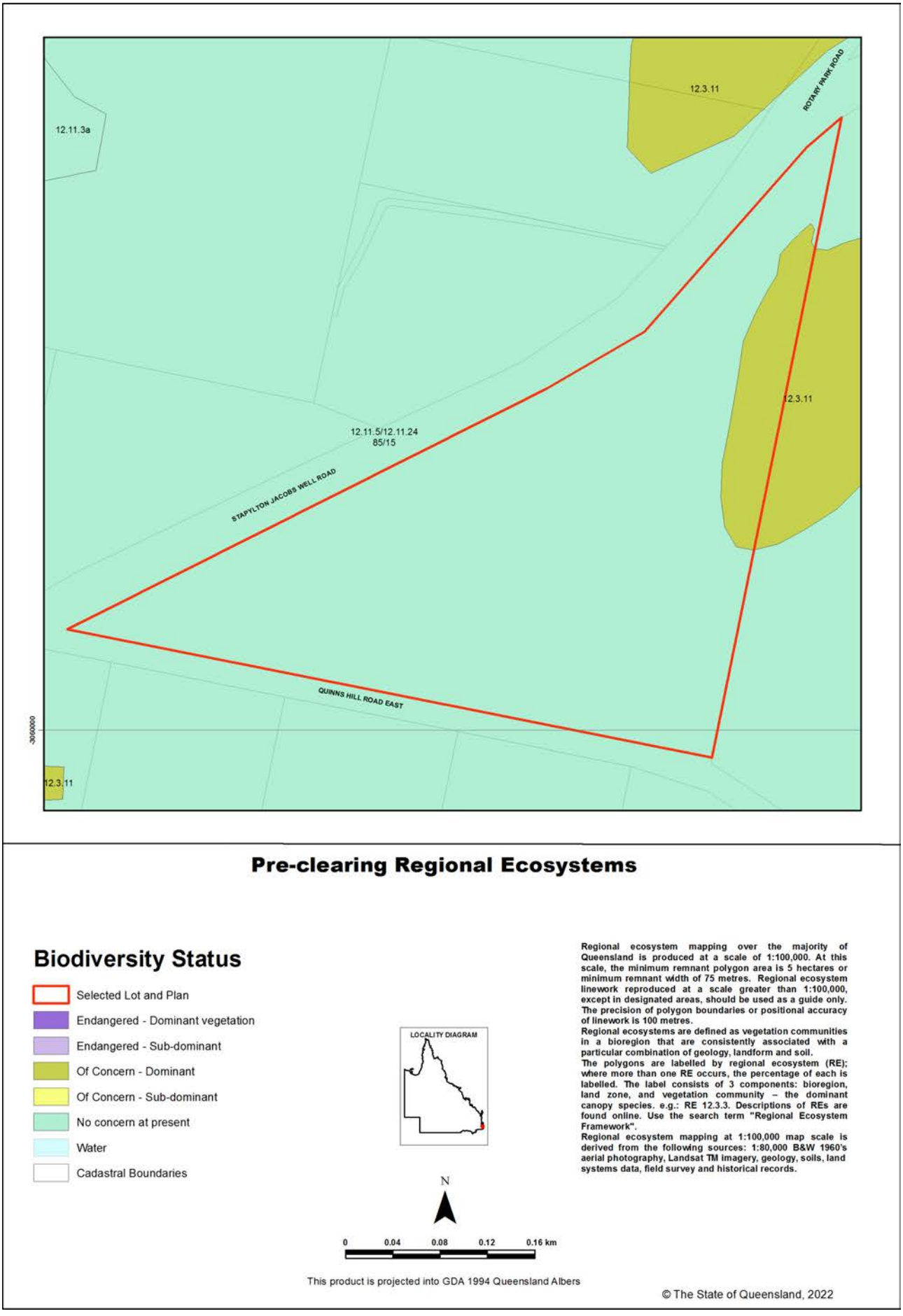
Map 1 - Location



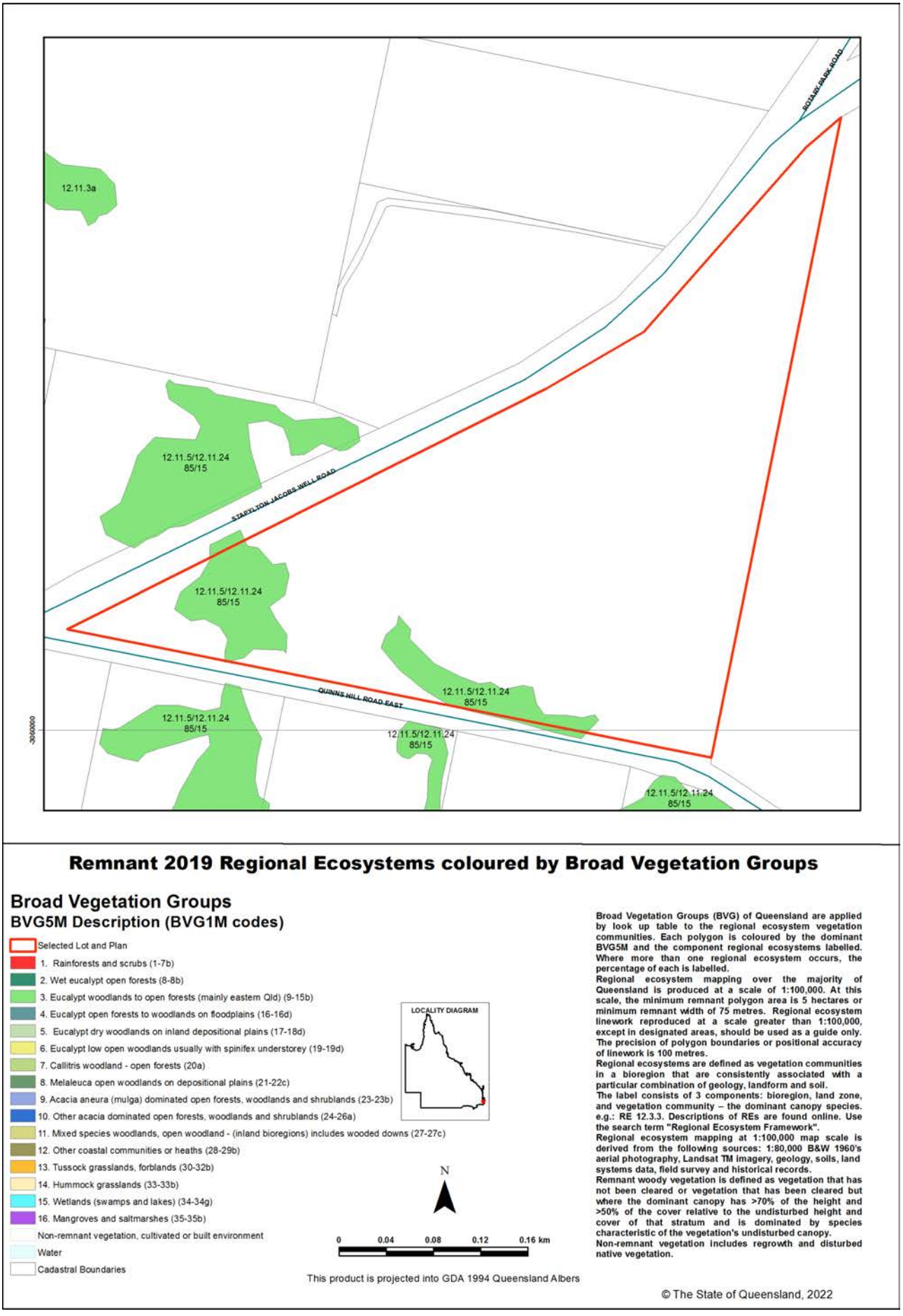
Map 2 - Remnant 2019 regional ecosystems



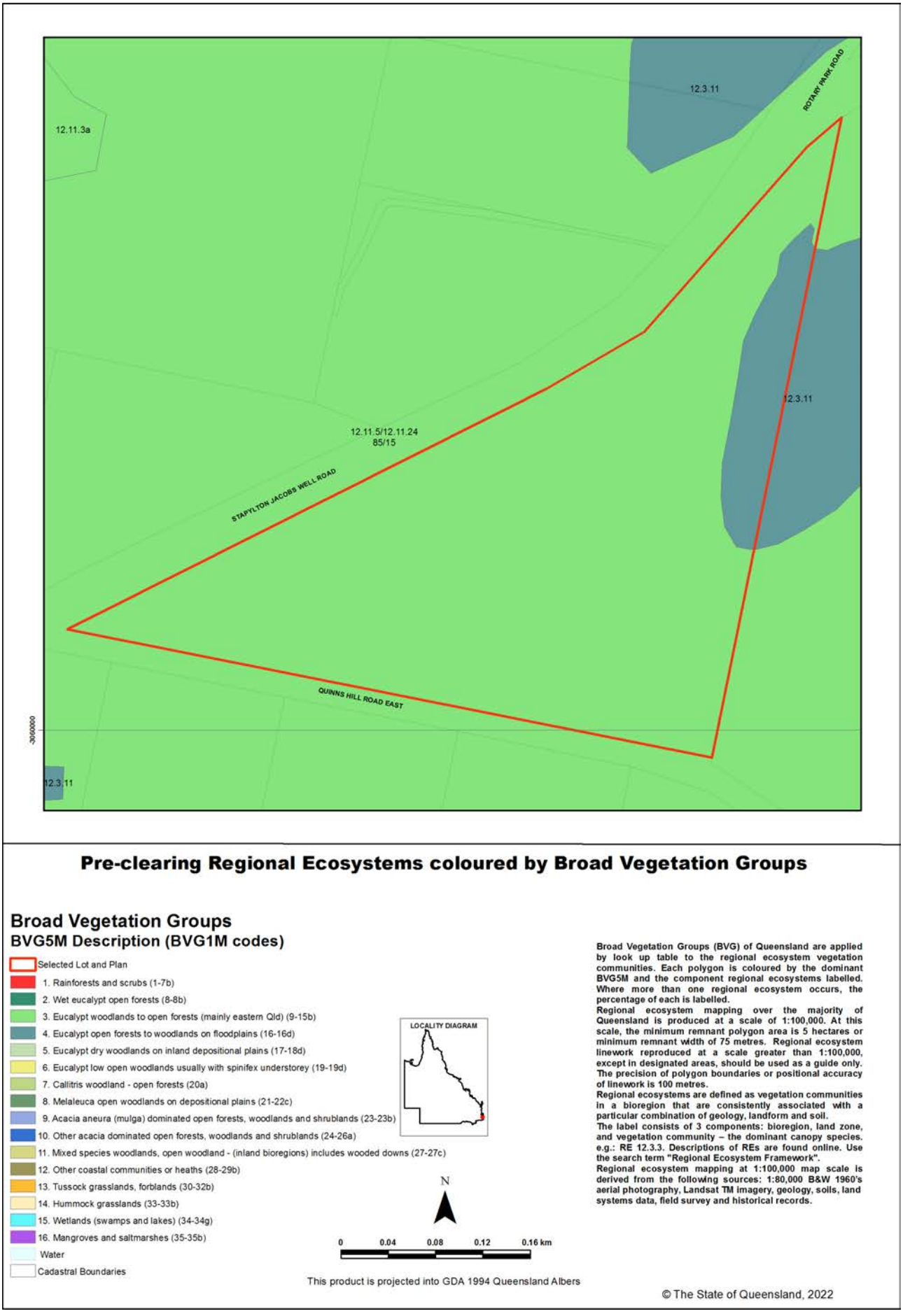
Map 3 - Pre-clearing regional ecosystems



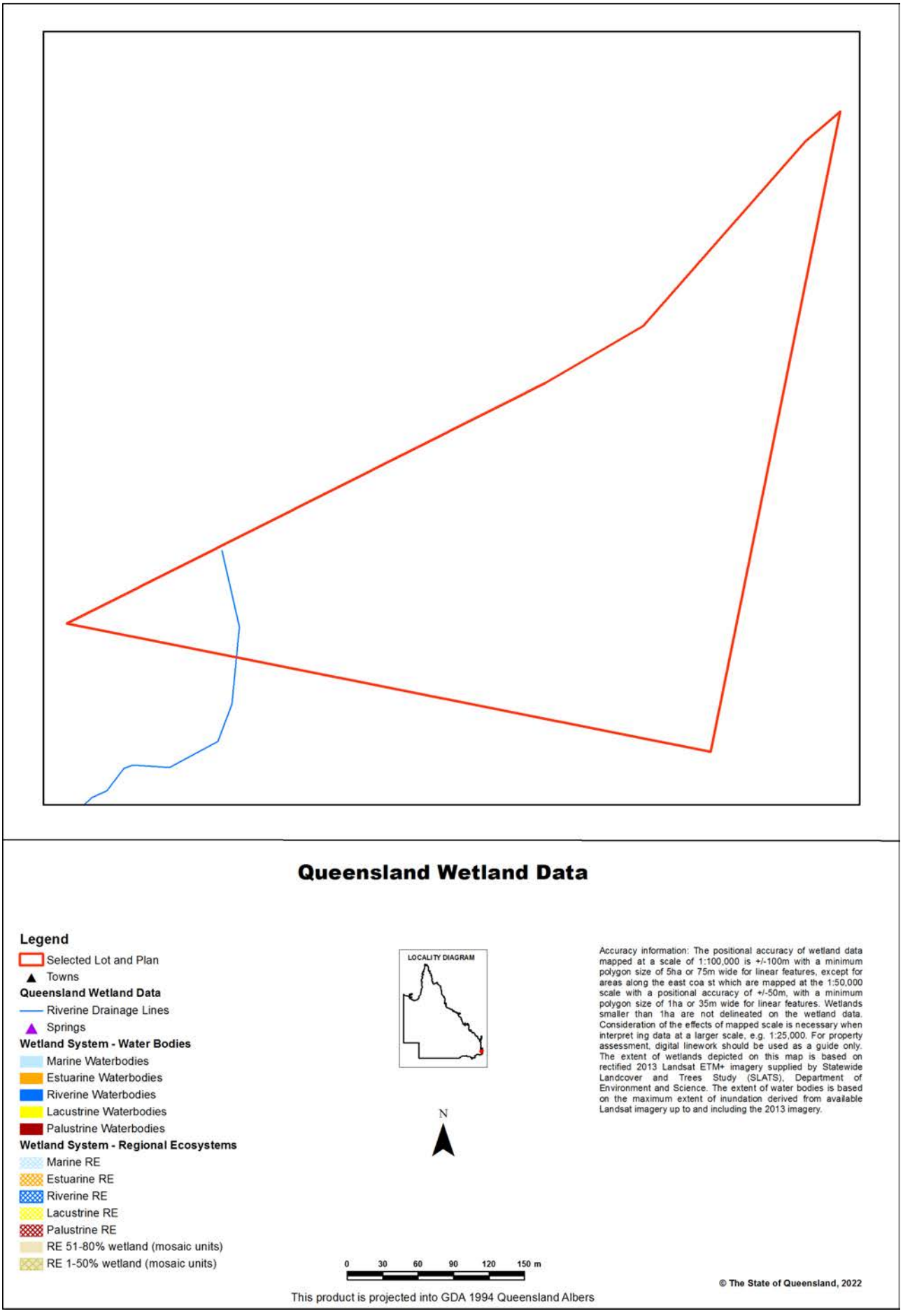
Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Map 6 - Wetlands and waterways



Links and Other Information Sources

The Department of Environment and Science's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

The methodology for mapping regional ecosystems can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

http://www.dnrm.qld.gov.au/mapping-data/queensland-globe

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

(https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

(https://publications.qld.gov.au/dataset/redd/resource/6dee78ab-c12c-4692-9842-b7257c2511e4)

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

Appendices

Appendix 1 - Source Data

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

WildNet Records
Species List

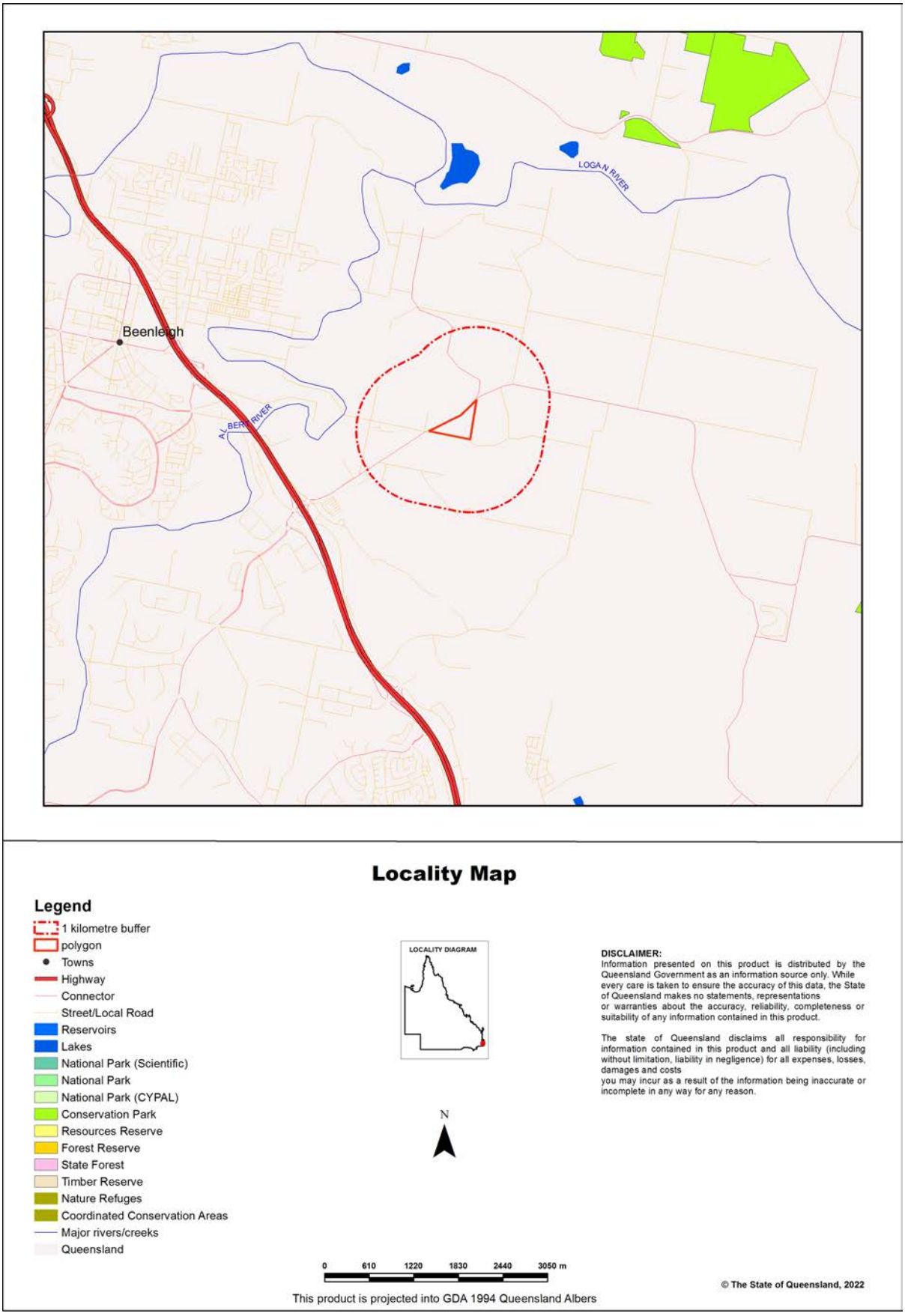
For the selected area of interest 13.24ha

Current as at 15/06/2022

WildNetSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest .

Table 1. Area of interest details

Size (ha)	13.24
Local Government(s)	Gold Coast City
Bioregion(s)	Southeast Queensland
Subregion(s)	Sunshine Coast - Gold Coast Lowlands, Burringbar - Conondale Ranges
Catchment(s)	Logan-Albert

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the animals recorded within the area of interest and its one kilometre buffer.

Table 3 lists the plants recorded within the area of interest and its one kilometre buffer.

Table 4 lists the fungi recorded within the area of interest and its one kilometre buffer.

Table 5 lists the other species recorded within the area of interest and its one kilometre buffer.

Table 2. Animals recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
716	Amphibia	Bufonidae	*Rhinella marina*	cane toad	None	None	0	1	15/07/2003
627	Amphibia	Hylidae	*Litoria caerulea*	common green treefrog	C	None	0	1	16/03/2015
1423	Aves	Acanthizidae	*Acanthiza pusilla*	brown thornbill	C	None	0	1	31/07/1991
1729	Aves	Accipitridae	*Accipiter fasciatus*	brown goshawk	C	None	0	1	20/01/1992
1721	Aves	Accipitridae	*Aviceda subcristata*	Pacific baza	C	None	0	1	31/12/1923
1971	Aves	Apodidae	*Hirundapus caudacutus*	white-throated needletail	V	V	0	1	09/03/2005
1832	Aves	Ardeidae	*Ardea pacifica*	white-necked heron	C	None	0	1	31/12/1923

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1830	Aves	Ardeidae	*Bubulcus ibis*	cattle egret	C	None	0	1	09/03/2005
1826	Aves	Ardeidae	*Egretta novaehollandiae*	white-faced heron	C	None	0	1	31/12/1923
1654	Aves	Artamidae	*Cracticus nigrogularis*	pied butcherbird	C	None	0	1	31/12/1923
1656	Aves	Artamidae	*Cracticus torquatus*	grey butcherbird	C	None	0	1	09/03/2005
1644	Aves	Artamidae	*Gymnorhina tibicen*	Australian magpie	C	None	0	1	09/03/2005
1645	Aves	Artamidae	*Strepera graculina*	pied currawong	C	None	0	1	09/03/2005
1191	Aves	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo	C	None	0	1	09/03/2005
1636	Aves	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike	C	None	0	1	31/12/1923
1639	Aves	Campephagidae	*Edolisoma tenuirostre*	common cicadabird	C	None	0	2	20/01/1992
1617	Aves	Climacteridae	*Cormobates leucophaea*	white-throated treecreeper	C	None	0	1	09/03/2005
18293	Aves	Climacteridae	*Cormobates leucophaea metastasis*	white-throated treecreeper (southern)	C	None	0	1	31/07/1991
1793	Aves	Columbidae	*Ocyphaps lophotes*	crested pigeon	C	None	0	2	24/03/2015
1609	Aves	Corvidae	*Corvus orru*	Torresian crow	C	None	0	2	09/03/2005
1601	Aves	Dicruridae	*Dicrurus bracteatus*	spangled drongo	C	None	0	1	09/03/2005
1359	Aves	Estrildidae	*Neochmia temporalis*	red-browed finch	C	None	0	1	31/07/1991
1342	Aves	Estrildidae	*Taeniopygia bichenovii*	double-barred finch	C	None	0	3	24/03/2015
1767	Aves	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra	C	None	0	1	31/12/1923
1760	Aves	Halcyonidae	*Todiramphus macleayii*	forest kingfisher	C	None	0	1	31/12/1923
1762	Aves	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher	C	None	0	2	20/01/1992
1558	Aves	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren	C	None	0	1	09/03/2005
1542	Aves	Meliphagidae	*Anthochaera chrysoptera*	little wattlebird	C	None	0	1	31/12/1923
1523	Aves	Meliphagidae	*Caligavis chrysops*	yellow-faced honeyeater	C	None	0	3	09/03/2005
1539	Aves	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater	C	None	0	1	31/12/1923
1500	Aves	Meliphagidae	*Manorina melanocephala*	noisy miner	C	None	0	1	31/12/1923
1504	Aves	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater	C	None	0	1	09/03/2005
1507	Aves	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater	C	None	0	2	09/03/2005

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1489	Aves	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater	C	None	0	1	31/07/1991
1493	Aves	Meliphagidae	*Philemon citreogularis*	little friarbird	C	None	0	1	31/12/1923
1494	Aves	Meliphagidae	*Philemon corniculatus*	noisy friarbird	C	None	0	1	31/12/1923
1764	Aves	Meropidae	*Merops ornatus*	rainbow bee-eater	C	None	0	1	09/03/2005
1589	Aves	Monarchidae	*Grallina cyanoleuca*	magpie-lark	C	None	0	1	31/12/1923
1600	Aves	Monarchidae	*Myiagra inquieta*	restless flycatcher	C	None	0	1	31/12/1923
1586	Aves	Monarchidae	*Myiagra rubecula*	leaden flycatcher	C	None	0	2	20/01/1992
1611	Aves	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird	C	None	0	2	09/03/2005
1442	Aves	Oriolidae	*Oriolus sagittatus*	olive-backed oriole	C	None	0	2	09/03/2005
1449	Aves	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush	C	None	0	2	09/03/2005
1437	Aves	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	C	None	0	2	09/03/2005
1392	Aves	Pardalotidae	*Pardalotus striatus*	striated pardalote	C	None	0	1	09/03/2005
1347	Aves	Petroicidae	*Eopsaltria australis*	eastern yellow robin	C	None	0	1	09/03/2005
1339	Aves	Petroicidae	*Microeca fascinans*	jacky winter	C	None	0	1	31/12/1923
1331	Aves	Petroicidae	*Petroica phoenicea*	flame robin	C	None	0	1	31/12/1923
1145	Aves	Psittacidae	*Glossopsitta concinna*	musk lorikeet	C	None	0	1	31/12/1923
1149	Aves	Psittacidae	*Lathamus discolor*	swift parrot	E	CE	0	1	31/12/1923
1124	Aves	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet	C	None	0	1	31/12/1923
1125	Aves	Psittacidae	*Trichoglossus moluccanus*	rainbow lorikeet	C	None	0	2	31/07/1991
1623	Aves	Psophodidae	*Psophodes olivaceus*	eastern whipbird	C	None	0	2	09/03/2005
1575	Aves	Rhipiduridae	*Rhipidura albiscapa*	grey fantail	C	None	0	2	20/01/1992
1576	Aves	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	C	None	0	1	31/12/1923
1812	Aves	Threskiornithidae	*Threskiornis molucca*	Australian white ibis	C	None	0	1	09/03/2005
1800	Aves	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis	C	None	0	2	09/03/2005
1276	Aves	Timaliidae	*Zosterops lateralis*	silvereye	C	None	0	2	09/03/2005
904	Mammalia	Macropodidae	*Notamacropus rufogriseus*	red-necked wallaby	C	None	0	1	15/07/2003

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
764	Mammalia	Muridae	*Mus musculus*	house mouse	None	None	0	1	15/07/2003
838	Mammalia	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna	SL	None	0	1	15/07/2003
556	Reptilia	Agamidae	*Pogona barbata*	bearded dragon	C	None	0	2	26/03/2015
519	Reptilia	Boidae	*Morelia spilota*	carpet python	C	None	0	1	23/03/2015
501	Reptilia	Elapidae	*Cacophis harriettae*	white-crowned snake	C	None	0	1	16/03/2015
457	Reptilia	Elapidae	*Cryptophis nigrescens*	eastern small-eyed snake	C	None	0	1	15/07/2003
493	Reptilia	Elapidae	*Demansia psammophis*	yellow-faced whipsnake	C	None	0	1	16/03/2015

Table 3. Plants recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
14741	Equisetopsida	Amaranthaceae	*Celosia argentea*	None	None	None	1	1	20/03/2004
41406	Equisetopsida	Annonaceae	*Huberantha nitidissima*	None	C	None	1	1	14/05/1957
16746	Equisetopsida	Proteaceae	*Macadamia integrifolia*	macadamia nut	V	V	1	1	30/06/2003
6242	Equisetopsida	Rosaceae	*Rubus probus*	None	C	None	1	1	12/08/1999
27437	Equisetopsida	Rubiaceae	*Cyclophyllum coprosmoides var. coprosmoides*	None	C	None	1	1	13/03/2006
15872	Equisetopsida	Rutaceae	*Acronychia pauciflora*	soft acronychia	C	None	1	1	30/06/2003
11300	Equisetopsida	Rutaceae	*Flindersia australis*	crow's ash	C	None	1	1	14/05/1957
13637	Equisetopsida	Sapindaceae	*Cupaniopsis newmanii*	long-leaved tuckeroo	NT	None	1	1	09/09/1976

Table 4. Fungi recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 5. Other species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

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

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

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

WildNet Records
Conservation Significant Species List

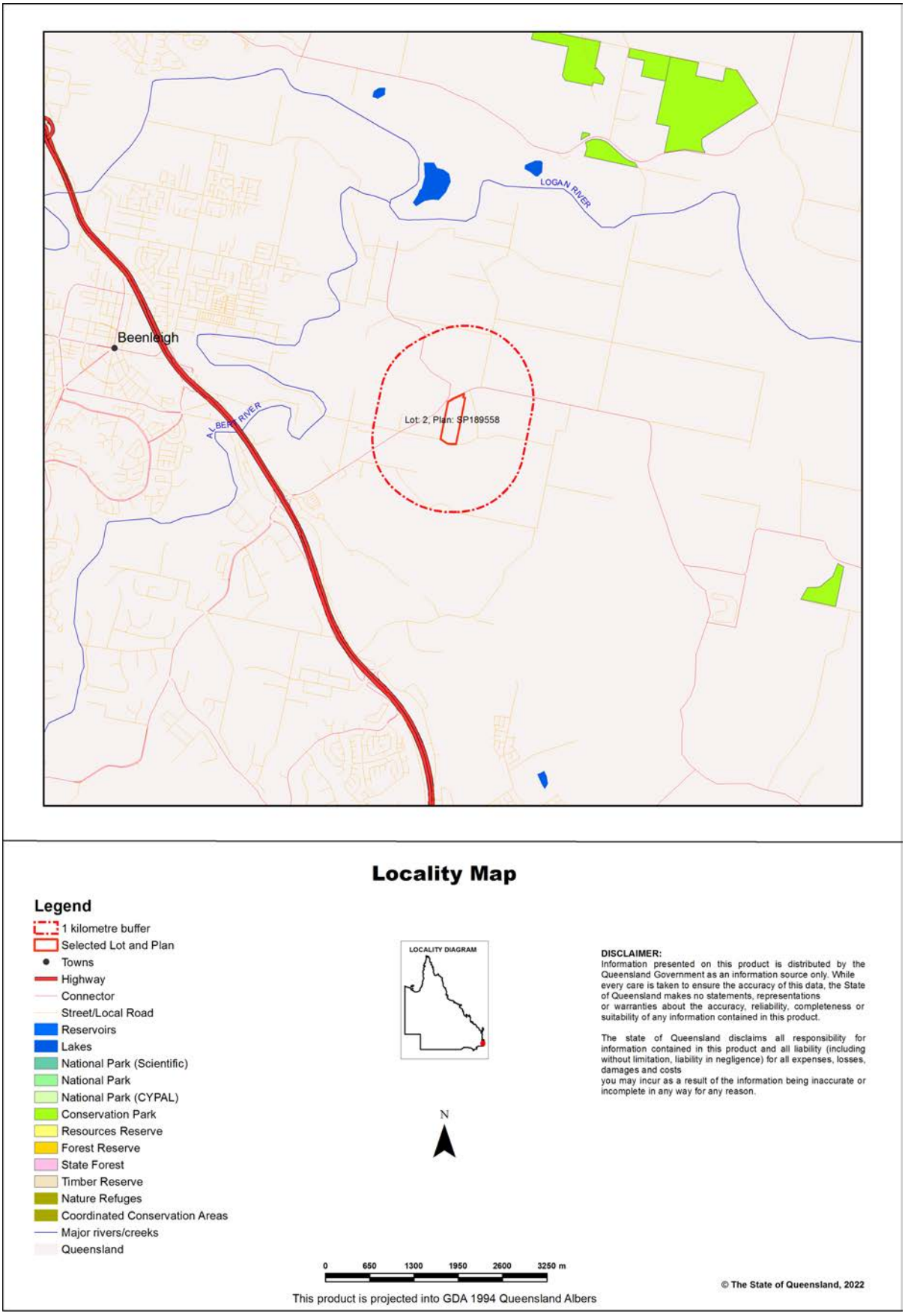
For the selected area of interest 16.05ha Lot: 2 Plan: SP189558

Current as at 14/06/2022

WildNetCSSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest Lot: 2 Plan: SP189558.

Table 1. Area of interest details

Size (ha)	16.05
Local Government(s)	Gold Coast City
Bioregion(s)	Southeast Queensland
Subregion(s)	Sunshine Coast - Gold Coast Lowlands, Burringbar - Conondale Ranges
Catchment(s)	Logan-Albert

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Conservation Significant Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

Conservation significant species are species listed:

- as threatened or near threatened under the Nature Conservation Act 1992;
- as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* or
- migratory species protected under the following international agreements:
  - Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
  - China-Australia Migratory Bird Agreement
  - Japan-Australia Migratory Bird Agreement
  - Republic of Korea-Australia Migratory Bird Agreement

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the species recorded within the area of interest and its one kilometre buffer.

Table 2. Conservation significant species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest.

Taxon Id: Unique identifier of the taxon from the WildNet database.

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

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

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
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- Protected Matters Search Tool

Disclaimer

SC6.7 City Plan policy – Ecological site assessments

1 Purpose

The purpose of the City Plan policy is to assist applicants to adequately address the performance outcomes stated in the **Environmental significance overlay code** by clearly articulating the Council's requirements for the preparation of an Ecological Site Assessment for a proposed development.

2 Application

This City Plan policy applies to assessable development where an applicant is preparing an Ecological Site Assessment Report in accordance with the acceptable outcomes of the **Environmental significance overlay code**.

3 About Ecological site assessments

3.1 Assessment process

Ecological site assessments are an integral part of the development design and assessment process and consist of 4 stages (see **Figure 1**):

Stage 1:	**Identify ecological features** Identify and undertake an analysis of the flora, fauna and habitat of the site and its immediate environment to determine the ecological features.
Stage 2:	**Identify matters of environmental significance** Identify matters of environmental significance on and adjacent to the site.
Stage 3:	**Assessment of impacts** Determine the potential impacts of the operation and construction phases of the development on the matters of environmental significance on and adjacent to the site, and on long term viability and function of these matters
Stage 4:	**Recommendations** Recommend any measures or changes to the development design that may be required to avoid or mitigate any impacts of the proposed development design, construction and operation.

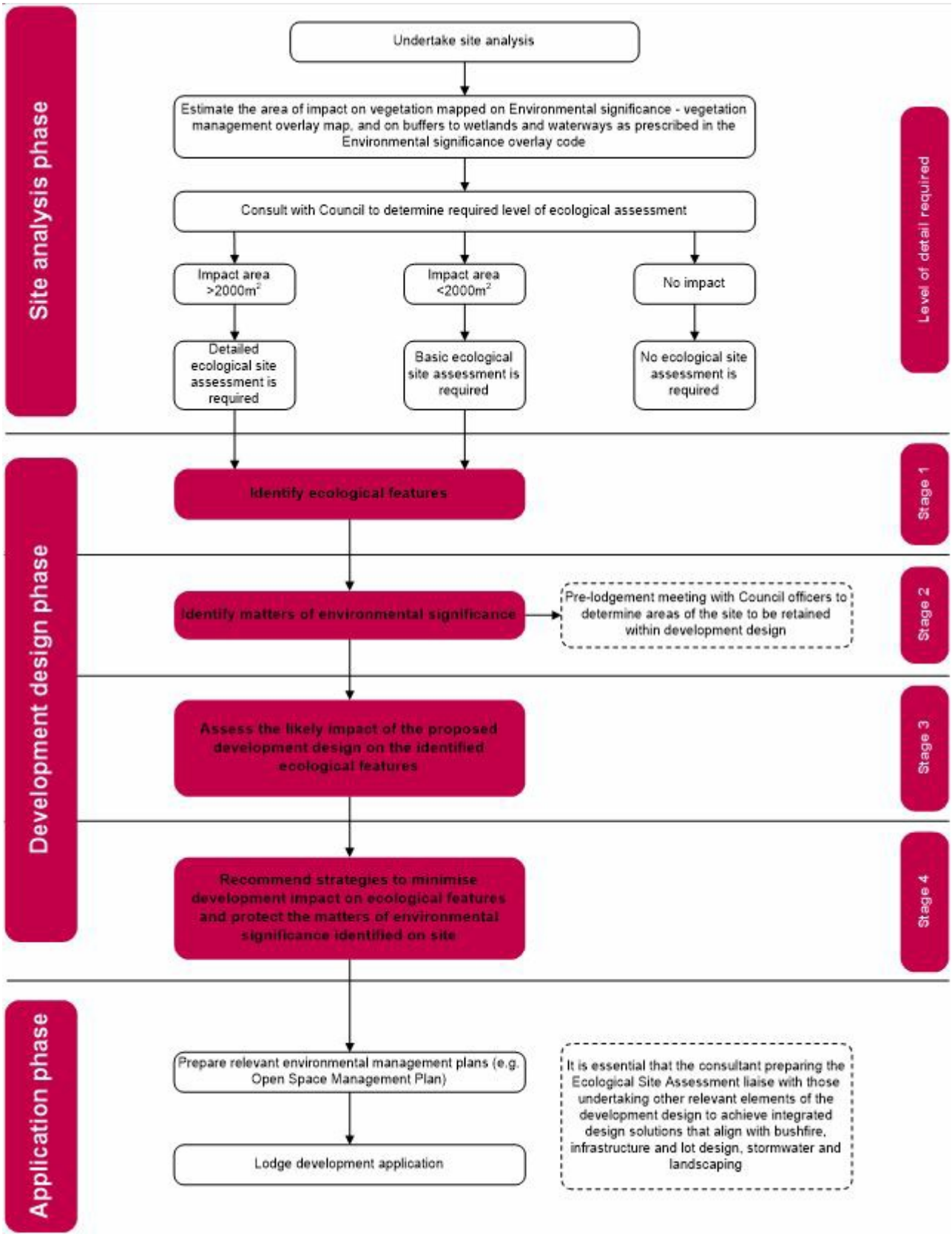

Figure 1
Process for undertaking an ecological site assessment

3.2 Documentation

The findings are to be documented in a written report in both hard copy and digital form (including excel spreadsheets containing GPS points for all species records). A sample table of contents is provided in **Appendix 1**.

3.3 Level of detail required

The level of detail required is determined by the area of impact the development will have on:

- vegetation mapped on the **Environmental significance – vegetation management overlay map**, and
- buffers to wetlands and waterways as prescribed in the **Environmental significance overlay code**.

Table 1: Determining the required level of ecological site assessment

	Level of ecological site assessment		
	None	**Basic**	**Detailed**
Area of impact on mapped vegetation and wetland/ waterway buffers	No impact	Less than 2000 m^2	Greater than or equal to 2000 m^2

Requests to undertake a lesser or greater degree of assessment will be reviewed by the Council on the basis of potential environmental impact of the particular development proposal.

3.4 Study area

The study area is the entire property that is the subject of the development application. Consideration should also be given to potential impacts outside the study area.

3.5 Consultant qualifications and experience

The consultant undertaking the Ecological Site Assessment must be appropriately qualified and experienced with tertiary qualifications in environmental science, botany, ecology, zoology or another related discipline, and with demonstrated experience in undertaking flora and fauna surveys and conservation assessments within the South East Queensland Bioregion.

3.6 Validity period of the Ecological assessment report

The validity period of the Ecological Site Assessment prepared in accordance with **SC6.7 City Plan policy – Ecological site assessments** extends for a period of four (4) years from the date of final report completion.

4 Preparing the Ecological site assessment

4.1 Stage 1: Ecological features

Ecological features include flora, fauna and habitat associations, both terrestrial and aquatic, within the study area. To determine these features, information on the presence/potential presence and distribution of flora and fauna and their habitat is to be gathered.

Basic assessment

The assessment is to be undertaken through a site visit and desktop assessment. It will:

(a) provide a map/survey plan, at the same scale as the proposed development plans, identifying all existing vegetation (including older and dominant taller trees), roads, contour lines (using intervals between 0.5 and 2.0 metres) and any existing buildings or other infrastructure;

(b) identify and describe the vegetation communities present (including those in a remnant, disturbed and

regrowth condition);
(c) provide a list of expected and known fauna to be determined using existing databases, such as Queensland Museum and WildNet data, Gold Coast Flora & Fauna Database and through on-site observation of scats, scratchings, burrows and habitat types;
(d) identify the location of wetlands, other water bodies (permanent or ephemeral), and waterways;
(e) identify the presence and location of any significant infestations of environmental weeds and plants or animals identified as prohibited or as a restricted invasive biosecurity matter, under the *Queensland Biosecurity Act 2014*;
(f) identify the location of any properties subject to a Voluntary Conservation Agreement, statutory covenant (for ecological purposes) or environmental offset within or adjacent to the study area;
(g) identify and describe the location, configuration, composition and functional value of any local habitat link and/or ecological corridor; and
(h) describe any threats or threatening processes that currently, or may in the future, impact on the site's ecological features.

Detailed assessment

The assessment is to complete all of the requirements for a basic assessment plus:

(a) undertake a Flora Survey (see **Appendix 2**); and
(b) undertake a Fauna Survey (see **Appendix 3**).

4.2 Stage 2: Matters of environmental significance

The following must be identified as matters of environmental significance if they occur within the study area.

(a) Matters of national environmental significance under the *Environmental Protection and Biodiversity Conservation Act 1999*, chapter 2, part 3, being:
- world heritage properties;
- national heritage places;
- wetlands of international importance (listed under the Ramsar Convention);
- listed threatened species and ecological communities;
- migratory species protected under international agreements;
- Commonwealth marine areas;

(b) Matters of state environmental significance under the *State Planning Policy July 2014*, being:
- protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992*;
- marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004*;
- areas within declared fish habitat areas that are management A areas or management B areas under the *Fisheries Regulation 2008*;
- threatened wildlife under the *Nature Conservation Act 1992* and special least concern animal under the *Nature Conservation (Wildlife) Regulation 2006*.
- regulated vegetation under the *Vegetation Management Act 1999* that is:
  - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
  - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
  - Category R areas on the regulated vegetation management map;
  - areas of essential habitat on the essential habitat map for wildlife prescribed as 'endangered wildlife' or 'vulnerable wildlife' under the *Nature Conservation Act 1992*;
  - regional ecosystems that intersect with waterways identified on the vegetation management waterway map;
  - regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;
- high preservation areas of wild river areas under the *Wild Rivers Act 2005*;
- wetlands in a wetland protection area or wetlands of high ecological significance shown on the Map of Referable Wetlands under the *Environmental Protection Regulation 2008*;
- wetlands and waterways in high ecological value waters as defined in the *Environmental Protection*

(Water) Policy 2009, schedule 2; and
- legally secured offset areas.

(c) Matters of local environmental significance, being:
- Hinterland core habitat systems;
- Coastal wetlands and islands core habitat systems;
- Substantial remnants;
- Hinterland to coast critical corridors;
- Local significant species and their habitat;
- High priority vegetation;
- Medium priority vegetation;
- General priority vegetation;
- Natural waterways and wetlands and associated buffers;
- Conservation estate, being areas owned or managed by the Council for nature conservation purposes (including Conservation Area, Environmental Reserve, Bushland Reserve and General Reserve);
- Areas subject to a Voluntary Conservation Agreement with the Council or registered voluntary covenant (for ecological purposes);
- Areas subject to a Vegetation Protection Order under the Council's Local Law No. 6 – Vegetation Management or similar mechanism;
- Environmental corridors required to link matters of environmental significance;
- Areas that contain environmental offsets provided in accordance with Queensland Government offset policies; and
- Areas that are subject to a statutory covenant (for ecological purposes).

The Ecological site assessment report should clearly document the consultant's reasons for any inclusion or rejection of matters identified as environmentally significant, based on the terms of the above criteria.

4.3 Stage 3: Assessment of impacts

The likely impacts of the proposed development design on the matters of environmental significance of the study area are to be determined. This is to address both the spatial and temporal impacts of the design, construction and operational phases of the development on these matters, and an evaluation of the likely consequences of the impacts.

The assessment should also consider the likely impacts of the proposed development design on the long term viability and function of matters of environmental significance, taking into account the need to:
- provide buffers around any matters of environmental significance that occur, either wholly or partly, on the development site. Buffers should also be provided on the development site for any matters of environmental significance that occur adjacent to its boundaries. Such buffers may incorporate both native vegetation and degraded areas requiring rehabilitation. The report should describe the location, dimensions and characteristics of these. Appropriate widths are provided in the **Environmental significance overlay code**;
- designate, protect and enhance ecological corridors on the development site to provide links between the identified matters of environmental significance of the study area and its surrounds. These may incorporate both native vegetation and degraded areas requiring rehabilitation. The report should describe the location, dimensions and characteristics of these;
- achieve an overall net gain in mature and actively regenerating koala habitat in identified koala habitat areas through measures such as restricting native vegetation clearing; reducing risks to koalas during construction activities; sequential clearing with reference to surrounding properties and land use; minimising barriers to safe koala movement and dispersal, except where exclusion fencing is necessary to restrict movement onto threat areas; using appropriate wildlife infrastructure to increase landscape connectivity and avoid high threat areas; and application of other measures as detailed in *'Koala Safety Fencing and Measures Guideline' (Department of Environment & Heritage Protection, 2010)*;
- identify areas of the site requiring rehabilitation to support the matters of environmental significance of the study area by enhancing their ecological value and function;
- identify pest plant and environmental weed infestations that require eradication and management; and
- determine management arrangements for each matter of environmental significance on the development site. Such arrangements might include incorporation of matters of environmental significance in areas proposed to be dedicated as public open space or, where public access is not required, incorporation within private open space as an area subject to a Voluntary Statutory Covenant or Vegetation Protection Order (or similar

mechanism).

Examples of potential spatial and temporal impacts include:
- loss or fragmentation of habitat, including wetlands;
- change in structure, composition, complexity and connectivity of vegetation;
- increases in edge effects (e.g. weeds, light and noise);
- introduction of feral/domestic animals;
- changes to fire risks/regime;
- barriers to wildlife movement (e.g. roads and fencing);
- earthworks and installation of infrastructure (e.g. retaining walls, roads, paths, sewer lines, stormwater treatment devices, etc);
- changes to flow regimes, nutrient, sediment and pollutant loads (stormwater devices, effluent disposal areas).

4.4 Stage 4: Recommendations

A strategy to minimise development impacts and protect matters of environmental significance during both the construction and operational phases of the development should be recommended.

The strategy should:
- specify in detail any changes to the development design that may be required to protect and minimise impacts on matters of environmental significance, as well as discuss those impacts that cannot be mitigated, the reasons why, the subsequent consequences and any proposed ecological rehabilitation and/or compensatory packages;
- identify any requirement for an environmental management plan (e.g. an environmental management plan prepared in accordance with SC6.8 City Plan policy – Environmental management plans, weed management plan, landscape plan, covenant management plan, on-site effluent management plan and/or open space management plan, etc) to be prepared for the site to protect the matters of environmental significance of the study area during the construction and operational phases of the development should the application be approved by the Council. Highlight the specific issues that it should address;
- consider and effectively respond to long term impacts such as sea level rise, temperature variability, altered intensity/frequency of rainfall and bushfire events on the viability of terrestrial/aquatic corridors and effect on flora and fauna species distribution;
- address specific koala habitat impacts and provide appropriate mitigation measures; and
- make reference to the acceptable outcomes provided in the **Environmental significance overlay code**.

5 Appendix 1: Table of contents for Ecological site assessment report

Ecological site assessment report for (lot/plan)	
1. Study area description	Provide a brief description of the study area.
2. Development description	Provide a brief outline of the proposed development.
3. Ecological features	Provide detailed information about the ecological features on the site (Where a detailed assessment has been undertaken, this section should also contain a summary of the relevant findings of the flora and fauna report. Full details of the latter should be provided as appendices).
4. Matters of environmental significance	Provide detailed assessment and information about the matters of environmental significance on the site.
5. Assessment of Impacts	Describe the likely extent of impacts on matters of environmental significance.
6. Recommendations	Proposed actions to minimise impacts on and protect matters of environmental significance.
7. Sources of information	Provide a list of reference material and literature cited in the assessment, and a list of individuals/community groups consulted.
8. Maps and aerial photographs	As a minimum, the following maps should be included: **Study area description:** • An up to date aerial photograph of the study area, in full colour and at a

	scale that enables detailed interpretation. This should include an overlay of the development footprint or, where relevant, the subdivision layout. **Matters of environmental significance:** • maps showing the location and extent of any national, state or local matters of environmental significance as listed in **Section 4.2**; the likely impacts of the development on these matters; • measures required to maintain their viability; and • any recommended measures to minimise impacts to protect any matters of environmental significance (e.g. the location of proposed vegetation/habitat, rehabilitation areas, etc.).
Appendices	Provide a list of observed, known and/or expected flora and fauna species. Where a detailed ecological site assessment has been undertaken, include the flora and fauna survey reports.

6 Appendix 2: Flora survey

6.1 Aim

To collect enough information to:
- identify terrestrial and aquatic flora species (native and exotic) on the site;
- highlight the presence (or expected presence) of any significant flora species (**Appendix 4**); and
- describe and map the terrestrial and aquatic vegetation communities of the study area and assess the integrity and condition of each community.

6.2 Method

Vegetation communities

Following an initial assessment of the study area, sampling sites within each vegetation community present should be located to ensure that a representative sample is identified and surveyed. A plot-based survey methodology is recommended, with fieldwork at each plot including plant identification, structural analysis and species diversity characterisation of all flora present. The survey methodology should be generally consistent with the established formats used by the Queensland Herbarium

Within each sample site, the following work is to be undertaken:

Plant collection and identification	A list of all plant species should be prepared within each vegetation association, making note of any significant species, including exotic species.
Classification of vegetation association	A formal classification of each vegetation association should be undertaken consistent with the classification system contained in Ryan et al (2003) to the extent that this is possible. It is, however, noted that the localised scale of the survey work required is likely to identify vegetation communities that are either sub-units of, or additional units to, those identified in the GCCC Nature Conservation Mapping Review Stage 1 Vegetation Mapping project November 2003. It is anticipated that the minimum data set required to adequately describe the terrestrial vegetation of any study area would include all of the following: (a) height estimates of each layer or strata within the vegetation community, together with records of dominant or emergent taxa; (b) an indication of the structural formation of the canopy (i.e. the crown separation class, e.g. tall open forest) and of each of the remaining stratum layers (i.e. groundcover class, e.g. dense or isolated clumps); (c) an indication in the range and mean basal areas (DBH) of the canopy for open forest/woodland communities; (d) an assessment of the level of any previous disturbance to the existing vegetation communities, e.g. fire, weeds, grazing, etc; and

	(e) a list of plant species occurring in each layer or strata within the vegetation community.

Significant flora species

Following a search of existing databases (e.g. such as WildNet and the Gold Coast Flora & Fauna Database) to identify which species are likely to occur in the area, a targeted systematic search is required over the entire study area to determine the presence and location of significant flora species (see **Appendix 4**) utilising 'whole-of-site' traverses or equivalent. This is of particular importance where existing records or local knowledge suggest that significant flora species may be present, or where prior site disturbance may have resulted in an unpredictable distribution of species.

6.3 Documentation

The findings of the flora survey, including the results of any community consultation, should be clearly presented as part of the ecological site assessment report (see the sample Table of Contents in **Appendix 1**). The following information should be included:

- a brief introduction providing a background to the study area, setting the context of the study, outlining the study objectives, and providing a brief outline of the proposed development;
- a summary of the methodology used to conduct the assessment, including the name of the field assessor and the date of the survey, and a justification of the selection of the methodology used;
- a brief summary of any regional floristic or vegetation data used to supplement on-site survey results (cite references);
- a summary of the floristics of the study area, including any significant species (**Appendix 4**), any prohibited or restricted invasive matter under the *Queensland Biosecurity Act 2014*; and any species listed in the *Pest Management Plan 2013-2017*;
- a concise description of the vegetation communities and existing environment within the study area. The description should include a list of the dominant plant species within each structural layer of each vegetation community;
- a list of identified flora species, noting their conservation status as defined by the particular statute (e.g. endangered, vulnerable, near threatened, or common as defined by the *Nature Conservation (Wildlife) Regulation* of the Nature Conservation Act 1992); their city wide significance (see **Appendix 4**); their status if applicable (prohibited or restricted invasive biosecurity matter and the category 1, 2, 3, 4 or 5) as defined by the *Queensland Biosecurity Act 2014*; or their environmental weed status as identified in the *Pest Management Plan 2013-2017*;
- an assessment of the 'condition' or 'integrity' of the vegetation associations present over the study area, in terms of site history, fire, prior land use, extent of canopy thinning/clearance, disturbance by weeds and feral animals, presence of understory, native grasses, fallen woody material, organic litter, recruitment of wood perennial species, native plant species richness, and other relevant notes. Any indication of vegetation dieback and its potential causes should also be included in this assessment;
- an assessment of the distribution and conservation status of identified vegetation associations locally and regionally, including reference to the *Vegetation Management Act 1999* and Regulations.

The above information should be supported by appropriately scaled map(s) clearly indicating:

- the location of all existing vegetation within the study area, contour lines (using intervals between 0.5 and 2.0 metres) and any existing buildings, roads or other infrastructure;
- the location of survey plots and/or transects used during the flora survey;
- the location, extent and conservation status of the different vegetation communities that exist within the study area; and
- The location of any significant species (**Appendix 4**), 'pest plants' or environmental weeds.

The maps should clearly indicate the location and extent of the feature being shown and either be overlaid, or be easily compared with, plans of the proposed development.

The species list(s) should be provided in hard copy and digital format. All species lists must be presented in Microsoft Excel spreadsheet format, and contain at least 6 fields including the genus, species, X and Y coordinates, date observed, and precision (m). GPS coordinates must be provided as Universal Transverse

Mercator (UTM) geographic coordinate system format. Separate lists must be submitted for flora and fauna.

7 Appendix 3: Fauna survey

7.1 Aim

To collect enough information to:

- identify terrestrial and aquatic fauna species (native and exotic) on the site;
- highlight the presence (or expected presence) of any significant fauna species (**Appendix 4**);
- highlight the presence and provide a description of any habitat for significant species (defined in **Appendix 4**) and other habitat features such as log-piles, termataries, ephemeral/perennial springs, hollows etc;
- describe and map any known essential habitat identified under the *Vegetation Management Act 1999*; and
- identify the location and extent of any koala habitat on or directly adjacent to the subject site consistent with the *SEQ Koala Habitat Values Map* under *State Planning Policy 2/10 Koala Conservation in South East Queensland* and provide a description of the habitat based on flora and fauna survey effort.

7.2 Methods

Prior to commencing the fauna survey, discussion should be undertaken with the Council officers to ascertain the survey period and detailed trapping requirements suited to the study area. Ideally, both a Site Analysis Report and Flora Survey will have been completed to assist in these determinations.

At least one sampling site should be established in each broad ecosystem and habitat type (i.e. gully, ridge, open forest, closed forest, heathland/shrubland, sedgeland, flowing/stagnant water bodies, etc). For large study areas it is expected that replicate sampling sites would be established within any widespread ecosystem and habitat types.

Prior to determining the appropriate survey methodology, the study area should be assessed on the basis of habitat types, existing fauna records and any available literature/reports for the surrounding area. Ideally, the survey methodologies should be sufficient to record all fauna species that utilise the study area and to identify the expected nature of use for available habitats (e.g. transient and migratory species, likely resident species).

Surveys should consist of both standardised and targeted methodologies, firstly to identify the fauna assemblage from representative sites within each of the habitat types present, and secondly to gain a comprehensive inventory of the full suite of fauna species present. The survey period requirements will be dependent on habitat diversity within the study area, the size of the area to be surveyed, and the seasonal behaviour of any expected species (e.g. of migratory birds).

Suggested methodologies for a standard fauna survey involve:	
Diurnal search	This involves intensive investigation of streams, ground layer (under logs, rocks and leaf litter), low vegetation (under bark and in tree stumps) and caves for target invertebrates (e.g. snails, ants, butterflies and any anticipated significant species) and all amphibians, reptiles, bats and animal signs, e.g. scats, owl pellets, remains and tracks. **Minimum Duration: 2hr/site during the middle part of the day**
Pitfall traps	These should comprise at least one pitfall trap line consisting of 3 or more pits (20 litre containers) and a 20 metre drift fence for each habitat type. However, the number of pits/line length to use is often best determined on site. Pitfall traps should be cleared early morning and late afternoon and should include material in the base for cover during the day. This is a sound means of sampling for amphibians, reptiles and small mammals. **Minimum Duration: Trapping over four (4) consecutive days and nights is recommended**
Opportunistic records	Covers all fauna observations outside the systematic survey times.
Spotlighting	Should be undertaken on foot, where possible, at a leisurely pace using hand-held 30 – 50 Watt spotlights and/or head torches. Surveys should be undertaken along predetermined transects of varying length and location, depending upon habitat and species' characteristics and should be started in the early evening. This method samples nocturnal

	mammals (flying, arboreal and terrestrial), birds (owls and nightjars), reptiles (geckos) and frogs. **Minimum Duration: 2hr per night during the survey period**
Elliot and wire cage traps	A minimum of 20 Elliot 'A' and 1 Elliot 'B' traps should be laid on ground transects 10 or more metres apart. Each transect should include two medium-large wire cage traps on the ground and five platform mounted arboreal traps using a variety of baits. This is a sound means of sampling for arboreal and terrestrial mammals. Trap placement will be influenced by vegetation diversity, the size and shape of habitat patches and by naturally occurring features such as logs, rock outcrops, tree bases and clumping vegetation. **Minimum Duration: Trapping over four (4) consecutive nights is recommended**
Bird surveys	Bird species are to be recorded, together with an indication of the method of identification (i.e. call or visual observation) and habitat location. Surveys should be conducted from dawn to early morning, dusk to early evening and during the night for nocturnal species. The affiliation with specific habitat types that occur within the study area and any implications for migratory species should be noted. Bird surveys are to be conducted in each of the habitat types/vegetation communities/ecosystems represented in the study area. **Minimum Duration: 20 minutes per transect, minimum 4 transects per site or 2 transects per 10hectaresfor larger sites**
Suggested methodologies for a targeted fauna survey involve:	
Targeted feed tree search	This involves intensive investigation of the site for isolated specimens and groves of feed trees of Glossy Black Cockatoo, and quantification of the density and age of characteristic orts or chewings of Allocasuarina littoralis and A torulosa at these locations. **Minimum Duration: 1hr/hectare during daylight hours**
Camera traps	This involves setting camera traps (Scout Guard etc) with motion triggers in appropriate locations for targeted fauna species, such as Spotted-tailed Quoll, Long-nosed Potoroo, Albert's Lyrebird etc. May include baiting to increase the probability of attracting target fauna past camera site. **Minimum Duration: 1 week/Trap, 3 traps minimum**
Hair tubes	Of different sizes left in site for up to two weeks as an additional method of mammal detection. This is a useful additional technique for the detection of rarer or more cryptic small ground-dwelling mammals (New Holland Mouse, Potoroo, Bandicoot). **Minimum Duration: 1 week/site, 20 traps minimum**
Targeted ground Search	This involves intensive investigation of streams, ground layer (under logs, rocks and leaf litter), low vegetation (under bark and in tree stumps), caves and other habitat features as appropriate for target fauna. Includes cryptic or rare species such as Stephens Banded Snake, Death Adder, rarer skinks (Ophioscincus, Coeranoscincus etc). **Minimum Duration: 16 hours total or 4hrs/10 hectares of site during active time period of target fauna**
Targeted bird surveys	Active searching for rare or cryptic bird species possibly expected for the study area, including searching for raptors on warm days, seasonal migrants during summer and winter seasonal conditions, and listening for characteristic vocalisations of rare species (Rails and Crakes, Button Quails etc). Any implications for migratory species should be noted. **Minimum Duration: Twenty Minutes Per Transect, minimum 4 transects/site or 2 transects/10hectares**
Harp traps	For the capture of micro chiropteran bats. Targeting appropriate flyways in habitat on site. **Minimum Duration: 2 harp trap nights up to 50 hectares, 4 harptrap nights for larger sites**
Electronic bat detectors	For recording the ultrasonic calls of micro chiropteran bats. Survey options include walking a predetermined transect, stopping to record calls detected, and remote/stationary detection at specific locations such as stage trees. Surveys of transects should occur at least one hour after sunset. **Minimum Duration: 4 full anabat nights up to 50 hectares, 8 anabat nights for larger sites**

Arboreal trapping	Used to identify the presence of gliders and Phascogale which are hard to detect using conventional spotlighting techniques. The method involves setting up specially designed trap stations, typically comprising a wooden platform secured to selected trees with a glider trap. Further information can be found in *Mawberry, 1989*. **Minimum Duration: 40 trap nights**
Targeted spotlighting	Should be undertaken on foot, where possible, at a leisurely pace using hand-held 30 – 50 Watt spotlights and/or head torches. Target species include threatened Owls, frogs and Stephens Banded Snake. **Minimum Duration: 2hr for each Night of the Survey Period**
Nocturnal voice playback and call recording	This technique uses voice playback in representative habitat sites for threatened owl and frog species. **Minimum Duration: 1hr for each target species**
Opportunistic records	Covers all other fauna observations outside of systematic and targeted survey methodologies.
Suggested methodologies for a koala survey and koala habitat assessment	
Koala searches	**Koala searches are relevant to proposed development sites that contain koala bushland habitat as shown on the Environmental significance – priority species overlay map:** Sites less than 50 hectares should be searched in their entirety using strip transect techniques, as outlined in the *Nature Conservation (Koala) Conservation Plan 2006* and *Management Program 2006-2016 (DERM 2006)* and Dique et al. 2003. The site should be divided into transects of width dependent upon the number of trained and experienced observers walking at approximately 15 to 20m spacings. Observers should walk each transect at a steady pace following set compass bearings, whilst maintaining roughly equal spacings from other observers. Searchers should be equipped with binoculars, compass, map, flagging tape, two-way radios, and at least one GPS unit per transect team to record any koala sightings. The outer-most searcher on each transect should flag the edge to help align the next transect and ensure areas are not missed. Sites greater than 50 hectares may be too large to search entirely, in which case a sampling strategy is required. Transects should be oriented in order to cover representative areas of each different vegetation/habitat type and topography/landform that occurs on the site and should ensure a focus on any mapped areas of koala bushland habitat as shown on the **Environmental significance – priority species overlay map,** and any areas that contain koala feed and shelter trees The minimum area of overall coverage for transect surveys should be 50 hectares and/or 30% of the site, whichever is greater.
Koala faecal pellet surveys	**Koala faecal pellet surveys are relevant to proposed development sites that contain koala bushland habitat as shown on the Environmental significance – priority species overlay map:** An assessment of koala faecal pellet-based habitat utilisation should be undertaken using the Spot Assessment Technique (SAT) to identify koala activity levels across the site (*Phillips & Callaghan 2011*). SAT sites should be located systematically using a grid over all native vegetation where mapped koala bushland habitat is represented. The arrangement of grid cells and the precise location of SAT sites within grid cells (one site per cell) should aim to maximise sampling of any mapped areas of koala bushland habitat as shown on the **Environmental significance – priority species overlay map** and any areas that contain koala feed and shelter trees. For sites less than 50 hectares, SAT surveys should be positioned using a 100 m grid overlay, with one SAT site per 100 m grid cell containing mapped koala bushland habitat. For sites greater than 50 hectares, SAT surveys can be positioned using a 200 m grid overlay, with one SAT site per 200 m grid cell containing mapped koala bushland habitat. As well as identifying koala activity levels across proposed development sites, SAT surveys facilitate assessment and reporting of the distribution and relative abundance of koala feed and shelter trees. To assist with estimation of relative abundance and densities of koala feed and shelter trees, the distance from the centre tree to the furthest of the 30 surveyed trees should be recorded for each SAT site. Each SAT survey should be accompanied by a 25 m radial search for koalas undertaken by one or more trained and experienced observers. The results from these searches provide for comparison and cross-checking against results from transect surveys.

	Note: Other specific methods may be required to target particular fauna species identified as potentially occurring within the study area. Persons undertaking fauna surveys must hold a current Scientific and Educational Purposes Permit (S&EPP) under the *Nature Conservation (Administration) Regulation 2006* issued from the Department of Environment and Resource Management or equivalent. It is the principal consultants/registered Scientific Users responsibility to ensure that the S&EPP enables survey effort to be undertaken in accordance with techniques prescribed under this policy. All survey work must strictly be conducted in accordance with Conditions of the S&EPP and comply with the provisions of the *Animal Care and Protection Act 2001*.
Koala Landscape Assessment	**Koala landscape assessments are relevant to proposed development sites that contain koala bushland habitat as shown on the Environmental significance – priority species overlay map:** The landscape assessment should refer to the other components of this policy and '*Planning Guidelines for Koala Conservation and Recovery – A Guide to Best Practice Planning' (McAlpine et al. 2007)*. The assessment should report on the range in patch sizes and the mean patch size in hectares of koala bushland habitat as shown on the **Environmental significance – priority species overlay map**. The landscape assessment should also report on the range in inter-patch distances and the mean inter-patch distance for all koala habitat categories combined.

7.3 Documentation

The findings of the fauna survey, including the results of any community consultation, should be clearly reported as part of the ecological site assessment report (see sample Table of Contents in **Appendix 1**). The following information should be included:

- a brief introduction providing the background to the study area, setting the context of the study, outlining the study objectives, and providing a brief outline of the proposed development;
- detailed information on the scope and duration of the fauna survey and description and justification of the techniques employed for each fauna group (i.e. fish, amphibians, reptile, birds and mammals). In particular, the report should provide details on survey intensity, survey duration, sampling methodology and strategies, qualification of any assumptions based on non-quantitative sampling techniques (i.e. those based on personal observation), and demonstration of how the effects of seasonal variation and climatic conditions have been addressed by the methodology;
- reference to any limitations in duration, scope and techniques of the fauna survey work;
- a summary of any regional fauna data used to supplement on-site survey results (site references);
- a summary assessment of the fauna and fauna habitat types within the study area, including any significant species (**Appendix 4**);
- the results of the fauna survey, expressed for each faunal group (i.e. fish, amphibians, reptiles, birds and mammals), giving a summary description of the fauna values of the study area and in which habitats/areas they occur. This should include the sites at which each species was recorded and a reference to their abundance at the site (i.e. abundant, common, uncommon, occasional);
- a list of all fauna species present or potentially present in the study area, noting whether they are native or exotic and their conservation status as defined by the particular statute (e.g. endangered, vulnerable, near threatened, common or special cultural significance), as defined by the *Nature Conservation (Wildlife) Regulation of the Nature Conservation Act*; their local significance, their 'pest animal' status if applicable (prohibited or restricted invasive biosecurity matter and the category 1, 2, 3, 4 or 5) as defined by the *Queensland Biosecurity Act 2014*.
- identification and assessment of habitat for significant species within the study area such as:
  - trees supporting scratch marks;
  - trees supporting hollows;
  - location and identification of scats, tracks and other traces;
  - fruit and seed falls;
  - fauna trails;
  - fallen logs;
  - termite mounds;
  - ground diggings;
  - rock outcrops;
  - nests in creek/riverine banks; and

- roost/nest/den trees

The above information should be supported by an appropriately scaled map(s) clearly indicating:

- the location of all existing vegetation within the study area, contour lines (using intervals between 0.5 and 2 0 metres) and any existing buildings or other infrastructure;
- the location of the survey area and a map of trap lines, pitfall lines, bird survey and spotlighting transects, and harp traps/mist nets;
- the location of any significant species (**Appendix 4**);
- the location of any identified fauna movement corridors, pathways or habitat links and/or breeding sites and clarification of site status (i.e. either active or dormant);
- identification of important habitat trees, i.e. active den and nest sites, the presence of tree hollows and obvious nests (particularly those of raptors), etc.; and
- the maps should clearly indicate the location and extent of the feature being shown and either be overlaid, or be easily compared with, plans of the proposed development.

The species list(s) should be provided in hard copy and digital format. All species lists must be presented in Microsoft Excel spreadsheet format, and contain at least 6 fields including the genus, species, X and Y coordinates, date observed, and precision (m). GPS coordinates must be provided as Universal Transverse Mercator (UTM) geographic coordinate system format. Separate lists must be submitted for flora and fauna.

8 Appendix 4: Significant species

Key to significant species tables

National significant species	Critically Endangered (CE); Endangered (E); Vulnerable (V); Migratory *Environmental Protection & Biodiversity Conservation Act 1999 (EPBCA)*							
State significant species	Endangered (E), Vulnerable (V), Near threatened (NT) , Special Least Concern (SLC) *Nature Conservation Act 1992 (NCA)*							
Local significant species	**Abundance**		**Distribution**				**Endemism**	**Listing**
	A1	A2	D1	D2	D3	D4	E1	L1
	Low number of records within Gold Coast LGA	Expert Panel Rating	At the limit or near limit of geographical range	Gold Coast LGA or SEQ bioregion is a significant stronghold	Specialised or complex habitat requirements	Expert Panel Rating	Endemic to Gold Coast LGA or SEQ bioregion	Listed under the EPBCA or NCA, automatic inclusion

Note: The following table identifies the legislative status of significant species within the city as at 1st January 2017. The status of National and State significant species may have changed since this date. The current status of National and State significant species is to be used for assessment purposes.
Where species are currently matters of National and/or State significance, they are not matters of Local significance despite their listing within the table below. Where species are not currently matters of National and/or State significance, they are matters of Local significance as identified in the table below.

Significant fauna species

No	Scientific name	Common name	National significant species	State significant species	Local significant species
Frogs					
1	*Adelotus brevis*	Tusked Frog		V	A1 L1
2	*Assa darlingtoni*	Marsupial Frog			A1 D2

3	*Crinia tinnula*	Tinkling Froglet		V	A1 D3 L1
4	*Lechriodus fletcheri*	Fletcher's Frog			A1 D1 D3
5	*Litoria brevipalmata*	Green-thighed Frog			A1 D1
6	*Litoria freycineti*	Freycinet's Frog		V	A1 D3 L1
7	*Litoria olongburensis*	Olongburra Frog	V	V	A1 D3 L1
8	*Litoria pearsoniana*	Pearson's Frog		V	L1
9	*Litoria revelata*	Revealed Frog			A1 D3
10	*Litoria verreauxii*	Verreaux's Frog			A1 D1
11	*Mixophyes fleayi*	Fleay's Barred Frog	E	E	L1
12	*Mixophyes iteratus*	Giant Barred Frog	E	E	A1 L1
13	*Philoria loveridgei*	Loveridge's Frog			A1 D1 D2 D3
14	*Uperoleia fusca*	Dusky Toadlet			A1 D1
15	*Uperoleia laevigata*	Smooth Toadlet			A1 D1
Birds					
16	*Actitis hypoleucos*	Common Sandpiper	Migratory	SLC	A1 D3
17	*Anthochaera phrygia*	Regent Honeyeater	E	E	A1 L1
18	*Apus pacificus*	Fork-tailed Swift	Migratory	SLC	A1
19	*Ardenna pacifica*	Wedge-tailed shearwater	Migratory	V	
20	*Arenaria interpres*	Ruddy Turnstone	Migratory	SLC	A1 D3
21	*Atrichornis rufescens*	Rufous Scrub-bird	E	V	A1 D3 L1
22	*Biziura lobata*	Musk Duck			A1
23	*Botaurus poiciloptilus*	Australasian Bittern	E		A1 L1
24	*Calidris acuminata*	Sharp-tailed Sandpiper	Migratory	SLC	A1 D3
25	*Calidris alba*	Sanderling	Migratory	SLC	A1 D3
26	*Calidris canutus*	Red Knot	E, Migratory	E	A1 D3
27	*Calidris ferruginea*	Curlew Sandpiper	CE, Migratory	E	A1 D3
28	*Calidris melanotos*	Pectoral Sandpiper	Migratory	SLC	A1
29	*Calidris ruficollis*	Red-necked Stint	Migratory	SLC	A2 D3
30	*Calidris tenuirostris*	Great Knot	CE, Migratory	E	A1 D3
31	*Calyptorhynchus banksii*	Red-tailed Black-Cockatoo			A1 D3
32	*Calyptorhynchus lathami*	Glossy Black-Cockatoo		V	L1
33	*Charadrius bicinctus*	Double-banded Plover	Migratory	SLC	A1 D3 D4
34	*Charadrius leschenaultii*	Greater Sand Plover	V, Migratory	V	A1 D3
35	*Charadrius mongolus*	Lesser Sand Plover	E, Migratory	E	A1 D3
36	*Charadrius veredus*	Oriental Plover	Migratory	SLC	A1
37	*Chlidonias leucopterus*	White-winged Black Tern	Migratory	SLC	A1
38	*Chthonicola sagittata*	Speckled Warbler			A1 D3

39	*Cinclosoma punctatum*	Spotted Quail-thrush			A1 D3
40	*Climacteris erythrops*	Red-browed Treecreeper			A1 D1
41	*Cyclopsitta diophthalma coxeni*	Double-eyed Fig-Parrot	E	E	A1 L1
42	*Diomedea exulans exulans*	Wandering Albatross	V	V	A1 L1
43	*Diomedea exulans gibsoni*	Gibson's Albatross	V	V	A1 L1
44	*Egretta sacra*	Eastern Reef Egret			A1 D3
45	*Ephippiorhynchus asiaticus*	Black-necked Stork			A1 A2 D3
46	*Esacus magnirostris*	Beach Stone-curlew		V	A1 D3 L1
47	*Gallinago hardwickii*	Latham's Snipe	Migratory	SLC	A1 D3
48	*Glossopsitta concinna*	Musk Lorikeet			A1
49	*Haematopus fuliginosus*	Sooty Oystercatcher			A1
50	*Ixobrychus dubius*	Australian Little Bittern			A1 D3
51	*Ixobrychus flavicollis*	Black Bittern			A1 D3
52	*Lathamus discolor*	Swift Parrot	E	E	A1 L1
53	*Lewinia pectoralis*	Lewin's Rail			A1 D4
54	*Lichenostomus melanops*	Yellow-tufted Honeyeater			A1
55	*Limicola falcinellus*	Broad-billed Sandpiper	Migratory	SLC	A1
56	*Limosa lapponica*	Bar-tailed Godwit	Migratory	V	A2 D3
57	*Limosa limosa*	Black-tailed Godwit	Migratory	SLC	A1 D3
58	*Lophoictinia isura*	Square-tailed Kite			A1
59	*Macronectes giganteus*	Southern Giant-Petrel	E	E	A1 L1
60	*Macronectes halli*	Northern Giant-Petrel	V	V	A1 L1
61	*Manorina melanophrys*	Bell Miner			A1 D1
62	*Menura alberti*	Albert's Lyrebird		NT	D1 D2
63	*Myiagra alecto*	Shining Flycatcher			A1
64	*Myzomela obscura*	Dusky Honeyeater			A1 D1
65	*Nettapus coromandelianus*	Cotton Pygmy-goose			A1
66	*Ninox connivens*	Barking Owl			A1
67	*Ninox strenua*	Powerful Owl		V	A1 L1
68	*Numenius madagascariensis*	Eastern Curlew	Migratory, CE	E	A2 D3
69	*Numenius minutus*	Little Curlew	Migratory	SLC	A1
70	*Numenius phaeopus*	Whimbrel	Migratory	SLC	A2 D3
71	*Pachycephala olivacea*	Olive Whistler			A1 D1 D3
72	*Petroica boodang*	Scarlet Robin			A1 D1 D4
73	*Petroica phoenicea*	Flame Robin			A1 D1
74	*Phaethon rubricauda*	Red-tailed Tropicbird		V	A1 L1
75	*Pluvialis fulva*	Pacific Golden Plover	Migratory	SLC	A1 D3

76	*Pluvialis squatarola*	Grey Plover	Migratory	SLC	A1 D3
77	*Podargus ocellatus*	Marbled Frogmouth		V	A1 L1
78	*Pomatostomus temporalis*	Grey-crowned Babbler			A1 D4
79	*Pterodroma heraldica*	Herald Petrel	CE	E	A1 L1
80	*Ptilinopus superbus*	Superb Fruit-Dove			A1
81	*Rostratula australis*	Australian Painted Snipe	E	V	A1 L1
82	*Sterna striata*	White-fronted Tern			A1 D1
83	*Sternula albifrons*	Little Tern	Migratory		L1
84	*Thalassarche melanophris*	Black-browed Albatross	V		A1 L1
85	*Thelasseus bengalensis*	Lesser Crested Tern			A1 D1
86	*Todiramphus chloris*	Collared Kingfisher			A1 D1 D3
87	*Tringa brevipes*	Grey-tailed Tattler	Migratory	SLC	A1 D3
88	*Tringa glareola*	Wood Sandpiper	Migratory	SLC	A1
89	*Tringa incana*	Wandering Tattler	Migratory	SLC	A1
90	*Tringa nebularia*	Common Greenshank	Migratory	SLC	A1 D3
91	*Tringa stagnatilis*	Marsh Sandpiper	Migratory	SLC	A1 D3
92	*Turnix melanogaster*	Black-breasted Button-quail	V	V	A1 L1
93	*Tyto longimembris*	Eastern Grass Owl			A1 D3
94	*Tyto novaehollandiae*	Masked Owl			A1
95	*Tyto tenebricosa*	Sooty Owl			A1 D3
96	*Xenus cinereus*	Terek Sandpiper	Migratory	SLC	A1 D3
Fish					
97	*Anguilla australis*	Southern Shortfin Eel			A1 D1
98	*Bidyanus bidyanus*	Silver Perch	CE		A1
99	*Craterocephalus marjoriae*	Marjorie's Hardyhead			A1 D2
100	*Gobiomorphus coxii*	Cox's Gudgeon			A1 D1
101	*Maccullochella peelii mariensis*	Mary River Cod	E		A1 L1
102	*Macquaria novemaculeata*	Australian Bass			A1 D1
103	*Mogurnda adspersa*	Southern Purplespotted Gudgeon			A1 D4
104	*Neoceratodus forsteri*	Australian Lungfish	V		A1 L1
105	*Redigobius bikolanus*	Speckled Goby			A1 D1
106	*Rhadinocentrus ornatus*	Ornate Rainbowfish			A1
107	*Trachystoma petardi*	Pinkeye Mullet			A1 D1
Mammals					
108	*Antechinus subtropicus*	Subtropical Antechinus			A1 A2 D1 D2
109	*Antechinus swainsonii*	Dusky Antechinus			A1 D1 D3
110	*Cercartetus nanus*	Eastern Pygmy-possum			A1 D1

111	*Dasyurus maculatus*	Spotted-tailed Quoll	E	V	A1 L1
112	*Dugong dugon*	Dugong	Migratory	V	A1 L1
113	*Macropus agilis*	Agile Wallaby			A1 D1 D4
114	*Macropus dorsalis*	Black-striped Wallaby			A1
115	*Megaptera novaeangliae*	Humpback Whale	V	V	A1 L1
116	*Mormopterus beccarii*	Beccari's Freetail Bat			A1 D1
117	*Myotis macropus*	Large-footed Myotis			A1 D1
118	*Nyctimene robinsoni*	Eastern Tube-nosed Bat			A1 D1 D2
119	*Ornithorhynchus anatinus*	Platypus		SLC	
120	*Petauroides volans*	Greater Glider	V	V	A1 D3
121	*Petrogale penicillata*	Brush-tailed Rock-wallaby	V	V	A1 D3 L1
122	*Phascogale tapoatafa*	Brush-tailed Phascogale			A1
123	*Phascolarctos cinereus*	Koala	V	V	D3 L1
124	*Potorous tridactylus*	Long-nosed Potoroo	V	V	A1 L1
125	*Pteropus poliocephalus*	Grey-headed Flying-fox	V		L1
126	*Scoteanax rueppellii*	Greater Broad-nosed Bat			A1 D1
127	*Scotorepens orion*	Eastern Broad-nosed Bat			A1 D1
128	*Scotorepens sp.*	Central-eastern Broad-nosed Bat			A1 D1
129	*Sminthopsis murina*	Common Dunnart			A1 D1
130	*Sousa sahulensis*	Indo-pacific Hump-backed Dolphin	Migratory	V	A1 D1
131	*Tachyglossus aculeatus*	Echidna		SLC	
132	*Thylogale stigmatica*	Red-legged Pademelon			A1 A2 D3
133	*Vespadelus darlingtoni*	Large Forest Bat			A1 D1
134	*Xeromys myoides*	False Water Rat	V	V	A1 L1
Reptiles					
135	*Acanthophis antarcticus*	Common Death Adder		V	A1 D1 D3
136	*Anilios wiedii*	Brown-snouted Blind Snake			A1 D4
137	*Caretta caretta*	Loggerhead Turtle	E	E	A1 L1
138	*Carlia pectoralis*	Open-litter Rainbow skink			A1 D1
139	*Chelonia mydas*	Green Turtle	V	V	A1 L1
140	*Ctenotus arcanus*	Arcane Ctenotus			A1 D1
141	*Dermochelys coriacea*	Leathery Turtle	E	E	A1 L1
142	*Diporiphora australis*	Tommy Roundhead			A1 D1
143	*Harrisoniascincus zia*	Rainforest Cool-skink			A1 D1

144	*Hoplocephalus bitorquatus*	Pale-headed Snake			A1
145	*Hoplocephalus stephensii*	Stephen's Banded Snake			A1 D1 D3
146	*Hypsilurus spinipes*	Southern Angle-headed Dragon			A1 D1
147	*Karma tryoni*	Tryon's Skink		V	A1 D1 D2 D3 E1
148	*Notechis scutatus*	Tiger Snake			A1 D1
149	*Ophioscincus truncatus*	Short-limbed Snake-skink			A1 A2 D1 D2
150	*Pseudechis guttatus*	Spotted Black Snake			A1 D1
151	*Saiphos reticulatus*	Three-toed Snake-tooth Skink	V		A1 L1
152	*Saltuarius swaini*	Southern Leaf-tailed Gecko			A1 D1
153	*Saproscincus challengeri*	Orange-tailed Shadeskink			A1 D1
154	*Saproscincus rosei*				A1 D1
155	*Wollumbinia latisternum*	Saw-shelled Turtle			A1 D1

Significant flora species

No	Scientific name	Common name	National significant species	State significant species	Local significant species
1	*Abelmoschus moschatus tuberosus*	Yellow Mallow			A1 A2 D1
2	*Acacia attenuata*	Wattle	V	V	A1 L1
3	*Acacia bakeri*	Marblewood			A1 D1 D3 E1
4	*Acacia baueri baueri*	Bauer's Wattle		V	A1 L1
5	*Acacia binervata*	Two-veined Hickory			A1 A2 D1 D4
6	*Acacia brownei*	Brown's Wattle			A1 A2 D1
7	*Acacia cincinnata*	Coiled Pod Wattle			A1 A2 D1 D4
8	*Acacia floribunda*	Gossamer Wattle			A1 A2 D1 D4
9	*Acacia glaucocarpa*	Whitewood			A1 A2 D4
10	*Acacia myrtifolia*	Myrtle Wattle			A1 D1 D4
11	*Acacia obtusifolia*	Blunt-leaved Wattle			A1 A2 D1 D4
12	*Acacia orites*	Mountain Wattle		NT	A1 D1 D4 L1
13	*Acacia penninervis var. longiracemosa*	Mountain Hickory			A1 D1 D4
14	*Acacia stricta*	Hop Wattle			A1 A2 D1 D4
15	*Acacia viscidula*	Sticky Wattle			A1 D1 D4
16	*Acalypha capillipes*	Small-leaved Acalypha			A1 D1 D3
17	*Acalypha eremorum*	Common Acalypha			A1 D1 D4
18	*Acronychia baeuerlenii*	Green-fruited Acronychia		NT	A1 D1 D3 L1

19	*Acronychia littoralis*	Scented Acronychia	E	E	A1 L1
20	*Acronychia suberosa*	Corky Acronychia			A1 D1 E1
21	*Acronychia wilcoxiana*	Silver Aspen			A1 D1 D3
22	*Acrothamnus spathaceus*				A1 A2 D1 D4
23	*Actephila grandifolia*	Large-leaved Actephila			A1 D1 E1
24	*Adenostemma lavenia*	Sticky Daisy			A1 A2 D4
25	*Adenostemma macrophyllum*				A1 A2 D1
26	*Adriana urticoides var. urticoides*	Hairy Adriana			A1 D3
27	*Agiortia pedicellata*				A1 D1 D3 E1
28	*Alectryon connatus*	Scrub Red Jacket			A1 A2 D4
29	*Alectryon reticulatus*	Scrub Boonaree			A1 A2 D1 D4
30	*Allocasuarina rigida rigida*	She-Oak			A1 D1 D3
31	*Alloxylon pinnatum*	Tree Waratah		NT	A1 D1 L1
32	*Alphitonia petriei*	White Ash			A1 D1 D4
33	*Ammannia multiflora*	Jerry-jerry			A1 A2 D4
34	*Anisomeles malabarica*				A1 D1 D3
35	*Anopterus macleayanus*	Macleay Laurel			A1 D1 D3
36	*Aponogeton elongatus elongatus*			NT	A1 D3 L1
37	*Archidendron hendersonii*	White Lace Flower			A1 D1 D3
38	*Archidendron muellerianum*	Veiny Lace Flower			A1 D1 D3 L1
39	*Ardisia bakeri*	Ardisia		NT	A1 D1 E1 L1
40	*Argophyllum nullumense*	Silver Leaf			A2 D1 D3 L1
41	*Asplenium attenuatum var. indivisum*	Frilly Spleenwort			A1 D1 D3
42	*Asplenium difforme*	Shore Spleenwort			A1 D1 D3
43	*Asplenium flabellifolium*	Necklace Fern			A1 D1 D3
44	*Asplenium harmanii*	Necklace Fern			A1 D1 D2 D3
45	*Astrotricha umbrosa*	Woolly Star-hair			A1 D1 D3
46	*Atalaya multiflora*	Broad-leaved Whitewood			A1 A2 D1 D4
47	*Austrobuxus swainii*	Pink Cherry			A1 D1 D4 L1
48	*Austrocynoglossum latifolium*	Forest Hound's Tongue			A1 D1 D3
49	*Azolla filiculoides*	Red Azolla			A1 D3
50	*Backhousia sciadophora*	Shatterwood			A1 D4
51	*Baeckea diosmifolia*	Fringed Baeckea			A1 D1 D4
52	*Backhousia subargentea*	Giant Ironwood			A1 D1 D3 L1
53	*Baeckea imbricata*	Spindly Baeckea			A1 D1 D4

54	*Baeckea linifolia*	Swamp Baeckea			A1 D1 D3
55	*Baloghia marmorata*	Jointed Baloghia	V	V	A1 D3 L1
56	*Banksia aemula*	Wallum Banksia			A1 D1 D4
57	*Banksia conferta conferta*	Mountain Banksia		V	A1 D3 L1
58	*Banksia oblongifolia*	Dwarf Banksia			A1 D1 D4
59	*Banksia spinulosa var. cunninghamii*	Hairpin Banksia			A1 D1 D4
60	*Barklya syringifolia*	Crown of Gold			A1 D1 D4
61	*Bauera capitata*				A1 D1 D3
62	*Belvisia mucronata var. mucronata*	Tailed Fern			A1 D1
63	*Beyeria lasiocarpa*	Beyeria			A1 A2 D1 D4
64	*Blandfordia grandiflora*	Christmas Bells		E	A1 D3 L1
65	*Blechnum camfieldii*	Water Fern			A1 D1 D3
66	*Blumea lacera*				A1 D1
67	*Boronia falcifolia*	Wallum Boronia			A1 D1 D4
68	*Boronia rosmarinifolia*				A1 D1 D4
69	*Boronia safrolifera*	Safrole Boronia			A1 D1 D4
70	*Bosistoa transversa*	Three-leaved Bosistoa	V		A1 L1
71	*Bossiaea brownii*				A1 D1
72	*Bossiaea scortechinii*				A1 D1
73	*Brachychiton bidwillii*	Little Kurrajong			A1 D1 D4
74	*Brachychiton sp. Ormeau (L.H.Bird AQ435851)*	Ormeau Bottletree	CE	E	A1 D1 E1 L1
75	*Brachyloma daphnoides daphnoides*	Daphne Heath			A1 D3 D4
76	*Brachyloma scortechinii*	Large-fruited Daphne Heath			A1 D1 D3
77	*Brunoniella spiciflora*	White Brunoniella			A1 D1 D3
78	*Bulbine vagans*	Bulbine Lily			A1 D1 D3
79	*Bulbophyllum globuliforme*	Miniature Moss-Orchid	V	NT	A1 L1
80	*Caleana major*	Large Duck Orchid			A1 D1 D3
81	*Caleana minor*	Small Duck Orchid			A1 D1 D3
82	*Callerya australis*	Blunt Wistaria			A1 D1 D3
83	*Callitris macleayana*	Stringybark Pine			A1 A2 D4
84	*Callitris monticola*	Steelhead			A1 D1 D3 L1
85	*Calochilus campestris*	Copper Beard Orchid			A1 D1 D3
86	*Calochilus paludosus*	Golden Beard Orchid			A1 D1 D3
87	*Calystegia soldanella*				A1 D1
88	*Carex breviculmis*				A1 D1 D3
89	*Cassia marksiana*	Brush Cassia		V	A1 D3 L1

90	*Centranthera cochinchinensis*				A1 D1
91	*Cheirostylis ovata*				A1 D1 D3
92	*Chiloglottis reflexa*	Autumn Bird Orchid			A1 D1 D3
93	*Chiloglottis trapeziformis*	Broad-lip bird orchid			A1 D1 D3
94	*Christella arida*	Binung			A1 D1
95	*Christella parasitica*	Water Fern			A1 D1
96	*Citrus australasica*	Finger Lime			A1 A2 D1 E1
97	*Citrus australis*	Native Lime			A1 D1 E1
98	*Cladium procerum*	Leafy Twig-rush			A1 D4
99	*Coatesia paniculata*	Axebreaker			A1 A2 D1
100	*Codonocarpus attenuatus*	Bellfruit			A1 A2 D3
101	*Comesperma ericinum*	Pink Matchheads			A1 A2 D4
102	*Comesperma volubile*	Climbing Milkwort			A1 D1 D4
103	*Commersonia fraseri*	Brush Kurrajong			A1 D1 D3
104	*Corchorus cunninghamii*	Cunningham's Jute	E	E	A1 L1
105	*Correa lawrenciana var. glandulifera*	Mountain Correa			A1 D1 D4
106	*Corybas aconitiflorus*	Spurred Helmet Orchid			A1 D3 D4
107	*Corybas fordhamii*	Fringed Helmet Orchid			A1 D1 D3
108	*Corybas undulatus*	Tailed Helmet Orchid			A1 D3
109	*Corymbia henryi*	Large-leaved Spotted Gum			A1 D1 D4
110	*Corynocarpus rupestris arborescens*	Southern Corynocarpus		V	A1 D3 L1
111	*Craspedia variabilis*				A1 D1
112	*Cryptandra longistaminea*				A1 D1
113	*Cryptandra sp. (Ngungun L.S. Smith 13973)*				A1 A2 D4
114	*Cryptocarya foetida*	Stinking Cryptocarya	V	V	A1 L1
115	*Cryptocarya macdonaldii*				A1 D1 D3
116	*Cryptocarya meisneriana*	Thick-leaved Laurel			A1 D1 D3
117	*Cryptocarya rigida*	Southern Maple			A1 D1 D3
118	*Cryptostylis erecta*	Bonnett Orchid			A1 D4
119	*Cryptostylis subulata*	Large Tongue Orchid			A1 D3 D4
120	*Cupaniopsis baileyana*	Narrow-leaved Tuckeroo			A1 D1 D3
121	*Cupaniopsis flagelliformis var. australis*	Narrow-leaved Tuckeroo			A1 D1 D3 E1
122	*Cupaniopsis newmanii*	Long-leaved Tuckeroo		NT	D1 D4 E1 L1
123	*Cupaniopsis serrata*	Smooth Tuckeroo			A1 D1 D3 E1
124	*Cynoglossum suaveolens*	Sweet Hound's Tongue			A1 D3
125	*Cyperus disjunctus*				A1 D1 D4

126	*Cyperus semifertilis*	Sedge	V	V	A1 L1
127	*Cyperus subulatus*	Pointed Flat-sedge			A1 A2 D4
128	*Daphnandra tenuipes*	Red-flowered Socketwood			A1 D1 D4
129	*Davidsonia johnsonii*	Smooth Davidson's Plum	E	E	A1 D3 L1
130	*Daviesia mimosoides mimosoides*	Golden Pea			A1 A2 D1
131	*Dendrobium falcorostrum*	Beech Orchid			A1 D1 D3
132	*Dendrobium monophyllum*	Lily of the Valley Orchid			A1 D1 D3
133	*Dendrobium schneiderae var. schneiderae*			NT	A1 D1 D2 D3
134	*Dendrocnide moroides*	Gympie Stinger			A1 A2 D1
135	*Denhamia pittosporoides pittosporoides*	Veiny Denhamia			A1 D1 D3
136	*Desmodium gangeticum*				A1 D1
137	*Desmodium heterocarpon var. heterocarpon*	Trefoil			A1 D1 D3
138	*Dichelachne montana*	Brisbane Plumegrass			A1 D1 E1
139	*Dicksonia youngiae*	Bristly Tree Fern			A1 D1 D3
140	*Diospyros major*				A1 D1 D2 D3 E1
141	*Diploglottis campbellii*	Small-leaved Tamarind	E	E	A1 L1
142	*Diuris alba*	White Donkey Orchid			A1 D3
143	*Diuris aurea*	Golden Donkey Orchid			A1 D3
144	*Diuris punctata var. punctata*	Purple Donkey Orchid			A1 D3
145	*Diuris sulphurea*	Hornet Orchid			A1 D1 D3
146	*Dockrillia mortii*	Mort's Pencil Orchid			A1 A2 D3 D4
147	*Dockrillia schoenina*	Pencil Orchid			A1 D1 D3
148	*Dodonaea megazyga*	Hop Bush			A1 D1 D4
149	*Doodia heterophylla*	Rasp Fern			A1 D1 D2 D3 E1
150	*Doryanthes palmeri*	Spear Lily			A1 D1 D3
151	*Drosera burmanni*	White-flowering Sundew			A1 D3
152	*Drosera pygmaea*	Little Sundew			A1 D3
153	*Echinostephia aculeata*	Prickly Tape Vine			A2 D1 D2 E1
154	*Endiandra compressa*	Queensland Greenheart			A1 D1 D3
155	*Endiandra crassiflora*	Dorrigo Maple			A1 D1 D3
156	*Endiandra floydii*	Rose Walnut	E	E	A1 L1
157	*Endiandra globosa*	Black Walnut		NT	D2 D3 L1
158	*Endiandra hayesii*	Velvet Laurel	V	V	A1 L1

159	*Endiandra muelleri bracteata*	Green-leaved Rose Walnut			A1 D1 D3
160	*Enydra fluctuans*				A1 D1 D3
161	*Epacris longiflora*	Fuschia Heath			A1 D1 D3
162	*Epacris microphylla var. microphylla*	Small-leaved Heath			A1 D3 D4
163	*Epacris obtusifolia*	Common Heath			A1 D1 D3
164	*Epacris pulchella*	Coral Heath			A1 D1 D3
165	*Eriochilus cucullatus*	Parson's Bands			A1 D1 D3
166	*Erythrorchis cassythoides*	Small Climbing Orchid			A1 D1 D3
167	*Eucalyptus bancroftii*	Tumbledown Gum			A1 D1
168	*Eucalyptus codonocarpa*	Bell-fruited Mallee		NT	A1 D1 D3 L1
169	*Eucalyptus curtisii*	Plunkett Mallee		NT	A1 D1 L1
170	*Eucalyptus dura*	Gum-topped Ironbark			A1 D1 D4
171	*Eucalyptus fusiformis*	Broad-leaved Ironbark			A1 D1 D4
172	*Eucalyptus globoidea*	White Stringybark			A1 D1
173	*Eucalyptus notabilis*	Blue Mountains Mahogany			A1 D1 D4
174	*Eucalyptus oreades*	Blue Mountains Ash			A1 D1 D4
175	*Eucalyptus tereticornis (Bunya Mountains P.V.Holzworth AQ397993)*				A1 A2 D4
176	*Eucryphia jinksii*	Springbrook Leatherwood		E	A1 D3 L1
177	*Everistia vacciniifolia var. nervosa*	Small-leaved Canthium			A1 D1 D4
178	*Fieldia australis*	Fieldia			A1 D1 D4
179	*Fimbristylis bisumbellata*	Finger-rush			A1 D1 D4
180	*Fimbristylis depauperata*	Finger-rush			A1 D1
181	*Fimbristylis velata*	Finger-rush			A1 D1
182	*Floydia praealta*	Ball Nut	V	V	A1 L1
183	*Fontainea australis*	Southern Fontainea	V	V	A1 D3 L1
184	*Fontainea venosa*	Fontainea	V	V	A1 D3 L1
185	*Freycinetia excelsa*	Climbing Pandani			A1 D1 D4
186	*Gahnia clarkei*	Tall Saw-sedge			A1 D1 D3
187	*Gahnia insignis*	Grassy Saw-sedge			A1 D3 L1
188	*Gahnia melanocarpa*	Black Fruit Saw-sedge			A1 D1 D3
189	*Genoplesium archeri*	Variable Midge Orchid			A1 D1 D3
190	*Genoplesium psammophilum*	Midge Orchid			A1 D1 D2 D3 E1
191	*Genoplesium rufum*	Red Midge Orchid			A1 D1 D3
192	*Genoplesium sigmoideum*				A1 D1 D2 D3

193	*Gleichenia rupestris*	Coral Fern			A1 D1 D4
194	*Glinus oppositifolius*				A1 A2 D4
195	*Glossodia minor*	Small Waxlip			A1 D1 D3
196	*Gompholobium sp. (Dave's Creek P.I.Forster+ PIF15979)*				A1 D1 D2 D4 E1
197	*Gonocarpus oreophilus*				A1 D1 D4
198	*Goodenia hederacea hederacea*	Ivy Goodenia			A1 D1 D4
199	*Goodenia ovata*	Hop Goodenia			A1 D1
200	*Goodia lotifolia var. lotifolia*	Golden Tip			A1 D1
201	*Gossia fragrantissima*	Sweet Myrtle	E	E	A1 L1
202	*Gossia punctata*	Dotted Myrtle			A1 D1 E1
203	*Grammitis billardierei*	Finger Fern			A1 D1 D3
204	*Graptophyllum spinigerum*	Spiny Graptophyllum			A1 D1 D3
205	*Grevillea helmsiae*	Helms' Silky Oak			A1 D1 D3
206	*Grevillea hilliana*	White Yiel Yiel			A1 A2 D1 D4
207	*Gynura drymophila var. drymophila*				A1 D1 D3
208	*Gyrostemon osmus*			E	A1 D1 D2 E1
209	*Hakea actites*	Mulloway Needle Bush			A1 D1 E1
210	*Hakea salicifolia salicifolia*	Willow-leaved Hakea			A1 D1 D4
211	*Harpullia alata*	White-winged Tulip			A1 D1 E1
212	*Helicia ferruginea*	Rusty Helicia		V	A1 L1
213	*Helmholtzia glaberrima*	Giant Stream Lily			A1 D1 E1 L1
214	*Hibbertia diffusa*	Wedge Guinea Flower			A1 D1 D4
215	*Hibiscus splendens*	Native Rosella			A1 A2 D2 D4
216	*Hicksbeachia pinnatifolia*	Red Boppel Nut	V	V	A1 L1
217	*Hierochloe rariflora*	Holy Grass			A1 D1 D4
218	*Homoranthus virgatus*				A1 D2 D3
219	*Hydrocotyle verticillata*	Shield Pennywort			A1 D1 D3
220	*Hygrophila angustifolia*	Karamat			A1 D1 D3
221	*Hymenophyllum australe*	Austral Filmy Fern			A1 D1 D4
222	*Hymenophyllum cupressiforme*	Common Filmy Fern			A1 D1 D4
223	*Indigofera trifoliata*				A1 D1
224	*Iphigenia indica*				A1 D1 D3
225	*Isotoma axillaris*	Australian Harebell			A1 D3
226	*Jasminum jenniae*			E	A1 L1
227	*Knoxia sumatrensis*				A1 D1
228	*Lastreopsis silvestris*	Forest Shield Fern		V	A1 D1 E1

229	*Lastreopsis smithiana*	Smooth Shield Fern			A1 D1 D2 D3
230	*Leionema elatius elatius*	Tall Phebalium			A1 D1 D4
231	*Lemna aequinoctialis*	Common Duckweed			A1 D1 D4
232	*Lenwebbia prominens*	Southern Velvet Myrtle		NT	A1 D1 E1 L1
233	*Lepiderema pulchella*	Fine-leaved Tuckeroo		V	A1 D1 L1
234	*Lepidium sagittulatum*	Virginian Peppercress			A1 D1
235	*Lepidosperma clipeicola*				A1 D1 D2 D3 E1
236	*Lepidosperma elatius*				A1 D1 D4
237	*Lepidozamia peroffskyana*	Shining Burrawang			A1 D2 D3
238	*Leptinella longipes*	Long Cotula			A1 D1
239	*Leptomeria acida*	Currant Bush			A1 D1 D4
240	*Leptinella reptans*	Cotula			A1 D3
241	*Leptomeria drupacea*	White-flowering Currant Bush			A1 D1
242	*Leptospermum brachyandrum*	Weeping Tea Tree			A1 A2 D2 D4
243	*Leptospermum juniperinum*	Prickly Tea Tree			A1 D1 D4
244	*Leptospermum liversidgei*	Olive Tea Tree			A1 D1 D4
245	*Leptospermum whitei*				A1 D1 D2
246	*Lepyrodia scariosa*				A1 D1
247	*Leucopogon deformis*				A1 D1 D3
248	*Leucopogon ericoides*	Prickly Heath			A1 D1 D3
249	*Leucopogon lanceolatus*				A1 D1 D3
250	*Leucopogon margarodes*				A1 D1 D3
251	*Leucopogon melaleucoides*				A1 D1 D3
252	*Leucopogon parviflorus*	Coastal Beard-heath			A1 D1 D3
253	*Leucopogon pimeleoides*				A1 D1 D3
254	*Leucopogon sp. (Lamington G.Leiper AQ633386)*	Lamington Beard Heath			A1 D1 D3
255	*Leucopogon virgatus*	White Bearded Heath			A1 D1 D3
256	*Lindsaea brachypoda*	Screw Fern			A1 D1 D3
257	*Lindsaea dimorpha*	Screw Fern			A1 D3
258	*Liparis swenssonii*	Small-flowered Tom Cats			A1 D1 D3
259	*Lobelia gibbosa var. gibbosa*	Tall Lobelia			A1 D1
260	*Lobelia membranacea*				A1 D1 D3
261	*Logania pusilla*	Little Logania			A1 D1
262	*Lomandra elongata*	Mat-rush			A1 A2 D2 D4
263	*Lycopodiella serpentina*	Bog Clubmoss			A1 A2 D4

264	*Lycopus australis*	Water Horehound			A1 D1
265	*Lyperanthus suaveolens*	Brown Beaks			A1 D3
266	*Lythrum salicaria*	Purple Loosestrife			A1 D1
267	*Macadamia integrifolia*	Macadamia Nut	V	V	D1 L1
268	*Macadamia tetraphylla*	Macadamia Nut	V	V	D1 E1 L1
269	*Mallotus megadontus*	Toothed Kamala		V	A1 D2 D3
270	*Marsdenia coronata*	Forest Milk Vine	V	V	A1 D3 L1
271	*Marsdenia fraseri*	Narrow-leaved Milk Vine			A1 D1 D4
272	*Marsdenia hemiptera*	Large-leaved Milk Vine		NT	A1 D1 D3 L1
273	*Marsdenia lloydii*	Corky Milk Vine			A1 D2 D3
274	*Marsdenia longiloba*	Slender-leaved Milk Vine	V	V	A1 D3 L1
275	*Marsdenia micradenia*				A1 D1 D3
276	*Marsdenia pleiadenia*	Downy Milk Vine			A1 D2 D3
277	*Maundia triglochinoides*	Maundia		V	A1 D3 L1
278	*Melaleuca comboynensis*	Cliff Bottlebrush			A1 D1 D2
279	*Melaleuca decora*	Pretty Paperbark			A1 D1
280	*Melaleuca pachyphylla*	Wallum Bottlebrush			A1 D1 D2
281	*Melaleuca pallida*	Lemon Bottlebrush			A1 D1 D4
282	*Melaleuca styphelioides*				A1 A2 D4
283	*Melaleuca thymifolia*	Thyme Honeymyrtle			A1 D1 D4
284	*Melichrus adpressus*	Large Nectar-heath			A1 D1 D3
285	*Melichrus procumbens*	Jam Tarts			A1 D1 D3
286	*Melicope vitiflora*	Northern Doughwood			A1 D1
287	*Micrantheum ericoides*				A1 D1
288	*Micromelum minutum*				A1 D1
289	*Mischocarpus lachnocarpus*	Woolly Pearfruit			A1 D1 D4
290	*Monococcus echinophorus*	Monococcus			A1 A2 D4
291	*Mucuna gigantea*	Burny Bean			A1 D1 D4
292	*Myrsine angusta*	Narrow-leaved Muttonwood			A1 D1 D2 E1
293	*Myrsine howittiana*	HBrush Muttonwood			A1 D1 D4
294	*Najas marina*	Water Nymph			A1 D1
295	*Neisosperma poweri*	Milkbush			A1 D1 D3
296	*Nematolepis squamea squamea*	Satinwood			A1 D1 D4
297	*Neptunia gracilis forma gracilis*	Native Sensitive Plant			A1 D1
298	*Nicotiana forsteri*				A1 A2 D4
299	*Niemeyera antiloga*	Brown Pearwood			A1 D1 D4
300	*Niemeyera whitei*	Rusty Plum		V	A1 D1 L1

301	*Notelaea venosa*	Veiny Mock Olive			A1 D1 D4
302	*Nothofagus moorei*	Antarctic Beech			A1 D1 D4
303	*Notodanthonia longifolia*	Long-leaf Wallaby Grass			A1 D1
304	*Nymphaea gigantea*	Giant Water Lily			A1 D1
305	*Oberonia complanata*	Green Fan Orchid			A1 D3
306	*Oberonia titania*	Soldier's Crest Orchid			A1 D3
307	*Ochrosia moorei*	Southern Ochrosia	E	E	A1 D3 L1
308	*Oldenlandia galioides*	Stinkweed			A1 D1
309	*Olearia elliptica elliptica*	Sticky Daisy Bush			A1 D1 D4
310	*Olearia heterocarpa*	Nightcap daisy bush		NT	A1 D1 D3 L1
311	*Opercularia aspera*	Coarse Stinkweed			A1 D1 D4
312	*Opercularia hispida*	Hairy Stinkweed			A1 A2 D4
313	*Owenia cepiodora*	Bog Onion	V	V	A1 L1
314	*Owenia venosa*	Crow's Apple			A1 D1 D4
315	*Oxylobium arborescens*	Tall Shaggy Pea			A1 D1
316	*Oxylobium robustum*	Shaggy Pea			A1 D1 D4
317	*Ozothamnus bidwillii*				A1 D1 D3
318	*Ozothamnus vagans*		V	V	A1 D3 L1
319	*Ozothamnus whitei*				A1 D1 D3 L1
320	*Pandorea baileyana*	Large-leaved Wonga Vine			A1 D1 D3 E1 L1
321	*Papillilabium beckleri*	Lipped Orchid		NT	A1 D1 D3 L1
322	*Pararistolochia laheyana*	Mountain Birdwing Vine			A1 D1 D2 D3 E1
323	*Pararistolochia praevenosa*	Richmond Birdwing Vine		NT	A1 D1 D3 L1
324	*Parsonsia brisbanensis*	Brisbane Silkpod			A1 D1 D2 E1
325	*Parsonsia induplicata*	Thin-leaved Silkpod			A1 D1 D3
326	*Parsonsia lilacina*	Crisped Silkpod			A1 D1 D2 D3
327	*Parsonsia paulforsteri*				A1 D1 D2
328	*Parsonsia tenuis*	Slender Silkpod		V	A1 D1 D3 L1
329	*Peristeranthus hillii*	Pidgeon Orchid			A1 D1 D3
330	*Persicaria elatior*		V	V	A1 L1
331	*Petermannia cirrosa*	Petermannia			A1 D1 D2 D3
332	*Petrophile pulchella*	Conesticks			A1 D1
333	*Phaius australis*	Swamp Orchid	E	E	A1 D3 L1
334	*Phaleria chermsideana*	Scrub Daphne			A1 D1 D2
335	*Phyllanthus microcladus*	Spiny Phyllanthus			A1 D1 D3
336	*Phlegmariurus varia*	Tassel Fern		V	A1 L1
337	*Phyllanthus subcrenulatus*				A1 A2 D4

338	*Picris conyzoides*			V	A1 L1
339	*Pimelea ligustrina ligustrina*	Tall Rice Flower			A1 D1 D4
340	*Pisonia aculeate*	Thorny Pisonia			A1 D1
341	*Pittosporum oreillyanum*	Thorny Pittosporum		NT	A1 D1 D2 D4 E1 L1
342	*Planchonella eerwah*	Red Coondoo	E	E	A1 L1
343	*Platysace linearifolia*				A1 D3
344	*Plectranthus argentatus*	Silver Plectranthus			A1 D1 D3
345	*Plectranthus habrophyllus*	Shaggy-leaf Plectranthus	E	E	A1 D3 L1
346	*Plectranthus nitidus*	Shiny-leaved Plectranthus	E	E	A1 D3 L1
347	*Pneumatopteris sogerensis*	Giant Creek Fern			A1 D1 D3
348	*Podolepis longipedata*	Showy Podolepis			A1 D3
349	*Podolepis monticola*			V	A1 D3 L1
350	*Podolobium scandens*	Creeping Shaggy Pea			A1 D1 D3
351	*Pollia macrophylla*	Large-leaved Pollia			A1 D1 D3
352	*Pomaderris notata*	Tall Pomaderris		V	A1 D1 D2 E1 L1
353	*Pouteria queenslandica*	Blush Coondoo			A1 D1 D2 D4
354	*Prasophyllum brevilabre*	Short-lipped Leek Orchid			A1 D1 D3
355	*Prasophyllum elatum*	Tall Leek Orchid			A1 D1 D3
356	*Prasophyllum exilis*			NT	A1 D1 D2 D3 E1 L1
357	*Proiphys cunninghamii*	Brisbane Lily			A1 D2 D3
358	*Prostanthera phylicifolia*	Spiked Mintbush			A1 D1 D3
359	*Pseudoraphis paradoxa*	Slender Mud-grass			A1 D3
360	*Pseudovanilla foliata*	Great Climbing Orchid			A1 D2 D3
361	*Psychotria simmondsiana var. exigua*	Small Psychotria			A1 D1 E1
362	*Psychotria simmondsiana var. glabrescens*	Small-leaved Psychotria			A1 D1 E1
363	*Psychotria simmondsiana var. simmondsiana*	Small-leaved Psychotria			A1 D1 E1
364	*Pterostylis acuminata*	Sharp Greenhood			A1 D3
365	*Pterostylis baptistii*	King Greenhood			A1 D3 D4
366	*Pterostylis bicornis*	Horned Greenhood	V	V	A1 D3 L1
367	*Pterostylis daintreana*	Daintree's Greenhood			A1 D1 D3
368	*Pterostylis obtusa*	Blunt Tongue Greenhood			A1 D1 D3
369	*Pterostylis ophioglossa*	Snake Tongue Greenhood			A1 D2 D3
370	*Pterostylis parviflora*	Tiny Greenhood			A1 D3

371	*Pterostylis pedunculata*	Maroonhood			A1 D1 D3
372	*Pterostylis revoluta*	Autumn Greenhood			A1 D1 D3
373	*Pterostylis rufa*	Rustyhood			A1 D1 D3
374	*Pultenaea flexilis*	Graceful Bush Pea			A1 D1
375	*Pultenaea pycnocephala*				A1 D1 L1
376	*Pultenaea spinosa*	Spiny Bush-pea			A1 D3
377	*Quassia sp. (Mt Nardi B.L.Walker AQ330746)*	Southern Quassia			A1 D1 D2
378	*Quintinia sieberi*	Rough Possumwood			A1 D1 D4
379	*Randia moorei*	Spiny Gardenia	E	E	L1
380	*Rhinerrhiza divitiflora*	Raspy Root Orchid			A1 D1 D3
381	*Rhodamnia dumicola*	Rib-fruited Malletwood			A1 D1 D2
382	*Rhodamnia maideniana*	Smooth Scrub Turpentine			A2 D1 D2 E1
383	*Rhodamnia whiteana*	White Malletwood			A1 D1 D2 E1
384	*Rhynchosia acuminatissima*				A1 A2 D1
385	*Rhynchospora rubra*				A1 D1 D3
386	*Ricinocarpos speciosus*	A Wedding Bush		V	A1 D3 L1
387	*Ripogonum fawcettianum*	Small Supplejack			A1 D1 D4
388	*Rorippa dietrichiana*	Black Locust			A1 A2 D4
389	*Rostellularia obtusa*				A1 D1 D2 D3
390	*Rubus probus*	Large-fruited Raspberry			A1 D1
391	*Rulingia dasyphylla*	Kerrawang			A1 A2 D4
392	*Rulingia salviifolia*				A1 D1 D3 L1
393	*Ruppia maritima*	Sea Tassel			A1 D3
394	*Santalum obtusifolium*	False Sandalwood			A1 D1 D3
395	*Sarcochilus argochilus*				A1 D3
396	*Sarcochilus ceciliae*	Fairy Bells			A1 D3
397	*Sarcochilus dilatatus*				A1 D1 D3
398	*Sarcochilus fitzgeraldii*	Ravine Orchid	V	E	A1 D3 L1
399	*Sarcostemma viminale brunonianum*	Caustic Vine			A1 D3
400	*Schoenus lepidosperma pachylepis*	Bog-rush			A1 D1 D3
401	*Schoenus nitens*	Shiny Bog-rush			A1 D1 D3
402	*Selaginella andrewsii*	Tallebudgera Spikemoss	V		A1 D1 D2 E1
403	*Selaginella brisbanensis*	Selaginella			A1 A2 D4
404	*Senna acclinis*	Rainforest Cassia			A1 A2 L1
405	*Solanum ditrichum*	Mt Maroon Solanum			A1 D1 D2
406	*Solanum serpens*	Hoop Pine Solanum			A1 D1 D2 E1

407	*Solanum shirleyanum*	Shirley's Nightshade			A1 D1 D2 E1
408	*Sophora fraseri*		V	V	A1 L1
409	*Sowerbaea juncea*	Vanilla Lily			A1 D1 D4
410	*Sphaerolobium vimineum*				A1 D1
411	*Sporadanthus caudatus*				A1 D1 D2
412	*Sporadanthus interruptus*				A1 D1 D4
413	*Sprengelia sprengelioides*	Sprengelia			A1 D1 D3
414	*Stackhousia nuda*	Leafless Stackhousia			A1 D3
415	*Stackhousia spathulata*	Coast Stackhousia			A1 D1 D3
416	*Stellaria flaccida*	Forest Starwort			A1 D1 D3
417	*Stictocardia tiliifolia*				A1 A2 D1
418	*Strangea linearis*				A1 D1 D2
419	*Stylidium ornatum*	Ornate Trigger Plant			A1 D1 D3
420	*Stylidium tenerum*	Swamp Trigger Plant			A1 D1 D3
421	*Styphelia viridis breviflora*	Green Five Fingers			A1 D1 D4
422	*Swainsona brachycarpa*	Slender Swainson-pea			A1 A2 D4
423	*Swainsona queenslandica*	Smooth Darling Pea			A1 A2 D4
424	*Symplocos baeuerlenii*	Small-leaved Hazelwood	V	V	A1 L1
425	*Symplocos harroldii*	Hairy Hazelwood		NT	A1 D1 D3 E1 L1
426	*Symplocos stawellii var. stawellii*	White Hazelwood			A1 D3
427	*Symplocos thwaitesii*	Buff Hazelwood			A1 D2 D3
428	*Syzygium hodgkinsoniae*	Red Lily Pilly	V	V	A1 L1
429	*Syzygium moorei*	Durobby	V	V	A1 L1
430	*Taeniophyllum muelleri*	Ribbon Orchid			A1 D3 L1
431	*Tapeinosperma repandulum*	Southern Tapeinosperma			A1 D1 D2
432	*Tephrosia bidwillii*				A1 D3
433	*Tetrarrhena juncea*	Wiry Ricegrass			A1 D1 D4
434	*Tetratheca thymifolia*	Thyme Pink-bells			A1 D1 D4
435	*Teucrium sp. (Ormeau G.Leiper AQ476858)*	Ormeau Germander			A1 D1 D3
436	*Thelionema caespitosum*	Tufted Blue-lily			A1 D1
437	*Thelymitra ixioides var. ixioides*	Dotted Sun Orchid			A1 D1 D3
438	*Thelymitra nuda*	Scented Sun Orchid			A1 D3
439	*Thelymitra pauciflora*	Slender Sun Orchid			A1 D3 D4
440	*Timonius timon var. timon*	Timonius			A1 D1
441	*Tinospora smilacina*				A1 D1 D3
442	*Tinospora tinosporoides*	Arrowhead Vine	V	V	A1 L1

443	*Toechima dasyrrhache*	Blunt-leaved Steelwood			A1 D1 D4
444	*Trichosanthes subvelutina*	Silky Cucumber			A1 D1 D2
445	*Triflorensia cameronii*	Diplospora			A1 D1 D2
446	*Tristaniopsis collina*	Hill Kanuka			A1 D1 D4
447	*Triunia youngiana*	Spice Bush			A1 D1 D2 D4
448	*Tylophora benthamii*	Coast Tylophora			A1 D1 D3
449	*Tylophora grandiflora*	Small-leaved Tylophora			A1 D3
450	*Uraria lagopodioides*				A1 D1
451	*Uromyrtus lamingtonensis*	Peach Myrtle		V	A1 D1 E1 L1
452	*Wahlenbergia scopulicola*	A Bluebell		NT	A1 D1 E1 L1
453	*Westringia blakeana*	Blake's Mintbush		NT	A1 D1 D3 L1
454	*Westringia rupicola*		V	V	A1 D3 L1
455	*Wilkiea austroqueenslandica*	Smooth Wilkiea			A1 D1 D2 D3
456	*Wilkiea macrophylla*	Large-leaved Wilkiea			A1 D2 D3
457	*Woollsia pungens*				A1 D1 D3
458	*Wurmbea biglandulosa biglandulosa*				A1 D1
459	*Xanthorrhoea fulva*	Swamp Grass Tree			A1 D2 D3
460	*Xanthosia pilosa*	Woolly Xanthosia			A1 D1 D3
461	*Zeuxine oblonga*				A1 D3
462	*Zieria adenodonta*			NT	A1 D1 E1 L1
463	*Zieria arborescens arborescens*	Tall Zieria			A2 D1 D4
464	*Zieria collina*	Mt Tamborine Zieria	V	V	A1 L1
465	*Zieria southwellii*				A1 D1 D4

9 Appendix 5: Mapping methodology - Environmental significance overlay maps

Biodiversity Areas Overlay Map

Mapping Data	Legend name
Protected Areas - Matter of State Environmental Significance (MSES). Identifies State conservation areas protected under the Queensland *Nature Conservation Act 1992*. Source: • Matters of State Environmental Significance version 4 in Queensland under the *State Planning Policy 2014*.	Protected Areas
Core Habitat Systems and Substantial Remnants - Matter of Local Environmental Significance (MLES) Core Habitats - Extensive tracts of intact habitat within the Hinterland and coastal wetlands and island areas that support a variety of vegetation associates and provide habitat for diverse fauna populations. Substantial remnants - Intact areas of vegetation that retain and enhance diversity within the urban footprint. Source:	Coastal Wetlands & Islands Core Habitat System Hinterland Core Habitat System Substantial Remnants

• *Nature Conservation Strategy 2009-2019* • *Substantial Remnants and Coastal Wetlands and Island Core Habitat System Mapping Review, 2011, Ecosure.* **Note - Minor amendments have been made to the Hinterland Core Habitat Area in order to align it to cadastral boundaries.**	
Hinterland to Coast Critical Corridors - Matters of Local Environmental Significance (MLES) Identifies bioregional corridors that connect large areas of intact remnant vegetation in the city's west to coastal areas in the east. Source: • *Burleigh to Springbrook Bioregional Corridor Study, 2009.* • *Southern Moreton Bay to Wongawallan Bioregional Corridor Study, 2009.* • *Clagiraba to Southern Moreton Bay Bioregional Corridor Study, 2009.* • *Gold Coast City Priority Linkage - Currumbin to Currumbin Valley and Currumbin to Cobaki Broadwater (Tweed Shire) Bioregional Corridor Study, 2010.* • *Critical corridor and substantial remnant mapping report, 2016.* • *Southern Moreton Bay to Wongawallan Bioregional Corridor - Review for the Norwell Investigation Area, 2018.* **Note - Minor amendments have been made to the Southern Moreton Bay to Wongawallan, Clagiraba to Southern Moreton Bay Clagiraba Corridor, and the Worongary Substantial Remnant for the purposes of the *City Plan*.**	Hinterland to Coast Critical Corridors

Priority Species Overlay Map

Mapping Data	Legend name
Koala Habitat Area - Matters of State Environmental Significance (MSES) Identifies classes of high, medium and low value bushland habitat for koalas. Source: • Matters of State Environmental Significance version 4 in Queensland under the *State Planning Policy 2014.*	Koala Habitat Area
State Significance Species - Matters of State Environmental Significance (MSES) Identifies essential habitat and recorded locations of protected species listed under Queensland's *Nature Conservation Act 1992* and *Vegetation Management Act 1999*. Source: • *Method for Mapping Ecological State Interests for Land Use Planning and Development Assessment. Ver 2.1,* *Environment Policy and Planning, Department of Environment and Heritage Protection. © The State of Queensland (Department of Environment and Heritage Protection) 2013* - Part 5. Method for mapping AES areas, Section 3. Species http://www.ehp.qld.gov.au/land/natural-resource/pdf/aes-methodology.pdf • Data sourced from flora and fauna species point records as derived from the Our Natural City Strategy Gold Coast Flora & Fauna Database for species listed under the *Nature Conservation Act 1992*, and/or *Environment Protection & Biodiversity Protection Act 1999.* **Note - Species point records, not aligning with mapped vegetation, were removed from within the Urban Footprint.** **Note - All high mobility species point records were removed unless roosting or breeding site known** Source: • *Biodiversity Planning Assessment SEQ Fauna Expert Panel Report, Environmental Protection Agency, November 2006* - Appendix. 1 High Mobility Threatened Taxa for South-east Queensland Bioregion.	State Significant Species
Local Significant Species - Matters of Local Environmental Significance (MLES) Identifies recorded locations of species of city-wide significance for conservation. The methodology used to define species of city-wide significance (CWS) was based on scientifically robust criteria determined by an expert panel, and these criteria applied to the established lists of vascular flora and vertebrate fauna species for the city. The final CWS list contains 153 fauna species and 466 flora species and can be found in	Local Significant Species

Appendix 4 Source: • Method for mapping Areas of Ecological Significance (AES) areas, Section 3. Species. • http://www.ehp.qld.gov.au/land/natural-resource/pdf/aes-methodology.pdf • Data sourced from flora and fauna species point records as derived from the Our Natural City Strategy Gold Coast Flora & Fauna Database for species listed as significant species. • Biodiversity Planning Assessment SEQ Fauna Expert Panel Report. Environmental Protection Agency. November 2006. Appendix. 1 High Mobility Threatened Taxa for South-east Queensland Bioregion **Note - Species point records without vegetation were removed from within the Urban Footprint.** **Note - All high mobility species point records were removed unless roosting or breeding sight known.**	

Vegetation Management Overlay Map

Mapping Data	Legend name
Regulated Vegetation - Matters of State Environmental Significance (MSES) Identifies areas of endangered and of concern vegetation, and excludes disturbed and regrowth vegetation. Source: • Matters of State Environmental Significance version 4 in Queensland under the *State Planning Policy 2014.*	Regulated Vegetation
High Priority Vegetation - Matters of Local Environmental Significance (MLES) Identifies areas of vegetation type where • <10% of pre-clear extent is remaining and cannot achieve 30% protection; and • 10-30% of pre-clear extent is remaining and cannot achieve 30% protection Source: • Vegetation Types 2009 Native Vegetation Mapping & Evaluation Project, 2013, Cardno. • City of Gold Coast Vegetation Community Representation Report, 2013, Cardno. • Queensland Herbarium, 2012 Survey and Mapping of 2009 Remnant Regional Ecosystems and Broad Vegetation Communities of Queensland, Version 7.0 (Department of Science, Information Technology, Innovation and the Arts: Brisbane).	High Priority Vegetation
Medium Priority Vegetation - Matters of Local Environmental Significance (MLES) Identifies areas of vegetation type where >30% of pre-clear extent is remaining, but less than 30% protected Source: • Vegetation Types 2009 Native Vegetation Mapping & Evaluation Project, 2013, Cardno. • City of Gold Coast Vegetation Community Representation Report, 2013, Cardno. • Queensland Herbarium, 2012 Survey and Mapping of 2009 Remnant Regional Ecosystems and Broad Vegetation Communities of Queensland, Version 7.0 (Department of Science, Information Technology, Innovation and the Arts: Brisbane).	Medium Priority Vegetation
General Priority Vegetation - Matters of Local Environmental Significance (MLES) Identifies areas of vegetation type where >30% of pre-clear extent is protected and contains both disturbed and regrowth vegetation. Source: • Vegetation Types 2009 Native Vegetation Mapping & Evaluation Project, 2013, Cardno. • City of Gold Coast Vegetation Community Representation Report, 2013, Cardno. • Queensland Herbarium, 2012 Survey and Mapping of 2009 Remnant Regional Ecosystems and Broad Vegetation Communities of Queensland, Version 7.0 (Department of Science, Information Technology, Innovation and the Arts: Brisbane).	General Priority Vegetation
Vegetation Protection Order - Matters of Local Environmental Significance (MLES) Source: • Vegetation Protection Orders under *Local Law 6 – Vegetation Management*.	Vegetation Protection Order

Wetlands and Waterways Overlay Map

Mapping Data	Legend name

State Significant Wetlands - Matters of State Environmental Significance (MSES) Identifies High Ecological Value (HEV) wetlands & waterways and High Ecological Significance (HES) wetlands under the *Environmental Protection Act 1994.* Source: • Matters of State Environmental Significance version 4 in Queensland under the State Planning Policy • Queensland Wetland Data Version 3.0	State Significant Wetlands
State Significant Aquatic Systems - Matters of State Environmental Significance (MSES) Identifies Marine Park areas under the *Marine Parks Act 2004* and Fish Habitat Areas under the Fisheries Act 1994. Source: • Matters of State Environmental Significance version 4 in Queensland under the *State Planning Policy 2014.*	State Significant Aquatic Systems
Local Significant Wetlands - Matters of Local Environmental Significance (MLES) Identifies local wetlands mapped according to the Queensland Wetland Mapping and Classification Methodology and areas within waterway channels have been classified as riverine wetlands. Source: • Gold Coast Surface Water Environments Mapping Project (2014).	Local Significant Wetlands
Major and Minor Waterways – Matters of Local Environmental Significance (MLES) Identifies Major Waterways as waterways that are fifth order and above including bed and banks and identifies Minor Waterway as waterways that are fourth order and below. Source: • Gold Coast Surface Water Environments Mapping Project (2014).	Major Waterway Minor Waterway
Canals and Lakes This category will not trigger the Environmental significance overlay code but has been incorporated into the map for completeness. Source: • Gold Coast Surface Water Environments Mapping Project (2014). **Note – 'Canal' has been extracted from the waterway layer and 'Lake' has been extracted from the wetlands layer.**	Canals and Lakes

Appendix B

Likelihood of occurrence assessment

a

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Plants				
Acronychia littoralis Scented Acronychia	E	E	Found between Fraser Island in Queensland and Port Macquarie on the north coast of NSW (OEH, 2021). Occurs within 2 km from the coast on sandy soil in transition zones between littoral rainforest and swamp sclerophyll forest; between littoral and coastal cypress pine communities; and margins of littoral forest (OEH, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Arthraxon hispidus Hairy-joint grass	V	V	In Queensland it occurs in scattered locations north to Port Douglas, and west to disjunct occurrences around springs in Carnarvon National Park, however, most occurrences are from Noosa southwards (DES, 2021b). Found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps. Other location recorded include coastal foreshore dunes around freshwater springs, in small shaded gullies, on creek banks, and on sandy alluvium in creek beds in open forests and woodlands (DES, 2021b).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Baloghia marmorata Marbled balogia	V	V	Species has a limited distribution around Lismore area and Tamborine Mtn, Qld (PlantNET, 2021). Preferred habitats include subtropical rainforest on basaltic soil (PlantNET, 2021)	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Corchorus cunninghamii Native jute	E	E	A herbaceous shrub growing to 1.5 m tall. It generally occurs on upper hillslopes or hillcrests at elevations of 110-430 m above sea level. The species is found in the narrow ecotone between subtropical rainforest and open eucalypt forest. It occurs between Brisbane, south-east Queensland and Lismore, north- east New South Wales. Flowers occur throughout the year, but the peak flowering period is from November to May (DES, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Cryptocarya foetida Stinking cryptocarya	V	V	The species distribution includes northern new South Wales and south-east Queensland (ALA, 2021). Occurs in littoral rainforest, usually on sandy soils, with mature trees also growing on basalt soils (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Cryptostylis hunteriana Leafless tongue-orchid	V	LC	It produces an upright flower-stem to 45 cm tall, bearing five to 10 flowers between November and February. The species is known from a range of communities, including sandy swamp-heathland for Queensland populations. Can reproduce from both seed and vegetatively hence can form colonies which become permanent at a site (NSW OEH, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Cupaniopsis shirleyana Wedge-leaf tuckeroo	V	V	This species occurs within the SEQ bioregion, from Brisbane, north to Bundaberg (DES 2021b). This species occurs between 20 to 550 m ASL. Found in a variety of rainforest types including vine thicket and dry rainforest. Recorded on hillsides, mountain tops, lower slopes of valleys, stream beds and along riverbanks. Grows in a variety of soil types (DES, 2020b).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Endiandra floydii Floyd's walnut	E	E	Small tree, flowering in autumn and fruiting in summer. Main populations occurring from southern Queensland, from Pimpama, south to Lismore NSW restricted to paleozoic metamorphics with overlying basalt soils in the Mount Warning area of New South Wales, and a couple of adjacent areas in Queensland. Grows in rainforest on also found as an understorey plant in brush box ecotone areas, on moderately steep slopes no higher than 430 metres ASL (ALA, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Gossia gonoclada Angle-stemmed myrtle	E	E	A tree 3-12 m high with a dense canopy of glossy, deep green foliage. It is found in lowland riparian rainforest and notophyll vine forest, along permanent watercourses subject to tidal influence. It usually grows below the peak flood level, on steep slopes and at low elevations of 5-50 m. It occurs on moderately well drained clay soils, sandy loams and alluvial soils It is currently known from sites along the lower reaches of the Brisbane and Logan Rivers and their tributaries. It reproduces both vegetatively and from seed with flowering occurring in late spring (October to November) with fruits ripening from January to February (DES, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Lepidium peregrinum Wandering pepper-cress	E	NL	A spreading soft-stemmed perennial herb. Occurs in an open riparian forest on the banks on sandy alluvium (NSW OEH, 2021). Has been recorded in tussock grassland fringe of riparian open forest, as well as in shade close to creek banks (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Macadamia integrifolia Macadamia nut	V	V	Tree to 18 m tall, with flowering April to May and fruiting July to August. The species occurs in northern New South Wales and south-east Queensland. In Queensland this species is known from Mt Bauple, north of Gympie, to Currumbin Valley in the Gold Coast hinterland (DAWE, 2022a). Grows in remnant rainforest, preferring partially open areas such as rainforest edges. The species can occur on a wide range of landforms including hill crests, hill slopes, scree slopes and foot slopes, gullies, benches and terrace plains.	**May occur** The species has been historically recorded within the study area (2003 at Mt Stapylton in dry vine thicket), however the species was not identified during the field survey and suitable habitat for the species was not identified during the field survey.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Macadamia tetraphylla Rough-shelled bush nut	V	V	The species is distributed from NSW north to south east QLD (ALA 2021). Known to occur within subtropical rainforest in coastal areas (PlantNET, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Persicaria elatior Tall knotweed	V	V	An erect herb growing to 90 cm tall, found in damp places, including coastal with swampy areas, along watercourses, streams and lakes, swamp forest and disturbed areas (DAWE, 2022a). Previously recorded in the nearby Logan region in 2019 as growing in weedy poorly drained alluvial soil in remnant *Melaleuca quinquenervia* woodland. Also as growing in 3m wide strip between farmer's property fence and roadside drainage. Other native species at site: *Melaleuca linariifolia, Melaleuca quinquenervia, Centella asiatica, Alternanthera denticulata, Parsonsia straminea, Tetragonia tetragonoides, Juncus sp., Persicaria strigosa, Persicaria attenuata, Persicaria orientalis, Persicaria subsessilis* (ALA, 2021).	**May occur** The species has not been historically recorded within the study area and the species was not identified during the field survey however marginally suitable habitat for the species exists within the project area.
Phaius australis Lesser swamp-orchid	E	E	The species has a primarily coastal environments throughout eastern QLD and NSW (ALA, 2021). Known to occur on sandy soils of coastal habitats that are almost always damp, but not flooded for lengthy periods. Can also be found in suitable areas further inland (DES, 2021b).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Planchonella eerwah Shiny-leaved condoo	E	E	Tall shrub or small tree to 10 m, with flowers and fruit found in any seasons. It is restricted to three locations in south-east Queensland (Ipswich-Beaudesert area, Beenleigh-Ormeau-Pimpama area, and Nambour-Maleny area). It grows on rocky slopes in vine thickets and rainforest habitats (ALA, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Rhodamnia rubescens Scrub turpentine	C.E	C.R	Shrub or small tree to 25 m high. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. Occurs in coastal regions and occasionally inland onto escarpments up to 600 m ASL in areas with rainfall of 1,000-1,600 mm. Occurs along the coast from Bundaberg, QLD south to Bateman's Bay, NSW (NSW OEH, 2021).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Rhodomyrtus psidioides Native guava	C.E	C.R	A shrub or small tree to 12 m. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. Occurs from Maryborough, QLD south to Broken Bay, NSW throughout coastal and sub-coastal areas at low elevations (NSW OEH, 2021)	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Samadera bidwillii Quassia	V	V	Small shrub or tree to 6 m with flowers from November to March and fruit February to May. Known to occur in several localities between Scawfell Island, near Mackay, and Goomboorian, north of Gympie (DAWE, 2022a). Occurs in lowland rainforest or on rainforest margins. Also found in open forests and woodlands. Commonly found in areas adjacent to permanent and temporary watercourses up to 510 m elevation. Occurs on lithosols, skeletal soils, loam soils, sands, silts and sands with clay subsoils (DAWE, 2022a).	**May occur** The species has not been historically recorded within the study area and the species was not identified during the field survey however marginally suitable habitat for the species exists within the project area.
Thesium australe Toadflax	V	V	Species is distributed from Bundaberg south to Victoria (DES, 2021b). A short-lived erect herb to 40 cm high, flowers from October through to April and known to occur within grassland or woodland, often in damp sites. Examples of associated vegetation include: open woodland with *Eucalyptus tereticornis* and *E. tindaliae* on skeletal soils; on heavy alluvium soil in grassy *E. populnea* woodland; on black cracking clay in grassland of *Dichanthium sericeum*; and grassland dominated by *Themeda triandra* and *Heteropogon contortus* on basaltic, rocky soils (DES, 2020b)	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Tylophora woollsii	E	E	Climber flowering January to April. Found in northern NSW and south east QLD (ALA, 2021). Species prefers moist eucalypt forest, moist sites in dry eucalypt forest and rainforest margins (OEH, 2021). It has been recorded from wet sclerophyll/rainforest margins, Eucalypt dominated open forests and disturbed road verges. It grows on brown clay over metasediments at altitudes between 10–750 m above sea level. Associated species include *Eucalyptus eugenioides, E. microcorys, E. saligna, E. biturbinata, Acacia hakeoides, A. lineate, Myoporum spp.,* and *Casuarina spp*. in NSW and *E. andrewsii* and *Angophora floribunda* in Queensland.	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Birds				
Anthochaera phrygia Regent honeyeater	CE	E	The regent honeyeater has an eastern distribution, occurring from Bundaberg, Qld to Warrnambool, Victoria. The species has experienced extensive range reduction due to habitat clearing and fragmentation and is considered 'uncommon' in Queensland (DAWE, 2022a). Species occurs in drier scrubs, woodlands, coastal banksia and paperbark forests, mangrove and swamp/savannah woodlands (Pizzey and Knight, 1999).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Botaurus poiciloptilus Australasian bittern	E	E	Occurs within eastern and south-eastern Australia. Considered uncommon throughout much of its range (Pizzey and Knight, 1999). Occurs in and about water in reedbeds, sedges and rushes. Occasionally seen in tussock paddocks, saltmarshes and brackish wetlands.	**Unlikely to occur** The proposed development area is not located within an estuarine, riverine or wetland environment and

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
				suitable habitat for this species was not identified during the field survey.
Calidris canutus Red knot	E	E	In Australasia, this species mainly inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets and lagoons (Menkhorst *et al*., 2019). Foraging habitat consists of intertidal mudflats or sand flats exposed by low tide. At high tide they may occur within lakes, sewage ponds and floodwaters (Pizzey and Knight, 1999), and have also been recorded on tidal sand flats, in shallow water, and in shallow pools on coral reef (Higgins and Davies 1996).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Calidris ferruginea Curlew sandpiper	CE	E	The curlew sandpiper is widely distributed around Australia; however the species occurs in high densities on coastal areas (DAWE, 2022a; Menkhorst *et al*., 2019; Pizzey and Knight, 1999). Small numbers are known to occur in inland Australia (DAWE, 2022a). Preferred habitats include intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also non-tidal swamps, lakes and lagoons (DAWE, 2022a). They are also recorded inland around ephemeral and permanent lakes, dams, waterholes and bore drains (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot	E	E	The primary habitat for the Coxen's Fig Parrot is lowland subtropical rainforest, dry rainforest, littoral and developing littoral rainforest, sub-littoral mixed scrub, riparian corridors in woodland, open woodland and across cleared land, and urbanised and agricultural areas with fig trees (Ficus spp.). It feeds on the seeds of figs, but also on fruit of other native and exotic trees, as well as nectar, lichen and insect larvae (Higgins 1999; Coxen's Fig-Parrot Recovery Team 2001).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey.
Erythrotriorchis radiatus Red goshawk	V	E	The red goshawk is widely distributed throughout northern and eastern Australia, particularly in a wide coastal strip along eastern Queensland, through to Cape York and west into the Northern Territory and the Kimberly .The species occurs in a range of habitats, often at ecotones, including coastal and sub-coastal tall open forests, tropical savannahs crossed by wooded or forested watercourses, woodlands, edges of rainforests and gallery forests along watercourses, and wetlands that include Melaleuca and Casuarina species (Menkhorst *et al*., 2019). The species typically nests in tall trees within 1 km of permanent water and occurs in habitats that support a high abundance of bird species (Pizzey and Knight, 1999).	**Unlikely to occur** Suitable habitat for the species was not identified within the project area and recent distribution modelling indicates the species is unlikely to occur in southeast Queensland.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Falco hypoleucos Grey falcon	V	V	The grey falcon is an extremely rare raptor which occurs at unusually low densities, exclusively in the arid and semi-arid zones of Australia (Schoenjahn, 2013). It inhabits a range of habitat types, including lightly timbered woodlands, Acacia shrublands and Triodia grasslands with annual rainfall under 500 mm (Marchant and Higgins, 1993). The species core breeding habitat lies within areas of the hottest climate classes (Schoenjahn, 2018), situated between the eastern and western borders of the central deserts of Western Australia.	**Unlikely to occur** The grey falcon occurs in arid / semi-arid regions of Australia. Suitable habitat for the species was not identified during the field survey and study area is situated outside the species' distribution.
Geophaps scripta scripta Squatter pigeon (southern)	V	V	In Queensland, the squatter pigeon (southern) can be found from the Burdekin - Lynd divide to the NSW / Qld border. Generally, the species is encountered west of the Great Diving Range (DAWE, 2022). The species occurs in open-forests to sparse, open-woodlands and scrub that are dominated by Eucalyptus, Corymbia and Acacia or Callitris species, remnant and regrowth within 3 km of water (DAWE, 2022a). Breeding and foraging habitat is generally restricted to well-draining, gravelly, sandy or loamy soils with a tussock-grassy understorey (Squatter Pigeon Workshop, 2011).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified during the field survey. In southeast Queensland, this species generally occurs west of the Great Dividing Range.
Grantiella picta Painted honeyeater	V	V	The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations of records come from inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (DAWE, 2022a). 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, paperbarks, casuarinas, callitris, and trees on farmland or gardens (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat was not identified within the project area, largely due to the absence of mistletoe.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Hirundapus caudacutus White-throated needletail	V, Mig	V	The white-throated needletail is widespread throughout eastern and south-eastern Australia. It has been recorded along all coastal regions of QLD and NSW (Pizzey and Knight, 1999). Almost exclusively aerial, it does prefer wooded, inland areas and heathland. In coastal areas they have been seen flying over mudflats and beaches (DAWE, 2022a).	**May occur** The species has no specific habitat requirement and is nomadic in response to climatic conditions. As such, the species may occur within the project area, but is unlikely to be a resident species and due to its exclusively aerial nature is unlikely to be reliant on habitats within the project area.
Lathamus discolor Swift parrot	C.E	E	The swift parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter (DAWE, 2022a). The swift parrot inhabits dry sclerophyll eucalypt forests and woodlands and occasionally occurs in wet sclerophyll forests (DAWE, 2022a). The presence of winter flowering eucalypt species is a critical habitat requirement for the species in southeast Queensland.	**May occur** Suitable foraging habitat for the species was identified within the proposed development and a historical record (1923) of the species occurs 1 km northwest of the project area. The species is considered rare, however still has a remote chance of occurring during winter.
Limosa lapponica baueri Western-Alaskan bar-tailed godwit	V	V	The bar-tailed godwit is a non-breeding visitor to Australia. Bar-tailed Godwits arrive in Australia each year in August from breeding grounds in the northern hemisphere. Within Australia, the species has a broad distribution across much of the country, preferring coastal regions and excluding the central deserts and mountainous region (Simpson and Day, 1999). Preferred habitats include estuaries, sheltered embayments, intertidal wetlands and mangrove communities (Simpson and Day, 1999). The species has also been recorded around beds of seagrass, and sometimes in nearby saltmarsh or the outer margins of mangrove areas (Pizzey and Knight, 1999).	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.
Numenius madagascariensis Eastern curlew	CE	E	The eastern curlew has a primarily coastal distribution and is commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats often with beds of seagrass (DAWE, 2022a; Menkhorst *et al*., 2019). The species 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 (DAWE, 2022a). The eastern curlew nests in the Northern Hemisphere summer and does not breed in Australia (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Pachyptila turtur subantarctica Fairy prion (southern)	V	NL	The species has a circumpolar distribution with breeding occurring on subantarctic and cool temperate islands (DAWE, 2022a). The species is thought to frequent subtropical waters during non-breeding months.	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.
Rostratula australis Australian painted snipe	E	E	The Australian painted snipe has a broad distribution and known to occur in all mainland states of Australia. The species generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps, claypans and waterlogged grasslands (DAWE, 2022a, Menkhorst *et al*., 2019).	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.
Sternula nereis nereis Australian fairy tern	V	E	Species occurs within coastal environments from Hervey Bay (Queensland) south to Port Hedland in Western Australia. The species nests on sheltered sandy beaches, spits and banks. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline.	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.
Thinornis cucullatus cucullatus Hooded plover (eastern)	V	LC	This species has a coastal distribution from Bundaberg (Queensland) to Lake Macleod (Western Australia). Preferred habitats include beaches with large amounts of beach-washed seaweed. Less common on narrow, steep beaches, where there are few or no dunes (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.
Turnix melanogaster Black-breasted button quail	V	V	It is restricted to coastal and near-coastal regions of south-eastern Queensland and north-eastern New South Wales (DAWE, 2022a). Rainforest and forests experiencing 770-1200 mm rainfall per annum. Prefers low closed forest in particular semi-evergreen vine thicket and other vine forest complexes. Required deep leaf litter. Nests within rainforest or under lantana thicket (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Mammals				
Chalinolobus dwyeri Large-eared pied bat	V		Records exist from Shoalwater Bay, north of Rockhampton, through to the vicinity of Ulladulla, NSW in the south (DAWE, 2022a). Most commonly found in dry sclerophyll forests and woodlands, but also known from rainforest edges and wetter sclerophyll forests. Roosting occurs in sandstone cliff/escarpment adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area and the proposed development is located outside the species predicted distribution (Batmap, 2021).
Marcoderma gigas Ghost bat	V	E	The species forages across a variety of woodland vegetation types, however roosting sites are highly specialised and usually represent deep natural caves or disused mines with specific microclimates. The distribution of regional populations is governed by the availability of permanent maternity sites, with no sites known to occur south of the Rockhampton region.	**Unlikely to Occur** The species has not been historically recorded within the study area and the proposed development is located
Dasyurus maculatus maculatus Spot-tailed quoll	E	LC	Once distributed throughout much of eastern Australia, the species has experienced significant range reductions in recent decades. Known to inhabit a range of forest environments, from rainforest to open woodland. They require forests with suitable den sites such as rock crevices, caves, hollow logs, burrows and tree hollows.	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.
Petaurus australis australis Yellow- bellied glider	V	V	The yellow-bellied glider inhabits tall, wet eucalypt forest throughout coastal Australia. Suitable habitat for the species is present within the Project area, however no evidence of the species was recorded. Several known foraging species were also recorded during vegetation assessments, notably, the small-fruited grey gum (Eucalyptus propinqua), forest red gum (E. tereticornis), and spotted gum (Corymbia citriodora).	**May occur** The yellow-bellied glider was not confirmed present during field surveys. Further, the species not been historically recorded within or adjacent to the Project area, with the nearest recorded located 8 km northeast.
Petauroides volans Greater glider	V	V	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria. This species is largely restricted to eucalypt forests and woodlands (DAWE, 2022a). Species requires abundance of hollow- bearing trees which provide den sites and is generally restricted to extensive forest networks larger than 160 km2 (DAWE, 2022a).	**May occur** Suitable foraging habitat for the species was identified within the remnant and regrowth woodland in the project area, though denning habitat (hollows) were largely absent.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Phascolarctos cinereus Koala	V	V	The koala is a habitat specialist, feeding almost exclusively on the leaves of trees from the *Eucalyptus, Corymbia, Lophostemon, Angophora* and *Melaleuca* genus (Martin & Handasyde, 1999). Koalas have a broad but patchy distribution, restricted to the eucalypt forests and woodlands of eastern Australia (Melzer *et al*., 2000). The distribution and density of koalas is influenced by numerous factors, including habitat connectivity, habitat quality, population dynamics and the presence of threats (Rhodes *et al*., 2015). Key threats include habitat loss and fragmentation, dog attacks, vehicle strikes, disease and drought (DAWE, 2022b).	**Likely to occur** The proposed development area contains core koala habitat and essential habitat for the species. Suitable foraging habitat was identified during the field survey, however the species is unlikely to be a resident species due to the occurrence of multiple threats and small size of the project area.
Potorous tridactylus tridactylus Long-nosed potoroo	V	V	The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania. They inhabit coastal heaths and dry and wet sclerophyll forests with a dense understorey of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature (OEH, 2020).	**Unlikely to occur** The species has not been historically recorded within the study area or during field surveys. Suitable habitat for the species was not identified within the project area.
Pseudomys novaehollandiae New Holland mouse	V	V	The species is known to occur from coastal areas and up 100 km inland, and from sea level up to 900 m above sea level. Prefers habitats with deeper topsoils and soft substrates for digging burrows. Known to inhabit open heathlands, open woodlands with heathland understorey and vegetated sand dunes (DAWE, 2022a; NSW EOH, 2021).	**Unlikely to occur** Suitable habitat for the species is absent from the project area and the species has not been historically recorded within the study area.
Pteropus poliocephalus Grey-headed flying fox	V	LC	This species occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria (DAWE, 2022a). The species is organised around roost sites commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy. Bats commute daily to foraging areas, typically within 15 km of the day roost where they feed on a wide variety of flowering and fruiting plants including the blossoms of eucalypts (DAWE, 2022a).	**Likely to occur** Potential foraging habitat for the species was identified within the remnant woodland, however no roosts occur within the study area. The nearest mapped flying-fox colony occurs approx. 5 km southwest of the proposed development.
Xeromys myoides Water mouse	V	V	The false water mouse has a coastal distribution from northern NSW north to Darwin (DAWE, 2022a). The species inhabits mangroves and the associated saltmarsh, sedgelands, clay pans, heathlands and freshwater wetlands. The main habitat difference at each location is the littoral, supralittoral and terrestrial vegetation which differs in structure and composition.	**Unlikely to occur** The proposed development area is not located within an estuarine or wetland environment and suitable habitat for this species was not identified during the field survey.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Reptiles				
Coeranoscincus reticulatus Three-toed Snake-tooth Skink	V	LC	The three-toed snake-tooth skink occurs on the coast and ranges from the Macleay valley in NSW to south-eastern Queensland. Preferred habitats include rainforests and occasionally moist eucalypt forest, on loamy or sandy soils where the species lives in loose soil, leaf litter and rotting logs.	**Unlikely to occur** Suitable habitat for this species was not encountered during field surveys and no historical records were reported from within the study area.
Delma torquata Collared delma	V	V	This species is endemic to south-eastern Queensland and known to occur from Rockhampton in the north to the Queensland / New South Wales border. Normally inhabits eucalypt-dominated woodlands and open-forests on alluvium (river and creek flats), undulating country on fine-grained sedimentary rocks, and sandstone ranges. Requires rocks, logs, bark and other coarse woody debris, and mats of leaf litter (DAWE, 2022a).	**May occur** The species has not been historically recorded within the study area, however suitable habitat was identified within the project area.
Amphibians				
Mixophyes fleayi Fleay's frog	E	E	This species has a narrow and disjunct distribution from the Conondale Range in south-east Queensland to the Upper Richmond River in northern NSW. Known to occurs in rainforest and wet sclerophyll forest, usually close to permanent running water from mid to high elevations. Prefers stream habitats from first to third order streams but is not found in ponds or ephemeral pools (NSW EOH, 2000).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat is absent from the project area.
Insects				
Argynnis hyperbius inconstans Australian fritillary	C.E	E	This species is restricted to south-east Queensland and north-east NSW in open swampy coastal areas where the larval food plant Viola betonicifolia (arrowhead violet) occurs. Most recently known from a few widespread localities between Port Macquarie and Gympie, populations have declined dramatically to the extent that the butterfly has not been verified at any site for over a decade.	**Unlikely to occur** This species hasn't been recorded in Queensland in over 25 years and suitable habitat for the species was not encountered within the project area.
Phyllodes imperialis smithersi Pink underwing moth	E	LC	The pink underwing moth 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 (DAWE, 2022a).	**Unlikely to occur** The species has not been historically recorded within the study area and suitable habitat is absent from the project area.
Fish				
Maccullochella mariensis Mary River cod	E	E	This species utilises a wide variety of freshwater habitats from rocky upland streams to low-flowing, lowland pools. Within all habitats, the species requires heavy instream cover such as rocky debris, large	**Unlikely to occur** The proposed development is not situated within an aquatic

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
			logs and/or log piles for nesting and ambush-feeding. (Simpson and Jackson, 1996).	environment and suitable habitat for the species is absent from the project area.
Migratory species				
Apus pacificus Fork-tailed swift	Mig	SL	In Australia, the fork-tailed swift occurs mostly over inland plains, above foothills or in coastal areas (Menkhorst *et al*., 2019). The species is almost entirely aerial favours dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, health land or saltmarsh (DAWE, 2022a). The species has also been recorded over cliffs and beaches, out to sea and over settled areas, including towns, urban areas and cities (Menkhorst *et al*., 2019: Pizzey and Knight, 1999). 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.	**May occur** The fork-tailed swift has broad habitat requirements and can occur across a range of habitat types. Although the species hasn't been historically recorded within the project area, the species may still occur as a temporary or transient visitor.
Cuculus optatus Oriental cuckoo	Mig	SL	The oriental cuckoo is a non-breeding migrant to Australia, with breeding occurring broadly across northern Eurasia east to northern China, Korea and Japan. In Australia, the species inhabits coastal regions across northern and eastern Australia, as well as offshore islands (DAWE, 2022a). Species utilises a range of vegetated habitats, including monsoon rainforests, wet sclerophyll forests, open woodlands and along the edges of forests (DAWE, 2022a; Menkhorst *et al*., 2019).	**May occur** This species has broad habitat requirements and potential suitable habitat was identified during the field surveys. However, the species hasn't been historically recorded within the study area.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Monarcha melanopsis Black-faced monarch	Mig	SL	Species inhabits rainforest ecosystems that include semi-deciduous vine thickets, complex notophyll vine-forests, tropical rainforests, subtropical rainforests, mesophyll thicket/shrubland, warm and cool temperate rainforest, and dry rainforest (DAWE, 2022a). The species feeds mostly in rainforest but also in open eucalypt forest (DAWE, 2022).	**Unlikely to occur** Suitable habitat for the species was not identified within the project area and the species has not been historically recorded within the study area.
Symposiachrus trivirgatus Spectacled monarch	Mig	SL	The spectacled monarch is found in coastal north-eastern and eastern Australia, from Cape York to Port Stephens. The species prefers thick understory habitats in rainforests, wet sclerophyll forests and mangroves (DAWE, 2022a).	**Unlikely to occur** Suitable habitat for the species was not identified within the project area and the species has not been historically recorded within the study area.
Myiagra cyanoleuca Satin flycatcher	Mig	SL	The satin flycatcher has a broad distribution, occurring throughout eastern Australia and Tasmania (Pizzey and Knight, 1999). The species migrates annually, spending spring and summer in south-eastern Australia and migrating to north in the winter months (Pizzey and Knight, 1999). The species occurs in a range of habitats, predominantly favouring heavily vegetated gullies associated with wetlands and watercourses in wet sclerophyll woodland (Menkhorst *et al*., 2019). During migration the species occurs in coastal forests, woodlands, mangroves and drier woodlands and forests (Pizzey and Knight, 1999).	**May occur** The satin flycatcher has not been historically recorded within the study area, however sub-optimal habitat for the species was identified during the field surveys. Therefore, the species may occur, but is unlikely to be a permanent resident.
Rhipidura rufifrons Rufous fantail	Mig	SL	The rufous fantail is distributed throughout northern and eastern coastal Australia, though is considered more common in the north (DAWE, 2022a). The species inhabits sclerophyll forests, often in gullies dominated by eucalypts and usually within a dense shrubby understory that often includes ferns (Menkhorst *et al*., 2019; Pizzey and Knight, 1999). Movement patterns for the rufous fantail are not well-known, and eastern populations are believed to migrate to northern Australian during the winter (DAWE, 2022a).	**May occur** The rufous fantail has been historically recorded within the study area, however only sub-optimal habitat for the species was identified during the field surveys. Therefore, the species may occur, but is unlikely to be a permanent resident.
Actitis hypoleucos Common sandpiper	Mig	SL	Found along all coastlines of Australia and in many areas inland, the common sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia where it inhabits coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores (DAWE, 2022a).	**Unlikely to occur** The proposed development is not located within a coastal, estuarine or wetland environment. Therefore, suitable habitat for the common sandpiper was not identified during the field survey.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Calidris acuminata Sharp-tailed sandpiper	Mig	SL	Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage (Pizzey and Knight, 1999). In Queensland, they are recorded in most regions, being widespread along much of the coast and are very sparsely scattered inland (Pizzey and Knight, 1999).	**Unlikely to occur** Suitable habitat for the species was not identified during the field surveys and the species has not been historically recorded within the study area.
Calidris melanotos Pectoral sandpiper	Mig	SL	Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitats but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation (Pizzey and Knight, 1999). In Queensland, most records for the Pectoral Sandpiper occur around Cairns.	**Unlikely to occur** The proposed development is not located within a coastal, estuarine or wetland environment. Therefore, suitable habitat for the pectoral sandpiper was not identified during the field survey.
Gallinago hardwickii Latham’s snipe	Mig	SL	Latham's snipe is a non-breeding visitor to Australia, arriving in south-eastern Australia between August and January, before migrating back to Japan for the breeding season (Higgins & Davies, 1996). During its northern migration, the species is encountered along much of eastern Australia (DAWE, 2022a). The species often occurs in groups or individually in freshwater wetlands near the coast. They prefer areas with dense vegetation cover such as sedges, grasses, lignum, reeds and rushes. Can be found along creeks and saltmarshes along migratory pathways (BirdLife, 2021).	**Unlikely to occur** No well vegetated wetlands occur within the project area and suitable habitat for the species was not identified during field surveys.

Species	Conservation status		Species distribution and habitat requirements	Likelihood of occurrence
	EPBC Act	NC Act		
Pandion haliaetus Eastern osprey	Mig	SL	The eastern osprey is distributed around the Australian coastline, excluding only Victoria and Tasmania (NSW EOH, 2021). Preferred habitats for the species include coastlines, estuaries, bays and inlets, river systems and lake complexes, and the species are known to venture inland, particularly in northern Queensland (Pizzey and Knight, 1999; OEH, 2021). The species favours large, emergent trees, cliff races and high vantage points as nesting habitat, usually in exposed locations and within 1 km of water (Thomson *et al*. 2019).	**May occur** No rivers of significant watercourses occur within the project area; however the Albert River is located 1.5 km west and the species has been historically recorded within the study area. Whilst the species is unlikely to forage or nest within the proposed development, it may occur infrequently and temporarily.
Tringa nebularia Common greenshank	Mig	SL	The common greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, both permanent and ephemeral terrestrial wetlands, and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores (DAWE, 2022a).	**Unlikely to occur** The proposed development is not located within a coastal, estuarine or wetland environment. Therefore, suitable habitat for the pectoral sandpiper was not identified during the field survey.

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