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Harry Evans Park Pathway

Ecological Assessment Report

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Niche Environment and Heritage Pty Ltd (ACN 137 111 721)
Enquiries should be addressed to Niche Environment and Heritage
PO Box 2443, Parramatta NSW 1750, Australia
Email: info@niche-eh.com

Executive summary

Project outline

Moreton Bay Regional Council (MBRC) are planning to construct a new public pedestrian and cycling pathway (and associated infrastructure) located at Harry Evans Park, Arana Hills, Queensland (the Project). The Project is located in the MBRC Local Government Area (LGA) and will connect Dinterra Avenue in the south-west to Leslie Street/Jane Street in the north-east (Figure 1).

Key features of the Project include:

- Construction of a 3m wide shared pathway for cyclists and pedestrians between Dinterra Avenue and Jane Street, with bicycle friendly handrails, CCTV for security and fauna friendly LED lighting
- Stormwater management, including a swale drain, culverts and gross pollutant traps
- Fencing from adjoining properties
- Wayfinding signage to direct users between the pathway and surrounding streets, parks, schools and shops
- Restoration of the vegetation along the riparian zone of Kedron Brook
- A local level playground facility at the end of Dinterra Avenue.

The need for the Project has been identified as a missing link in the cycling and pedestrian network between the Hills District and Brisbane's northern suburbs and aims to provide a safer option for commuting and exercising by getting people off busy roads.

Existing environmental values

The Project traverses Harry Evans Park within the suburb of Arana Hills where surrounding land is generally comprised of urban development. Harry Evans Park is zoned as a mix of Recreation and Open Space at the western end and Environmental Management and Conservation in the north-east comprising a vegetated natural area.

Based on the results of the desktop and field assessments undertaken for the Ecological Assessment Report, the following existing environmental values have been identified:

- The study area contains vegetation mapped on the Essential Habitat Map as supporting Essential Habitat for the Koala and Tusked Frog, including a species record for the Tusked Frog.
- An unnamed tributary of Kedron Brook is present along the southern boundary of the study area, that is mapped as a watercourse/drainage feature on the vegetation management watercourse and drainage features map and a W3 – Waterway on the MBRC planning scheme Environmental Areas overlay.
- The study area is mapped on the Vegetation Management Supporting Map as supporting Remnant Category B, Remnant Of Concern Regional Ecosystem (RE) 12.11.25.
- The study area was identified as supporting habitat or likely habitat for a number of Threatened fauna species, including the Tusked Frog (recorded), Koala (observed evidence), Grey-headed Flying Fox and White-throated Needletail.
- The study area is mapped within the Koala Priority Area as supporting Core Koala Habitat Areas and Koala Habitat Restoration Areas.
- Areas of known and potential breeding habitat for the Tusked Frog have been identified within and adjoining the study area.
- Seventeen potential low risk Animal Breeding Places (that is, animal breeding places for Least Concern fauna) were identified within the study area.

Summary of potential impacts and mitigation

The proposed development is limited to land above the upper bank of the unnamed tributary of Kedron Brook and is not expected to require groundworks that would impact on the aquatic connectivity or hydrological patterns experienced at the local level. Nonetheless, the Project will require clearing within the vegetated natural areas of Harry Evans Park, mapped as supporting Remnant Of Concern RE and habitat for Threatened species, including the Koala.

Mitigation measures for the Project are recommended to follow the hierarchy of: avoid, minimise, mitigate, to ensure that impacts resulting from the Project are appropriately managed. The proposed pathway has been designed to protect existing environmental values as far as practical by modifications to the footprint to retain habitat trees and use of elevated sections of pathways to minimise disturbances to surrounding trees. In addition, the Project has been designed to avoid direct impacts to areas identified as providing known and potential breeding habitat for the Tusked Frog, as far as practical.

Recommended mitigation measures to minimise the impacts of the Project on identified Project values include, but are not limited to:

- Minimising the construction footprint required to construct the proposed pathway to the minimum practical width to retain mature trees and other vegetation.
- Utilising arborist (minimum Australian Qualification Framework Level 5) advice and supervision during works to ensure that trees identified for retention adjacent to works are suitably protected from damage.
- The high risk Species Management Program for the Tusked Frog is required to be approved by Department of Environment and Science (DES) and implemented by Moreton Bay Regional Council (MBRC) to manage Project impacts to Tusked Frog breeding places during and post construction.
- Clearing of animal breeding places, including hollows and nests, should be avoided as far as practical. Any potential animal breeding places shall be checked by a fauna spotter/catcher prior to clearing to assess animal breeding. Should evidence of animal breeding be identified either:
 - No clearing shall be undertaken of the animal breeding place until the breeding has ceased and the animal (and offspring) vacate the breeding place on their own volition; or
 - Activities are undertaken in accordance with MBRC's approved Species Management Program for least concern species for tampering with an animal breeding place.
- Minimising ground disturbance and implementing erosion and sediment controls to protect the unnamed tributary of Kedron Brook and protect habitat for the Tusked Frog.
- Utilising fauna friendly lighting and in-ground path markers to minimise light spill and disturbance for adjacent fauna habitats.
- Ensuring habitat connectivity for the Koala through sensitive design measures including providing connectivity under elevated sections of pathway and ensuring Koala sensitive fencing design is incorporated into the design.
- Undertaking offset planting at a rate of 3:1 to compensate for the trees removed as part of the Project, with a preference for targeting offset planning within the local area wherever possible.

Glossary and list of abbreviations

Term or abbreviation	Definition
AHD	Australian Height Datum
CEMP	Construction Environmental Management Plan
DBH	Diameter at Breast Height
DAWE	Department of Agriculture, Water and Environment (Commonwealth)
DES	Department of Environment and Science (Queensland)
DNRME	Department of Natural Resources, Mines and Energy (Queensland) (former)
DoE	Department of Environment
DoR	Department of Resources (Queensland) (formerly the Department of Natural Resources, Mines and Energy)
EAR	Ecological Assessment Report
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESSR	Environmental Site Survey Report
GPS	Global Positioning System
GPT	Gross Pollutant Traps
Ha	Hectares
Habitat Tree	Defined as a native tree with a diameter greater than 80cm at 1.3metres above the ground under the Moreton Bay Regional Council Planning Scheme Policy Environmental Areas and Corridors
IECA	International Erosion Control Association
Koala plan	Nature Conservation (Koala Conservation) Plan 2017 (Queensland)
LED	Light-emitting diode
LGA	Local Government Area
Local population	The population of a particular species that occurs in the locality
MBRC	Moreton Bay Regional Council
MLES	Matters of Local Environmental Significance, according to the local government Planning Scheme.
MNES	Matters of National Environmental Significance, according to the <i>Environment Protection and Biodiversity Conservation Act 1999</i>
MSES	Matters of State Environmental Significance, according to the <i>Nature Conservation Act 1992</i>
NC Act	<i>Nature Conservation Act 1992</i> (Queensland)
NJKHT	Non Juvenile Koala Habitat Tree
Planning Scheme	Moreton Bay Regional Council Planning Scheme 2016 V 4.0
PMASV	Property Map of Assessable Vegetation
PMST	Protected Matters Search Tool
Offsets Act	<i>Environmental Offsets Act 2014</i> (Queensland)

Term or abbreviation	Definition
RE	Regional Ecosystem
Remnant vegetation	<p>The definition of remnant vegetation under the VM Act is vegetation—</p> <ul style="list-style-type: none"> a) that is— <ul style="list-style-type: none"> (i) an endangered regional ecosystem; or (ii) an of concern regional ecosystem; or (iii) a least concern regional ecosystem; and b) forming the predominant canopy of the vegetation— <ul style="list-style-type: none"> (i) covering more than 50% of the undisturbed predominant canopy; and (ii) averaging more than 70% of the vegetation’s undisturbed height; and (iii) composed of species characteristic of the vegetation’s undisturbed predominant canopy.
SAT	Spot Assessment Technique
SMP	Species Management Program
Study area	Includes approximately 3.67 ha of land within and adjacent to the proposed Project, as shown in Figure 1.
Threatened Ecological Community (TEC)	An ecological community (biodiversity, landscape/seascape, habitat qualities and ecosystem services) that naturally occur together and are listed as Critically Endangered, Endangered and Vulnerable under the EPBC Act.
Threatened species	Flora and fauna listed as Endangered, Vulnerable or Critically Endangered under the schedules of the EPBC Act, or listed as Endangered, Vulnerable or Near Threatened under the schedules of NC Act.
TPZ	Tree Protection Zone
VM Act	<i>Vegetation Management Act 1999</i> (Queensland)

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1. Introduction

1.1 Project background

Moreton Bay Regional Council (MBRC) are planning to construct a new shared pathway and playground (and associated infrastructure) located at Harry Evans Park, Arana Hills, Queensland (the Project). The Project is located in the MBRC Local Government Area (LGA) and will connect Dinterra Avenue in the south-west to Leslie Street/Jane Street in the north-east (Figure 1).

Key features of the Project include:

- Construction of a 3m wide shared pathway for cyclists and pedestrians between Dinterra Avenue and Jane Street, with bicycle friendly handrails, CCTV for security and fauna friendly LED lighting.
- Stormwater management, including a swale drain, culverts and gross pollutant traps.
- Fencing from adjoining properties.
- Wayfinding signage to direct users between the pathway and surrounding streets, parks, schools and shops.
- Restoration of the vegetation along the riparian zone of Kedron Brook.
- A local level playground facility at the end of Dinterra Avenue.

MBRC have identified that the Project will offer connectivity and a high-quality walking and cycling environment within the Arana Hills suburb (MBRC, 2019). The Project will deliver (MBRC, 2021):

- A safer option for commuting and exercising by getting people off busy roads like Patricks Road.
- Better connectivity for Ferny Hills and Arana Hills communities to local schools, shopping and activity centres.
- A crucial missing link between the Hills District and Brisbane's northern suburbs.

In August 2020, an Environmental Site Survey Report (ESSR) was completed for the Project (Niche, 2020). The ESSR informed environmental opportunities and constraints to inform Project design, advised of potential legislative triggers, approvals or requirements, and recommended further environmental assessments. The ESSR identified the following environmental constraints within the study area:

- Regulated native vegetation including:
 - Category B (remnant) Of concern Regional Ecosystems.
 - Essential Habitat for the Tusked Frog.
- Records or habitat for Threatened species, including:
 - Grey-headed Flying Fox (*Pteropus poliocephalus*)
 - Koala (*Phascolarctos cinereus*)
 - White-throated needletail (*Hirundapus caudacutus*) and
 - Tusked Frog (*Adelotus brevis*).
- The presence of Non-juvenile Koala Habitat Trees (NJKHT) and low Koala activity levels.
- Native vegetation clearing within a waterway buffer identified on the Moreton Bay Regional Council Planning Scheme 2016 V 4.0 (the Planning Scheme) for the Kedron Brook Tributary.
- The presence of several invasive flora species, in particular the exotic *Anredera cordifolia* (Madeira Vine).
- Sensitive receptors to Project air, noise, vibration.
- A soil type that is likely to be dispersive, and prone to scouring or erosion.

This should be read in conjunction with the ESSR (Niche, 2020) and documents the results of supplementary ecological investigations carried out as a part of the detailed design stage of the Project.



1.2 Site details

1.2.1 Location details

Figure 1 shows a map of the Project which is located within Harry Evans Park, Arana Hills in the MBRC LGA.

Table 1 outlines the Project footprint on the following four land parcels and one road reserve corridor, including land use and land tenure (Figure 1) (Niche, 2021; Queensland Government, 2021).

Table 1: Land parcels and land use description for the Project.

Land parcel	Land use description	Land tenure
Lot 1 on SP103023	Harry Evans Park, including dense vegetation that is directly adjacent to Kedron Brook Tributary	Freehold
Lot 1 on RP154413	Golden Valley Keperra Lions Club, including a small nursery	Freehold
Lot 1 on RP201551	Kingdom Hall of Jehovah's Witnesses and carpark	Freehold
Lot 1 on RP92266	Private dwelling	Freehold
Road reserve	Leslie Street/ Jane Street	Road reserve

1.2.2 Landscape and context

The Project is located within the suburb of Arana Hills where surrounding land use is dominated by urban development (refer to Figure 1 – Project Locality). Lands that are zoned as general residential within a suburban neighbourhood precinct are situated to the north and west of the Project. The Keperra Golf Course is situated immediately to the south with vegetated natural areas bordering the Project to the east. An unnamed tributary of the Kedron Brook waterway is located along the southern border of Harry Evans Park and flows to the east where it connects with Kedron Brook approximately 350m downstream.

The Project is located in the South East Queensland bioregion and the Burringbar-Conondale Ranges subregion (refer to Annex 1 – Desktop Searches – Vegetation Management Report 14/04/2021).

1.2.3 Site characteristics

The site is predominantly characterised by recreational land and vegetated natural areas. The western portion of the study area supports cleared areas for existing buildings (a sewage pumping station and old scout hall) amongst an open canopy woodland with a maintained understory of maintained lawn, concrete driveway, footpaths, picnic tables and plantings.



Plate 1. Cleared area for the old scout hall amongst maintained open woodland

The eastern portion of the study area supports vegetated natural areas along the upper banks and up slope of the unnamed tributary of Kedron Brook towards Fairway Outlook, with the far eastern portion traversing part of an existing Jehovah's Witness property (Lot 1 on RP201551) and road verge for Jane Street.



Plate 2. Looking east toward the vegetated natural area on the unnamed tributary of Kedron Brook upper bank

1.2.4 Previous and existing use

Lands within Harry Evans Park are zoned as a mix of Recreation and Open Space at the western end and Environmental Management and Conservation in the north-east. The Recreation and Open Space section currently supports an old scout hall that has been used as the Golden Valley Keperra Lions Building. The lions club will be relocating to a new building in James Drysdale Reserve which will result in the removal of the old scout hall to accommodate the installation of a local playground in the area.

The Environmental Management and Conservation section in the north-east supports vegetated natural area that is mapped as supporting remnant vegetation.

1.3 Purpose of report

The purpose of this Ecological Assessment Report (EAR) is to meet the requirements of the Moreton Bay Regional Council Planning Scheme 2016 V 4.0 and includes the following information:

- The results of desktop and field investigation completed for the study area.
- Biodiversity values and constraints applicable to the Project.
- Potential Project impacts to biodiversity values identified for the study area.

- Suitable strategies for avoiding, minimising, mitigating and/ or offsetting project impacts to biodiversity.

2. Methodology

2.1 Study area

The study area for the Project includes approximately 3.67ha of land located within and adjacent to Harry Evans Park, as shown in Figure 1.

2.2 Desktop assessment

A desktop review of existing spatial datasets, maps and background literature relevant to flora and fauna was carried out for the study area. The review included the following sources:

- Commonwealth Department of Agriculture, Water and Environment (DAWE) Protected Matters Search Tool (PMST) (accessed, 12/10/2020).
- Queensland Department of Environment and Science (DES) Wildlife Online database (accessed, 12/10/2020).
- Atlas of Living Australia database (accessed 12/10/2020).
- Queensland Department of Resources Regulated Vegetation Management Map, Vegetation Management Supporting Map and Essential Habitat Map (DoR, 2021).
- Protected Plants Flora Survey Trigger Map (DES, 2021).
- Queensland Watercourse Identification Map (DNRME, 2020a).
- Queensland Waterways for Waterway Barrier Works (DNRME, 2020a).
- South East Queensland Koala Conservation Strategy 2019-2024 mapping layers (DNRME, 2020a).
- Koala Hospital Data (KoalaBase) April 1996-February 2017 (DES, 2019).
- MBRC Planning Scheme 2016 V 4.0 (local Planning Scheme) – Zones and Overlay Interactive Mapping.

2.3 Field assessment

2.3.1 Survey timing and justification

Field surveys were carried out over three days from 6 October 2020 to 20 November 2020 which is considered an ideal timing for conducting ecological surveys in South-east Queensland due to the prevalence of spring flowering plants and increased animal activity as the weather warms (Table 1). An initial assessment of habitat value for Tusked Frog was undertaken on 17 October 2020. Additional surveys targeting Tusked Frog were undertaken on the 20 November 2020, 2-3 weeks after heavy rain in late October creating suitable conditions for undertaking Tusked Frog transects.

2.3.2 Weather conditions

Table 2. Weather observations during the survey (Bureau of Meteorology, 2020)

Survey date	Rainfall (mm)	Temperature (°C)	
		Min	Max
6 October 2020	0	10.5	29.7
17 October 2020	0	16.9	28.1
3 November 2020	0	12.9	28.7
20 November 2020	0	20.4	25.3

2.3.3 Survey team qualifications

The ecological field assessments for the Project were undertaken by three suitably qualified and experienced consultants and professionals as detailed in Annex 2 – Suitably qualified and experienced consultants and professionals who undertook field assessments for the Project.

2.3.4 Survey permits

All field assessment and survey for this EAR was conducted under Niche's existing ecological survey permits, in particular:

- Queensland Animal Ethics Approval for Fauna surveys carried out for environmental impact assessments and other wildlife surveys: AEC Ref. CA 2019/09/1322 (Valid to 14 September 2022).
- Queensland Scientific Purposes Permit Number WA0021993 (Valid to 1st March 2025).

2.3.5 Field survey location and methods

Field surveys were carried out over three days from 6 October 2020 to 20 November 2020 to assess the following for the study area:

- The floristic composition, structure and health of vegetation communities.
- The presence of potential habitat for any State or Commonwealth listed species or threatened ecological communities.
- Tusked Frog presence and the extent and any suitable breeding habitats.
- Opportunistic records for other non-target fauna including birds, flying foxes and koala.

The following data was also collected for lands within and immediately adjacent to (within 10m) the proposed pathway alignment:

- The location, tree species, trunk diameter (Diameter at Breast Height (DBH)) and height of any trees.
- The presence of any habitat trees, as defined by the *Environmental Areas and Corridors Planning Scheme Policy* (MBRC, 2020).
- An arboricultural assessment carried out for any habitat trees identified.
- The location of any Non-juvenile Koala Habitat Trees (NJKHT) within mapped koala habitat areas.

2.3.6 Vegetation surveys

Vegetation within the study area was assessed in accordance with the Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland v5.1 (Neldner et al, 2020) and incorporated the survey of three quaternary and one secondary sites, as shown in Figure 2.

Quaternary surveys incorporated the collection of data relating to floristic composition, structure health and condition to verify and map vegetation communities for the study area. A secondary survey incorporating the use of a BioCondition plot (Eyre et al, 2011) was carried out for the most dominant vegetation community to allow for a more detailed classification and description of vegetation attributes. Plot dimensioned followed Eyre et al (2011) and included the following:

- 100m x 50m area: number of large trees, recruitment of canopy species, tree canopy height and native tree species richness.
- 100m transect: tree canopy cover and native shrub canopy cover.
- 50m x 10m sub-plot: non-native plant cover and native plant species richness of shrubs, grass and non-grass species.
- 50m x 20m sub-plot: coarse woody debris.
- Five 1m x 1m quadrats: native grass cover and organic litter.



2.3.7 Terrestrial habitat assessment

The terrestrial habitat assessment primarily focused on determining the suitability of habitat for threatened species with potential to occur within the study area, based on the results of the desktop searches. Habitat suitability was determined by comparing the ecological requirements of individual threatened species (i.e. tree hollows, roosts, water availability, retreat sites) to observed habitat characteristics.

Likelihood of occurrence was assessed for all species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Nature Conservation Act 1992* (NC Act) detected within 3km of the study area. Each species was assessed based on the criteria listed in Table 3.

Table 3. Criteria for assessing the likelihood of species occurrence

Likelihood of occurrence	Criteria
High	Recorded within and/ or surrounding (within 3km) the study area AND Suitable habitat is present within the study area
Moderate	No records within and/ or surrounding (within 3km) the study area AND Suitable habitat is present within the study area
Low	No records within and/ or surrounding (within 3km) the study area AND No suitable habitat is present within or immediately adjacent to the study area
Transient	Habitat within the study area is considered marginal for the species AND Species is highly mobile and known to occasionally appear in areas away from known population centres (usually birds). Species unlikely to permanently establish.

2.3.8 Tusked Frog survey

Targeted surveys for Tusked Frog were carried out for the study area in accordance with 'Tusked frog (*Adelotus brevis*) – Targeted species survey guidelines' (Rowland, 2013). All areas of suitable stream and pond habitat within and immediately downstream (i.e. within 100m) of the Project were surveyed by two ecologists over two days: 17 October 2020 and 3 November 2020 (refer to Annex 2 – Tusked Frog Survey Report).

Weather conditions at the time of survey were suitable for the detection of calling animals and tadpoles (i.e. under suitably warm conditions, in the presence of surface water, and with basal and/or low stream flow) and are documented in Table 1 – Weather Conditions at the time of survey.

The extent of survey activities is shown in Figure 2 and includes:

- Diurnal survey of stream and pond habitat, including:
 - Passive listening for calling animals.
 - Inspection of surface water for tadpoles (including disturbance of leaf litter in order to flush tadpoles).
 - Capture and identification of tadpoles.
 - Inspection of likely oviposition sites (undercut banks, crayfish burrows, vegetation overhanging water and flood debris at water's edge) for spawn.
- Nocturnal survey of stream and pond habitat within the study area listening for calling animals and conducting call playback every 100m of stream transect.

2.3.9 Non-juvenile Koala Habitat Tree Survey

A survey of all NJKHT located within and immediately adjacent to (within 10m) the pathway alignment was carried out to assess potential project impacts to Koala habitat and to inform any potential offset requirements under the Queensland Offsets Framework. For the purposes of the survey, NJKHT are defined as Koala Habitat Trees¹ with a height of more than 4m or a trunk circumference greater than 31.5 cm. The following data was collected for each NJKHT to inform habitat quality for Koala:

- Tree species.
- Trunk diameter (DBH).
- Tree height.
- Observed signs of koala activity (i.e. scratch marks).

2.3.10 Limitations and assumptions

The content of this report, including the assessment of project impacts, is based on information available at the time the report was prepared. Flora and fauna records were obtained from:

- Wildlife Online.
- EPBC Act PMST.
- DES KoalaBase.
- Atlas of Living Australia.
- KoalaTracker databases.

While every care has been taken to ensure the accuracy of this data, Niche makes no statements regarding the reliability or completeness of this data.

Tree survey locations documented within this report were provided by a third party. The tree survey data is compiled of three separate tree survey data layers that have been provided by the client for use in the report. It is noted that one set of data (200319_Detailed_Survey) did not include attribute data to ascertain the tree species or relevant information (such as DBH) and therefore this layer could not be verified against Niche collected data. Niche have added in two tree locations that were observed to be omitted from the consolidated tree survey layer, which have been included using hand-held GPS data and therefore should be considered for reference only and not for use as accurate spatial data. Although Niche has taken reasonable steps to validate available data, no statements regarding data accuracy can be made.

¹ A tree of the *Corymbia*, *Melaleuca*, *Lophostemon* or *Eucalyptus* genera that is edible by koalas or a tree of a type typically used by koalas for shelter, including, for example, a tree of the *Angophora* genus.

3. Existing Environment

3.1 Environmental areas

3.1.1 Habitat and wildlife corridors

The study area does not traverse any State or Regional Corridors mapped on the Statewide Biodiversity Corridor mapping, the nearest corridor is a Regional Corridor mapped approximately 700m north of the study area (north of Patricks Road). This Regional Corridor generally follows Cabbage Tree Creek from Sandgate along the Moreton Bay coastline inland to Samford.

The study area is mapped on the Essential Habitat Map as supporting Essential Habitat for the Koala and Tusked Frog, including a species record for the Tusked Frog (refer to Annex 1 – Desktop Searches – VM Report, accessed 14/04/21).

At a local level, the study area provides connectivity and stepping-stone habitat along the patchy vegetated corridor of Kedron Brook and its tributaries. The study area is located approximately 2-2.5km away from larger connected habitat areas that form D'Aguilar National Park, Enoggera Reservoir, Keppera Bushland and Samford Conservation Park.

3.1.2 Waterways and riparian corridors

The study area is located within the Pine River catchment which covers a total area of 825km². The catchment has headwaters in the D'Aguilar Range and falls mostly within the Moreton Bay local government area. The main waterways in the catchment are the North and South Pine rivers together with other numerous waterways, including Hays Inlet and Kedron Brook.

Dominant land uses within the upper catchment include cattle grazing, nature conservation and mining/quarry. Lower catchment areas are highly urbanised and dominated by residential land uses.

Within the study area, an unnamed tributary of the Kedron Brook is present along the southern boundary which flows to the east where it connects with Kedron Brook approximately 350m downstream (Figure 3). Review of available datasets identified that this tributary is mapped as the following on state and local mapping resources:

- A watercourse/drainage feature on the vegetation management watercourse and drainage features map under the *Vegetation Management Act 1999* (VM Act). The stream order is not provided, however it fits the definition of a stream order 1 watercourse.
- An unmapped watercourse under the *Water Act 2000*.
- A W3 – Waterway on the MBRC planning scheme Environmental Areas overlay, which has a 20m buffer on the Riparian and Wetland Setbacks map.

The field survey also identified that the study area intersects two (2) culverts (Plate 3) in the eastern section of Lot 1 on SP103023 that flow towards the unnamed tributary of Kedron Brook.



Plate 3. Existing culvert located in eastern section of study area, near Jehovah's witness property.

There are no wetlands mapped within the study area, however to the east of the study area the Kedron Brook tributary is mapped as supporting wetland areas on the Queensland wetlands mapping and MBRC planning scheme Riparian and Wetland Setbacks map. These wetland areas are located approximately 50m downstream of the study area and extending to the confluence with Kedron Brook.

3.1.3 Geology and soils

The study area is mapped as generally containing lands on rolling to hilly terrain with gentle to moderate slopes (Queensland Government, 2021). Soil types within the site are characterised by duplex yellow-grey, hard setting A horizon, bleached A2 horizon, and acidic pedal mottled B horizon (ID: Tb64) (Queensland Government, 2021). Duplex soils often indicate the potential presence of sodic soils (a soil type which is structurally unstable and potentially dispersive) (Fitzpatrick et al, 1994).

Given that the study area is located at approximately 50m AHD and 20km from the coast, it is not likely that the Project will impact on Potential or Actual Acid Sulfate Soils (PASS or AASS). In addition, the study area is not mapped within the Acid Sulfate Soils overlay (MBRC, 2016).

The land zones supported by the study area include land zone 3 (recent Quaternary alluvial systems) along the unnamed tributary of Kedron Brook and land zone 11 (hills and lowlands on metamorphic rocks) stretching upslope from the waterway high bank towards Fairway Outlook (refer to Annex 1 – Desktop Searches – Vegetation Management Report 14/04/2021).

3.1.4 Vegetation Communities

Based on the Vegetation Management Supporting Map (refer to Annex 1 – Desktop Searches – Vegetation Management Report 14/04/2021), the study area mostly contains mapped *Of Concern* remnant (Category B) vegetation, with small patches of non-remnant (Category X) vegetation mapped in the western and eastern extents (VM Act) (Figure 3). The Vegetation Management Supporting Map identifies the remnant (Category B) vegetation is comprised wholly of Regional Ecosystem (RE) 12.11.25 *Corymbia henryi* and/or *Eucalyptus fibrosa* supsp. *Fibrosa* +/- *E. crebra*, *E. carnea*, *E. tindaliae* woodland on metamorphics +/- interbedded volcanics (Figure 3).

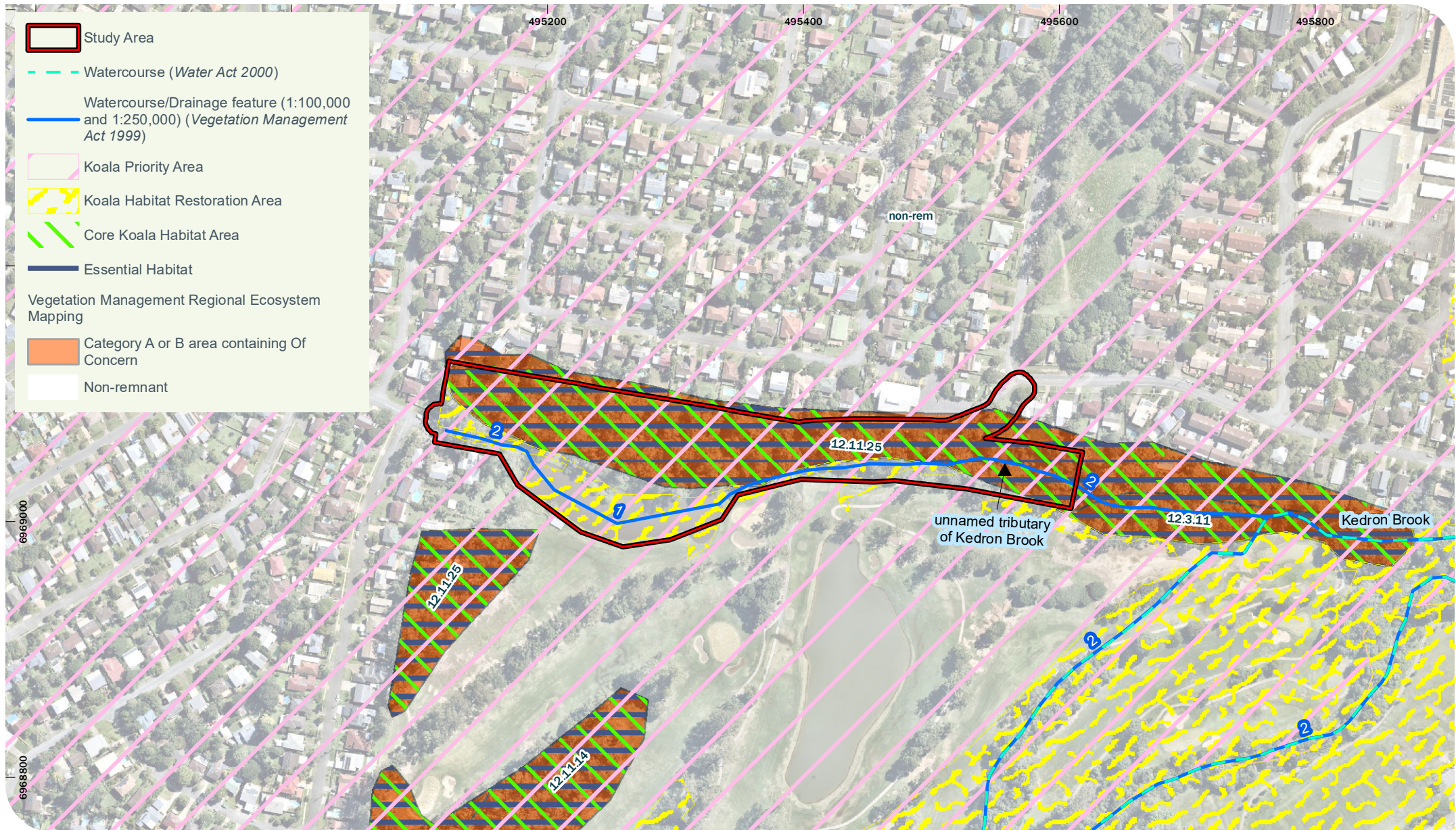


Table 4. Regional Ecosystems mapped on the Vegetation Management Supporting Map

RE Code	Status	Description	Extent within the study area (ha)	% study area
12.11.25	Of Concern	<i>Corymbia henryi</i> and/ or <i>Eucalyptus fibrosa</i> subsp. <i>Fibrosa</i> +/- <i>E. crebra</i> , <i>E. carnea</i> , <i>E. tindaliae</i> woodland on metamorphics +/- interbedded volcanics	2.35	64%

The ESSR for the Project included a brief field visit which identified that the vegetation community observed within the study did not match the mapped RE 12.11.25 as it lacked the indicator canopy species such as *C. henryi* and *E. fibrosa* and instead more closely resembled RE12.3.11 *Eucalyptus tereticornis* +/- *E. siderophloia*, *Corymbia intermedia* open forest on alluvial plains. Please note that some references within the ESSR to RE12.11.5 was incorrect and should be corrected to RE12.11.25 (Niche, 2020).

Vegetation communities were mapped for the study area in ESRI ArcGIS, drawing upon the results of the field surveys and aerial photo interpretation. Site-based vegetation communities identified for the study area are shown in Figure 4 – Field Survey Results.

A total of 3.67ha was surveyed during the field assessment for this report including:

- 2.26ha of Eucalypt forest
- 0.53ha of exotic riparian forest
- 0.1ha exotic forbs and grasses
- 0.2ha of developed areas and
- 0.58ha of standing water.

Approximately 1.73ha of Eucalypt forest within the study area comprised ground-truthed RE 12.11.3. This RE supported high levels of weed disturbance within the understorey. The remaining 0.53ha of Eucalypt forest comprised ground-truthed RE 12.3.11, located in the western portion of the study area in close proximity to the unnamed tributary of Kedron Brook and the Keperra Golf Club. This RE supported an intact open canopy with modified/ maintained understorey. The results of RE verification are presented in Table 5 and Table 6 (refer to Annex 4 - Flora and Fauna Survey Results for flora schedule).

Table 5. RE field verification results

Survey site	Mapped RE	RE mapping correct	Description of observed vegetation community
Q1	12.11.25	No	Remnant Eucalypt open forest generally consistent with RE12.3.11
Q2	12.11.25	No	Site located on the edge of gully. Riparian vegetation within the gully dominated by exotic species.
Q3	12.11.25	No	Riparian vegetation associated with tributary of Kedron Brook dominated by exotic vegetation and lacking native canopy.
S1	12.11.25	No	Remnant Eucalypt open forest generally consistent with RE12.11.3

A detailed description of each field-verified vegetation community, along with photographs and calculations of extent within the study area is provided in Table 6.

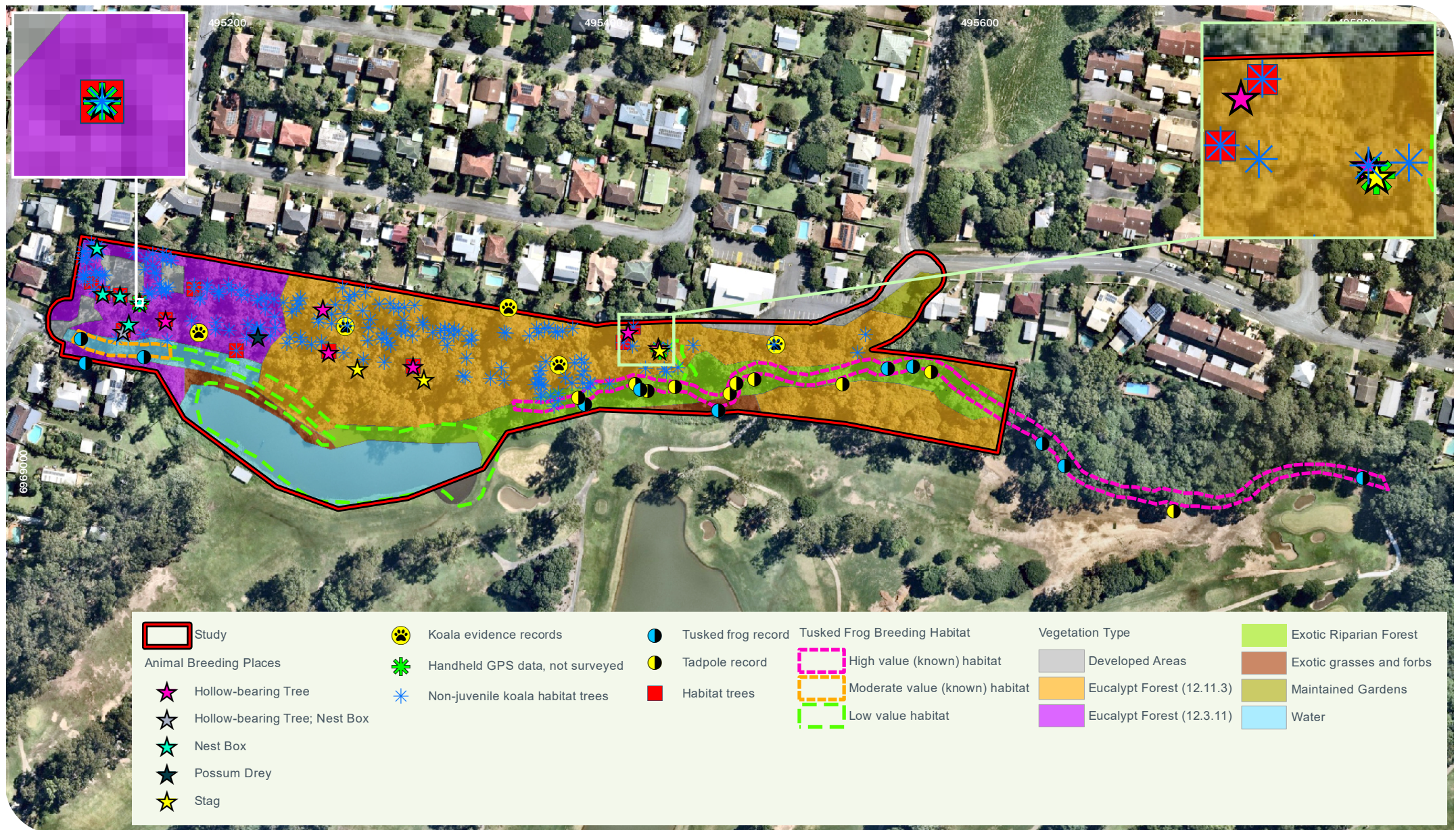






Table 6. Site-based vegetation communities

Vegetation community	Description	Extent within the study area (ha)	% of the study area
 <p>Eucalypt forest RE 12.11.3</p>	<p>RE 12.11.3 <i>Eucalyptus siderophloia</i>, <i>E. propinqua</i> +/- <i>E. microcorys</i>, <i>Lophostemon confertus</i>, <i>Corymbia intermedia</i>, <i>E. acmenoides</i> open forest on metamorphics +/- interbedded volcanics</p> <p>This vegetation community supported an open canopy (T1: 12-16m) dominated by <i>Eucalyptus microcorys</i> (Tallowwood), <i>Lophostemon confertus</i> (Brush Box) and <i>E. tereticornis</i> (Queensland Blue Gum). <i>E. propinqua</i> (Small-fruited Grey Gum) and <i>Corymbia intermedia</i> (Pink Bloodwood) were also observed. Frequent exotics included <i>*Syragrus romanzoffiana</i> (Cocos Palm), <i>Corymbia torelliana</i> (Cadaghi) and <i>*Celtis sinensis</i> (Chinese Elm).</p> <p>A mid-dense shrub (S:2-6 m) layer was observed dominated by exotic species including <i>*Ochna 17elleri17e</i> (Mickey Mouse Plant), <i>*Leuceana leucocephala</i> (Leuceana), <i>*Lantana camara</i> (Lantana) and <i>*Asparagus sp.</i> (Climbing Asparagus Vine). <i>Parsonsia sp.</i> Was also abundant with rare <i>Alphitonia excelsa</i> (Red Ash), <i>Acacia disparima</i> subsp. <i>Disparima</i> (Hickory Wattle) and <i>Pittosporum revolutum</i> (Rough-fruited Pittosporum).</p> <p>An open ground (G: <0.5m) was observed dominated by exotic species including <i>*Paspalum sp.</i>, <i>*Callisia fragrans</i> layer (Purple Succulent) and <i>*Asparagus aethiopicus</i> (Ground Asparagus Fern). Rare natives included <i>Entolasia stricta</i> (Wiry Panic Grass), <i>Eustrephus latifolius</i> (Wombat Berry), <i>Dianella caerulea</i> (Blue Flax-lily), <i>Goodenia rotundifolia</i> (Star Goodenia) and <i>Lomandra muliflora</i> (Many-flowered Mat-rush). High amounts of litter and woody debris were noted.</p>	1.73	47%

Vegetation community	Description	Extent within the study area (ha)	% of the study area
 <p>Eucalypt forest RE 12.3.11</p>	<p>RE 12.3.11 <i>Eucalyptus tereticornis</i> +/- <i>Eucalyptus siderophloia</i>, <i>Corymbia intermedia</i> open forest on alluvial plains usually near coast</p> <p>This vegetation community largely comprised mature native canopy trees over maintained lawns. The canopy (T1:14-16m) layer was dominated by <i>E. tereticornis</i> and <i>Lophostemon suaveolens</i>. <i>E. siderophloia</i> (Grey Ironbark), <i>Melaleuca 18elleri18e18via</i> (Broad-leaved Paperbark) and <i>Corymbia intermedia</i> were also observed. Landscape plantings included <i>Aracaria 18elleri18e</i> (Bunya Pine), <i>Podocarpus elatus</i> (Brown Pine) and <i>Melaleuca viminalis</i> (Weeping Bottlebrush).</p> <p>No shrub layer was observed. The ground layer was dominated by exotic grasses.</p>	0.53	14%
 <p>Exotic riparian forest</p>	<p>This vegetation community was associated with the banks of the tributary of Kedron Brook and was dominated by exotic species.</p> <p>A dense canopy (T1: 8-10m) layer was observed dominated by <i>*Celtis sinensis</i>, <i>*Cinnamomum camphora</i> (Camphor Laurel), <i>*Syragrus romanzoffiana</i>, <i>Archontophoenix alexandrae</i>, <i>Ligustrum lucidum</i> (Broad-leaved Privet), <i>*Koelreuteria elegans</i> (Chinese Rain Tree) and <i>*Eriobotrya japonica</i> (Loquat).</p> <p>A sparse shrub (S:1-5m) layer comprising <i>*Ochna 18elleri18e</i>, <i>Celtis sinensis</i>, <i>Schefflera actinophylla</i> (Umbrella Tree), <i>*Solanum chrysotrichum</i> (Giant Devil's Fig) and <i>*Leuceana leucocephala</i> was noted.</p> <p>A mid-dense to dense understorey (U: <0.5 m) of <i>*Sphagneticola trilobata</i> (Singapore Daisy), <i>*Impatiens sp.</i>, <i>*Nephrolepis cordifolia</i> (Fishbone Fern), <i>*Symphoricarpos orbiculatus</i> (Coralberry), <i>*Dracaena trifasciata</i> (Mother-in-law Tongue) and occasional <i>Pteridium esculentum</i> (Bracken Fern) was present.</p>	0.53	14%

Vegetation community	Description	Extent within the study area (ha)	% of the study area
 <p>Exotic grasses and forbs</p>	<p>This vegetation community dominated waterway banks subject to apparent historical clearing and ground disturbance. No canopy or shrub layer was observed. The ground layer (G: >0.5m) was dominated by dense <i>*Sphagneticola trilobata</i> with occasional <i>*Paspalum sp.</i></p>	0.10	3%
 <p>Developed areas</p>	<p>Developed areas comprise buildings, driveways, hardstand and maintained lawns.</p>	0.20	5%

Vegetation community	Description	Extent within the study area (ha)	% of the study area
 <p>Time taken: 15:22 Location: 68.148572E 0969044N ± 4.72510E 049879437m Facing: 90°</p>	These areas supported surface water associated with the unnamed tributary of Kedron Brook.	0.58	16%
Water			
Total		3.67	100%

* Denotes exotic species

3.1.5 Threatened Ecological Communities

A search of the EPBC Act PMST (accessed 12/10/2020) indicates three Threatened Ecological Communities (TEC) have a potential to occur within a 3km radius of the study area (Table 7). These TECs do not correspond with any mapped or ground-truthed vegetation communities identified for the study area.

Table 7. Threatened ecological communities

TEC name	EPBC Act status
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland	Endangered
Lowland Rainforest of Subtropical Australia	Critically Endangered
Poplar Box Grassy Woodland on Alluvial Plains	Endangered

3.2 Flora species

A total of 53 flora species were recorded within the study area during the field investigations, including 27 native and 26 exotic species. The flora schedule is provided in Annex 4 – Flora and Fauna Survey Results.

A search of the EPBC Act PMST (accessed 12/10/2020) identifies a total of 15 threatened flora species with the potential to occur within 3 km of the study area (Annex 1 – Desktop Searches – Vegetation Management Report 12/10.2020). Review of the Queensland Wildlife Online database (accessed 12/10/2020) returned no recent (post 1980) threatened flora records for the study area. Similarly, review of the PPFS Trigger Map indicates the study area does not support any high risk areas for protected plants Outlook (refer to Annex 1 – Desktop Searches – Vegetation Management Report 14/04/2021).

Based on the assessment of vegetation and habitats within the study area, all potentially occurring threatened flora species are unlikely to occur within the study area due to a lack of suitable habitats (Refer to Annex 5 - Likelihood of Occurrence). No threatened flora species were identified within the study area during field investigations.

3.3 Fauna habitats

This section presents a summary of fauna habitat values identified within the study area based on site observations and the stratification of vegetation communities (as per Eyre et al, 2012). Three broad habitat types were identified within the study area including Eucalypt Forest, Riparian habitats and disturbed areas.

Eucalypt Forest

Eucalypt forest within the study area is dominated Tallowwood, Forest Red Gum and Small-fruited Grey Gum subject to high levels of weed intrusion. These areas offer high value habitat for Koala (*Phascolarctos cinereus*) given the availability of primary and secondary preferred Koala food trees and connectivity with other suitable Koala habitat located along Kedron Brook, upstream and downstream of the study area. Vegetation offers suitable foraging opportunities for nectivores including flying-fox species. No active Flying-fox roosts were observed. The study area supports low numbers of hollow-bearing trees indicating habitats are marginal for hollow-dwelling arboreal mammals. Three hollow-bearing trees were observed with small (<5 cm) to medium (5-10 cm) sized hollows suitable for nesting birds including Rainbow Lorikeet (*Trichoglossus moluccanus*). Three trees located in the western section of the study area, in the vicinity of the old scout hall, were also observed to have nest boxes installed. High amounts of litter and woody debris were noted offering suitable refuge for reptiles and extended shelter and foraging opportunities for frogs.

Riparian Habitats

Riparian habitats within the study area were dominated by exotic vegetation supporting a moderate level of structural complexity. A dense canopy of **Celtis sinensis*, **Cinnamomum camphora* and **Syragrus romanzoffiana* was observed offering suitable foraging opportunities for mobile urban adapted species including Grey-headed Flying-fox (*Pteropus poliocephalus*). This vegetation also provides suitable perching / roosting opportunities for woodland and waterbirds such as Australian Brush-turkey (*Alectura lathami*), Azure Kingfisher (*Alcedo azurea*) and Cattle Egret (*Ardea ibis*). Steep undercut and vegetated banks were identified within proximity to areas of permanent water offering suitable shelter and oviposition sites for frog species including Tusked Frog (*Adelotus brevis*) and Striped Marsh Frog (*Limnodynastes peronii*). High amounts of litter and woody debris were also noted.

Disturbed Habitat

Disturbed areas within the study area offered minimal value as habitat for fauna. Landscape gardens are likely to provide some foraging opportunities for mobile urban-adapted species including flying-fox species and birds such as Noisy Miner (*Manorina melanocephala*), Laughing Kookaburra (*Dacelo novaeguineae*), Torresian Crow (*Corvus orru*) and Pied Butcherbird (*Cracticus nigrogularis*).

Essential habitat

The Koala (*Phascolarctos cinereus*) is listed as *Vulnerable* under the EPBC Act and NC Act. Essential habitat (under the VM Act) for the Koala is mapped across areas of remnant vegetation within the study area (Figure 3). There is potential for the Koala to occur throughout the Eucalypt forest vegetation mapped and field verified within the study area as discussed further in the following sections.

There is also mapped essential habitat for the Tusked Frog (*Adelotus brevis*) within the study area, including one recorded sighting within Lot 1 on SP103023 (refer to Annex 1 – Desktop Searches - VM Report, accessed 14/04/21). The Tusked Frog is listed as *Vulnerable* under the NC Act. Habitat for the Tusked Frog is present within the study area associated with remnant vegetation and the unnamed tributary of Kedron Brook as discussed further in the following sections.

Animal breeding places- low risk

Seventeen low risk Animal Breeding Places² were identified within the study area during the field survey including seven hollow-bearing trees, three stags, six trees with installed nest boxes and one possum drey. Two hollow-bearing trees supported active use by Rainbow Lorikeets. The locations of low risk Animal Breeding Places are shown on Figure 4.

3.4 Fauna species

A total of 40 fauna species were recorded within the study area during the field investigations, including:

- 3 amphibians
- 2 mammals
- 2 reptiles
- 6 fish and
- 27 bird species.

The fauna schedule is provided in Annex 4 – Flora and Fauna Survey Results.

² Defined as: a bower, burrow, cave, hollow, nest or other thing that is commonly used by the animal to incubate or rear the animal's offspring (Schedule 5, *Nature Conservation (Wildlife Management) Regulation 2006*).

A review of the EPBC Act PMST (accessed 12/10/2020) identifies a total of 25 threatened fauna species (13 birds, 8 mammals, 1 frog, 1 insect and 2 reptiles) with the potential to occur within 3km of the study area (refer to Annex 1 – Desktop Searches – PMST Report). A search of the Queensland Wildlife Online database (accessed 12/10/2020) for the same search area indicated the potential presence of one additional threatened fauna species (Tusked Frog) (Annex 1 – Desktop Searches – Wildlife Online).

In addition to presence of mapped Essential Habitat for Koala and Tusked Frog within the study area, vegetation within and adjacent to the study area is also mapped as Core and Restoration habitat for Koala under the Koala Plan (DES, 2020) (Figure 3).

Based on the assessment of vegetation and habitats within the study area, one threatened fauna species was recorded (Tusked Frog) and two threatened fauna species have been identified as having a high likelihood of occurrence within the study area (Table 8). One additional threatened fauna species (White-throated Needletail) is likely to have a transient presence within the study area. All other threatened species are unlikely to occur within the study area due to a lack of suitable habitat and/ or an absence of historical sightings (refer to Annex 5 – Likelihood of Occurrence). Likely threatened fauna species are discussed further in the following sections.

Table 8. Threatened fauna likely to occur within the study area

Scientific name	Common name	¹ EPBC Act status	² NC Act status	Habitat requirements	Likelihood of occurrence
Birds					
<i>Hirundapus caudacutus</i>	White-throated Needletail	V; M	V; SL	Non-breeding only. Aerial species forages over woodlands, considered common and widespread. Occurs in all coastal regions of Queensland and New South Wales, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains.	Transient
Frogs					
<i>Adelotus brevis</i>	Tusked Frog	-	V	Inhabits wet eucalypt forest, rainforest, and sometimes dry eucalypt forest, where it can be found in close proximity to suitable breeding habitat such as ponds and slow-moving sections of streams. Also recorded from dams and garden ponds in urban and peri-urban areas.	High
Mammals					
<i>Phascolarctos cinereus</i> (combined populations of QLD, NSW and the ACT)	Koala	V	V	In coastal areas, koalas inhabit forest and woodland mostly dominated by Eucalyptus species (or those of related genera) and also those dominated by Melaleuca or Casuarina species (with emergent food trees). In Moreton Bay, prefers vegetation dominated by Tallowwood, Swamp Mahogany <i>Eucalyptus robusta</i> , Bancroft's Red Gum <i>E. bancroftii</i> and Forest Red Gum.	High
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	-	Occur in subtropical and temperate rainforests, tall sclerophyll forests and	High

Scientific name	Common name	¹ EPBC Act status	² NC Act status	Habitat requirements	Likelihood of occurrence
				woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	

1. Listed as Marine (M), Critically Endangered (CE), Endangered I, Vulnerable (V) under the EPBC Act

2. Listed as Special Least Concern (SL), Endangerl(E), Vulnerable (V) and Near Threatened (NT) under the NC Act

3.4.1 White-throated Needletail

White-throated Needletail (*Hirundapus caudacutus*) is a non-breeding migrant to Australia listed as Vulnerable and Migratory under the EPBC Act, and Vulnerable and Special Least Concern under the NC Act. The species is found across a range of habitats, more often over wooded areas, where it is almost exclusively aerial, though does roost in tree hollows and the foliage canopy (TSSC, 2019). It forages for insects on the wing, flying anywhere between “cloud level” and “ground level” and readily forms mixed feeding flocks with other aerial insectivores. The species roosts at night in the crowns of tall trees, mainly in forest habitats.

In Australia, threats to the species include collision with wind turbines and overhead wires and loss of forest and woodland habitats supporting roost sites (TSSC, 2019).

Presence within the study area

A search of the Wildlife Online database (accessed 12/10/2020) did not return any recent records for White-throated Needletail within a 3km radius to the study area (refer to Annex 1 – Desktop Searches). Review of the Atlas of Living Australia database indicates ten sightings of the species for the same search area. This includes records from the Bunyaville Conservation Park and surrounding suburbs to the north of the study area.

The *Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015) provides guidelines and thresholds for determining if project impacts are likely to significantly impact relevant bird species, including the White-throated Needletail. The study area lies within core non-breeding habitat for the White-throated Needletail. It has recently been established that large areas of native woodland may be important for supporting foraging, and the species has been recorded roosting in hollows or the bark of large trees and rock faces on ridgelines (DoE, 2015).

No White-throated Needletail were observed within the study area during the course of field investigations. Habitats within the study area are not considered important for the species, especially considering a general lack of suitable roosting/ nesting sites for the species. Please refer to Annex 6 – Significant Impact Assessments for an assessment of the Project’s potential impact to White-throated Needletail under the EPBC Act and Queensland Offsets Framework.

3.4.2 Tusked Frog

Tusked Frog is a terrestrial species that occurs from approximately Eungella, Queensland, along the coast and Great Dividing Range to Moss Vale in New South Wales (QM, 2021). The species has also been found inland at Blackdown Tableland and Carnarvon Gorge. The species is listed as Vulnerable under the NC Act.

The Tusked Frog occurs in wet eucalypt forest, rainforest, and sometimes dry eucalypt forest, in close proximity to suitable breeding habitat such as ponds and slow-moving sections of streams (Queensland Government, 2021; QM, 2021). On land, they can be found under logs and in hollows/rock crevices beside streams and ponds. The species appears to be capable of surviving and breeding in some highly disturbed areas and polluted drainage lines. On the other hand, it does not occur at all sites containing suitable habitat, indicating that precise habitat requirements for the species may still be uncertain.

Impacts to habitat (e.g. habitat loss, fragmentation and simplification or degradation or modification) from human activities are identified as major threats. Other known threats include predation of eggs and larvae by introduced fish, competition from the exotic Cane Toad (*Rhinella marina*) for food resources or depleting oxygen in breeding pools, and the spread of chytrid fungus resulting in Tusked Frog death (DSEWPC, 2021). Climate change is also a threat to the species through changes such as altered rainfall patterns and rising minimum temperatures (AmphibiaWeb, 2021; RCC, 2021).

Presence within the study area

Search of the Wildlife Online and the Atlas of Living Australia indicates Tusked Frog has been recorded approximately 0.5 km south of the study area. Vegetated areas within the study area are mapped as essential habitat for the species (Figure 3).

Targeted surveys for Tusked Frog within adjacent and downstream waterway reaches identified numerous tadpoles, including multiple age cohorts. Tusked Frogs were recorded calling in low numbers on all three creek transects, within and immediately downstream of the study area. The locations of all recorded Tusked Frog individuals and tadpoles are shown in Figure 4 and survey results are discussed in further detail in the Tusked Frog Survey Report (refer to Annex 3 – Tusked Frog Survey Report).

Habitat for Tusked Frog is mapped in Figure 4 for the study area, based on the assessment of habitat values and targeted surveys for the species. Areas of high value (known) habitat likely to support successful breeding/recruitment of Tusked Frogs were confirmed within eastern parts of the study area associated the unnamed tributary of Kedron Brook. These areas supported undercut banks, dense understorey and canopy vegetation and large amounts of woody debris offering good stream-side structure and cover for calling/ breeding Tusked Frogs and oviposition. Stream flow was generally slow with depth variable to a maximum of approximately 1 m. A sheltered gully situated downslope from an existing culvert is also likely to support breeding activity during wetter conditions.

Waterway reaches situated further to the west appear to have been historically modified with connectivity to downstream waterway reaches by means of overland flow only. These areas support little streamside and/ or in-stream cover (i.e. litter, understorey/ overhanging vegetation) for calling/ spawning individuals and tadpoles and are considered to provide moderate (known) or lower quality breeding habitat for the Tusked Frog. An erosion gully below one of these outlets (mapped as lower quality habitat in Figure 4 and Figure 6), could also provide breeding opportunities for Tusked Frogs, though only under much wetter conditions than those through May-November of 2020 (Figure 4). No Tusked Frog individuals were recorded within lower quality breeding habitats. However, one Tusked Frog was recorded calling from a property immediately south at 38 Dinterra Ave (Figure 4). It is possible that this property supports ponds/ pools offering extended breeding opportunities for the species.

Please refer to Annex 6 – Significant Impact Assessments for an assessment of the Project's potential impact to Tusked Frog under the EPBC Act and Queensland Offsets Framework.

3.4.3 Koala

Koala are widely distributed throughout north-east, central and south-east Queensland, extending south through New South Wales and Victoria into South Australia. They occur in a variety of vegetation types although are primarily associated with eucalypt woodland and forest habitat types that contain suitable food trees (TSSC, 2012). According to the EPBC Act Referral Guidelines (DOE, 2014), Koala food trees include tree species whose foliage is consumed by Koalas.

Although Koala use a variety of trees, including many non-eucalypts, for feeding and resting, their diet is generally restricted to the foliage of *Eucalyptus* species and related genera, including *Corymbia*, *Angophora* and *Lophostemon*. However, Koalas are known to have distinct, localized feeding preferences throughout their range, selecting some species in preference to others (TSSC 2012). In Moreton Bay, primary and secondary koala food trees can include *Eucalyptus microcorys*, *E. bancroftii*, *E. robusta* and *E. tereticornis* (Australian Koala Foundation 2015), however a wider range of eucalypts can be used.

In Queensland, the highest densities of Koala occurs in the southeast region (~1-3 koalas / ha) (TSSC, 2012). However, ongoing habitat loss, habitat fragmentation, vehicle strike, disease and dog attack have led to population declines in all Southeast Queensland local government areas, including the Moreton Bay.

No recovery plan has been developed for the koala under the EPBC Act, however the EPBC Act Referral Guidelines (DOE, 2014) identify measures (and their associated standards) for mitigating impacts resulting from urban development. Please refer to Annex 6 – Significant Impact Assessments for an assessment of the Project's potential impact to Koala under the EPBC Act and Queensland Offsets Framework.

Review of existing data

The study area is located within an area mapped as *Koala district A* (DES, 2020). The study area is wholly located within a *Koala Priority Area*, and the majority of the Study area is located within a *Koala Habitat Area (core)*, in accordance with the Koala Plan under the NC Act (Figure 3). Some mapped Restoration habitats also occur within western and southern parts of the study area. Vegetation within the study area is mapped as essential habitat for Koala under the VM Act (Figure 3).

Wildlife Online database search results (DES, 2020) indicate 108 records for Koala within a 3 km radius to the study area. One record is located approximately 150m east of the study area. Similarly, Atlas of Living Australia indicates Koala are known from nine additional locations within a 3km radius to the study area including Bunya Conservation Park to the north, Upper Kedron to the south and Samford Conservation Park to the northwest (ALA, 2020). Koala records have also been captured from a review of Koala Hospital Data (KoalaBase) April 1996-February 2017 (DES, 2019).

Koala Spot Assessment Techniques (SAT) surveys were carried out as a part of preliminary environmental investigations completed during earlier stages of the project. The results of the survey are detailed in Annex 3 (Niche, 2020). Briefly, the survey did not record any Koala scats within the study area, indicating low Koala activity levels according to Phillips & Callaghan (2011).

Review of existing data suggests Koala are most active to the north of the study area in proximity to larger more contiguous habitats including Bunyaville Conservation Park. Vegetative connectivity south from these areas to the study area is significantly inhibited due to the presence of dense urban development. Some north-south stepping stone connectivity remains by means of Council parks (i.e. Leslie Street Park) and waterway corridors with east-west movement likely to occur within the riparian corridor of Kedron Brook.

Habitat for Koala within the study area is unlikely to sustain Koala for long periods given its relatively small extent and poor connectivity with larger more contiguous habitats to the north, south and west. However, vegetation is likely to provide transient foraging and resting opportunities for the species across its local range.

Survey results

Approximately 1.34ha of land within and immediately adjacent to (within 10m) the project footprint was surveyed to record any NJKHT. A total of 133 NJKHT were recorded within areas of Eucalypt forest including field-verified RE12.3.11 and RE12.11.3 (Figure 4). NJKHT recorded comprised primary and secondary preferred Koala food tree species for the Moreton Bay region including *E. microcorys*, *E. tereticornis*, *E. propinqua* and *E. robusta* (AKF, 2015). Other tree species included *L. confertus*, *L. suaveolens* and *Melaleuca spp.* which do not generally offer foraging opportunities for Koala but may be utilised for resting.

A schedule of NJKHTs recorded as a part of the survey is presented in Annex 4 – Flora and Fauna Survey Results.

Assessment against EPBC Act referral guidelines

This section provides an assessment of Koala habitats located within the study area against the Koala habitat Assessment Tool (Table 4 of the EPBC Act Referral Guidelines (DoE, 2014)).

The habitat assessment tool assists in determining the sensitivity, value and quality of Koala habitat within a locality. Data for five primary Koala habitat attributes: Koala occurrence, vegetation composition, habitat connectivity, existing threats and recovery value are input into the tool for the purposes of the assessment. Each habitat attribute is scored between zero and two then the scores are added together to give a total out of 10 for the overall value of habitat within the locality. Where habitats score a five or more using the tool, they are to be considered habitat that is critical to the survival of the Koala.

The assessment indicates that vegetation located within the study area is not considered habitat critical to the survival of the Koala, obtaining an overall score of 4. The results of the assessment carried out for the study area are provided in Table 9. Data and information input into the tool included desktop sourced information, maps and datasets, as listed in Section 3 as well as the results from historical surveys carried out as a part of the Project (Niche, 2020). In general, the study area is considered to comprise a small patch of Koala habitat (i.e. < 2ha) that is likely to provide stepping stone habitat where koalas can eat, rest and escape predators as they move between larger areas of habitat. The small habitat size, limited habitat quality due to weed infestation and proximity to urban threats (e.g. dogs and roads) reduce the capability of sustaining a resident Koala population. Nonetheless, vegetation within the study area is considered to provide important refuge habitat for Koala across the locality and movement opportunities along the Kedron Brook corridor.

Table 9. EPBC Act Referral Guidelines Koala Habitat Assessment Tool

Attributes	Score	Coastal	Assessment within study area
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	1 Review of existing data including historical surveys carried out for the project indicate no evidence (i.e. records and/ or scats) of Koala within the study area. Koala has been recorded approximately 150m east of the study area and is
	+1 (medium)	Evidence of one or more koalas within 2km of the edge of the impact area within the last 10 years	
	0 (low)	None of the above	

Attributes	Score	Coastal	Assessment within study area
			considerably active to north within 2km of the study area.
Vegetation composition	+2 (high)	Has forest or woodland with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	2 The study area supports Eucalypt forest dominated by koala food trees.
	+1 (medium)	Has forest or woodland with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 500 ha.	0 The study area is largely surrounded by urban areas within poor connectivity to larger more contiguous habitats situated to the north, west and south.
	+1 (medium)	Area is part of a contiguous landscape <500ha, but ≥ 300 ha.	
	0 (low)	None of the above.	
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR Areas which score 0 for koala occurrence and have no dog or vehicle threat present.	0 Review of Koala hospital records for the area indicates a lack of reported Koala injuries and deaths within immediate proximity to the site. However, this is likely due to low levels of Koala activity rather than low threat levels. Given the urban nature of surrounds to study area, there is likely to be a moderate to high threat level from dog and vehicle strike, particularly given a lack of suitable movement corridors.
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR Areas which score 0 for koala occurrence and are likely to have some degree of dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 of the guidelines.	1 The vegetation is a small patch of moderately disturbed habitat fragmented from adjacent bushland by local roads and offering little connectivity value to the larger more contiguous habitats to the north, west and south. It is uncertain whether the
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 of the guidelines.	

Attributes	Score	Coastal	Assessment within study area
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 of the guidelines.	habitat is important for achieving the recovery of the koala.
Total			4

3.4.4 Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is Australia's only endemic Flying-fox, occurring in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. The species is listed as Vulnerable under the EPBC Act. The Grey-headed Flying-fox forages in the canopies of vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. However, the species' foraging habitats do not produce continuous foraging resources throughout the year, thus the species has is highly mobile and commutes daily to foraging areas, as well as seasonal movements (DAWE 2020). The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast (Van der Ree et al. 2005). Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation (Nelson 1965; Ratcliffe 1931). Colonies also use highly modified vegetation in developed areas.

Since European settlement, Flying-fox mortality has increased as a result of habitat destruction and culling. The major threats to the Grey-headed Flying-fox include habitat loss and fragmentation affecting both foraging and roosting areas, and shooting for protection of commercial food crops. Other threats are competition and hybridisation with other flying fox species, pollutants, pathogens and electrocution on powerlines.

Presence within the study area

A review of the Atlas of Living Australia database indicates three Grey-headed Flying-fox sightings within a 3km radius to the study area. This includes records from urban areas to the east at Everton Park, south adjacent to the Gallipoli Barracks and to the west at Ferny Hills. A known Flying-fox camp that is located at Ferny Hills, approximately 1.5km west of the study area (Kylie Ave 341). Most recent counts from February 2015 indicate the camp supports between 500-2,499 flying-fox individuals including Grey-headed Flying-fox and Black Flying-fox (*Pteropus alecto*).

Grey-headed Flying-foxes are capable of nightly flights of up to 50km from their roost to different feeding areas as food resources change (DAWE, 2020). It is likely that individuals from the Ferny Hills camp would regularly utilise foraging resources within the study area.

Discussions with MBRC indicate vegetation immediately to the east of the study area supports a historical Flying-fox camp (pers.com. M. Hrsto, 2020). Council monitoring suggests Flying-foxes have not been observed within the camp since prior to July 2019.

No Flying-fox camp was observed within or adjacent to the study area during field surveys. It is likely that the study area provides a temporary roost for Flying-fox species subject to localised seasonal availability of foraging resources. Please refer to Annex 6 – Significant Impact Assessments for an assessment of the Project's potential impact to Grey-headed Flying-fox under the EPBC Act and Queensland Offsets Framework.

4. Potential Impacts

4.1 Overview of Proposed Development

4.1.1 Project details

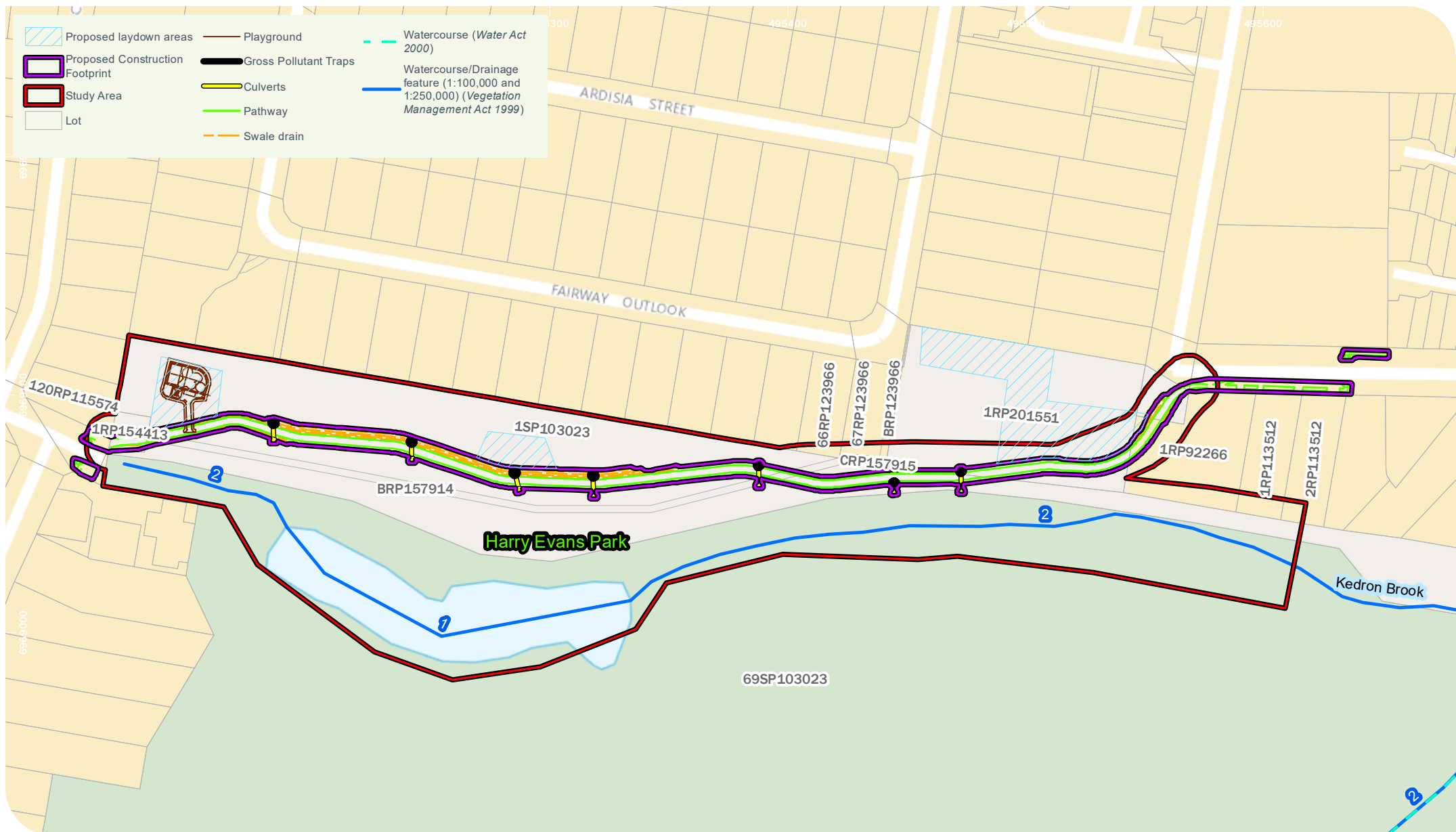
Please refer to Section 1.1 and Figure 5 for Project details.

4.1.2 Nature and extent of impacts

The proposed construction footprint for the Project includes the extent of the design footprint, including the pathway, swale drain, culverts and additional features, plus a 2m buffer as shown on Figure 5, comprising an area of 0.40ha.

Native vegetation that is mapped as remnant Of Concern vegetation up slope of the waterway will require removal in order to construct the Project. While the field survey identified that the vegetation communities across the study area differed from the mapped REs on the Vegetation Management Supporting Map, the submission of a Property Map of Assessable Vegetation (PMAV) to correct the mapping is not considered warranted by these minor inconsistencies in species dominance and spatial extent. The mapped layer is considered to provide the conservative approach for further assessments required to support Project approvals due to the mapping as a remnant Of Concern RE, therefore the assessment will be undertaken based on the mapped layer polygon of remnant Of Concern RE 12.11.25.

The extent of clearing required for the proposed Project is expected to comprise approximately 0.32ha of mapped remnant Of Concern vegetation located within the study area. In addition, minor clearing of native vegetation may be required within areas mapped as Category X vegetation, however this is limited to areas field verified as developed area (eg. existing driveway), maintained garden and road verge and is not expected to include any naturally occurring mature or semi-mature (>10cm DBH) native trees.



Within the proposed construction footprint, approximately 148 semi-mature to mature trees (>10 cm DBH) located within the construction footprint will be removed. This includes a mix of native and non-native species, including but not limited to *Lophostemon suaveolens*, **Celtis sinensis*, **Syragrus romanzoffiana*, *Eucalyptus microcorys*, *Eucalyptus robusta*, *Corymbia intermedia*, *Corymbia torelliana*, *Lophostemon confertus* and *Eucalyptus propinqua*. The construction footprint is sufficiently setback so as to avoid disturbance of the unnamed tributary of Kedron Brook, and is located wholly above the high bank of the waterway. While the western end of the construction footprint is located within 2m of the high bank, no clearing is expected in this area as it is maintained grassland with scattered trees. Clearing within the central portion of the construction footprint is expected to be more than 5m from the high bank (Figure 6).

Based on the proposed construction footprint, the Project has avoided the removal of Habitat trees identified within the study area as defined by the MBRC local Planning Scheme of >80cm DBH. Nonetheless, two mature trees that do not meet the definition of Habitat trees (i.e. <80cm DBH) that have been identified as supporting potential low risk animal breeding places (one hollow-bearing tree and one stag tree) are within the proposed construction footprint and will require removal for the Project. In addition, large trees located adjacent to the proposed construction footprint may be impacted by construction activities (requiring trimming of branches and/or roots) which will require management during the construction phase to ensure that they are suitably protected from works.

The proposed laydown areas have been positioned to make use of previously disturbed and cleared land as much as practicable (i.e. demolition space of the old scout hall and Jehovah's Witness carpark), however some native trees are located within the boundaries of these compounds and may be subject to some temporary disturbance. All trees within laydown areas are expected to be retained and protected from impacts during Project construction. In addition, the proposed playground will utilise the cleared space provided by the demolition of the old scout hall in the western portion of the site, in order to avoid tree clearing requirements.

Koala

As stated previously, the Project is expected to impact on approximately 0.32ha of Eucalypt forest (i.e. mapped remnant Of Concern vegetation) located within the study area that may provide habitat for the Koala. This will result in the linear loss of habitat for the Koala within the study area of 0.32ha within an area of approximately 2.35ha, or 13% of the available habitat at a local level. Within the proposed construction footprint, the field survey and tree survey data have identified the clearing will include 14 NJKHT located within the proposed construction footprint. The loss of NJKHT will require mitigation through landscaping and rehabilitation planting to ensure there is not net loss of Koala habitat as a result of the Project.

At a broader level, habitat connectivity will be maintained along the unnamed tributary of Kedron Brook as clearing has been avoided within and along the upper bank of the waterway. While this will maintain movement of Koala through the study area to habitat areas to the east and west of the site, the construction of the pathway (where fenced) may pose a barrier to Koala movement within the study area and isolate mapped Koala habitat likely to provide refuge and feeding opportunities, particularly in the north west of the study area. Fauna sensitive pathway and fence design strategies will be required to ensure that the Project continues to facilitate safe Koala movement throughout the site.

Tusked Frog

The potential direct impacts to Tusked Frog habitat resulting from the Project is expected to be limited to 0.0032 ha of lower quality breeding habitat identified within a culvert at the centre of the proposed construction footprint (Figure 6). This equates to 0.5% of the total mapped known or potential breeding habitat mapped within the study area (i.e. 0.78ha).

The following potential (direct and indirect) Project impacts to Tusked Frog populations and breeding habitat as a result of the Project have been identified:

- Direct and indirect mortality of Tusked Frog due to Project activities or infrastructure such as Gross pollutant traps (GPTs), earthworks or introduction of pests, disease and human activity.
- Disturbance, modification or loss of Tusked Frog breeding habitat through vegetation and soil loss or disturbance due to earthworks, heavy machinery or project infrastructure.
- Alteration to volume, timing, duration and frequency of surface runoff patterns, influencing habitat quality or integrity and abundance and availability of breeding places including changes to surface water levels, undercut banks, debris, tree roots and overhanging vegetation.
- Promote invasive species that compete or predate on Tusked Frog e.g. Cane Toads, Mosquitofish (*Gambusia holbrooki*) and Swordtail (*Xiphophorus hellerii*). To note, invasive flora species presence does not currently impact Tusked Frogs (Meyer, 2021). However, the Project has the potential to promote invasive flora species which may significantly impact Tusked Frog habitat quality and integrity.
- Decreased water quality through increase of pollutants such as fuel or concrete leachate, movement of unconsolidated soil, sediment or rubble into areas of riparian breeding habitat downstream/downslope of Project.
- Disruption of breeding cycle through increased ambient noise levels and seismic vibration during construction works and/or increased light pollution from artificial light sources.

4.1.3 Significance of impacts

Significant impact assessments were undertaken for threatened species in accordance with the Commonwealth *Significant Impact Guidelines 1.1 Matters of National Environmental Significance* (the Significant Impact Guidelines) (Department of the Environment, 2013) and Significant Residual Impact Guidelines under the Queensland *Environmental Offsets Act 2014* (Offsets Act) (Queensland Government, 2014). The significant impact assessments are provided in Annex 5 and have determined that the Project is unlikely to result of significant impacts for threatened species.

Further assessment of the potential for Significant Residual Impacts in relation to Regulated Vegetation under the VM Act may be required should the Project trigger the need for a Permit to clear native vegetation. Further consideration of the location of the 'defining bank' (i.e. high bank) of the unnamed tributary of Kedron Brook is required to determine the approvals requirements in relation to the clearing of approximately 0.32ha of mapped remnant Of Concern vegetation located within the study area. The following options have been identified:

- If clearing is avoided within 10m of the defining bank of the watercourse, then the Project would meet the requirements of the Accepted development vegetation clearing code: Clearing for infrastructure (DNRME, 2020)³.
- If clearing is required within 10m of the defining bank of the watercourse, then a Permit to clear native vegetation would be required.

³ Note that this is also reliant on the clearing meeting the clearing width limits as per Appendix 2, Table A of the code, which the proposed clearing footprint assessed for this report currently does as it is less than 10m.

4.2 Threatening processes

4.2.1 Edge effects

Edge associated impacts are potential impacts commonly associated with linear infrastructure, including roads and pathways. Edge associated impacts are zones of changed environmental conditions (i.e. altered light levels, wind speed and/or temperature) occurring along the edges of habitat fragments. These new environmental conditions can promote the growth of different vegetation types (including weeds) and allow invasion by pest animals specialising in edge habitats. While the eastern and western portions of the construction footprint traverse areas of maintained garden/road verge and disturbed areas, a large central portion traverses the vegetated natural area of Harry Evan Park and may result in the introduction of new or novel edge effects to habitats adjoining the proposed pathway. Mitigation measures will be required to address the potential risk of edge effects and improve habitat values adjoining the proposed pathway.

4.2.2 Biodiversity and habitat impacts

A number of potential impacts on both ecosystem function and biodiversity have been identified as risks related to the construction of the proposed pathway, including:

- Vegetation/habitat removal.
- Fragmentation of habitat.
- Water quality changes.

Vegetation and habitat removal/loss has been discussed in Section 4.1.2, where the construction footprint is identified as requiring the clearing of approximately 0.32ha or mapped remnant Of Concern vegetation (i.e. Eucalypt forest habitat) comprising 147 semi-mature to mature trees (>10cm DBH) located within the construction footprint.

Additionally, the Project has the potential to fragment fauna populations through the construction of the pathway which may act as a barrier to fauna movement. Overall, there are a number of adverse impacts likely to occur if there is impediment of terrestrial fauna movements across the landscape due to fragmentation of habitat. The construction of the pathway parallel to the waterway through the study area has potential to cause a barrier to fauna movement within the study area and isolate mapped Eucalypt habitat in the north west of the study area. The design of the pathway includes sections of ground level pathway and elevated sections which may allow fauna movement over and under the pathway, respectively, however appropriate mitigation measures will be required for features such as fencing to ensure that to ensure fauna movement opportunities are maintained. At a broader level connectivity will be maintained along the unnamed tributary of Kedron Brook as clearing has been avoided within and along the upper bank of the waterway which is expected to allow movement of fauna through the study area and maintain access to habitat areas to the east and west.

As the proposed construction footprint is limited to above the upper bank of the unnamed waterway, potential impacts to water quality would likely be associated with temporary impacts during the construction of the Project and potential risk of cleared land increasing erosion risk within the study area. Mitigation measures will be required to ensure that suitable erosion and sedimentation controls are incorporated into the design and implemented during construction activities.

4.2.3 Landscape effects

The existing connectivity of habitat in the local area is generally associated with riparian corridors present along Kedron Brook and its tributaries. The alignment of the pathway has been selected and modifications have been made during the design process to minimise the impact on the native vegetation in the study area. The construction footprint avoids directly impacting on the unnamed tributary of Kedron Brook, with

the construction footprint wholly located above the high bank of the waterway and clearing is expected to be more than 5m from the high bank at the closest point (Figure 6). Therefore, the existing connectivity of habitat in the local area provided by the unnamed tributary of Kedron Brook for aquatic and semi-aquatic fauna and other native species is expected to be maintained through the study area.

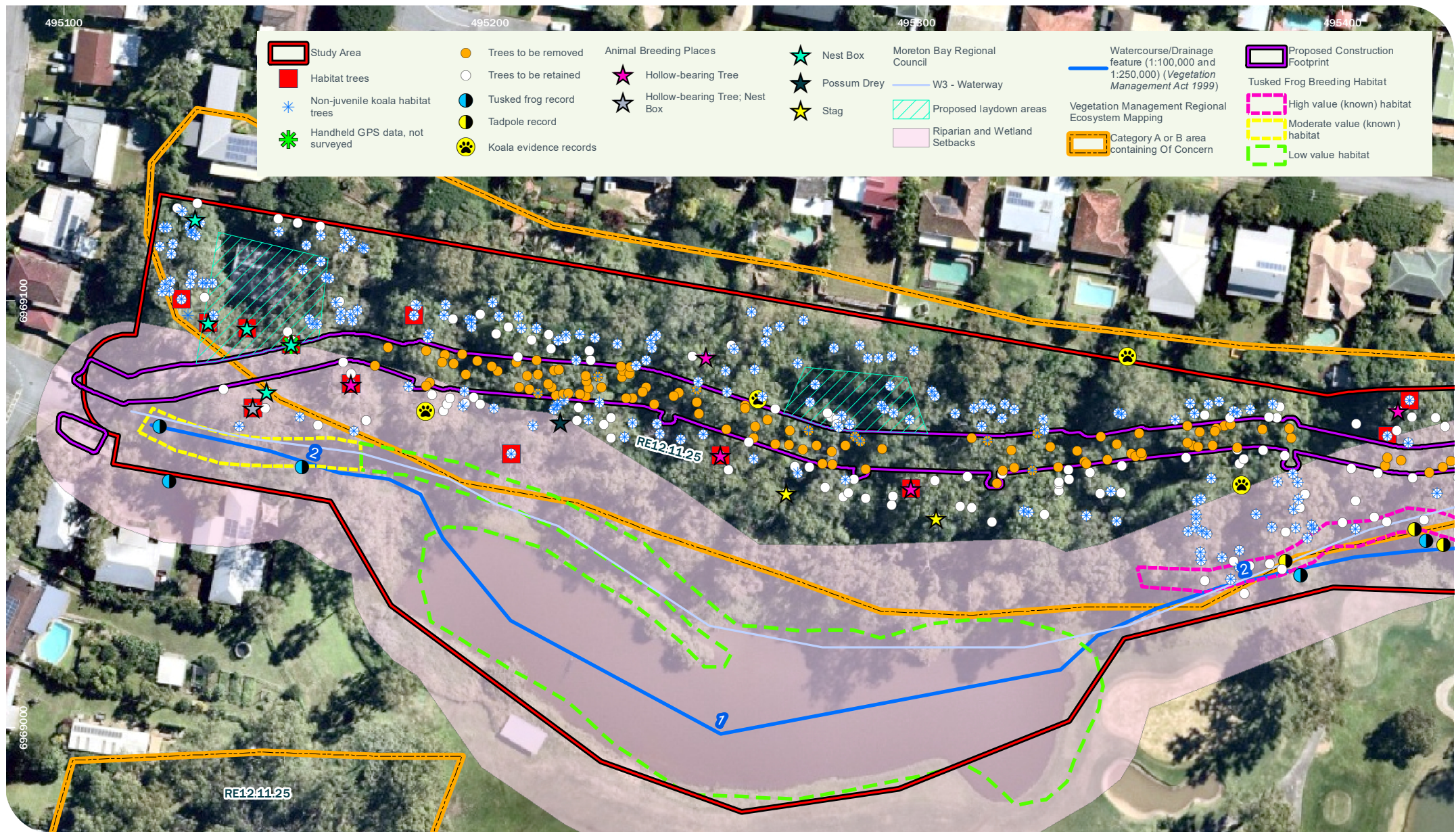
The proposed construction footprint is limited to above the upper bank of the unnamed waterway and is not expected to require cut and fill works that would impact on hydrological patterns experienced at the local level.

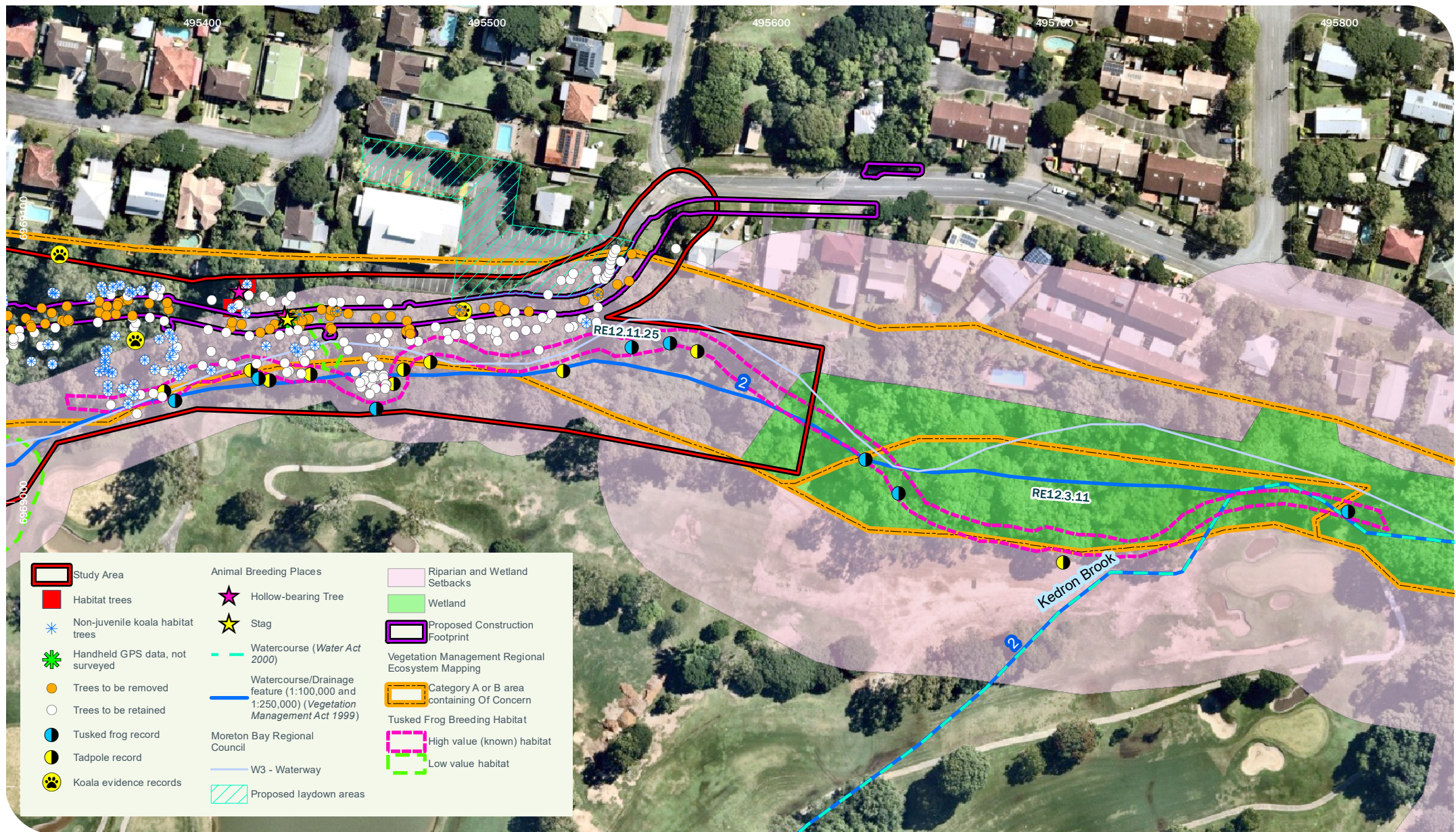
4.2.4 Invasive species and disease

A number of exotic species are present within the study area and adjacent lands including a range of declared pest plants, environmental weeds and vertebrate pests. Spread of these weeds and pest animals is a potential threat arising from both the construction and operational phase of this Project. Exotic species have the potential to invade newly created environments and potentially influence species composition and abundance both within and adjacent to the study area. Due to the disturbed nature of the study area related to existing weed infestation, it is unlikely that the construction of the pathway will lead to significant changes in the composition and abundance of exotic species within the study area, however construction disturbances may encourage the spread of exotic species throughout the study area.

Construction activities also have the potential to impact on native species by facilitating the spread of disease. In particular, this is a threat to frog species in relation to the amphibian Chytrid fungus disease. The Chytrid fungus invades the surface layers of the frog's skin and is capable of causing the death of frog populations.

Mitigation measures to manage the potential impacts of weed infestations, movement of pest animals and spread of disease within and adjacent the Project will be required to minimise impacts to surrounding habitat areas and are detailed in Section 5 of this report.





5. Mitigation Measures

5.1 Mitigation hierarchy

Mitigation measures for the Project are recommended to follow the hierarchy of: avoid, minimise, mitigate, to ensure that impacts resulting from the Project are appropriately managed. The proposed pathway has been designed to protect existing environmental values as far as practical by modifications to the footprint to retain habitat trees and use of elevated sections of pathways to minimise disturbances to surrounding trees. In addition, the Project has been designed to avoid direct impacts to areas identified as providing known and potential breeding habitat for the Tusked Frog, as far as practical.

5.2 Proposed avoidance

The proposed pathway design has undergone alterations and modifications to avoid impacting on habitat trees and sensitive vegetation with the aim of selecting a footprint that minimises impacts on native vegetation and wildlife, as far as practical. Additionally, the following measures have been incorporated into the pathway to minimise the impact on the environment:

- Utilising elevated sections of pathway to reduce tree clearing requirements and minimise impacts to tree protection zones and structural root zones.
- Designing the pathway to reduce impacts to existing riparian vegetation, canopy trees and habitat trees.
- Avoiding clearing to protect existing Koala food trees, habitat trees and maintain movement corridors.
- Avoiding impacts on breeding and foraging habitat for Tusked Frog, as far as practical.

The proposed laydown areas have been positioned to make use of previously disturbed and cleared land as far as practical (i.e. demolition space of the old scout hall and Jehovah's Witness carpark), however some native trees are located within the boundaries. All trees within laydown areas are expected to be retained and protected from impacts during Project construction. In addition, the proposed playground will utilise the cleared space provided by the demolition of the old scout hall in the western portion of the site, in order to avoid tree clearing requirements.

5.3 Recommendations and mitigation measures

5.3.1 Design recommendations and measures

A number of design measures and features have been incorporated into the detailed design for the Project including:

- Suitable erosion and sedimentation controls in the design and during construction.
- LED fauna friendly bollard lighting and in-ground path markers to minimise light spill and disturbance for adjacent fauna habitats.

Further recommendations with respect to the Project design that should be considered to protect ecological values and minimise impacts to flora and fauna are discussed further in the following sections.

Gross pollutant traps (GPTs)

Gross pollutant traps (GPTs) are included in the design at the upslope end of each culvert. GPTs have the potential to capture or injure ground dwelling fauna, including Tusked Frog adults, juveniles and tadpoles. It is recommended that GPTs should not include the lift trap liner insert as it may trap small animals, including Tusked Frog individuals. Should fine particulate pollution be regarded as an issue this should first be

monitored, then if lift trap liners are deemed required, bunding should be installed around the edges of GPTs to decrease likelihood of, small animals such as Tusked Frogs accessing the GPT and being trapped.

Koala fencing

The design of the pathway includes the installation of safety fencing that meet the Bikesafe Bikeway Barrier Specifications. This fencing has the potential to act as a barrier to fauna movement, including for the Koala, which could isolate habitat areas and fragment populations within the study area and adjoining lands. To ensure that the pathway and associated fencing minimises impacts to fauna movement opportunities and retains connectivity with the study area as far as practical, it is recommended that the fencing design details include features for Koala-friendly fencing specified in the Koala-sensitive Design Guideline (DES, 2019). In particular, a mix of the following features are recommended:

- In areas of ground level pathway where a Bikesafe Bikeway Barrier is present, provide a minimum gap of 300 mm between the ground and the lowest rail to allow koalas to move underneath the fence.
- In areas where the pathway is elevated off the ground ensure that there is connectivity available for the Koala (and other fauna) to move under the pathway and where possible provide groundcover and/or fauna furnishings (such as logs and rails) to promote fauna use as an underpass.
- At regular intervals (such as 50 m), provide fauna movement opportunities by either vertical gaps in fencing (at least 300 mm width) or fencing additions, such as timber posts, Koala bridges (Plate 4) or ladders to aid Koala movement across the pathway.



Plate 4. Example of a Koala bridge to provide connectivity across a fenced barrier to movement (DES, 2019)

Signage

The increased public access to Harry Evans Park and the riparian area along the unnamed tributary of Kedron Brook has the potential to impact vegetation and fauna habitat as a result of introduced threats such as arson, vegetation trampling and riparian area damage/erosion. It is recommended that the Project should include measures to discourage public access to riparian areas through signage, fencing, dense planting, brushmatting⁴ or Project design elements such as guardrails and raised pathway sections.

Playground

The proposed playground will utilise the cleared space provided by the demolition of the old scout hall in the western portion of the study area in order to avoid tree clearing requirements. Based on the current design there is further investigation required to ensure all trees can be retained to accommodate the playground. While the pathway is considered to be necessary built infrastructure as transport infrastructure

⁴ Process of strategically installing dead tree branches in areas to discourage public access.

under Section 22A of the VM Act, clearing of native remnant Of Concern vegetation for construction of the playground may be considered prohibited development. Further investigation of the proximity of works to native vegetation is recommended and design modifications employed as required to protect native trees.

5.3.2 Pre-construction and construction mitigation

Table 10 outlines the following proposed pre-construction and construction impact management solutions to minimise impacts on ecological values for the study area as a result of the Project. Please also refer to Annex 6 – Significant Impact Assessments for an assessment of the Project’s potential impact to Matters of National Environmental Significance under the EPBC Act and Matters of State Environmental Significance under the Queensland Offsets Framework.

Table 10. Recommended management strategies and mitigation measures

Description	Mitigation measures	Timing	Responsibility
Protection of native vegetation and fauna habitat	A <i>flora and fauna management plan</i> would be prepared, implemented and audited as part of the CEMP. The CEMP would address terrestrial and aquatic matters and include plans that show the construction footprint in proximity to ecological values, exclusion zones and Tree Protection Zones and provide details of pre-clearing protocols, weed and pest management and restoration requirements.	Pre-construction/ construction	Contractor
Protection of native vegetation and fauna habitat adjacent to construction footprint	<p>The <i>vegetation management plan</i>, <i>habitat tree management plan</i> and <i>nest box management plan</i> are to be implemented and audited as part of the CEMP.</p> <p>Vegetation clearing required for the Project is to be restricted to the proposed construction footprint. No clearing/vegetation disturbance shall be undertaken outside of the proposed construction footprint and no-go zones shall be established on construction plans to protect ecological values. Prior to undertaking any works the following activities would be undertaken:</p> <ul style="list-style-type: none"> • Marking-out and signing of clearing limits within the construction footprint. • Installation of barriers, which are identified on construction drawings and raised to site workers during induction training. • Clear identification of vegetation and habitat features to be retained and protected using suitable fencing, signage or markings. • Design and construction solutions are to be explored to minimise any impacts to vegetation proposed for retention during construction in accordance with AS4970-2009 and AS4373-2007. • Where works are proposed within the Tree Protection Zones (TPZ) of any trees to be retained, an arborist (min AQF level 5) is to be engaged to complete a tree health assessment and to provide recommendations for mitigating any impacts. The arborist is to assess alternative construction methods and prescribe suitable mitigation measures to maintain the health and long-term viability of any trees proposed for retention within the vicinity of proposed works. • Locating all construction access and storage within cleared or disturbed areas, outside of any exclusion zones or the Tree Protection Zone of vegetation to be retained as identified in the flora and fauna management plan. 	Pre-construction/ construction	Contractor
Protection of native vegetation within laydown areas	All construction infrastructure (eg. site office), parking and laydown/storage areas shall be limited to the proposed laydown areas and existing cleared land only. No clearing of native vegetation is to occur within the laydown areas and any storage or works required within the Tree Protection Zones of trees for retention shall be protected from construction disturbance and/or arborist recommendations/ treatments employed to protect the tree during works and ensure that the tree remains viable.	Pre-construction/ construction	Contractor

Description	Mitigation measures	Timing	Responsibility
Protection of riparian vegetation and habitat from damage due to increased public access	Look for opportunities to discourage public access to riparian areas through signage, fencing, dense planting, brushmatting or Project design (e.g. guardrails, raised pathway sections).	Pre-construction/ construction	Contractor
Protection of fauna during clearing	<p>A fauna spotter/catcher should be engaged prior to and during any clearance of woody vegetation to ensure that legislative obligations (under the NC Act) with respect to protection of native fauna are met. The responsibilities of the fauna spotter/catcher will ensure that:</p> <ul style="list-style-type: none"> • Clearing only occurs once a spotter/catcher gives sign off that vegetation has been inspected and is clear of native fauna identified as present on the site. • Clearing commences in areas of least connectivity and directs fauna towards retained areas (in particular will be directed away from Jane Street and Dinterra Avenue to minimise roadkill risk). • clearing is sequenced to ensure adequate time for fauna to relocate towards retained areas. 	Pre-construction/ construction	Contractor
Protection of animal breeding places	<p>Clearing of animal breeding places, including hollows and nests, should be avoided as far as practical. Any potential animal breeding places (in particular, the two potential low risk animal breeding places proposed for removal within the proposed construction footprint) that will require removal for the Project shall be checked by the fauna spotter/catcher prior to clearing to ensure any potential breeding place (such as nests/arboreal termite mounds/hollows) are not being used by a native animal to incubate or rear the animal's offspring. Should evidence of animal breeding be identified either:</p> <ul style="list-style-type: none"> • No clearing shall be undertaken of the animal breeding place until the breeding has ceased and the animal (and offspring) vacate the breeding place on their own volition; or • Activities are undertaken in accordance with an approved Species Management Program for tampering with an animal breeding place. 	Pre-construction/ construction	Contractor
Tusked Frog	<p>Undertake earthworks and use of heavy machinery outside of peak Tusked Frog breeding season [Spring/Summer].</p> <p>Minimise clearing and groundworks within areas identified as known or potential breeding habitat, including existing culverts, as far as practical.</p> <p>Temporary exclusion fencing (such as a dampcourse or shade-cloth fence) to be established during construction to prevent frogs entering active areas of construction and earthworks to minimise risk of fauna injury/mortality. Frog exclusion fencing should stand 30-40 cm tall and be buried to a depth of ~ 5cm, so as to prevent Tusked Frogs from passing over and/or</p>	Pre-construction/ construction	MBRC; Contractor

Description	Mitigation measures	Timing	Responsibility
	<p>underneath it. Frog fencing should also be kept clear of any rubble, vegetation or woody debris that might otherwise allow Tusked Frogs to climb over the top.</p> <p>Maintain a minimum 10 m setback from unnamed tributary of Kedron Brook and Tusked Frog breeding habitat, as far as practical.</p> <p>Acceptable Tusked Frog water quality parameters to be established for Project and monitored during and post construction.</p> <p>Avoid the use of herbicides, pesticides and wetting agent in proximity to Tusked Frog breeding habitat, especially during Spring, Summer and early Autumn.</p> <p>MBRC or the Contractor to develop and implement an Ecological Restoration Plan which outlines revegetation and rehabilitation of vegetation that is lost or disturbed during construction, preferably using local species that provide suitable Tusked Frog habitat (e.g. <i>Waterhousia floribunda</i> (Water lilly pilli) and <i>Lomandra spp.</i>) (MBRC, 2020).</p> <p>Management measures will be implemented throughout the Pre-construction and Construction of the Project to prevent of introduction and/or promotion of invasive pathogens such as Chytrid Fungus (<i>Batrachochytrium dendrobatidis</i>), including hygiene requirements, awareness, monitoring and reporting protocols</p>		
Koala	<p>Clearing of vegetation or earthworks within habitat for Koala to occur outside of the breeding season for the species [Spring/Summer].</p> <p>Minimise clearing of native vegetation and NJKHT for the project and identify any additional trees that are suitable for retention within the construction footprint prior to commencing works.</p> <p>A koala spotter should be engaged prior to and during any clearance of woody vegetation to ensure that legislative obligations (under the Nature Conservation (Koala) Conservation Plan 2017) with respect to protection of Koalas are met.</p> <p>Clearing of the Koala habitat trees is carried out in a way that ensures Koala with the area being cleared (the clearing site) 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 3ha, by:</p> <ul style="list-style-type: none"> • Carrying out the clearing in stages; and • Ensuring not more than the following is cleared in any 1 stage— <ul style="list-style-type: none"> ▪ For a clearing site with an area of 6ha, or - 50% of the site's area; ▪ For a clearing site with an area of more than 6ha, - 3ha or 3% of the site's area, whichever is the greater; and • Ensuring that between each stage and the next there is at least 1 period of 12 hours starting at 6p.m. on a day and ending at 6a.m. on the following day during which no trees are cleared on the site; and 	Pre-construction/ construction	MBRC; Contractor

Description	Mitigation measures	Timing	Responsibility
	<ul style="list-style-type: none"> 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; and 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. <p>MBRC or the Contractor to develop and implement an Ecological Restoration Plan which outlines revegetation and rehabilitation of vegetation that is lost or disturbed during construction, preferably using local species that are considered to be suitable Koala feed trees (MBRC, 2010).</p>		
Site workers and construction activity impacts	<p>All site workers would be trained to ensure awareness of requirements of the <i>flora and fauna management plan</i>, <i>vegetation management plan</i>, <i>habitat tree management plan</i> and <i>nest box management plan</i> and relevant statutory responsibilities.</p> <p>Site-specific training would be provided when specific work activities were taking place near areas of identified biodiversity value that are to be protected.</p>	Construction	Contractor
Unexpected finds	<p>An <i>unexpected finds procedure</i> would be prepared and implemented. This would describe the process for identifying, dealing with, and managing any unexpected threatened flora or fauna species found during the construction process. It would include the measures for stopping work, engaging a qualified ecologist, contacting the regulators and restarting work.</p>	Construction	Contractor
Spread of weeds, pests and pathogens	<p>Management measures would be prepared, implemented and audited to avoid and minimise the environmental risks associated with weeds, pests and pathogens and incorporated into the CEMP.</p> <p>Implementation of appropriate weed control and weed disposal shall occur in accordance with Biosecurity protocols.</p> <p>Any soil or other materials imported to the site for use in restoration or rehabilitation would be certified free from weeds and pathogens or obtained from sources that demonstrate best practice management to minimise weed and pathogen risks.</p> <p>Disposal of any weed material at an appropriately licensed facility.</p> <p>Implementation of appropriate hygiene protocols where there are potential or known pathogen risks.</p>	Construction	Contractor
Noise impacts	<p>Noise and Vibration Management Plan as part of CEMP.</p> <p>Avoid earthworks and using Project plant that contributes to high levels of noise and vibration during peak Tusked Frog breeding season.</p> <p>Plant and equipment should be selected to minimise noise emission and maintained regularly to avoid noise.</p>	Construction and operation	Contractor/ Proponent

Description	Mitigation measures	Timing	Responsibility
	Educate Project personnel to maximise awareness of Project noise goals and noise generating activities and encourage minimisation of these activities. Construction work should be carried out in accordance with Australian Standard 2436-1981, Guide to noise control on construction, maintenance and demolition sites (Standards Australia, 1981).		
Light disturbance	Minimise light pollution from site offices and associated plant during construction by locating lamps as far as possible from fauna habitat, in particular vegetated areas and Tusked Frog breeding habitat, installing glare guards and installing motion sensors. Fauna sensitive lighting to be installed and maintained for the pathway in accordance with the design requirements.	Construction and operation	Contractor/ Proponent
Dust and other air quality impacts	An Air Quality Management Plan would be prepared and developed as part of the CEMP outlining requirements for the management and monitoring of air quality emissions to ensure compliance with relevant standards.	Construction and operation	Contractor/ Proponent
Impacts to water quality and hydrology	Erosion and Sediment Control Plan as part of the CEMP which outlines mitigation measures for erosion and sediment pollution, in accordance with International Erosion Control Association (IECA) best practice guidelines. Stormwater Management Plan to be developed as part of the CEMP. The plan should outline: <ul style="list-style-type: none"> • Collection protocols of stormwater for the Project. • Measures for the management and monitoring of surface water quality and hydrology during construction. • Management of potential contaminants and sediments. • Monitoring of construction surface water quality. 	Construction and operation	Contractor/ Proponent
	Ensure laydown and stockpile areas occur as far from waterways as practically possible and outside overland flow paths or drainage patterns. All machinery and vehicles accessing the area shall be routinely checked for leaks. An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and trained in its use. Establish release criteria for management of 'construction contaminated water'. Stabilise exposed soils by using materials such as mulch, biodegradable matting, geotextile fabrics, and/or soil stabilisation products.	Construction and operation	Contractor/ Proponent
Impacts associated with litter and solid waste	A Waste Management Strategy would be developed outlining strategies for waste management during construction. Strategies for the management of litter within the site should also be written into operational plans and programs.	Construction	Contractor

Description	Mitigation measures	Timing	Responsibility
Clearing and disposal	<p>Cleared vegetation is to be reused on or off premises as far as practical and in accordance with biosecurity protocols and zones eg. Fire Ant Biosecurity Zones. Recycling techniques include mulching, tub-grinding, wood chipping and salvage (e.g. custom milling).</p> <p>Clearing of non-native vegetation and weeds shall be undertaken in a manner that does not spread seed to adjoining areas and should either be treated appropriately to ensure weeds do not propagate in re-use (i.e. by following mulching protocols) or disposed of appropriately.</p> <p>Vegetative material and debris must not be pushed into gullies, watercourses, other drainage lines or waterlogged areas.</p>	Construction	Contractor

5.4 Revegetation and offsets

The Project will include the preparation of an Ecological Restoration Plan which outlines revegetation and rehabilitation requirements for vegetation that is lost or disturbed during construction and will include the provision of landscaping that helps to control weeds and clears invasive species from the study area. Any revegetation and landscaping undertaken would include a preference for using local species that provide suitable habitat for the Koala and promoting Tusked Frog habitat (e.g. *Waterhousia floribunda* and *Lomandra spp.*). In addition, the revegetation would include the provision of nesting boxes to mitigate the loss of Habitat trees and/or animal breeding places (i.e. hollows) requiring removal for the Project.

Pending verification of the high bank of the unnamed tributary of Kedron Brook in relation to the proposed construction footprint and final clearing requirements, the Project may be able to comply with the Accepted development vegetation clearing code Clearing for infrastructure. One of the key criteria for the design and construction (once upfront principles of necessity and avoidance have been demonstrated) is the avoidance of clearing Category B regulated native vegetation within 10m of the defining (i.e. high) bank of a watercourse (being the adjacent tributary of Kedron Brook). If works cannot meet the requirements of this accepted development code, then both state and council approvals will be required for the clearing of native vegetation. Where further approvals are triggered and the acceptable solutions of the vegetation management code cannot be met, formal environmental offsets under the *Environmental Offsets Act 2014* would be required.

Notwithstanding any requirements for formal offsets to be delivered, the Project has committed to offset planting to be undertaken at a rate of 3:1 to compensate for tree removal, with every effort made to carry out offset planning within the local area wherever possible. The offset planting for the Project will include considerations for improving Koala and Tusked Frog habitat quality within riparian vegetation of offset areas, particularly any located along the unnamed tributary of Kedron Brook or within the Kedron Brook (east) Habitat Corridor.

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Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: -27.4017
Longitude: 152.9525
Distance: 3
Email: cwheeler@niche-eh.com
Date submitted: Monday 12 Oct 2020 17:52:32
Date extracted: Monday 12 Oct 2020 18:00:03

The number of records retrieved = 2

Disclaimer

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Limnodynastidae	<i>Adelotus brevis</i>	tusked frog		V		1
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala		V	V	108

CODES

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

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().

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

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.



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.

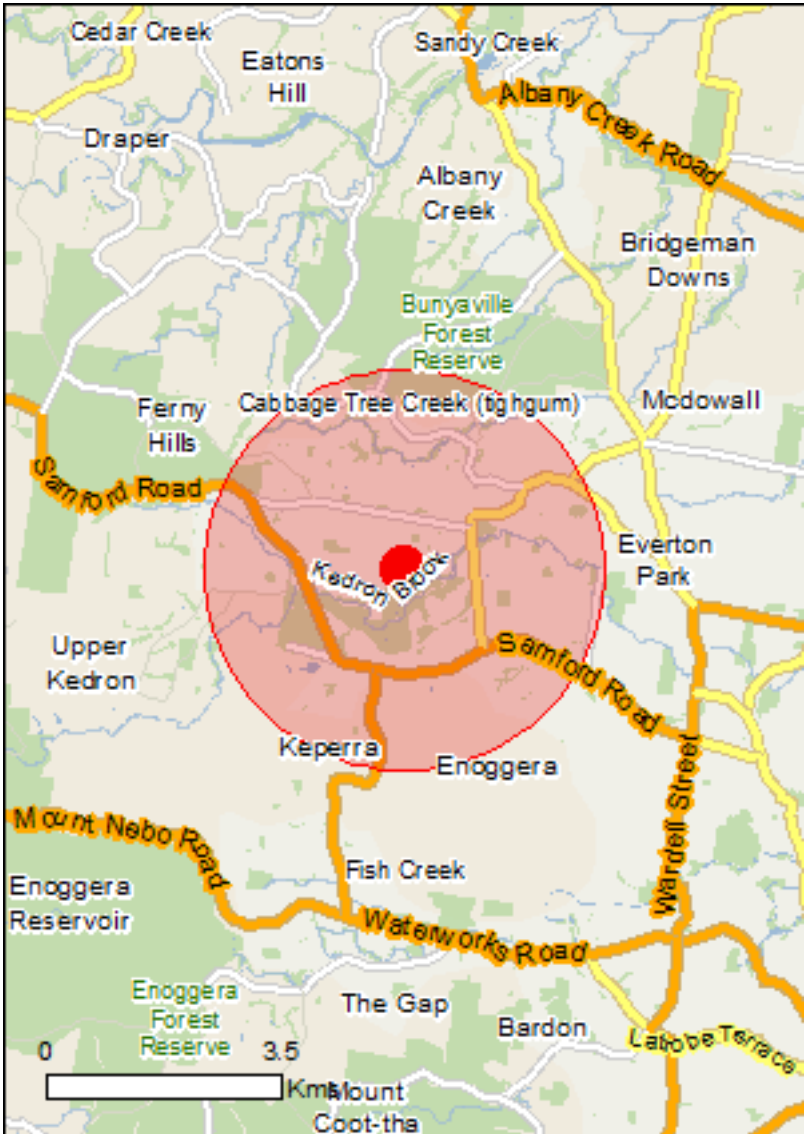
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 12/10/20 18:53:56

- [Summary](#)
- [Details](#)

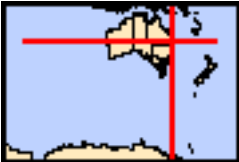
[Matters of NES](#)[Other Matters Protected by the EPBC Act](#)[Extra Information](#)
- [Caveat](#)
- [Acknowledgements](#)



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

[Coordinates](#)

Buffer: 3.0Km



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:	40
Listed Migratory Species:	15

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	22
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:	2
Regional Forest Agreements:	None
Invasive Species:	45
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	10 - 20km upstream	

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
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community may occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely 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 known 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
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

Name	Status	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thinornis cucullatus cucullatus Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely 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
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
Corchorus cunninghamii Native Jute [14659]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within area
Cupaniopsis shirleyana Wedge-leaf Tuckeroo [3205]	Vulnerable	Species or species habitat may occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat may occur within area
Lepidium peregrinum Wandering Pepper-cress [14035]	Endangered	Species or species habitat may occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat likely to occur within area
Macadamia ternifolia Small-fruited Queensland Nut, Gympie Nut [7214]	Vulnerable	Species or species habitat likely 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
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area
Sophora fraseri [8836]	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

Reptiles		
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat likely to occur within area
Furina dunmalli Dunmall's Snake [59254]	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 known to occur within area

Name	Threatened	Type of Presence
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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely 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 may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely 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

Commonwealth Land	[Resource Information]
<p>The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.</p>	

Name
Defence - Training logistic centre

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		

Name	Threatened	Type of Presence
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		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 may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely 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 may 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
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 likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
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 likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Bunyaville	QLD
Samford	QLD

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 [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 [780]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<div><div>Sturnus vulgaris</div><div>Common Starling [389]</div></div>		Species or species habitat likely to occur within area
Frogs		
<div><div>Rhinella marina</div><div>Cane Toad [83218]</div></div>		Species or species habitat known to occur within area
Mammals		
<div><div>Bos taurus</div><div>Domestic Cattle [16]</div></div>		Species or species habitat likely to occur within area
<div><div>Canis lupus familiaris</div><div>Domestic Dog [82654]</div></div>		Species or species habitat likely to occur within area
<div><div>Capra hircus</div><div>Goat [2]</div></div>		Species or species habitat likely to occur within area
<div><div>Felis catus</div><div>Cat, House Cat, Domestic Cat [19]</div></div>		Species or species habitat likely to occur within area
<div><div>Feral deer</div><div>Feral deer species in Australia [85733]</div></div>		Species or species habitat likely to occur within area
<div><div>Lepus capensis</div><div>Brown Hare [127]</div></div>		Species or species habitat likely to occur within area
<div><div>Mus musculus</div><div>House Mouse [120]</div></div>		Species or species habitat likely to occur within area
<div><div>Oryctolagus cuniculus</div><div>Rabbit, European Rabbit [128]</div></div>		Species or species habitat likely to occur within area
<div><div>Rattus norvegicus</div><div>Brown Rat, Norway Rat [83]</div></div>		Species or species habitat likely to occur within area
<div><div>Rattus rattus</div><div>Black Rat, Ship Rat [84]</div></div>		Species or species habitat likely to occur within area
<div><div>Sus scrofa</div><div>Pig [6]</div></div>		Species or species habitat likely to occur within area
<div><div>Vulpes vulpes</div><div>Red Fox, Fox [18]</div></div>		Species or species habitat likely to occur within area
Plants		
<div><div>Alternanthera philoxeroides</div><div>Alligator Weed [11620]</div></div>		Species or species habitat likely to occur within area
<div><div>Anredera cordifolia</div><div>Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]</div></div>		Species or species habitat likely to occur within area
<div><div>Asparagus aethiopicus</div><div>Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]</div></div>		Species or species habitat likely to occur within area
<div><div>Asparagus africanus</div><div>Climbing Asparagus, Climbing Asparagus Fern</div></div>		Species or species

Name	Status	Type of Presence
[66907]		habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		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] Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area Species or species habitat may occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913] Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area Species or species habitat likely to occur 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] Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		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
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		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
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
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade,		Species or species

Name	Status	Type of Presence
White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		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

-27.40172 152.9525

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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[Department of Agriculture Water and the Environment](#)

GPO Box 858

Canberra City ACT 2601 Australia

+61 2 6274 1111



Vegetation management report

For Lot: 1 Plan: SP103023

14/04/2021

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Recent changes

Updated mapping

Updated vegetation mapping was released on 6 April 2020 and includes the most recent Queensland Herbarium scientific updates to the Regulated Vegetation Management Map, regional ecosystems, wetland, high-value regrowth and essential habitat mapping.

Improvements to the format of the report were made in July 2020 to more clearly delineate the three regulatory frameworks of vegetation management, protected plants and koala habitat protection. The Vegetation Management Pre-clear Regional Ecosystem map was also removed from the Vegetation Management Report but can still be requested as a separate map.

Overview

Based on the lot on plan details you have supplied, this report provides the following detailed information:

Property details - information about the specified Lot on Plan, lot size, local government area, bioregion(s), subregion(s) and catchment(s);

Vegetation management framework - an explanation of the application of the framework and contact details for the Department of Resources who administer the framework;

Vegetation management framework details for the specified Lot on Plan including:

- the vegetation management categories on the property;
- the vegetation management regional ecosystems on the property;
- vegetation management watercourses or drainage features on the property;
- vegetation management wetlands on the property;
- vegetation management essential habitat on the property;
- whether any area management plans are associated with the property;
- whether the property is coastal or non-coastal; and
- whether the property is mapped as Agricultural Land Class A or B;

Protected plant framework - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework, including:

- high risk areas on the protected plant flora survey trigger map for the property;

Koala protection framework - an explanation of the application of the framework and contact details for the Department of Environment and Science who administer the framework; and

Koala protection framework details for the specified Lot on Plan including:

- the koala district the property is located in;
- koala priority areas on the property;
- core and locally refined koala habitat areas on the property;
- whether the lot is located in an identified koala broad-hectare area; and
- koala habitat regional ecosystems on the property for core koala habitat areas.

This information will assist you to determine your options for managing vegetation under:

- the vegetation management framework, which may include:

- exempt clearing work;
- accepted development vegetation clearing code;
- an area management plan;
- a development approval;

- the protected plant framework, which may include:

- the need to undertake a flora survey;
- exempt clearing;
- a protected plant clearing permit;

- the koala protection framework, which may include:

- exempted development;
- a development approval;
- the need to undertake clearing sequentially and in the presence of a koala spotter.

Other laws

The clearing of native vegetation is regulated by both Queensland and Australian legislation, and some local governments also regulate native vegetation clearing. You may need to obtain an approval or permit under another Act, such as the Commonwealth Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Section 8 of this guide provides contact details of other agencies you should confirm requirements with, before commencing vegetation clearing.

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1. Property details

1.1 Tenure and title area

All of the lot, plan, tenure and title area information associated with property Lot: 1 Plan: SP103023, are listed in Table 1.

Table 1: Lot, plan, tenure and title area information for the property

Lot	Plan	Tenure	Property title area (sq metres)
1	SP103023	Freehold	21,730
B	RP157914	Easement	899

The tenure of the land may affect whether clearing is considered exempt clearing work or may be carried out under an accepted development vegetation clearing code.

1.2 Property location

Table 2 provides a summary of the locations for property Lot: 1 Plan: SP103023, in relation to natural and administrative boundaries.

Table 2: Property location details

Local Government(s)
Moreton Bay Regional

Bioregion(s)	Subregion(s)
Southeast Queensland	Burringbar - Conondale Ranges

Catchment(s)
Pine

2. Vegetation management framework (administered by the Department of Resources)

The *Vegetation Management Act 1999* (VMA), the Vegetation Management Regulation 2012, the *Planning Act 2016* and the Planning Regulation 2017, in conjunction with associated policies and codes, form the Vegetation Management Framework.

The VMA does not apply to all land tenures or vegetation types. State forests, national parks, forest reserves and some tenures under the *Forestry Act 1959* and *Nature Conservation Act 1992* are not regulated by the VMA. Managing or clearing vegetation on these tenures may require approvals under these laws.

The following native vegetation is not regulated under the VMA but may require permit(s) under other laws:

- grass or non-woody herbage;
- a plant within a grassland regional ecosystem prescribed under Schedule 5 of the Vegetation Management Regulation 2012; and
- a mangrove.

2.1 Exempt clearing work

Exempt clearing work is an activity for which you do not need to notify the Department of Resources or obtain an approval under the vegetation management framework. Exempt clearing work was previously known as exemptions.

In areas that are mapped as Category X (white in colour) on the regulated vegetation management map (see section 4.1), and where the land tenure is freehold, indigenous land and leasehold land for agriculture and grazing purposes, the clearing of vegetation is considered exempt clearing work and does not require notification or development approval under the vegetation management framework. For all other land tenures, contact the Department of Resources before commencing clearing to ensure that the proposed activity is exempt clearing work.

A range of routine property management activities are considered exempt clearing work. A list of exempt clearing work is available at

<https://www.qld.gov.au/environment/land/vegetation/exemptions/>.

Exempt clearing work may be affected if the proposed clearing area is subject to development approval conditions, a covenant, an environmental offset, an exchange area, a restoration notice, or an area mapped as Category A. Exempt clearing work may require approval under other Commonwealth, State or Local Government laws, or local government planning schemes. Contact the Department of Resources prior to clearing in any of these areas.

2.2 Accepted development vegetation clearing codes

Some clearing activities can be undertaken under an accepted development vegetation clearing code. The codes can be downloaded at

<https://www.qld.gov.au/environment/land/vegetation/codes/>

If you intend to clear vegetation under an accepted development vegetation clearing code, you must notify the Department of Resources before commencing. The information in this report will assist you to complete the online notification form.

You can complete the online form at

<https://apps.dnrm.qld.gov.au/vegetation/>

2.3 Area management plans

Area Management Plans (AMP) provide an alternative approval system for vegetation clearing under the vegetation management framework. They list the purposes and clearing conditions that have been approved for the areas covered by the plan. It is not necessary to use an AMP, even when an AMP applies to your property.

On 8 March 2020, AMPs ended for fodder harvesting, managing thickened vegetation and managing encroachment. New notifications cannot be made for these AMPs. You will need to consider options for fodder harvesting, managing thickened vegetation or encroachment under a relevant accepted development vegetation clearing code or apply for a development approval.

New notifications can be made for all other AMPs. These will continue to apply until their nominated end date.

If an Area Management Plan applies to your property for which you can make a new notification, it will be listed in Section 3.6 of this report. Before clearing under one of these AMPs, you must first notify the Department of Resources and then follow the conditions and requirements listed in the AMP.

<https://www.qld.gov.au/environment/land/vegetation/area-plans/>

2.4 Development approvals

If under the vegetation management framework your proposed clearing is not exempt clearing work, or is not permitted under an accepted development vegetation clearing code, or an AMP, you may be able to apply for a development approval. Information on how to apply for a development approval is available at

<https://www.qld.gov.au/environment/land/management/vegetation/development>

2.5. Contact information for the Department of Resources

For further information on the vegetation management framework:

Phone 135VEG (135 834)

Email vegetation@resources.qld.gov.au

Visit <https://www.dnrme.qld.gov.au/?contact=vegetation> to submit an online enquiry.

3. Vegetation management framework for Lot: 1 Plan: SP103023

3.1 Vegetation categories

The vegetation categories on your property are shown on the regulated vegetation management map in section 4.1 of this report. A summary of vegetation categories on the subject lot are listed in Table 3. Descriptions for these categories are shown in Table 4.

Table 3: Vegetation categories for subject property. Total area: 2.08ha

Vegetation category	Area (ha)
Category B	2.0
Category X	< 0.1

Table 4: Description of vegetation categories

Category	Colour on Map	Description	Requirements / options under the vegetation management framework
A	red	Compliance areas, environmental offset areas and voluntary declaration areas	Special conditions apply to Category A areas. Before clearing, contact the Department of Resources to confirm any requirements in a Category A area.
B	dark blue	Remnant vegetation areas	Exempt clearing work, or notification and compliance with accepted development vegetation clearing codes, area management plans or development approval.
C	light blue	High-value regrowth areas	Exempt clearing work, or notification and compliance with managing Category C regrowth vegetation accepted development vegetation clearing code.
R	yellow	Regrowth within 50m of a watercourse or drainage feature in the Great Barrier Reef catchment areas	Exempt clearing work, or notification and compliance with managing Category R regrowth accepted development vegetation clearing code or area management plans.
X	white	Clearing on freehold land, indigenous land and leasehold land for agriculture and grazing purposes is considered exempt clearing work under the vegetation management framework. Contact the Department of Resources to clarify whether a development approval is required for other State land tenures.	No permit or notification required on freehold land, indigenous land and leasehold land for agriculture and grazing. A development approval may be required for some State land tenures.

Property Map of Assessable Vegetation (PMAV)

There is no Property Map of Assessable Vegetation (PMAV) present on this property.

3.2 Regional ecosystems

The endangered, of concern and least concern regional ecosystems on your property are shown on the vegetation management supporting map in section 4.2 and are listed in Table 5.

A description of regional ecosystems can be accessed online at

<https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/descriptions/>

Table 5: Regional ecosystems present on subject property

Regional Ecosystem	VMA Status	Category	Area (Ha)	Short Description	Structure Category
12.11.25	Of concern	B	1.87	Corymbia henryi and/or Eucalyptus fibrosa subsp. fibrosa +/- E. crebra, E. carnea, E. tindaliae woodland on metamorphics +/- interbedded volcanics	Sparse
12.3.11	Of concern	B	0.12	Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia open forest on alluvial plains usually near coast	Mid-dense
non-rem	None	X	0.09	None	None

Please note:

1. All area and area derived figures included in this table 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.
2. If Table 5 contains a Category 'plant', please be aware that this refers to 'plantations' such as forestry, and these areas are considered non-remnant under the VMA.

The VMA status of the regional ecosystem (whether it is endangered, of concern or least concern) also determines if any of the following are applicable:

- exempt clearing work;
- accepted development vegetation clearing codes;
- performance outcomes in State Code 16 of the State Development Assessment Provisions (SDAP).

3.3 Watercourses

Vegetation management watercourses and drainage features for this property are shown on the vegetation management supporting map in section 4.2.

3.4 Wetlands

There are no vegetation management wetlands present on this property.

3.5 Essential habitat

Under the VMA, essential habitat for protected wildlife is native wildlife prescribed under the *Nature Conservation Act 1992* (NCA) as critically endangered, endangered, vulnerable or near-threatened wildlife.

Essential habitat for protected wildlife includes suitable habitat on the lot, or where a species has been known to occur up to 1.1 kilometres from a lot on which there is assessable vegetation. These important habitat areas are protected under the VMA.

Any essential habitat on this property will be shown as blue hatching on the vegetation supporting map in section 4.2.

If essential habitat is identified on the lot, information about the protected wildlife species is provided in Table 6 below. The numeric labels on the vegetation management supporting map can be cross referenced with Table 6 to outline the essential habitat factors for that particular species. There may be essential habitat for more than one species on each lot, and areas of Category A, Category B and Category C can be mapped as Essential Habitat.

Essential habitat is compiled from a combination of species habitat models and buffered species records. Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated. Essential habitat, for protected wildlife, means an area of vegetation shown on the Regulated Vegetation Management Map -

- 1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database. Essential habitat factors are comprised of - regional ecosystem (mandatory for most species), vegetation community, altitude, soils, position in landscape; or
- 2) in which the protected wildlife, at any stage of its life cycle, is located.

If there is no essential habitat mapping shown on the vegetation management supporting map for this lot, and there is no table in the sections below, it confirms that there is no essential habitat on the lot.

Category A and/or Category B and/or Category C

Table 6: Essential habitat in Category A and/or Category B and/or Category C

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
860	<i>Phascolarctos cinereus</i>	koala	V	SEQ: 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 both greater and 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. Outside SEQ: Open eucalypt forest and woodland that contains Eucalyptus &/or Corymbia spp. Tree species used for food varies across State and can include Eucalyptus tereticornis, E. camaldulensis, E. coolabah; E. drepanophylla, E. platyphylla, E. orgadophylla, E. thozetiana, E. melanophloia, E. populnea, E. melliodora, E. dealbata, E. microtheca, E. crebra, E. exserta, E. blakelyi, E. papuana, Corymbia tessellaris, C. citriodora, Melaleuca quinquenervia, M. leucadendra.	Sea level to 1000m.	None	Riparian areas, plains and hill/escarpment slopes.
706	<i>Adelotus brevis</i>	tusked frog	V	In cavities, under debris (logs, stones) in subtropical vine forest, tall open moist forest, heaths, Melaleuca swamp and pasturelands near puddles and streams.	Sea level to 1000m.	None	None

Label	Regional Ecosystem (mandatory unless otherwise specified)
860	SEQ: 11.3.2, 11.3.4, 11.3.25, 11.3.26, 11.8.2, 11.8.4, 11.8.5, 11.8.8, 11.9.9, 12.2.5, 12.2.6, 12.2.7, 12.2.8, 12.2.10, 12.3.2, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.9, 12.3.10, 12.3.11, 12.3.14, 12.3.18, 12.3.19, 12.3.20, 12.5.1, 12.5.2, 12.5.3, 12.5.4, 12.5.6, 12.5.7, 12.5.10, 12.5.12, 12.8.1, 12.8.8, 12.8.9, 12.8.11, 12.8.12, 12.8.14, 12.8.16, 12.8.17, 12.8.20, 12.8.24, 12.8.25, 12.9-10.1, 12.9-10.2, 12.9-10.3, 12.9-10.4, 12.9-10.5, 12.9-10.7, 12.9-10.8, 12.9-10.11, 12.9-10.12, 12.9-10.14, 12.9-10.17, 12.9-10.18, 12.9-10.19, 12.9-10.21, 12.9-10.25, 12.9-10.26, 12.9-10.27, 12.9-10.28, 12.9-10.29, 12.11.2, 12.11.3, 12.11.5, 12.11.6, 12.11.7, 12.11.8, 12.11.9, 12.11.14, 12.11.15, 12.11.16, 12.11.17, 12.11.18, 12.11.22, 12.11.23, 12.11.24, 12.11.25, 12.11.26, 12.11.27, 12.11.28, 12.12.2, 12.12.3, 12.12.5, 12.12.6, 12.12.7, 12.12.8, 12.12.9, 12.12.11, 12.12.12, 12.12.14, 12.12.15, 12.12.23, 12.12.24, 12.12.25, 12.12.28. Outside SEQ: 4.3.1, 4.3.2, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.8, 4.3.10, 4.3.11, 4.4.1, 4.5.3, 4.5.5, 4.5.6, 4.5.8, 4.5.9, 4.7.1, 4.7.7, 4.7.8, 4.9.6, 4.9.10, 4.9.12, 4.9.17, 6.3.1, 6.3.2, 6.3.3, 6.3.4, 6.3.5, 6.3.7, 6.3.8, 6.3.9, 6.3.11, 6.3.12, 6.3.17, 6.3.18, 6.3.22, 6.3.24, 6.3.25, 6.4.1, 6.4.2, 6.4.3, 6.4.4, 6.5.1, 6.5.2, 6.5.3, 6.5.5, 6.5.6, 6.5.7, 6.5.8, 6.5.9, 6.5.10, 6.5.11, 6.5.13, 6.5.14, 6.5.15, 6.5.16, 6.5.17, 6.5.18, 6.5.19, 6.6.2, 6.7.1, 6.7.2, 6.7.5, 6.7.6, 6.7.7, 6.7.9, 6.7.11, 6.7.12, 6.7.13, 6.7.14, 6.7.17, 6.9.3, 7.2.3, 7.2.4, 7.2.7, 7.2.11, 7.3.7, 7.3.8, 7.3.9, 7.3.12, 7.3.13, 7.3.14, 7.3.16, 7.3.19, 7.3.20, 7.3.21, 7.3.25, 7.3.26, 7.3.39, 7.3.40, 7.3.42, 7.3.43, 7.3.44, 7.3.45, 7.3.47, 7.3.48, 7.3.50, 7.5.1, 7.5.2, 7.5.3, 7.5.4, 7.8.7, 7.8.8, 7.8.10, 7.8.15, 7.8.16, 7.8.17, 7.8.18, 7.8.19, 7.11.5, 7.11.6, 7.11.13, 7.11.14, 7.11.16, 7.11.18, 7.11.19, 7.11.20, 7.11.21, 7.11.31, 7.11.32, 7.11.33, 7.11.34, 7.11.35, 7.11.37, 7.11.37, 7.11.41, 7.11.42, 7.11.43, 7.11.44, 7.11.45, 7.11.46, 7.11.47, 7.11.48, 7.11.49, 7.11.50, 7.11.51, 7.12.4, 7.12.5, 7.12.17, 7.12.21, 7.12.22, 7.12.23, 7.12.24, 7.12.25, 7.12.26, 7.12.27, 7.12.28, 7.12.29, 7.12.30, 7.12.33, 7.12.34, 7.12.35, 7.12.51, 7.12.52, 7.12.53, 7.12.54, 7.12.55, 7.12.56, 7.12.57, 7.12.58, 7.12.59, 7.12.60, 7.12.61, 7.12.62, 7.12.63, 7.12.65, 7.12.66, 7.12.69, 8.1.5, 8.2.3, 8.2.6, 8.2.7, 8.2.8, 8.2.11, 8.2.12, 8.2.13, 8.2.14, 8.3.1, 8.3.2, 8.3.3, 8.3.5, 8.3.6, 8.3.8, 8.3.10, 8.3.11, 8.3.13, 8.5.1, 8.5.2, 8.5.3, 8.5.5, 8.5.6, 8.5.7, 8.9.1, 8.10.1, 8.11.1, 8.11.3, 8.11.4, 8.11.5, 8.11.6, 8.11.8, 8.11.10, 8.11.12, 8.12.4, 8.12.5, 8.12.6, 8.12.7, 8.12.8, 8.12.9, 8.12.12, 8.12.14, 8.12.20, 8.12.22, 8.12.23, 8.12.25, 8.12.26, 8.12.27, 8.12.29, 8.12.31, 8.12.32, 9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.3.5, 9.3.6, 9.3.7, 9.3.8, 9.3.10, 9.3.11, 9.3.13, 9.3.14, 9.3.15, 9.3.16, 9.3.17, 9.3.19, 9.3.20, 9.3.21, 9.3.22, 9.3.27, 9.4.1, 9.4.2, 9.4.3, 9.5.1, 9.5.3, 9.5.4, 9.5.5, 9.5.6, 9.5.7, 9.5.8, 9.5.9, 9.5.10, 9.5.11, 9.5.12, 9.5.15, 9.5.16, 9.5.17, 9.7.1, 9.7.2, 9.7.3, 9.7.4, 9.7.5, 9.7.6, 9.8.1, 9.8.2, 9.8.3, 9.8.4, 9.8.5, 9.8.9, 9.8.10, 9.8.11, 9.8.13, 9.10.1, 9.10.3, 9.10.4, 9.10.5, 9.10.7, 9.10.8, 9.11.1, 9.11.2, 9.11.3, 9.11.4, 9.11.5, 9.11.7, 9.11.10, 9.11.12, 9.11.13, 9.11.14, 9.11.15, 9.11.16, 9.11.17, 9.11.18, 9.11.19, 9.11.21, 9.11.22, 9.11.23, 9.11.24, 9.11.25, 9.11.26, 9.11.28, 9.11.29, 9.11.30, 9.11.31, 9.11.32, 9.12.1, 9.12.2, 9.12.3, 9.12.4, 9.12.5, 9.12.6, 9.12.7, 9.12.10, 9.12.11, 9.12.12, 9.12.13, 9.12.14, 9.12.15, 9.12.16, 9.12.17, 9.12.18, 9.12.19, 9.12.20, 9.12.21, 9.12.22, 9.12.23, 9.12.24, 9.12.25, 9.12.26, 9.12.27, 9.12.28, 9.12.29, 9.12.30, 9.12.31, 9.12.32, 9.12.33, 9.12.35, 9.12.36, 9.12.37, 9.12.38, 9.12.39, 9.12.44, 10.3.2, 10.3.3, 10.3.5, 10.3.6, 10.3.9, 10.3.10, 10.3.11, 10.3.12, 10.3.13, 10.3.14, 10.3.15, 10.3.17, 10.3.20, 10.3.27, 10.3.28, 10.4.3, 10.4.9, 10.5.1, 10.5.2, 10.5.4, 10.5.5, 10.5.7, 10.5.8, 10.5.9, 10.5.10, 10.5.11, 10.5.12, 10.7.1, 10.7.2, 10.7.3, 10.7.4, 10.7.5, 10.7.9, 10.7.10, 10.7.11, 10.7.12, 10.9.2, 10.9.3, 10.9.5, 10.10.1, 10.10.3, 10.10.4, 10.10.5, 10.10.7, 11.2.1, 11.2.5, 11.3.1

3.6 Area Management Plan(s)

Nil

3.7 Coastal or non-coastal

For the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP), this property is regarded as*

Coastal

*See also Map 4.3

3.8 Agricultural Land Class A or B

The following can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code:

Does this lot contain land that is mapped as Agricultural Land Class A or B in the State Planning Interactive Mapping System?

No Class A

No Class B

Note - This confirms Agricultural Land Classes as per the State Planning Interactive Mapping System only. This response does not include Agricultural Land Classes identified under local government planning schemes. For further information, check the Planning Scheme for your local government area.

See Map 4.4 to identify the location and extent of Class A and/or Class B Agricultural land on Lot: 1 Plan: SP103023.

4. Vegetation management framework maps

Vegetation management maps included in this report may also be requested individually at:

<https://www.dnrme.qld.gov.au/qld/environment/land/vegetation/vegetation-map-request-form>

Regulated vegetation management map

The regulated vegetation management map shows vegetation categories needed to determine clearing requirements. These maps are updated monthly to show new [property maps of assessable vegetation \(PMAV\)](#).

Vegetation management supporting map

The vegetation management supporting map provides information on regional ecosystems, wetlands, watercourses and essential habitat.

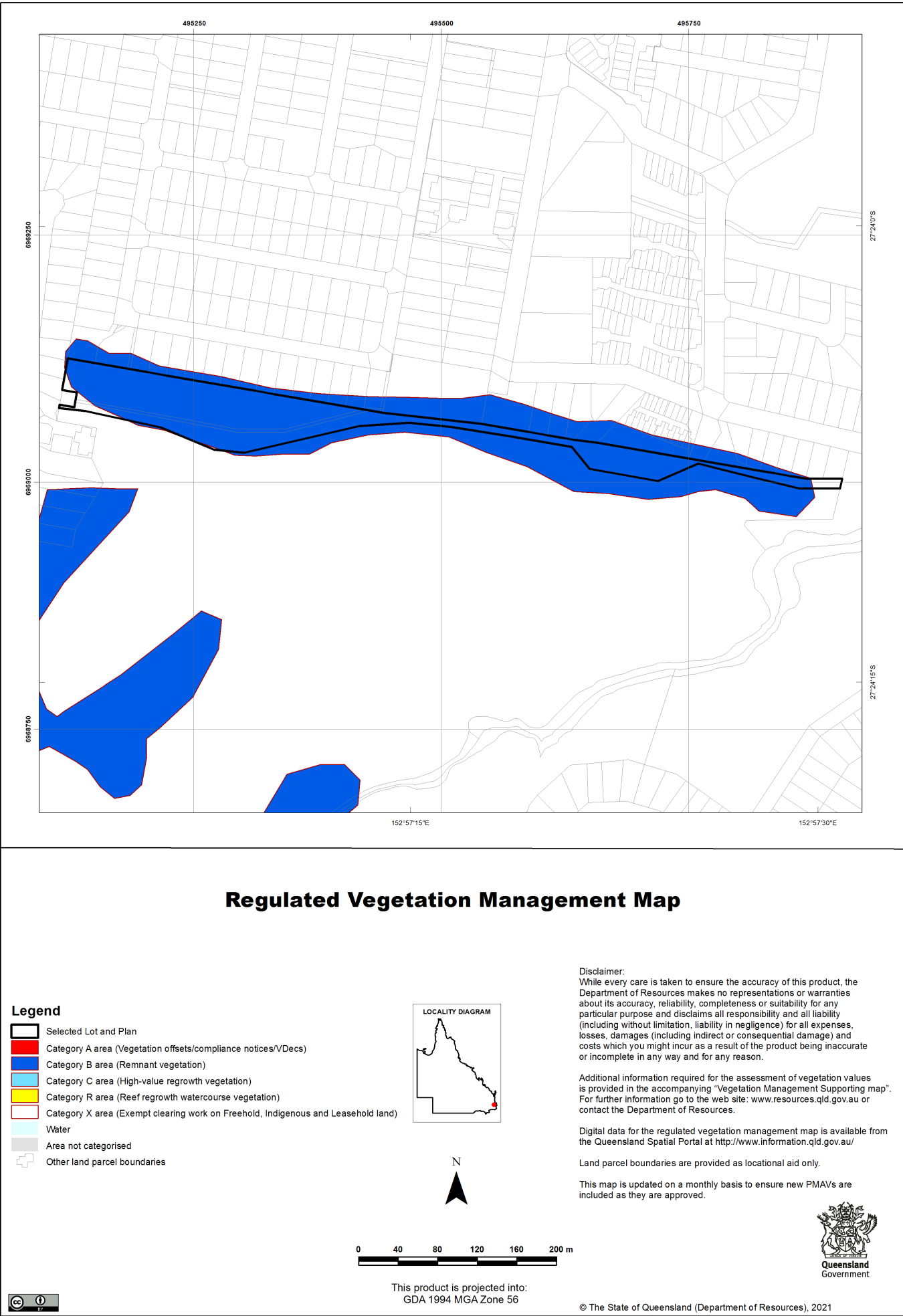
Coastal/non-coastal map

The coastal/non-coastal map confirms whether the lot, or which parts of the lot, are considered coastal or non-coastal for the purposes of the accepted development vegetation clearing codes and State Code 16 of the State Development Assessment Provisions (SDAP).

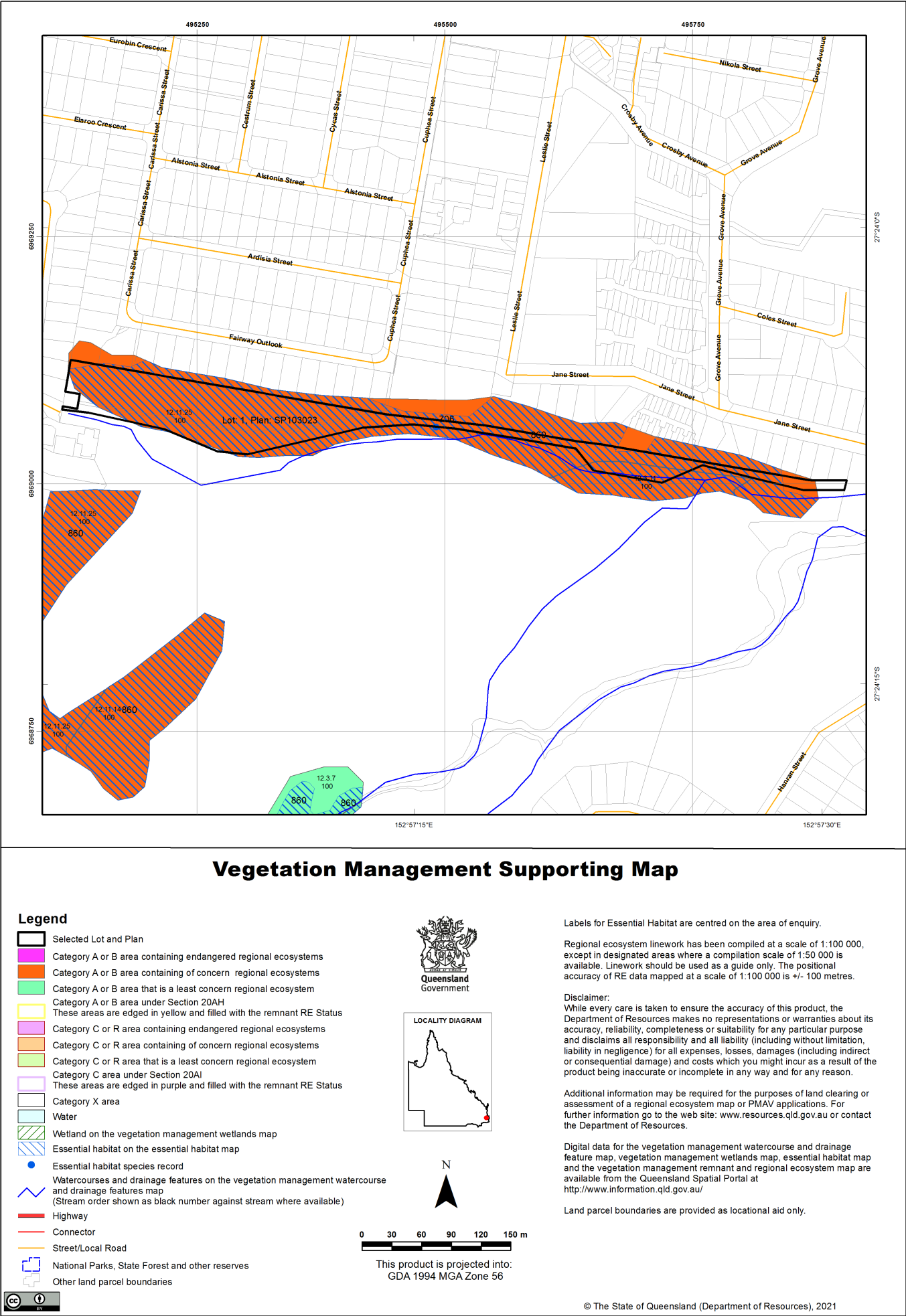
Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture

The Agricultural Land Class map confirms the location and extent of land mapped as Agricultural Land Classes A or B as identified on the State Planning Interactive Mapping System. Please note that this map does not include areas identified as Agricultural Land Class A or B in local government planning schemes. This map can be used to identify Agricultural Land Class A or B areas under the "Managing regulated regrowth vegetation" accepted development vegetation clearing code.

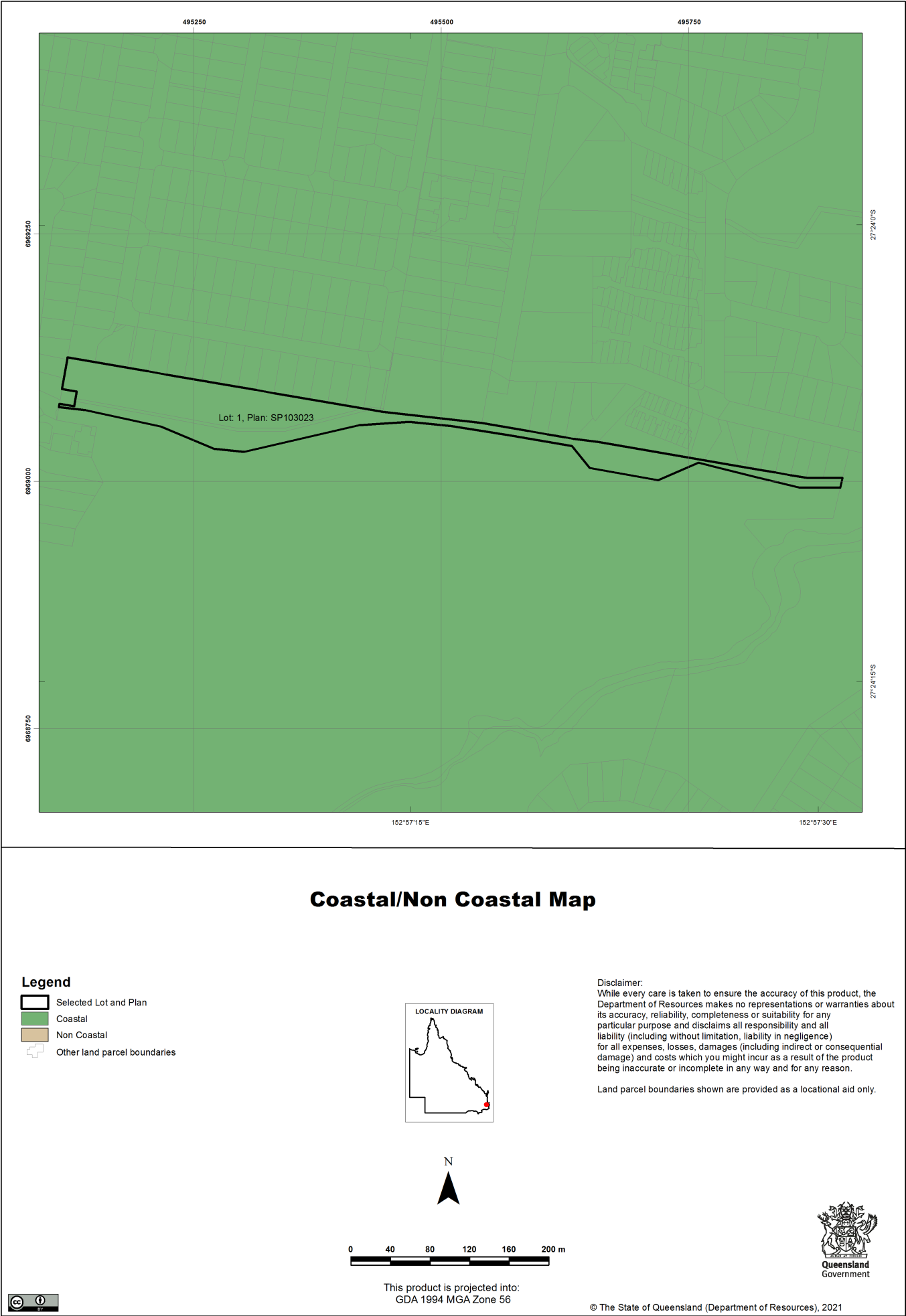
4.1 Regulated vegetation management map



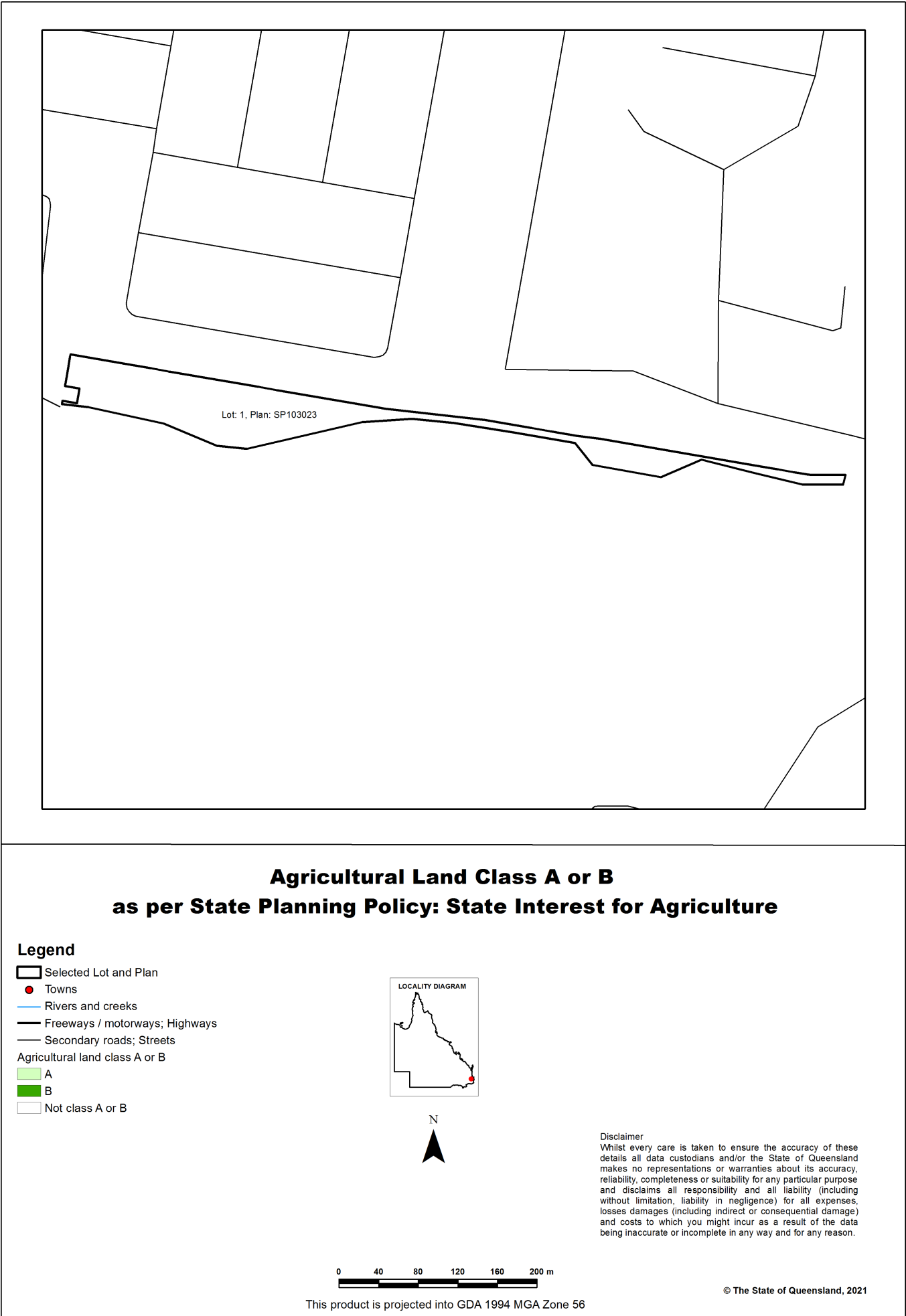
4.2 Vegetation management supporting map



4.3 Coastal/non-coastal map



4.4 Agricultural Land Class A or B as per State Planning Policy: State Interest for Agriculture



5. Protected plants framework (administered by the Department of Environment and Science (DES))

In Queensland, all plants that are native to Australia are protected plants under the [Nature Conservation Act 1992](#) (NCA). The NCA regulates the clearing of protected plants 'in the wild' (see [Operational policy: When a protected plant in Queensland is considered to be 'in the wild'](#)) that are listed as critically endangered, endangered, vulnerable or near threatened under the Act.

Please note that the protected plant clearing framework applies irrespective of the classification of the vegetation under the *Vegetation Management Act 1999* and any approval or exemptions given under another Act, for example, the *Vegetation Management Act 1999* or *Planning Regulation 2017*.

5.1 Clearing in high risk areas on the flora survey trigger map

The flora survey trigger map identifies high-risk areas for endangered, vulnerable or near threatened (EVNT) plants. These are areas where EVNT plants are known to exist or are likely to exist based on the habitat present. The flora survey trigger map for this property is provided in section 5.5.

If you are proposing to clear an area shown as high risk on the flora survey trigger map, a flora survey of the clearing impact area must be undertaken by a suitably qualified person in accordance with the [Flora survey guidelines](#). The main objective of a flora survey is to locate any EVNT plants that may be present in the clearing impact area.

If the flora survey identifies that EVNT plants are not present within the clearing impact area or clearing within 100m of EVNT plants can be avoided, the clearing activity is exempt from a permit. An [exempt clearing notification form](#) must be submitted to the Department of Environment and Science, with a copy of the flora survey report, at least one week prior to clearing.

If the flora survey identifies that EVNT plants are present in, or within 100m of, the area to be cleared, a clearing permit is required before any clearing is undertaken. The flora survey report, as well as an impact management report, must be submitted with the [clearing permit application form](#).

5.2 Clearing outside high risk areas on the flora survey trigger map

In an area other than a high risk area, a clearing permit is only required where a person is, or becomes aware that EVNT plants are present in, or within 100m of, the area to be cleared. You must keep a copy of the flora survey trigger map for the area subject to clearing for five years from the day the clearing starts. If you do not clear within the 12 month period that the flora survey trigger map was printed, you need to print and check a new flora survey trigger map.

5.3 Exemptions

Many activities are 'exempt' under the protected plant clearing framework, which means that clearing of native plants that are in the wild can be undertaken for these activities with no need for a flora survey or a protected plant clearing permit. The Information sheet - General exemptions for the take of protected plants provides some of these exemptions.

Some exemptions under the NCA are the same as exempt clearing work (formerly known as exemptions) under the *Vegetation Management Act 1999* (i.e. listed in Schedule 21 of the Planning Regulations 2017) while some are different.

5.4 Contact information for DES

For further information on the protected plants framework:

Phone 1300 130 372 (and select option four)

Email palm@des.qld.gov.au

Visit <https://www.qld.gov.au/environment/plants-animals/plants/protected-plants>

5.5 Protected plants flora survey trigger map

This map included may also be requested individually at: <https://apps.des.qld.gov.au/map-request/flora-survey-trigger/>.

Updates to the data informing the flora survey trigger map

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.






Species information

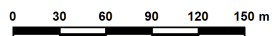
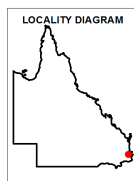
Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the [Queensland Spatial Catalogue](#), the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the [clearing of protected plants](#) for more information.



Protected Plants Flora Survey Trigger Map

Legend

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



This product is projected into:
GDA 1994 MGA Zone 56

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

Land parcel boundaries are provided as locational aid only.

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

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

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

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6. Koala protection framework (administered by the Department of Environment and Science (DES))

The koala (*Phascolarctos cinereus*) is listed in Queensland as vulnerable by the Queensland Government under *Nature Conservation Act 1992* and by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999*.

The Queensland Government's koala protection framework is comprised of the *Nature Conservation Act 1992*, the *Nature Conservation (Animals) Regulation 2020*, the *Nature Conservation (Koala) Conservation Plan 2017*, the *Planning Act 2016* and the *Planning Regulation 2017*.

6.1 Koala mapping

6.1.1 Koala districts

The parts of Queensland where koalas are known to occur has been divided into three koala districts - koala district A, koala district B and koala district C. Each koala district is made up of areas with comparable koala populations (e.g. density, extent and significance of threatening processes affecting the population) which require similar management regimes.

Section 7.1 identifies which koala district your property is located in.

6.1.2 Koala habitat areas

Koala habitat areas are areas of vegetation that have been determined to contain koala habitat that is essential for the conservation of a viable koala population in the wild based on the combination of habitat suitability and biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water). In order to protect this important koala habitat, clearing controls have been introduced into the *Planning Regulation 2017* for development in koala habitat areas.

Please note that koala habitat areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley, Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

There are two different categories of koala habitat area (core koala habitat area and locally refined koala habitat), which have been determined using two different methodologies. These methodologies are described in the document [Spatial modelling in South East Queensland](#).

Section 7.2 shows any koala habitat area that exists on your property.

Under the *Nature Conservation (Koala) Conservation Plan 2017*, an owner of land (or a person acting on the owner's behalf with written consent) can request to make, amend or revoke a koala habitat area determination if they believe, on reasonable grounds, that the existing determination for all or part of their property is incorrect.

More information on requests to make, amend or revoke a koala habitat area determination can be found in the document [Guideline - Requests to make, amend or revoke a koala habitat area determination](#).

The koala habitat area map will be updated at least annually to include any koala habitat areas that have been made, amended or revoked.

Changes to the koala habitat area map which occur between annual updates because of a request to make, amend or revoke a koala habitat area determination can be viewed on the register of approved requests to make, amend or revoke a koala habitat area available at: <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/koalamaps>. The register includes the lot on plan for the change, the date the decision was made and the map issued to the landholder that shows areas determined to be koala habitat areas.

6.1.3 Koala priority areas

Koala priority areas are large, connected areas that have been determined to have the highest likelihood of achieving conservation outcomes for koalas based on the combination of habitat suitability, biophysical variables with known relationships to koala habitat (e.g. landcover, soil, terrain, climate and ground water) and a koala conservation cost benefit analysis.

Conservation efforts will be prioritised in these areas to ensure the conservation of viable koala populations in the wild including a focus on management (e.g. habitat protection, habitat restoration and threat mitigation) and monitoring. This includes a prohibition on clearing in koala habitat areas that are in koala priority areas under the *Planning Regulation 2017* (subject to some exemptions).

Please note that koala priority areas only exist in koala district A which is the South East Queensland "Shaping SEQ" Regional Plan area. These areas include the local government areas of Brisbane, Gold Coast, Logan, Lockyer Valley,

Ipswich, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba (urban extent).

Section 7.2 identifies if your property is in a koala priority area.

6.1.4 Identified koala broad-hectare areas

There are seven identified koala broad-hectare areas in SEQ. These are areas of koala habitat that are located in areas committed to meet development targets in the SEQ Regional Plan to accommodate SEQ's growing population including bring-forward Greenfield sites under the Queensland Housing Affordability Strategy and declared master planned areas under the repealed *Sustainable Planning Act 2009* and the repealed *Integrated Planning Act 1997*.

Specific assessment benchmarks apply to development applications for development proposed in identified koala broad-hectare areas to ensure koala conservation measures are incorporated into the proposed development.

Section 7.2 identifies if your property is in an identified koala broad-hectare area.

6.2 Koala habitat planning controls

On 7 February 2020, the Queensland Government introduced new planning controls to the Planning Regulation 2017 to strengthen the protection of koala habitat in South East Queensland (i.e. koala district A).

More information on these planning controls can be found here:

<https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy>.

As a high-level summary, the koala habitat planning controls make:

- development that involves interfering with koala habitat (defined below) in an area that is both a koala priority area and a koala habitat area, prohibited development (i.e. development for which a development application cannot be made);
- development that involves interfering with koala habitat (defined below) in an area that is a koala habitat area but is not a koala priority area, assessable development (i.e. development for which development approval is required); and
- development that is for extractive industries where the development involves interfering with koala habitat (defined below) in an area that is both a koala habitat area and a key resource area, assessable development (i.e. development for which development approval is required).

Interfering with koala habitat means:

- 1) Removing, cutting down, ringbarking, pushing over, poisoning or destroying in anyway, including by burning, flooding or draining native vegetation in a koala habitat area; but
- 2) Does not include destroying standing vegetation stock or lopping a tree.

However, these planning controls do not apply if the development is exempted development as defined in Schedule 24 of the [Planning Regulation 2017](#). More information on exempted development can be found here:

<https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping/legislation-policy>.

There are also assessment benchmarks that apply to development applications for:

- building works, operational works, material change of use or reconfiguration of a lot where:
 - the local government planning scheme makes the development assessable;
 - the premises includes an area that is both a koala priority area and a koala habitat area; and
 - the development does not involve interfering with koala habitat (defined above); and
- development in identified koala broad-hectare areas.

The [Guideline - Assessment Benchmarks in relation to Koala Habitat in South East Queensland assessment benchmarks](#) outlines these assessment benchmarks, the intent of these assessment benchmarks and advice on how proposed development may meet these assessment benchmarks.

6.3 Koala Conservation Plan clearing requirements

Section 10 and 11 of the [Nature Conservation \(Koala\) Conservation Plan 2017](#) prescribes requirements that must be met when clearing koala habitat in koala district A and koala district B.

These clearing requirements are independent to the koala habitat planning controls introduced into the Planning Regulation 2017, which means they must be complied with irrespective of any approvals or exemptions offered under other legislation.

Unlike the clearing controls prescribed in the Planning Regulation 2017 that are to protect koala habitat, the clearing requirements prescribed in the Nature Conservation (Koala) Conservation Plan 2017 are in place to prevent the injury or death of koalas when koala habitat is being cleared.

6.4 Contact information for DES

For further information on the koala protection framework:

Phone 13 QGOV (13 74 68)

Email koala.assessment@des.qld.gov.au

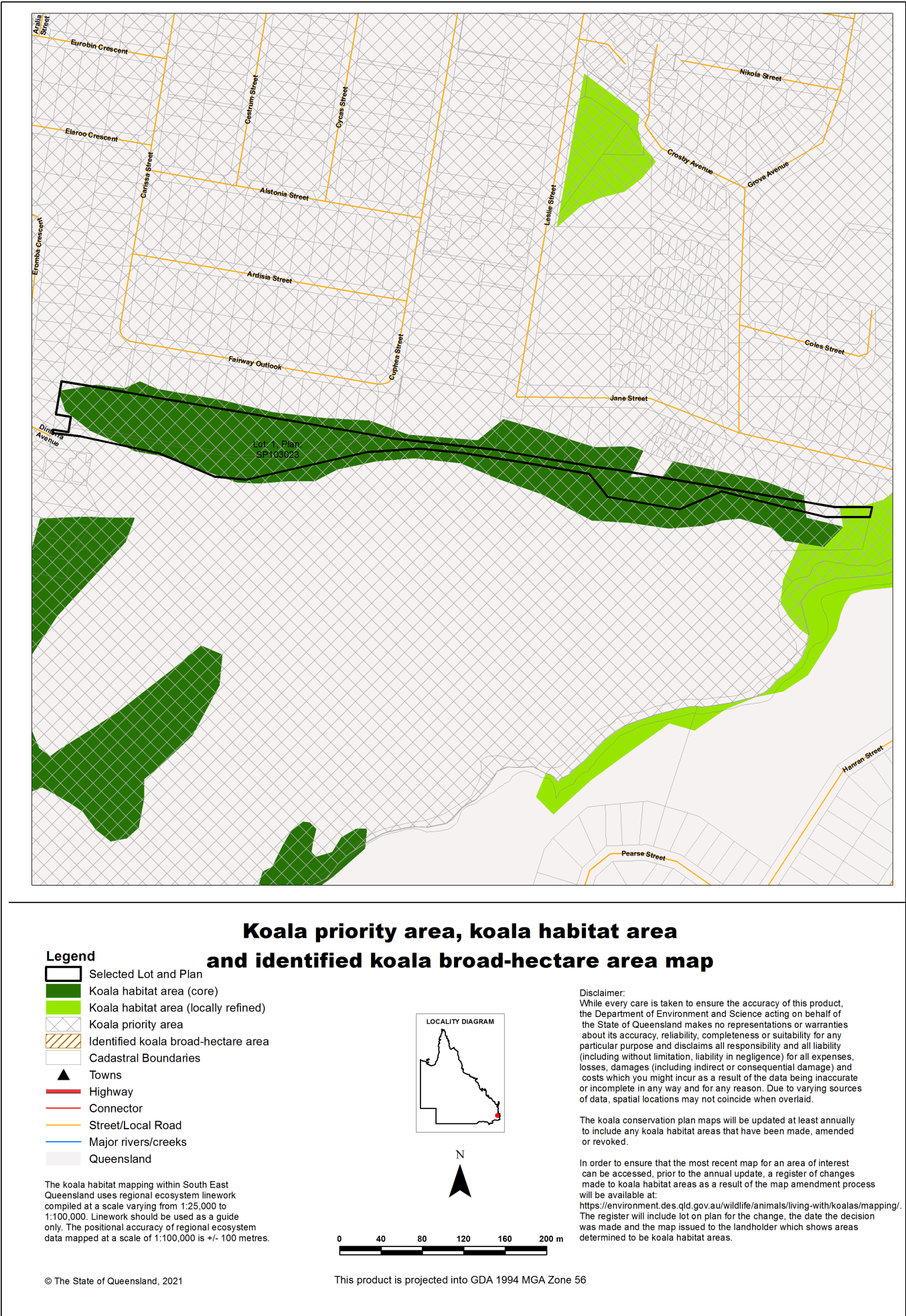
Visit <https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping>

7. Koala protection framework details for Lot: 1 Plan: SP103023

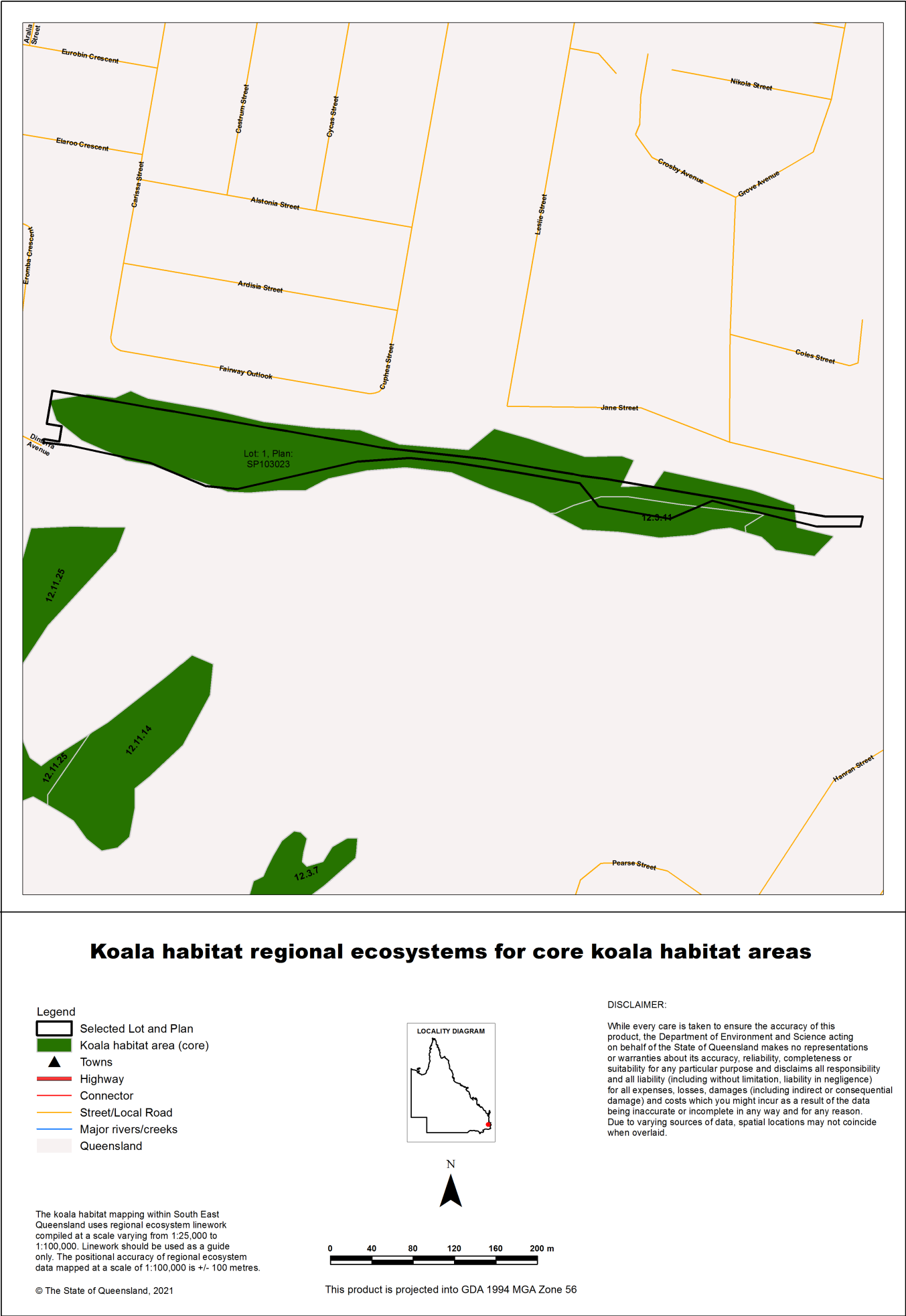
7.1 Koala districts

Koala District A

7.2 Koala priority area, koala habitat area and identified koala broad-hectare area map



7.3 Koala habitat regional ecosystems for core koala habitat areas



8. Other relevant legislation contacts list

Activity	Legislation	Agency	Contact details
<ul style="list-style-type: none"> • Interference with overland flow • Earthworks, significant disturbance 	<i>Water Act 2000</i> <i>Soil Conservation Act 1986</i>	Department of Regional Development, Manufacturing and Water (Queensland Government) Department of Resources (Queensland Government)	Ph: 13 QGOV (13 74 68) www.dnrme.qld.gov.au
<ul style="list-style-type: none"> • Indigenous Cultural Heritage 	<i>Aboriginal Cultural Heritage Act 2003</i> <i>Torres Strait Islander Cultural Heritage Act 2003</i>	Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships	Ph: 13 QGOV (13 74 68) www.datsip.qld.gov.au
<ul style="list-style-type: none"> • Mining and environmentally relevant activities • Infrastructure development (coastal) • Heritage issues 	<i>Environmental Protection Act 1994</i> <i>Coastal Protection and Management Act 1995</i> <i>Queensland Heritage Act 1992</i>	Department of Environment and Science (Queensland Government)	Ph: 13 QGOV (13 74 68) www.des.qld.gov.au
<ul style="list-style-type: none"> • Protected plants and protected areas 	<i>Nature Conservation Act 1992</i>	Department of Environment and Science (Queensland Government)	Ph: 1300 130 372 (option 4) palm@des.qld.gov.au www.environment.gov.au
<ul style="list-style-type: none"> • Koala mapping and regulations 	<i>Nature Conservation Act 1992</i>	Department of Environment and Science (Queensland Government)	Ph: 13 QGOV (13 74 68) Koala.assessment@des.qld.gov.au
<ul style="list-style-type: none"> • Interference with fish passage in a watercourse, mangroves • Forestry activities on State land tenures 	<i>Fisheries Act 1994</i> <i>Forestry Act 1959</i>	Department of Agriculture and Fisheries (Queensland Government)	Ph: 13 QGOV (13 74 68) www.daf.qld.gov.au
<ul style="list-style-type: none"> • Matters of National Environmental Significance including listed threatened species and ecological communities 	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Department of Agriculture, Water and the Environment (Australian Government)	Ph: 1800 803 772 www.environment.gov.au
<ul style="list-style-type: none"> • Development and planning processes 	<i>Planning Act 2016</i> <i>State Development and Public Works Organisation Act 1971</i>	Department of State Development, Infrastructure, Local Government and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) www.dsdmip.qld.gov.au
<ul style="list-style-type: none"> • Local government requirements 	<i>Local Government Act 2009</i> <i>Planning Act 2016</i>	Department of State Development, Infrastructure, Local Government and Planning (Queensland Government)	Ph: 13 QGOV (13 74 68) Your relevant local government office
<ul style="list-style-type: none"> • Harvesting timber in the Wet Tropics of Qld World Heritage area 	<i>Wet Tropics World Heritage Protection and Management Act 1993</i>	Wet Tropics Management Authority	Ph: (07) 4241 0500 www.wettropics.gov.au

Annex 2 Suitably qualified and experienced consultants and professionals who undertook field assessments for the Project

Name	Role	Suitability and qualifications for field assessment
Chani Wheeler Senior Ecologist – Niche Environment and Heritage BSc, MConsBiol	Field lead, field support Tusked Frog surveys, lead data management and reporting	Chani is a terrestrial ecologist with over eight years' experience in consulting and the public sector. Chani holds a Bachelor of Science (Ecology and Conservation) and a Master of Conservation Biology. She is a Member of the Environment Institute of Australia and New Zealand and an accredited biodiversity assessor in NSW.
Alana Homewood Ecologist – Niche Environment and Heritage BSc, MEnvMgmt	Field assessment and support	Alana is an ecologist with 5 years' experience. Alana has experience in a range of flora and fauna surveys throughout multiple locations in QLD and northern NSW. Alana holds a Bachelor of Science (Ecology and Conservation) and a Master of Environmental Management (Conservation and Natural Resource Management). She is a Member of the Environment Institute of Australia and New Zealand and holds a Rehabilitation Permit for fauna spotter catcher activities.
Dr Edward Meyer Ecological Consultant – Sole Trader BSc (Hon 1A), PhD	Tusked Frog field lead, technical reporting and advice	Dr Edward Meyer is a fauna ecologist with over 25 years' experience conducting fauna surveys and fauna monitoring in eastern and northern Australia. Edward has undertaken fauna surveys, monitoring and impact assessments for a range of development projects including road and runway upgrades, water and gas pipelines, industrial and urban development projects, aquaculture projects, coal mine expansion projects, and coal seam gas exploration ventures. Edward's consulting experience includes the development, implementation and review of management plans for mitigating and offsetting development impacts on a range of threatened species. Ed has also worked as an expert witness in court cases in Queensland and New South Wales. Edward holds a Bachelor of Science (Zoology) and PhD in Zoology.



**Tusked Frog habitat
values and potential
impacts of a
proposed
bikeway/footpath
on Tusked Frog
habitat at Harry
Evans Park,
Arana Hills**

**FINAL
17 Dec 2020**

**Report prepared for Niche
Environment and Heritage by
Edward Meyer (PhD),
Ecological Consultant**

ed_meyeroz@yahoo.ccm.au

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Front cover (from top to bottom): Tusked Frog (*Adelotus brevis*) tadpole captured within project area during dip-net surveys in October 2020; Tusked Frog breeding habitat in east of project area; leaf litter providing cover for Tusked Frog tadpoles in east of project area; lower value Tusked Frog habitat in the far west of the project area (near Dinterra Avenue).

1. Introduction and background

This document has been prepared for Niche Environment and Heritage to assist with the development of an environmental report addressing potential impacts of a proposed bikeway/footpath on Tusked Frog (*Adelotus brevis*) habitat at Harry Evans Park, Arana Hills (see Figure 1, below).



Figure 1. Location of project area showing the proposed alignment of the bikeway/footpath being constructed at Harry Evans Park. Development footprint shown in red, with alignment of bikeway/footpath shown in orange and associated drainage works in blue.

This document provides information on existing habitat values for Tusked Frog within Harry Evans Park, potential impacts of the proposed development on these values, and measures for avoiding or minimising development impacts on Tusked Frog habitat within and immediately downstream of the project area.

The advice provided here is based on field investigations and surveys undertaken on 17 October 2020 and 20 November 2020, details of which are provided below.

2. Field investigations and surveys

Surveys targeting Tusked Frog and an initial assessment of habitat values for Tusked Frog within and immediately adjacent the project area were undertaken on the 7th of October 2020. At this time, areas of surface water within and adjacent the project area were surveyed for spawn and tadpoles and a nocturnal survey (including call playback) undertaken for calling animals. Diurnal surveys targeting spawn and tadpoles and nocturnal surveys targeting calling frogs were conducted along transects in the far west and eastern half of the project area. Details of survey methods employed during nocturnal and diurnal surveys are provided below.

Additional surveys targeting Tusked Frog were undertaken on the 20th of November 2020, 2-3 weeks after heavy rain in late October (see Figure 2, below, for the timing of surveys in relation to rainfall). Field investigations undertaken at this time focused on areas of surface water within and downstream of the project area which were not accessed during previous surveys. A section of creek in the west of the project area surveyed in October 2020 was also resurveyed at this time. Pipe culverts carrying runoff from Cuphea Street and an erosion gully downstream of one of these culverts (which were dry in early October) were also inspected for surface water and spawn/tadpoles during surveys in November 2020. The location of transects and aural census points surveyed in November 2020 is shown in Figure 3 (below). GPS coordinates for these census points and the start and end points of each transect are provided in Appendix A of this report.

Tusked Frog surveys at Harry Evans Park were undertaken by the author with the assistance of Niche field ecologists Chani Wheeler and Alana Trott.

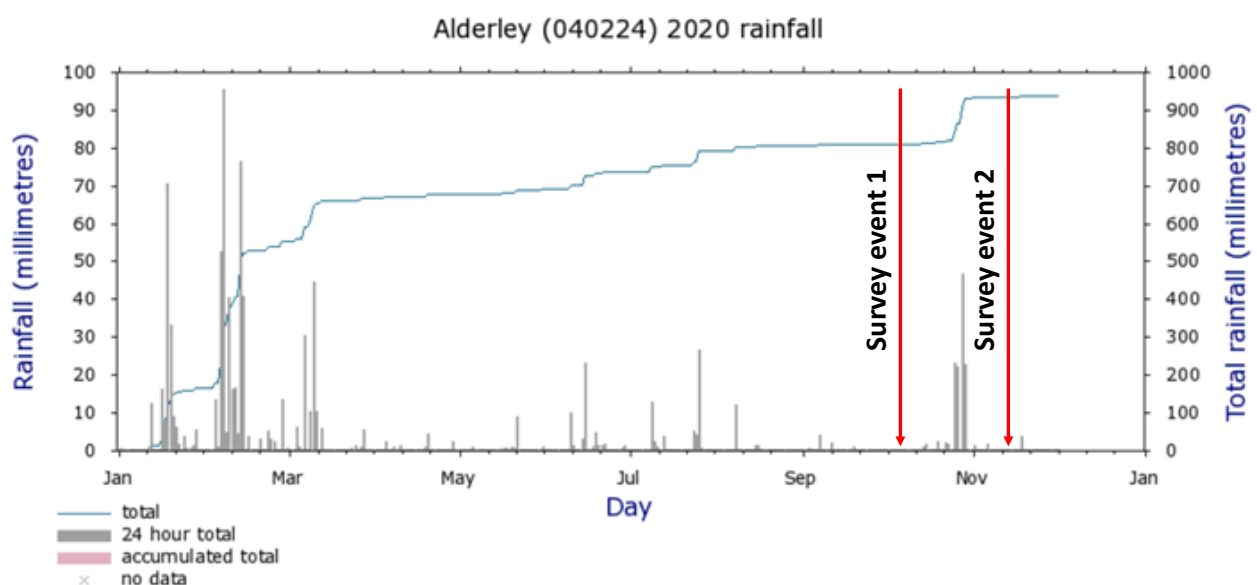


Figure 2. The timing of surveys in relation to rainfall. Rainfall data sourced from Bureau of Meteorology (<http://bom.gov.au>)

2.1 Survey methods

2.1.1 Aural surveys

Nocturnal surveys targeting calling animals were undertaken along creek transects within and downstream of the project area (see Figure 3, below, for the location of transects). During nocturnal surveys, creek transects were traversed slowly on foot, with observers stopping regularly to listen for calling animals. The location of Tusked Frogs heard calling whilst surveying transects was recorded on a hand-held GPS and details of the number/location of calling recorded on a proforma. In order to quantify the abundance of Tusked Frogs heard, fixed-point counts of calling animals were undertaken at 50-100 metre intervals along each transect. In the absence of calling frogs or where frogs were calling only weakly, call playback (using an iPhone and hand-held speaker) was used to stimulate calling behaviour.

The location of any Tusked Frogs heard calling during diurnal surveys targeting Tusked Frog spawn and tadpoles was also recorded with a GPS.



Figure 3. Google Earth satellite imagery of the project area and surrounds showing the location of creek transects (solid yellow lines) and aural census points (red pins) surveyed in October and November 2020.

2.1.2 Surveys targeting spawn and tadpoles

Areas of surface water along each transect were dip-netted for Tusked Frog tadpoles using a long-handled dip-net fitted with a thirty-centimetre-wide, fine-mesh, triangular catch-bag. Tadpoles captured during dip-net surveys were identified to species levels and staged according to the schedule in Table 1. The number and developmental stage/age of tadpoles and any predatory fish seen and/or captured whilst undertaking dip-net surveys were recorded on a proforma and the location of Tusked Frog tadpoles captured during dip-netting was marked on a handheld GPS.

Table 1. Schedule for ageing tadpoles.

Developmental stage	Gosner stage (after Gosner, 1960)	Defining features
early	23-30	Limb buds absent or developing, with toes still to develop on hindlimbs.
mid	31-37	Toes developing on hindlimbs; tubercles still to develop on underside of feet.
late	38-46	Hindlimbs well-developed, toes obvious and tubercles developing on underside of feet.

Whilst surveying riparian habitat for tadpoles undercut banks and vegetation overhanging water were also inspected for egg masses of the Tusked Frog with the aid of a headlamp.

2.2 Assessment of habitat suitability

While undertaking field surveys, the suitability of riparian habitat for Tusked Frogs within and adjacent the project area was assessed against the following criteria:

- Presence of cover (undercut banks, crayfish burrows, flood debris, litter drifts tree roots, and vegetation overhanging water) at the water's edge;
- Extent of canopy cover and shading of surface water;
- Availability of in-stream cover (leaf litter/litter drifts) for tadpoles;
- Presence and abundance of predatory fish;
- Presence and extent of surface water during periods of low/basal flow; and
- Presence of foraging resources (leaf litter and herbaceous ground cover likely to support terrestrial and arthropod prey and pond snails) along and/or adjacent riparian areas.

Based on these attributes, areas of riparian habitat within the project area were assessed as having low, moderate or high amenity/value for Tusked Frog.

Stormwater outlets within the study area (including two outlets fitted with stilling dams in the centre-east of the project area) were also inspected during surveys in order to assess their suitability as breeding habitat for Tusked Frogs.

2.3 Survey conditions and limitations

Surveys targeting Tusked Frog were undertaken under ideal conditions for the detection of calling animals and Tusked Frog tadpoles with stream levels low and air temperature and humidity high. Conditions during nocturnal surveys are summarised in Table 2. below.

Table 2. Weather conditions during nocturnal surveys.

Date	7/10/2020	20/11/2020
Temperature (dry bulb) (°C)	19.2-20.6	21.3-25.3
Temperature (wet bulb) (°C)	16.2-17	18.4-20.4
Water temperature (°C)	19-23.9	21.8-26.4
Relative humidity (%)	69-73.4	60.4-76
Cloud cover (eighths)	0	0
Wind	Nil	Nil
Moonlight	Nil	Moon 1/3rd full and visible

The assessment of habitat values undertaken in this report is based on field investigations undertaken early in the wet season and reflective of drier conditions typical of the peak breeding period for Tusked Frogs in coastal lowland parts of south-east Queensland (i.e., spring/early summer). Areas assessed as having low or moderate amenity for Tusked Frog could have greater amenity for this species under wetter conditions (i.e., in wetter years and/or later in the wet season).

3. Results of field investigation/surveys

3.1 Aural surveys

During surveys, Tusked Frogs were recorded calling in low numbers on all three creek transects, within and immediately downstream of the project area (see Figure 4). The majority of calling animals detected surveys were recorded in the east and immediately downstream of the project area, where male Tusked Frogs were recorded calling from underneath undercut banks and tree roots overhanging water, amongst flood debris (leaf litter and branches), and under vegetation overhanging water (including a localised infestation of Singapore Daisy [*Sphagneticola trilobata*] in the centre-east of the project area). On Transect 1, in the far west of the study area, two male Tusked Frogs were also heard calling amongst rocks in water. More detailed information regarding the number and location of calling animals detected during surveys is provided in Appendix 2.



Figure 4. Location of calling Tusked Frogs (green) and Tusked Frog tadpoles (blue) within the project area during surveys. Locality data for Tusked Frog records shown in this figure are provided in Appendix B.

3.2 Dip-net surveys

During dip-net surveys, Tusked Frog tadpoles were recorded only on Transects 2 and 3, in the eastern half and immediately downstream of the project area. The highest abundances of tadpoles were recorded on Transect 2, where 150 early- and mid-stage tadpoles were captured during surveys in October 2020 (see Appendix B for details). Despite the presence of calling animals, no Tusked Frog tadpoles were captured on Transect 1 in the west of the project area during surveys.

Most of the Tusked Frog tadpoles observed during dip-net surveys were located amidst leaf litter in areas of shallower water. A small number of tadpoles were also captured in deeper water sheltering amidst the

fibrous roots of vegetation fringing water. Tusked Frog tadpoles captured during dip-net surveys in October 2020 were mostly early and mid-stage tadpoles. Late stage Tusked Frog tadpoles were recorded only in low numbers during surveys in late November.

In areas where Tusked Frog tadpoles were located during surveys, predatory fish, including Swordtail (*Xiphophorus hellerii*) Mosquitofish (*Gambusia holbrooki*) and Tilapia (*Oreochromis mossambicus*), were also present in low-to-moderate numbers. Densities of these pest fish species were noticeably higher in areas of open water in the west of the study area, where tadpoles of the cane toad (*Rhinella marina*) and recently-metamorphosed animals were also present at very high abundances (see Appendix B). The only other native frog species recorded during surveys was the striped marshfrog (*Limnodynastes peronii*), tadpoles of which were recorded in low numbers at a single site in the east of the project area.

3.3 Incidental records of other fauna encountered during surveys

In addition to the aforementioned frog and fish species, a number of other vertebrate species were recorded within the project area during surveys. A list of these species is included in Appendix C of this report.

3.3 Comparative assessment of habitat values for Tusked Frog within the project area

Habitat values for Tusked Frog within and immediately downstream of the project area are summarised in Figure 5, above. In this figure, areas of riparian habitat in the centre and eastern half of the project area and riparian habitat immediately downstream of the project area are mapped as high value habitat for Tusked Frogs, while those in the west are mapped as low-to-moderate value habitat. Areas of habitat in the east of the project area were assessed as having higher value for Tusked Frog due, in part, to:

- The greater extent of canopy cover and shading of surface water by canopy trees (in particular *Waterhousia floribunda*);
- The abundance of cover for calling/spawning Tusked Frogs (undercut banks, crayfish burrows, flood debris, litter drifts, tree roots, and vegetation overhanging water [including localised infestations of Singapore Daisy]);
- Greater availability of in-stream cover (leaf litter/litter drifts) for tadpoles;
- Comparatively lower abundance of predatory fish; and
- A greater abundance of foraging resources (leaf litter and herbaceous ground cover likely to support terrestrial and arthropod prey and pond snails) along and/or adjacent riparian areas.

Although Tusked Frogs were present in the west of the project area during surveys in November 2020, riparian habitat in this part of the site is likely to have limited amenity for Tusked Frogs due to a paucity of suitable cover for calling/breeding animals (with suitable oviposition/calling sites in water limited to a few scattered rockpiles). In-stream cover for tadpoles in this part of the project area is also scarce, leaving tadpoles of the Tusked Frog vulnerable to predation by fish (which were abundant in areas of open water in the western half of the project area during surveys). The very high densities of cane toad tadpoles and metamorphosing tadpoles observed in the west of the project area could also reduce the amenity of habitat for Tusked Frogs, with tadpoles and juvenile cane toads in this area potentially competing with Tusked Frog tadpoles and metamorphs for food and shelter.

Notwithstanding the above, the amenity of riparian habitat for Tusked Frogs in the west of the site could be higher under wetter conditions when stream levels are up and vegetation along the top of creek banks might provide more cover for calling animals.



Figure 5. Comparative habitat values for Tusked Frog within and immediately downstream of the project area. Areas of high value (known) habitat likely to support successful breeding/recruitment of Tusked Frogs are shown in green. Areas of moderate value (known) habitat with lower potential to support successful breeding are shown in orange. Lower value habitat areas with only limited potential to support breeding of Tusked Frogs under wetter than normal conditions are shown in yellow.



Figure 6. Detail from centre of Figure 5 showing area where the development footprint overlaps high value (known) and lower value (potential) Tusked Frog breeding habitat.

Stormwater outlets receiving runoff from Cuphea Street are unlikely to hold sufficient water to support successful breeding/recruitment of Tusked Frogs, except perhaps under very wet conditions and/or when pipes draining stilling basins are clogged with debris (in which case water may remain within stilling basins for longer). An erosion gully below one of these outlets (mapped as low-quality habitat in Figures 5 and 6), could also provide breeding opportunities for Tusked Frogs, though only under much wetter conditions than those through May-November of 2020.

In addition to the areas of riparian habitat discussed above, vegetation in close proximity to areas of known or potential breeding habitat is likely to provide foraging and shelter habitat for non-breeding animals. This includes areas where the ground stratum is presently dominated by weed species.

Currently, the presence of weed species within the project area does not appear to pose a threat to Tusked Frogs within the project area, with localised infestations of Singapore Daisy providing cover for calling animals in the centre-east of the project area.

4. Potential impacts of proposed works on Tusked Frogs/Tusked Frog habitat values

Based on preliminary design plans prepared by ADG (ADG, 2020), construction of the proposed bikeway/footpath within Harry Evans Park could potentially impact on Tusked Frogs and/or Tusked Frog habitat as a result of:

1. Increased ambient noise levels and seismic vibration during construction works

Substantial increases in ambient noise and seismic vibration levels from machinery operating in close proximity to riparian habitat have the potential to disrupt or interfere with Tusked Frog calling and breeding behaviour during periods of breeding activity. Reports of unusually high mortality amongst Tusked Frogs near a development site at Toowong Creek (O'Malley, 2019; I. Hing, pers. comm.) suggest that sustained noise and vibration immediately adjacent areas of Tusked Frog habitat could also contribute to mortality of adult animals, possibly through increased physiological stress, though empirical data demonstrating a causal link between increased noise and vibration and mortality of Tusked Frogs are currently lacking.

2. Increased light pollution from artificial light sources

Strong lighting in proximity to Tusked Frog breeding habitat could potentially interfere with the behaviour of breeding and foraging animals and potentially expose foraging animals to increased predation by visual predators such as Kookaburras (which will continue to forage around artificial light sources after dark).

3. Movement of unconsolidated soil/sediment, concrete leachate and/or rubble into areas of riparian breeding habitat downstream/downslope of work areas

The movement of unconsolidated soil, concrete leachate, sediment and/or rubble into areas of tusked breeding habitat immediately downslope or downstream of construction areas, in the far west and centre east of the project area, could adversely impact water quality in nearby areas of breeding habitat. Resulting changes in water quality (increased sediment loading and/or alkalinity) could prove harmful to aquatic fauna including Tusked Frog tadpoles, in the short-term at least.

4. Disturbance of vegetation in proximity to areas of known and potential Tusked Frog breeding habitat

The proposed installation of rock protection along an erosion gully carrying stormwater runoff southwards from Cuphea Street may necessitate additional disturbance/clearing of vegetation in areas of known/likely Tusked Frog breeding habitat in the centre-east of the project area (see Figure 6). The clearing of vegetation

in this area will likely result in increased ambient light, temperature and UV-B levels in known and/or potential breeding Tusked Frog habitat, to the possible detriment of this species. Clearing/removal of the ground stratum may also reduce the amenity of Tusked Frog foraging/shelter habitat alongside areas of breeding habitat in this part of the project area.

5. Disturbance/loss of potential breeding habitat

Under wetter conditions (i.e., in years with above average spring/summer rainfall), the stormwater outlet and erosion gully carrying stormwater southwards from Cuphea Street (mapped as low-quality habitat in Figure 6), could potentially support breeding of Tusked Frogs. Works in this part of the project area (including the installation of rock scour protection along the aforementioned erosion gully) may therefore result in some loss of potential Tusked Frog breeding habitat. The resulting loss of habitat in this area, however, is unlikely to have a significant impact on the overall value/amenity of habitat for Tusked Frogs within the project area given the extent of higher quality habitat elsewhere within and downstream of this area.

6. Increased public access to areas of Tusked Frog breeding habitat

Construction of a bikeway/footpath within Harry Evans Park may allow greater public access to areas of Tusked Frog habitat, potentially increasing the risk of habitat disturbance/degradation due to arson, trampling of vegetation, and or localised destruction/damage of creek banks in areas of known Tusked Frog breeding habitat.

7. Direct mortality of Tusked Frogs in work areas within or in close proximity to known Tusked Frog habitat

Construction works involving the soil disturbance and/or the operation of heavy machinery within or in close proximity to areas of known or potential Tusked Frog habitat could result in direct mortality of Tusked Frogs and tusked frog tadpoles due to injury.

In addition to the impacts identified above, the use of pesticides and wetting agents in close proximity to areas of surface water during spring, summer and early autumn poses a potential threat to Tusked Frog tadpoles in areas of known or potential tusked frog breeding habitat.

5. Mitigation measures

Measures for mitigating, minimising or avoiding the impacts identified above, include the following:

1. Ensuring that works involving heavy machinery/major earthworks in proximity to (within 30 m of) known breeding habitat in the centre and north-east of the project area are undertaken outside the peak breeding season for Tusked Frogs (i.e., in autumn and/or winter, not spring and summer).
2. Minimising light pollution in areas of Tusked Frog habitat by: (i) locating lamps as far away as possible from areas of breeding habitat; (ii) fitting lamps in proximity to breeding/foraging areas with a motion sensor, so that lights don't remain on continuously; and (iii) installing glare guards to direct lamp light away from known/likely Tusked Frog breeding/foraging habitat.
3. Establishing effective soil/sediment traps on the downslope side of any earthworks/ spoil piles in proximity to known or likely Tusked Frog breeding areas (i.e., areas mapped as high or moderate value habitat), and ensuring that that traps are regularly checked and maintained, especially if rain and/or storms are forecast.
4. Ensuring soil, gravel and cement are stockpiled away from overland flow paths and not in areas subject to semi-regular flooding (i.e., outside of the medium risk flood zone shown in MBRC mapping).

5. Avoiding or minimising tree clearing in proximity to areas of known or likely Tusked Frog breeding habitat.
6. Replanting/rehabilitating areas of riparian vegetation disturbed during construction works with local native species (e.g., *Waterhousia floribunda* and *Lomandra* spp.).
7. Replanting/rehabilitating nearby areas of shelter and foraging habitat cleared of vegetation using locally-native species (e.g., *Lomandra* species and native tree or shrub species providing litterfall/leaf litter).
8. Erecting a temporary dampcourse or shade-cloth frog fence around work areas abutting known or likely Tusked Frog habitat in the centre-east of the project area where the development footprint intersects areas of known and potential Tusked Frog breeding habitat (as shown in Figure 6). Frog-exclusion fencing should stand 30-40 cm tall and be buried to a depth of ~ 5cm, so as to prevent Tusked Frogs from passing over and/or underneath it. Frog fencing should also be kept clear of any rubble, vegetation or woody debris that might otherwise allow Tusked Frogs to climb over the top.
9. Engaging a suitably qualified spotter-catcher with experience in the capture, handling and transport of frogs and tadpoles to relocate any Tusked Frogs, Tusked Frog tadpoles and/or Tusked Frog spawn from in and around areas of known or potential breeding habitat in the centre of the project area (where the development footprint intersects areas of known and potential Tusked Frog breeding habitat [as shown in Figure 6]).
10. Installing signage directing members of the public using the footpath/bikeway to remain on the footpath and establishing dense plantings along the eastern half of the footpath/bikeway to discourage people from accessing areas of higher quality Tusked Frog breeding habitat in the east of the project area.
11. Avoiding the use of pesticide sprays and wetting agents to control weeds in proximity to surface water within areas of known or potential tusked frog breeding habitat in spring, summer and early autumn.

6. Summary and conclusions

Overall, the proposed works appear unlikely to have a significant impact on Tusked Frog habitat values within or downstream of the project area, with the majority of works occurring away from areas of known or likely Tusked Frog breeding habitat. Any residual impacts on Tusked Frogs/Tusked Frog habitat, moreover, can be avoided or minimised by adopting the mitigation measures identified above. Successful adoption of these measures should help ensure minimum disturbance/disruption of Tusked Frogs and Tusked Frog habitat within and downstream of the project area.

7. References

- ADG (2020). Harry Evan Park, Arana Hills, Pathway Construction: Basis of Design Report. Report prepared for Moreton Bay Regional Council.
- Gosner, K. 1960. A simplified system for staging anuran embryos and larvae with notes on identification. *Herpetologica*, 16, pp. 183-190.
- O'Malley, B. 2020. Mass frog deaths at school construction site. Westside News (Brisbane), 17 December 2019, p8.

Appendix A. Details of the location and timing of surveys.

Table 1. Transect details.

Transect #	Transect length (m)	Survey type	Survey event	Transect start point	Transect end point	Duration of survey
1	140	Nocturnal	7/10/2020	-27.401686, 152.950648	-27.402098, 152.951914	20:20-20:51
1	140	Diurnal	7/10/2020	-27.402098, 152.951914	-27.401686, 152.950648	17:34-18:24
1	140	Nocturnal	20/11/2020	-27.401686, 152.950648	-27.402098, 152.951914	20:20-21:15
1	140	Diurnal	20/11/2020	-27.402098, 152.951914	-27.401686, 152.950648	17:37-18:38
2	250	Nocturnal	7/10/2020	-27.401832, 152.955269	-27.402038, 152.953025	18:45-20:10
2	250	Diurnal	7/10/2020	-27.402038, 152.953025	-27.401832, 152.955269	15:00-17:24
3	150	Nocturnal	20/11/2020	-27.402414, 152.957004	-27.402031, 152.955591	19:06-20:01
3	150	Diurnal	20/11/2020	-27.402031, 152.955591	-27.402414, 152.957004	16:00-17:00

Table 2. Timing and location of point count censuses.

Census point	Transect #	Lat/Long	Survey event
1	1	-27.401686, 152.950648	7/10/2020
2	1	-27.401882, 152.951593	7/10/2020
1	1	-27.401686, 152.950648	22/11/2020
2	1	-27.401882, 152.951593	22/11/2020
3	2	-27.402050, 152.953089	7/10/2020
4	2	-27.401944, 152.953960	7/10/2020
5	2	-27.401834, 152.954791	7/10/2020
6	3	-27.402031, 152.955591	22/11/2020
7	3	-27.402460, 152.956412	22/11/2020
8	3	-27.402414, 152.957004	22/11/2020
9	NA	-27.402370, 152.957527	22/11/2020

Appendix B. Tusked Frog survey results

Table 1. Results of dip-net surveys. SEE = seen; HAN = handled/captured.

Transect #	Survey event	<i>Adelotus brevis</i> (tadpoles)	<i>Adelotus brevis</i> (adult)	<i>Limnodynastes peronii</i> (tadpoles)	<i>Rhinella marina</i> (tadpoles)	<i>Rhinella marina</i> (metamorphs)	<i>Gambusia holbrooki</i>	<i>Xiphophorus helleri</i>	<i>Hypseleotris galii</i>	<i>Xiphophorus maculatus</i>	Juvenile Platy and/or Swordtail	Pond snails
1	7/10/2020				>500 HAN/SEE		>100 HAN/SEE					
1	20/11/2020				>16000 HAN/SEE	650 HAN/SEE	8 HAN	10 HAN				
2	7/10/2020	>150 HAN/SEE		5 HAN			5 SEE		1 HAN			<5 HAN
3	20/11/2020	1 HAN	3 HEA					11 HAN/SEE	1 HAN	1 HAN	25 HAN	<5 HAN

Table 2. Number of Tusked Frog and other vertebrate species heard and/or seen on riparian transects during nocturnal surveys. HEA = heard; SEE = seen; SHD = seen and heard.

Transect #	Survey event	<i>Adelotus brevis</i>	<i>Limnodynastes peronii</i>	<i>Rhinella marina</i> (metamorphs)	<i>Hemidactylus frenatus</i>
1	7/10/2020	1 HEA			
1	20/11/2020	2 HEA	1 SEE	400 SEE	7 HEA
2	7/10/2020	5 HEA			
3	20/11/2020	1 HEA			6 HEA

Table 3. Number of Tusked Frogs heard calling during point count censuses.

Census point	Transect #	Lat/Long	Survey event	Number heard within 5 m	Number heard within 5-10 m	Number heard >10 m away
1	1	-27.401686, 152.950648	7/10/2020			
2	1	-27.401882, 152.951593	7/10/2020			
1	1	-27.401686, 152.950648	22/11/2020	1	1	1
2	1	-27.401882, 152.951593	22/11/2020			

Census point	Transect #	Lat/Long	Survey event	Number heard within 5 m	Number heard within 5-10 m	Number heard >10 m away
3	2	-27.402050, 152.953089	7/10/2020			
4	2	-27.401944, 152.953960	7/10/2020			2
5	2	-27.401834, 152.954791	7/10/2020			2
6	3	-27.402031, 152.955591	22/11/2020			
7	3	-27.402460, 152.956412	22/11/2020			
8	3	-27.402414, 152.957004	22/11/2020			1
9	NA	-27.402370, 152.957527	22/11/2020		1	

Table 4. Locality data for Tusked Frog records shown in Figure 4.

Life stage	Lat	Long
Adult	-27.401817	152.950685
Tadpoles	-27.401985	152.953334
Adult	-27.401943	152.953669
Adult	-27.402043	152.954088
Adult	-27.401834	152.955134
Adult	-27.401845	152.954998
Tadpoles	-27.40186	152.955232
Tadpoles	-27.401921	152.954754
Tadpoles	-27.401895	152.954281
Tadpoles	-27.401917	152.954186
Tadpoles	-27.401964	152.95415
Tadpoles	-27.401932	152.953854
Tadpoles	-27.401952	152.953709
Tadpoles	-27.401919	152.953641
Adult	-27.4017	152.950663
Adult	-27.401787	152.951001
Adult	-27.402371	152.95755
Adult	-27.402204	152.955831
Adult	-27.402313	152.955947
Tadpoles	-27.402529	152.956534
Adult	-27.402016	152.953371

Appendix C. Vertebrate species recorded during surveys

Table.1. List of vertebrate species recorded within the project area and/or immediately downstream of the project area during surveys.

Class	Scientific name	Common name
amphibians	<i>Adelotus brevis</i>	Tusked Frog
amphibians	<i>Limnodynastes peronii</i>	Striped Marshfrog
amphibians	<i>Rhinella marina</i>	Cane Toad
birds	<i>Alectura lathami</i>	Australian Brush-turkey
birds	<i>Anas superciliosa</i>	Pacific Black Duck
birds	<i>Chenonetta jubata</i>	Australian Wood Duck
birds	<i>Nycticorax caledonicus</i>	Nankeen Night-heron
birds	<i>Amaurornis moluccana</i>	Pale-vented Bush-hen
birds	<i>Gallinula tenebrosa</i>	Dusky Moorhen
birds	<i>Gallirallus philippensis</i>	Buff-banded Rail
birds	<i>Porphyrio melanotus</i>	Purple Swamphen
birds	<i>Burhinus grallarius</i>	Bush Stone-curlew
birds	<i>Vanellus miles novaehollandiae</i>	Masked Lapwing (southern subspecies)
birds	<i>Cacatua sanguinea</i>	Little Corella
birds	<i>Alisterus scapularis</i>	Australian King-parrot
birds	<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet
birds	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
birds	<i>Eudynamys orientalis</i>	Eastern Koel
birds	<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo
birds	<i>Ninox boobook</i>	Southern Boobook
birds	<i>Ceyx azureus</i>	Azure Kingfisher
birds	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
birds	<i>Eurystomus orientalis</i>	Dollarbird
birds	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater
birds	<i>Meliphaga lewinii</i>	Lewin's Honeyeater
birds	<i>Oriolus sagittatus</i>	Olive-backed Oriole
birds	<i>Cracticus nigrogularis</i>	Pied Butcherbird
birds	<i>Strepera graculina</i>	Pied Currawong (eastern Australia)
birds	<i>Corvus orru</i>	Torresian Crow
birds	<i>Grallina cyanoleuca</i>	Magpie-lark
mammals	<i>Trichosurus vulpecula</i>	Common Brushtail Possum
mammals	<i>Pteropus scapulatus</i>	Little Red Flying-fox
ray-finned fishes	<i>Gambusia holbrooki</i>	Mosquitofish
ray-finned fishes	<i>Xiphophorus hellerii</i>	Swordtail
ray-finned fishes	<i>Xiphophorus maculatus</i>	Platy
ray-finned fishes	<i>Oreochromis mossambicus</i>	Mozambique Mouthbrooder
ray-finned fishes	<i>Gobiomorphus australis</i>	Striped Gudgeon
ray-finned fishes	<i>Hypseleotris galii</i>	Firetail Gudgeon
reptiles	<i>Hemidactylus frenatus</i>	House Gecko
reptiles	<i>Intellagama lesueurii</i>	Eastern Water Dragon

Annex 4 Flora and Fauna Survey Results

Class	Scientific name	Common name
amphibians	<i>Adelotus brevis</i>	Tusked Frog
amphibians	<i>Limnodynastes peronii</i>	Striped Marshfrog
amphibians	<i>Rhinella marina</i>	Cane Toad
birds	<i>Alectura lathamii</i>	Australian Brush-turkey
birds	<i>Anas superciliosa</i>	Pacific Black Duck
birds	<i>Chenonetta jubata</i>	Australian Wood Duck
birds	<i>Nycticorax caledonicus</i>	Nankeen Night-heron
birds	<i>Amaurornis moluccana</i>	Pale-vented Bush-hen
birds	<i>Gallinula tenebrosa</i>	Dusky Moorhen
birds	<i>Gallirallus philippensis</i>	Buff-banded Rail
birds	<i>Porphyrio melanotus</i>	Purple Swamphen
birds	<i>Burhinus grallarius</i>	Bush Stone-curlew
birds	<i>Vanellus miles novaehollandiae</i>	Masked Lapwing (southern subspecies)
birds	<i>Cacatua sanguinea</i>	Little Corella
birds	<i>Alisterus scapularis</i>	Australian King-parrot
birds	<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet
birds	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet
birds	<i>Eudynamis orientalis</i>	Eastern Koel
birds	<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo
birds	<i>Ninox boobook</i>	Southern Boobook
birds	<i>Ceyx azureus</i>	Azure Kingfisher
birds	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
birds	<i>Eurystomus orientalis</i>	Dollarbird
birds	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater
birds	<i>Meliphaga lewinii</i>	Lewin's Honeyeater
birds	<i>Oriolus sagittatus</i>	Olive-backed Oriole
birds	<i>Cracticus nigrogularis</i>	Pied Butcherbird
birds	<i>Strepera graculina</i>	Pied Currawong (eastern Australia)
birds	<i>Corvus orru</i>	Torresian Crow
birds	<i>Grallina cyanoleuca</i>	Magpie-lark
mammals	<i>Trichosurus vulpecula</i>	Common Brushtail Possum
mammals	<i>Pteropus scapulatus</i>	Little Red Flying-fox
ray-finned fishes	<i>Gambusia holbrooki</i>	Mosquitofish
ray-finned fishes	<i>Xiphophorus hellerii</i>	Swordtail
ray-finned fishes	<i>Xiphophorus maculatus</i>	Platy
ray-finned fishes	<i>Oreochromis mossambicus</i>	Mozambique Mouthbrooder
ray-finned fishes	<i>Gobiomorphus australis</i>	Striped Gudgeon
ray-finned fishes	<i>Hypseleotris galii</i>	Firetail Gudgeon
reptiles	<i>Hemidactylus frenatus</i>	House Gecko
reptiles	<i>Intellagama lesueurii</i>	Eastern Water Dragon

Scientific name	Common name	Site ⁵				
		Exotic ⁶	Q1	Q2	Q3	B1
<i>Alphitonia excelsa</i>	Soap Tree					X
<i>Acacia disparima</i> subsp. <i>Disparima</i>	Hickory Wattle					X
<i>Eucalyptus microcorys</i>	Tallowwood		X			X
<i>Lophostemon confertus</i>	Brush Box					X
<i>Corymbia intermedia</i>	Pink Bloodwood					X
<i>Eucalyptus terreticornis</i>	Forest Red Gum		X			X
<i>Lophostemon suaveolens</i>	Swamp Box		X			X
<i>Eucalyptus propinqua</i>	Small-fruited Grey-gum					X
<i>Eriobotrya japonica</i>	Loquat	*			X	X
<i>Corymbia torreliana</i>	Cadaghi					X
<i>Leucaena leucocephala</i>	River Tamarind			X	X	X
<i>Senna pendula</i> var. <i>glabrata</i>	Easter Cassia	*			X	X
<i>Lantana camara</i>	Lantana	*				X
<i>Anredera cordifolia</i>	Madeira Vine	*		X		X
<i>Ochna serrulata</i>	Mickey Mouse Plant	*		X	X	X
<i>Syragrus romanzoffiana</i>	Cocos Palm	*		X	X	X
<i>Jagera pseudorhus</i>	Foambark					X
<i>Celtis sinensis</i>	Chinese Elm	*		X	X	X
<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum					X
<i>Paspalum</i> sp.		*	X	X	X	X
<i>Entolasia stricta</i>	Wiry Panic					X
<i>Nerium oleander</i>	Oleander	*				X
<i>Dianella caerulea</i>	Blue Flax Lily					X
<i>Eustephus latifolius</i>	Wombat Berry					X
<i>Callisia fragrans</i>	Purple Succulent	*		X	X	X
<i>Goodenia rotundifolia</i>	Star Goodenia					X
<i>Asparagus</i> spp.	Climbing Asparagus Vine	*		X		X
<i>Hardenbergia violacea</i>	Native Sasparilla					X
<i>Lomandra hystrix</i>	Green Mat-rush			X	X	X
<i>Desmodium intortum</i>	Greenleaf Desmodium	*				X
<i>Nephrolepis cordifolia</i>	Fishbone Fern	*			X	X
<i>Asparagus aethiopicus</i>	Ground Asparagus	*				X
<i>Melaleuca quiquinervia</i>	Broad-leaved Paperbark		X			
<i>Sida</i> sp.		*				X
<i>Commelina benghalensis</i>	Hairy Commelina	*				X
<i>Molineria capitulata</i>	Palm Grass	*				X
<i>Cinnamomum camphora</i>	Camphor Laurel	*		X	X	
<i>Ligustrum lucidum</i>	Broad-leaved Privet	*		X		
<i>Koelreuteria paniculate</i>	Chinese Rain Tree	*		X	X	

⁵ X = presence within survey site.

⁶ * = exotic species.

Scientific name	Common name	Site ⁵				
		Exotic ⁶	Q1	Q2	Q3	B1
<i>Schefflera actinophylla</i>	Umbrella Tree			x	x	
<i>Solanum chrysotrichum</i>	Giant Devil's Fig	*			x	
<i>Impatiens sp.</i>		*		x	x	
<i>Symphoricarpos orbiculatus</i>	Coral Berry	*		x	x	
<i>Dracaena trifasciata</i>	Mother-in-law Tongue	*				
<i>Pteridium esculentum</i>	Bracken Fern				x	
<i>Sphagneticola trilobata</i>	Singapore Daisy	*		x	x	
<i>Archontophoenix alexandrae</i>	Alexander Palm			x	x	
<i>Eucalyptus siderophloia</i>	Grey Ironbark		x			
<i>Melaleuca bracteata</i>	Black Tea-tree		x			
<i>Aracaria bidwillii</i>	Bunya Pine		x			
<i>Melaleuca viminalis</i>	Bottlebrush		x			
<i>Eucalyptus robusta</i>	Swamp Mahogany		x			
<i>Jacaranda mimosifolia</i>	Jacaranda	*	x			

Annex 5 Likelihood of Occurrence

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
Plant	<i>Arthraxon hispidus</i>	Hairy-joint Grass	V	V	Moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps.	No	Low
Plant	<i>Bosistoa transversa</i>	Three-leaved Bosistoa	V	LC	Grows in wet sclerophyll forest, dry sclerophyll forest and rainforest including highly disturbed habitat up to 300 m in altitude. Occurs from Mount Larcom in central-eastern QLD south to Mullumbimby NSW.	No	Low
Plant	<i>Corchorus cunninghamii</i>	Native Jute	E	E	Occurs in ecotones between wet eucalypt forest and dry to dry-subtropical rainforest on sheltered slopes and gullies, and grassy, open forest on exposed slopes and ridges.	No	Low
Plant	<i>Cryptocarya foetida</i>	Stinking Cryptocarya	V	V	Found in littoral, warm temperate and subtropical rainforest, wet sclerophyll forest and Camphor laural forest usually on sandy soils, but mature trees are also known on basalt soils.	No	Low
Plant	<i>Cupaniopsis shirleyana</i>	Wedge-leaf Tuckeroo	V	V	Found in dry rainforest north from the Carina area near Brisbane and Maryborough to Mt Larcom near Gladstone in Queensland.	No	Low
Plant	<i>Dichanthium setosum</i>	Bluegrass	V	LC	Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. Associated with heavy basaltic	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
					black soils and red-brown loams with clay subsoil.		
Plant	<i>Lepidium peregrinum</i>	Wandering Pepper-cress	E	LC	Rare species, possibly extinct, recorded from the Blue Mountains and near the QLD border. Occurs in an open riparian forest supporting sandy alluvium soils	No	Low
Plant	<i>Macadamia integrifolia</i>	Macadamia Nut	V	V	Lowland warm complex notophyll vine forest and Araucarian notophyll vine forest. Found mainly on alluvial situations bordering rivers and creeks where the fertile volcanic soils are rich in humus.	No	Low
Plant	<i>Macadamia ternifolia</i>	Small-fruited Queensland Nut	V	V	Lowland warm complex notophyll vine forest and Araucarian notophyll vine forest on basic and intermediate volcanics and alluvia in higher rainfall areas of southeast Queensland.	No	Low
Plant	<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V	Complex notophyll vine forest, littoral rainforest and wet sclerophyll communities extending from the Coomera River south of Brisbane to the Richmond River in northern New South Wales, and an altitudinal range of 100-800m.	No	Low
Plant	<i>Persicaria elatior</i>	Knotweed	V	V	Grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
Plant	<i>Phaius australis</i>	Lesser Swamp-orchid	E	V	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas.	No	Low
Plant	<i>Samadera bidwillii</i>	Quassia	V	V	Occurs in CEQ from near Mackay southwards to near Gympie in south eastern Queensland. Grows in dry rainforest and vine thickets.	No	Low
Plant	<i>Sophora fraseri</i>		V	V	Usually found in wet situations in wet sclerophyll forest or vine forest, often near rainforest.	Yes- 1 record 2km southwest of the study area.	Low
Plant	<i>Thesium australe</i>	Austral Toadflax	V	V	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (<i>Themeda australis</i>).	No	Low
Birds	<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak.	No	Low
Birds	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.).	No	Low
Birds	<i>Calidris ferruginea</i>	Curlew Sandpiper	CE	CE	Non-breeding only. Occupies littoral and estuarine habitats, and is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
					or waterweed, or on banks of beach-cast seagrass or seaweed.		
Birds	<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-parrot	E	E	Subtropical rainforest, dry rainforest, littoral and developing littoral rainforest, sub-littoral mixed scrub, riparian corridors in woodland, open woodland and otherwise cleared land, and urbanised and agricultural areas with fig trees	No	Low
Birds	<i>Erythrotriorchis radiatus</i>	Red Goshawk	V	E	Inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands.	No	Low
Birds	<i>Falco hypoleucos</i>	Grey Falcon	V	V	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	No	Low
Birds	<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	V	V	Grassy woodlands and plains, preferring sandy areas and usually close to water.	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
Birds	<i>Hirundapus caudacutus</i>	White-throated Needletail	V;M	V;SL	Found across a range of habitats, more often over wooded areas, where it is almost exclusively aerial. Large tracts of native vegetation, particularly forest, may be a key habitat requirement for species. Found to roost in tree hollows in tall trees on ridge-tops, on bark or rock faces. Appears to have traditional roost sites.	Yes	Transient
Birds	<i>Lathamus discolor</i>	Swift Parrot	CE	E	Found in dry sclerophyll forests and woodlands, suburban parks and gardens and flowering fruit trees. Occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	No	Low
Birds	<i>Numenius madagascariensis</i>	Eastern Curlew	CE	E	Non-beeding only. Occupies coastal lakes, inlets, bays and estuarine habitats, and is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.	No	Low
Birds	<i>Rostratula australis</i>	Australian Painted Snipe	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	No	Low
Birds	<i>Thinornis cucullatus cucullatus</i>	Hooded Plover	V	LC	inhabits sandy, ocean beaches. Also inhabits inland and coastal salt lakes.	No	Low
Birds	<i>Turnix melanogaster</i>	Black-breasted Button-quail	V	V	Vine thickets and rainforest vegetation types that are periodically water-stressed.	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
Frogs	<i>Adelotus brevis</i>	Tusked Frog		V	Inhabits wet eucalypt forest, rainforest, and sometimes dry eucalypt forest, where it can be found in close proximity to suitable breeding habitat such as ponds and slow-moving sections of streams. Also recorded from dams and garden ponds in urban and peri-urban areas.	Yes- 1 record 0.6km south	High
Frogs	<i>Mixophyes fleayi</i>	Fleay's Frog	E	E	Rainforest and wet eucalypt forest of the escarpment and foothills, usually close to gravely streams.	No	Low
Insects	<i>Argynniz hyperbius inconstans</i>	Australian Fritillary	CE	E	River estuaries or open, swampy coastal areas. Restricted to areas where the larval food plant, <i>Viola betonicifolia</i> (the arrowhead violet), occurs.	No	Low
Mammals	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years.	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
Mammals	<i>Dasyurus hallucatus</i>	Northern Quoll	E	LC	Occupies a variety of habitats including rocky areas, eucalypt forest and woodlands, dry rainforests and vine thickets, sandy lowlands and beaches, shrublands, grasslands and deserts. Habitat usually includes some form of rocky area or structurally diverse woodland or forest used for shelter purposes with surrounding vegetated habitats used for foraging and dispersal.	No	Low
Mammals	<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spot-tailed Quoll	E	V	Occupies a wide range of habitat types including rainforest, wet and dry sclerophyll forest, coastal heathland, scrub and dunes, woodland, heathy woodland, swamp forest, mangroves, on beaches and sometimes in grassland or pastoral areas adjacent to forested areas. Habitat characterised by relatively high (> 600 mm/yr) and predictable seasonal rainfall.	Yes- 1 record 1.7km southwest	Low
Mammals	<i>Petauroides volans</i>	Greater Glider	V	V	Eucalypt forest approximately 845m above sea level supporting preferred food trees and tree hollows.	No	Low
Mammals	<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	V	V	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night when foraging.	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
Mammals	<i>Phascolarctos cinereus</i> (combined populations of QLD, NSW and the ACT)	Koala	V	V	In coastal areas, koalas inhabit forest and woodland mostly dominated by Eucalyptus species (or those of related genera) and also those dominated by Melaleuca or Casuarina species (with emergent food trees). In Moreton Bay, prefers vegetation dominated by E.microcorys, E.robusta, E.brancroftii and E.tereticornis.	Yes	High
Mammals	<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	V	V	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist 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.	No	Low
Mammals	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	-	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Yes	High
Reptiles	<i>Delma torquata</i>	Adorned Delma	V	V	Eucalyptus-dominated woodlands with rocky ground cover. The species shelters under these rocks.	No	Low
Reptiles	<i>Furina dunmalli</i>	Dunmall's Snake	V	V	Brigalow forest and woodland with fallen timber and ground litter, growing on cracking clay soils and clay loam soils. Also occurs in eucalypt and Callitris	No	Low

Taxa	Scientific name	Common name	EPBC Act*	NC Act*	Habitat requirements	Records within 3km of study area	Likelihood
					woodland with fallen timber and ground litter.		

*Table Codes: EPBC Act Status- M: Marine, CE: Critically Endangered; V: Vulnerable. NC Act Status- LC: Least Concern; E: Endangered; V: Vulnerable; CE: Critically Endangered, SL: Special Least Concern.

Annex 6 Significant Impact Assessments

Commonwealth Matters of National Environmental Significance

Based on the desktop and field assessments detailed in Section 4.3 of the Ecological Assessment Report, two threatened fauna species listed under the EPBC Act have been identified as having a high likelihood of occurrence within the study area and one additional threatened fauna species is likely to have a transient presence within the study area. These threatened fauna species are listed as a Matter of National Environmental Significance (MNES) according to the EPBC Act and include:

- White-throated Needletail (*Hirundapus caudacutus*), listed as Vulnerable and Migratory⁷ under the EPBC Act.
- Koala (*Phascolarctus cinereus*), listed as Vulnerable under the EPBC Act.
- Grey-headed Flying-fox (*Petrogale penicillata*), listed as Vulnerable under the EPBC Act.

The following assessments in Table 11 consider the nature and extent of impacts from the action (the Project) to MNES using the criteria within 'Significant Impact Guidelines 1.1 Matters of National Environmental Significance' (the Significant Impact Guidelines) (Department of the Environment, 2013) and 'EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)' (Commonwealth of Australia, 2014).

Table 11. Significant Impact Assessment for Vulnerable species for the White-throated Needletail, Koala and Grey-headed Flying-fox

Criteria if there is a real chance or possibility that the action (the Project) will:	Response criteria
Lead to a long-term decrease in the size of an important population ⁸ of a species	<p>Koala - unlikely</p> <p>Important populations have not been established for Koala, since insufficient information is available to adequately identify and separate the nature of any important populations throughout the species' range (Commonwealth of Australia, 2014). Regardless, a review of existing data indicates Koala occur within a 3km radius to the study area (ALA, 2020; DES, 2020; DES, 2019). Targeted Koala surveys within the study area indicates low Koala activity levels according to Phillips & Callaghan (2011). Data suggests that Koala are most active to the north of the study area in proximity to larger more contiguous habitats including Bunyaville Conservation Park.</p> <p>The study area is likely to provide transient foraging and resting opportunities for the Koala across its local range. However, given its relatively small extent and poor connectivity with larger more contiguous habitats to the north, south and west, the study area is considered unlikely to support an important population of the Koala.</p>

⁷ An assessment according to significant impact criteria for migratory species is not required for the White-throated Needletail, since an assessment according to significant impact criteria for vulnerable species is already being undertaken (Department of the Environment, 2013).

⁸ As per the Significant impact guidelines, an 'important population' is a population that is necessary for a species' long-term survival and recovery (DOE, 2013). This may include populations identified as such in recovery plans, and/or that are: key source populations either for breeding or dispersal; populations that are necessary for maintaining genetic diversity, and/or populations that are near the limit of the species range.

As such, the Project is considered unlikely to lead to a long-term decrease in the size of an important population of this species.

White-throated Needle-tail - unlikely

While important populations for the White-throated Needle-tail are not specified within its conservation advice (TSSC, 2019), an action which constitutes serious disruption to an ecologically significant proportion of the White-throated Needle-tail population is one that meets or exceeds mortality of 100 individuals (DOE, 2015). Actions likely to meet or exceed the mortality of 10 individuals should be investigated further through more targeted surveys. A review of existing data indicates that ten sightings of the species occur within a 3km radius to the study area, including records from the Bunyaville Conservation Park and surrounding suburbs to the north (ALA, 2020). However, no White-throated Needle-tail were observed within the study area during the course of field investigations. In addition, a lack of suitable roosting/ nesting sites within the study area was generally identified for the species.

The White-throated Needle-tail is likely to have a transient and predominantly aerial presence within the study area.

As such, the Project is considered unlikely to lead to a long-term decrease in the size of an important population of this species.

Grey-headed Flying-fox - unlikely

Grey-headed Flying-fox are considered to form one single interbreeding population across most states of Australia (Commonwealth of Australia, 2017; Webb & Tidemann 1995). As such, local populations of the species may be considered to be an important population. Flying-fox roost data indicates one local Flying-fox population named Ferny Hills, Kylie Avenue occurs 700 m west of the study area (Commonwealth of Australia, 2015; MBRC, 2020). However, according to the National Flying-fox Viewer (DAWE, 2015) the Ferny Hills, Kylie Avenue flying fox roost is not considered a nationally-important grey-headed flying fox camp, as it has not contained $\geq 10,000$ Grey-headed Flying-foxes within the past 10 years. Additionally, monitoring suggests that Flying-foxes have not been observed within the camp since February 2020 (DAWE, 2015).

No Flying-fox roost was observed within or adjacent to the study area during field surveys. However, information provided by MBRC has indicated that the study area is adjacent to a historical flying fox camp (pers.com. Marnie Hrsto, 2020). It is understood that this colony is considered transient and that flying foxes have not colonised/roosted within this location for some time (pers. comm. Robyn Moffat, MBRC, 12 August 2020).

Grey-headed Flying Foxes are capable of nightly flights of up to 50km from their roost to different feeding areas as food resources change (DAWE, 2020). It is likely that individuals from the Ferny Hills camp would regularly utilise foraging resources within the study area.

Nonetheless, the study area is not considered to support an important population of Grey-headed Flying-fox as nearby roosts are considered transient and do not meet the criteria for a nationally-important grey-headed flying fox camp.

As such, the Project is considered unlikely to lead to a long-term decrease in the size of an important population of this species.

<p>Reduce the area of occupancy of an important population</p>	<p>Koala - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of suitable Koala habitat, comprising Eucalypt forest ground-truthed as RE12.11.25 and RE12.11.3.</p> <p>However, the study area is considered unlikely to support an important population of the Koala and rather may provide transient foraging and resting opportunities for the species across its local range.</p> <p>As such, the Project is considered unlikely to reduce the area of occupancy of an important population of this species.</p> <p>White-throated Needle-tail - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of Eucalypt forest which has the potential to serve as transient foraging and resting habitat for the species. However, habitats within the study area are not considered important for the species, due to the lack of suitable roosting/ nesting sites for the species.</p> <p>As such, the Project is considered unlikely to reduce the area of occupancy of an important population of this species.</p> <p>Grey-headed Flying-fox – unlikely</p> <p>The Project is expected to impact approximately 2.79ha of suitable Grey-headed Flying-fox foraging habitat, comprising Eucalypt forest and exotic riparian forest. However, the study area is not considered to support an important population of Grey-headed Flying-fox as nearby roosts are considered transient and do not meet the criteria for a nationally-important Grey-headed Flying-fox camp.</p> <p>As such, the Project is considered unlikely to reduce the area of occupancy of an important population of this species.</p>
<p>Fragment an existing important population into two or more populations</p>	<p>Koala - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of suitable Koala habitat, comprising Eucalypt forest ground-truthed as RE12.11.25 and RE12.11.3.</p> <p>However, the study area is considered unlikely to support an important population of the Koala and rather may provide transient foraging and resting opportunities for the Koala across its local range. The loss of suitable Koala habitat as a result of the Project is not considered of sufficient magnitude to result in the fragmentation of local populations into two or more subpopulations. Additionally, local connectivity will be maintained by maintaining buffer vegetation along the unnamed tributary of Kedron Brook and movement opportunities for the species are incorporated into the Project design which will be implemented post-construction including landscaping and the preparation of an Ecological Restoration Plan.</p> <p>As such, the Project is considered unlikely to fragment an existing important population of this species into two or more populations.</p> <p>White-throated Needle-tail – unlikely</p> <p>The Project is expected to impact approximately 2.35ha of Eucalypt forest which has the potential to serve as transient foraging and resting habitat for the White-throated Needle-tail.</p>

	<p>Due to the highly mobile and almost exclusively aerial behaviour of the White-throated Needletail, and lack of suitable roosting/nesting sites for the species identified within the study area, the Project is considered unlikely to fragment an existing important population of this species into two or more populations.</p> <p>Grey-headed Flying-fox - unlikely</p> <p>The Project is expected to impact approximately 2.79ha of suitable Grey-headed Flying-fox habitat, comprising Eucalypt forest and exotic riparian forest.</p> <p>However, given the highly mobile nature of the species, availability of other suitable foraging habitats within the region and data indicating lack of nationally-important Flying-fox roost within the study area, the Project is not considered to fragment an existing important population into two or more populations.</p>
<p>Adversely affect habitat critical to the survival of a species</p>	<p>Koala - unlikely</p> <p>As per the habitat assessment undertaken for the Project, the study area is not considered to comprise habitat critical to the survival of the Koala according to the EPBC Act referral guidelines for the vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (Commonwealth of Australia, 2014). While the study area may provide foraging and resting opportunities for the species across its local range, the value of habitat within the study area itself is considered to be limited, though important for connectivity. The Project is unlikely to adversely affect the broader Koala habitat as it is avoiding direct impacts on the majority of contiguous vegetation along the unnamed tributary of Kedron Brook and mitigation measures such as maintaining buffer vegetation and landscaping will be implemented to minimise impacts.</p> <p>As such, the Project is considered unlikely to adversely affect habitat critical to the survival of a species.</p> <p>White-throated Needletail - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of Eucalypt forest which has the potential to serve as transient foraging and resting habitat for the White-throated Needletail.</p> <p>Due to the highly mobile and almost exclusively aerial behaviour of the White-throated Needletail, and lack of suitable roosting/nesting sites for the species identified within the study area, the Project is considered unlikely to adversely affect habitat critical to the survival of a species.</p> <p>Grey-headed Flying-fox - unlikely</p> <p>The Project is expected to impact approximately 2.79ha of suitable Grey-headed Flying-fox habitat, comprising Eucalypt forest and exotic riparian forest.</p> <p>Given the availability of other suitable foraging habitats within the region (including Bunyaville Conservation Park and Kedron Brook), the study area is likely to provide a temporary roost for Flying Fox species subject to localised seasonal availability of foraging resources. However, the highly mobile nature of the species and data indicating lack of recent Flying-fox</p>

	<p>presence indicates the Project is considered unlikely to adversely affect habitat critical to the survival of a species.</p>
<p>Disrupt the breeding cycle of an important population</p>	<p>Koala - unlikely</p> <p>Habitat for Koala within the study area is unlikely to sustain Koala for long periods given its relatively small extent and poor connectivity with larger more contiguous habitats to the north, south and west. However, vegetation is likely to provide transient foraging and resting opportunities for the species across its local range. Since the study area is unlikely to be used for breeding by the species, impacts from the Project are unlikely to disrupt the Koala breeding cycle.</p> <p>As such, the Project is considered unlikely to disrupt the breeding cycle of an important population of this species.</p> <p>White-throated Needletail - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of Eucalypt forest which has the potential to serve as transient foraging and resting habitat for the species. The study area is not considered important breeding habitat for the species, due to the lack of suitable roosting/ nesting sites for the species.</p> <p>As such, the Project is considered unlikely to disrupt the breeding cycle of an important population of this species.</p> <p>Grey-headed Flying-fox - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of suitable Grey-headed Flying-fox foraging habitat, comprising Eucalypt forest and exotic riparian forest. However, the study area is not considered to support an important population of Grey-headed Flying-fox, as nearby roosts are considered transient and do not meet the criteria for a nationally-important grey-headed flying fox camp.</p> <p>As such, the Project is considered unlikely to disrupt the breeding cycle of an important population of this species.</p>
<p>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>Koala - unlikely</p> <p>Habitat modification from the Project is considered unlikely to lead to the species declining, since the Project will avoid directly impacting on the majority of contiguous vegetation along the unnamed tributary of Kedron Brook. In addition, clearing of Koala habitat trees has been minimised as far as practical within the study area. Koala movement opportunities have also been considered in the Project design, such as maintenance or rehabilitation of Koala habitat trees and potential Koala-friendly fencing. Mitigation measures will be implemented to ensure that the Project does not result in indirect impacts that will affect adjoining habitat areas.</p> <p>As such, the Project is considered unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that this species is likely to decline.</p> <p>White-throated Needletail and Grey-headed Flying-fox - unlikely</p> <p>The study area is not expected to support important populations of these species and given their highly mobile nature and the availability of other suitable foraging habitats within the region, these species are not considered likely to be reliant on vegetation within the study area.</p>

	<p>As such, the Project is considered unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that these species are likely to decline.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p>	<p>Koala, White-throated Needletail and Grey-headed Flying-fox - unlikely</p> <p>Invasive species identified within the study area are not considered a primary threat for Koala or White-throated Needletail (DAWE, 2020). In fact, some invasive flora species identified within the study area may be considered a Grey-headed Flying-fox food source i.e. Camphor laurel (<i>Cinnamomum camphora</i>) and Chinese celtis (<i>Celtis sinensis</i>) (Commonwealth of Australia, 2017).</p> <p>It is unlikely that the Project will result in an increase in the presence and establishment of invasive species which may impact on the Koala, White-throated Needletail or Grey-headed Flying-fox. The area of potential habitat is already affected by weed invasion and mitigation strategies, including weed management will be implemented during the life of the Project to manage potential impacts from invasive species.</p> <p>As such, the Project is considered unlikely to result in invasive species that are harmful to a vulnerable species becoming established in habitat for these vulnerable species.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>Koala, White-throated Needletail and Grey-headed Flying-fox - unlikely</p> <p>The Project is unlikely to introduce disease which may lead to declines of these species. While it is unknown whether individuals that may use the study area for transient foraging or resting opportunities are disease free, no additional risk to the health of these species is considered likely as a result of construction of the Project.</p> <p>Pathogens, such as Myrtle rust (<i>Austropuccinia psidii</i>) and Phytophthora (<i>Phytophthora cinnamomi</i>), have the potential to be introduced to the study area during Project construction, by means of increased vehicular and pedestrian movements and imported soils. These pathogens may result in reduced quality and integrity of habitats for Koala, White-throated Needletail and Grey-headed Flying-fox. The potential risks associated with the introduction and spread of these pathogens are considered relatively low risk where appropriate construction hygiene protocols are implemented for the Project. Appropriate construction hygiene measures would be captured within a relevant management plan, such as the Construction Environmental Management Plan.</p> <p>As such, the Project is considered unlikely to introduce disease that may cause these species to decline.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>Koala, White-throated Needletail and Grey-headed Flying-fox - unlikely</p> <p>The Project is unlikely to interfere substantially with the recovery of these species, as the study area is only considered to contain marginal transient or foraging habitat for these species and connectivity will be maintained along the unnamed tributary of Kedron Brook. In addition, clearing of native vegetation will be minimised as far as practical and mitigation measures will be implemented to ensure that fauna habitat is suitably protected and that the Project does not result in indirect impacts that will affect adjoining habitat areas.</p> <p>As such, the Project is considered unlikely to interfere substantially with the recovery of the species</p>

Conclusion: Based on the significant impact assessment, it is determined that the Project is considered unlikely to result in a significant impact to the Koala, White-throated Needle-tail or Grey-headed Flying-fox.

Queensland Matters of State Environmental Significance

Based on the desktop and field assessments detailed in Section 4.3 of the Ecological Assessment Report, one threatened fauna species listed under the NC Act was recorded within the study area, one threatened fauna species has been identified as having a high likelihood of occurrence within the study area and one additional threatened fauna species is likely to have a transient presence within the study area. These threatened fauna species are listed as a Matter of State Environment Significance (MSES) according to the Queensland *Environmental Offset Act 2014* and include:

- Tusked Frog (*Adelotus brevis*), listed as Vulnerable under the NC Act.
- White-throated Needle-tail (*Hirundapus caudacutus*), listed as Vulnerable and Special Least Concern under the NC Act.
- Koala (*Phascolarctus cinereus*), listed as Vulnerable under the NC Act.

The following assessments in Table 12 consider the nature and extent of impacts from the action (the Project) to MSES using the criteria within 'Queensland Environmental Offsets Policy Significant Residual Impact Guideline' (the Significant Residual Impact Guidelines) (Queensland Government, 2014).

To note, the trigger for the assessment of the Koala with respect to the Significant Residual Impact Guidelines is related to mapped Koala habitat areas within the study area, made assessable under the *Planning Regulation 2017*. However, the Project is considered exempted development under Schedule 24 (d) of the *Planning Regulation 2017* for development for infrastructure stated in Schedule 5, if the development is carried out by or for the State or a public sector entity. Schedule 5 includes "transport infrastructure stated in Schedule 2 of the *Planning Act 2016*" which includes "roads, vehicle lay-bys, traffic control devices, dedicated public transport corridors, public parking facilities predominantly serving a local area, cycleways, pathways". As such, a significant residual impact assessment for impacts to Koala are not required for the Project.

The Project will also impact on Regulated Vegetation which is an MSES. Further assessment of the potential for Significant Residual Impacts in relation to Regulated Vegetation under the VM Act may be required should the Project trigger the need for a Permit to clear native vegetation. The requirement for a Permit to clear native vegetation requires further investigation of the location of the 'defining bank' (i.e. high bank) of the unnamed tributary of Kedron Brook. Should clearing be required within 10m of the defining bank, the Project would not meet the Accepted development vegetation clearing code: Clearing for infrastructure (DNRME, 2020)⁹ and therefore trigger approvals requirements.

⁹ Note that this is also reliant on the clearing meeting the clearing width limits as per Appendix 2, Table A of the code, which the proposed clearing footprint assessed for this report currently does as it is less than 10m.

Table 12. Significant Residual Impact Assessment for Tusked Frog and White-throated Needle-tail

Criteria if the Project is likely to have a significant impact on endangered and vulnerable wildlife habitat (including Essential Habitat) if the impact on the habitat is likely to:	Response criteria
<p>Lead to a long-term decrease in the size of a local population</p>	<p>Tusked Frog - unlikely</p> <p>The Tusked Frog was recorded calling in low numbers on all three creek transects undertaken during field investigations for the Project, within and immediately downstream of the study area. The potential direct impacts to Tusked Frog habitat resulting from the Project is expected to be limited to 0.0032ha of lower quality breeding habitat identified within a culvert at the centre of the proposed construction footprint, which equates to 0.5% of the total mapped known or potential breeding habitat mapped within the study area (i.e. 0.78ha). No Tusked Frog individuals were recorded within lower quality breeding habitats and the area of potential impact is only considered to provide breeding opportunities for Tusked Frogs under much wetter conditions than those through May-November of 2020.</p> <p>As such, the Project is considered unlikely to lead to a long-term decrease in the size of a local population of this species.</p> <p>White-throated Needle-tail - unlikely</p> <p>A review of existing data indicates that ten sightings of the White-throated Needle-tail occur within a 3km radius to the study area, including records from the Bunyaville Conservation Park and surrounding suburbs to the north (ALA, 2020). However, no White-throated Needle-tail were observed within the study area during the course of field investigations. In addition, a lack of suitable roosting/ nesting sites within the study area was generally identified for the species.</p> <p>The White-throated Needle-tail is likely to have a transient and predominantly aerial presence within the study area.</p> <p>As such, the Project is considered unlikely to lead to a long-term decrease in the size of a local population of this species.</p>
<p>Reduce the extent of occurrence of the species</p>	<p>Tusked Frog - unlikely</p> <p>The potential direct impacts to Tusked Frog habitat resulting from the Project is expected to be limited to 0.0032ha of lower quality breeding habitat identified within a culvert at the centre of the proposed construction footprint where no Tusked Frogs have been recorded during field investigations. This area is only considered to provide breeding opportunities for Tusked Frogs under much wetter conditions than those through May-November of 2020. The Project will avoid impacts on remaining 0.78ha of identified high, moderate and lower quality Tusked Frog breeding habitat and mitigation measures will be employed to protect this species from indirect impacts.</p>

	<p>As such, the Project is considered unlikely to reduce the extent of occurrence of the species.</p> <p>White-throated Needletail - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of Eucalypt forest which has the potential to serve as transient foraging and resting habitat for the species. However, habitats within the study area are not considered important for the species, due to the lack of suitable roosting/ nesting sites for the species. The White-throated Needletail is likely to have a transient and predominantly aerial presence within the study area.</p> <p>As such, the Project is considered unlikely to reduce the extent of occurrence of the species.</p>
Fragment an existing population	<p>Tusked Frog - unlikely</p> <p>The potential direct impacts to Tusked Frog habitat resulting from the Project is expected to be limited to 0.0032ha of lower quality breeding habitat identified within a culvert at the centre of the proposed construction footprint, which is along the edge of the identified habitat areas. The Project will avoid impacts on remaining 0.78ha of identified high, moderate and lower quality Tusked Frog breeding habitat and mitigation measures will be employed to protect this species from indirect impacts.</p> <p>As such, the Project is considered unlikely to fragment an existing population of the species.</p> <p>White-throated Needletail - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of Eucalypt forest which has the potential to serve as transient foraging and resting habitat for the species. However, habitats within the study area are not considered important for the species, due to the lack of suitable roosting/ nesting sites for the species. The White-throated Needletail is likely to have a transient and predominantly aerial presence within the study area.</p> <p>As such, the Project is considered unlikely to fragment an existing population of the species.</p>
Result in genetically distinct populations forming as a result of habitat isolation	<p>Tusked Frog - unlikely</p> <p>As discussed above, the Project is expected to have minor direct impacts on lower quality habitat for the Tusked Frog. However, identified habitat areas will not be fragmented.</p> <p>As such, the Project is considered unlikely to result in genetically distinct populations forming as a result of habitat isolation for the species.</p> <p>White-throated Needletail - unlikely</p> <p>The White-throated Needletail is likely to have a transient and predominantly aerial presence within the study area.</p>

	<p>As such, the Project is considered unlikely to result in genetically distinct populations forming as a result of habitat isolation for the species.</p>
<p>Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat</p>	<p>Tusked Frog and White-throated Needle-tail - unlikely</p> <p>Invasive species identified within the study area are not considered a primary threat for Tusked Frog or White-throated Needle-tail (DAWE, 2020; Meyer, 2020). It is unlikely that the Project will result in an increase in the presence and establishment of invasive species which may impact on the Tusked Frog or White-throated Needle-tail. The area of potential habitat is already affected by weed invasion and mitigation strategies, including weed management will be implemented during the life of the Project to manage potential impacts from invasive species.</p> <p>As such, the Project is considered unlikely to result in invasive species that are harmful to a vulnerable species becoming established in habitat for these vulnerable species.</p>
<p>Introduce disease that may cause the population to decline</p>	<p>Tusked Frog - unlikely</p> <p>A potential threat to the Tusked Frog and its habitat is the introduction of disease that may directly impact Tusked Frog such as Chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) or may reduce habitat quality and integrity such as Myrtle rust (<i>Austropuccinia psidii</i>) and Phytophthora (<i>Phytophthora cinnamomi</i>). Management measures will be implemented throughout the Pre-construction and Construction of the Project to prevent of introduction and/or promotion of invasive pathogens, including hygiene requirements, awareness, monitoring and reporting protocols. Appropriate construction hygiene measures would be captured within a relevant management plan, such as the Construction Environmental Management Plan.</p> <p>As such, the Project is considered unlikely to introduce disease that may cause the population to decline.</p> <p>White-throated Needle-tail - unlikely</p> <p>The White-throated Needle-tail is likely to have a transient and predominantly aerial presence within the study area. The Project is unlikely to introduce disease which may lead to decline of this species.</p> <p>As such, the Project is considered unlikely to introduce disease that may cause the population to decline.</p>
<p>Interfere with the recovery of the species</p>	<p>Tusked Frog - unlikely</p> <p>The potential direct impacts to Tusked Frog habitat resulting from the Project is expected to be limited to 0.0032ha of lower quality breeding habitat identified within a culvert at the centre of the proposed construction footprint, which is along the edge of the identified habitat areas. The Project will avoid impacts on remaining 0.78ha of identified high, moderate and lower quality Tusked Frog breeding habitat and mitigation measures will be employed to protect this species from indirect impacts.</p>

	<p>As such, the Project is considered unlikely to interfere with the recovery of this species.</p> <p>White-throated Needletail - unlikely</p> <p>The Project is unlikely to interfere with the recovery of this species as the study area is only considered to contain marginal habitat for these species and connectivity will be maintained along the unnamed tributary of Kedron Brook. In addition, clearing of native vegetation will be minimised as far as practical and mitigation measures will be implemented to ensure that fauna habitat is suitably protected and that the Project does not result in indirect impacts that will affect adjoining habitat areas.</p> <p>As such, the Project is considered unlikely to interfere with the recovery of this species.</p>
<p>Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.</p>	<p>Tusked Frog - unlikely</p> <p>The potential direct impacts to Tusked Frog habitat resulting from the Project is expected to be limited to 0.0032ha of lower quality breeding habitat identified within a culvert at the centre of the proposed construction footprint which is along the edge of the identified habitat areas. The Project will avoid impacts on remaining 0.78ha of identified high, moderate and lower quality Tusked Frog breeding habitat and mitigation measures will be employed to protect this species from indirect impacts. In addition, specific mitigation measures will be implemented to minimise the potential impacts to the breeding cycle for this species, such as timing construction activities appropriately around breeding season and use of fauna sensitive lighting.</p> <p>As such, the Project is considered unlikely to cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of this species.</p> <p>White-throated Needletail - unlikely</p> <p>The Project is expected to impact approximately 2.35ha of Eucalypt forest which has the potential to serve as transient foraging and resting habitat for the species. However, habitats within the study area are not considered important for the species, due to the lack of suitable roosting/ nesting sites for the species.</p> <p>As such, the Project is considered unlikely to cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of this species.</p>
<p>Conclusion: Based on the significant residual impact assessment, it is determined that the Project is considered unlikely to result in a significant residual impact to the Tusked Frog or White-throated Needletail.</p>	

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Contact Us

Niche Environment and Heritage
02 9630 5658
info@niche-eh.com

NSW Head Office – Sydney
PO Box 2443 North Parramatta
NSW 1750 Australia

QLD Head Office – Brisbane
PO Box 540 Sandgate
QLD 4017 Australia

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Impact assessments
Development and activity approvals
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Stakeholder consultation and facilitation
Project management

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Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)