Significant Biodiversity Assessment Report

176-228 Mountain Ridge Road
South Maclean
Prepared for Orchard Development Management
24 January 2020

Job No. 9534

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2019/1013

Date: 30 April 2020

Queensland Government

Document control

Document: Significant Biodiversity Assessment Report (Issue C) for 176-228 Mountain Ridge Road, South Maclean, prepared by Saunders Havill Group for Orchard Development Management Pty Ltd ATF Orchard Development Unit Trust.

Document Issue

Issue	Date	Prepared By	Checked By
Issue A	25.02.2019	James Gautrey Olivia Short	Adam Hutchinson
Issue B	26.09.2019	Hannah Silcox	Adam Hutchinson
Issue C	23.01.2020	Chris Huff	Adam Hutchinson

Prepared by

ABN 24 144 972 949
www.saundershavill.com

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Acronyms and abbreviations

Legislation and Government Departments

DAF	Department of Agriculture and Fisheries (Qld)
DES	Department of Science and Environment (Qld)
DLGRMA	Department of Local Government, Racing and Multicultural Affairs (Qld)
DNRME	Department of Natural Resources, Mines and Energy (Qld)
EDQ	Economic Development Queensland (Qld)
EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
LCC	Logan City Council
MSES	Matters of State Environmental Significance
NCA	*Nature Conservation Act 1992* (Qld)
NCWR	Nature Conservation (Wildlife) Regulation 2006 (Qld)
PA	*Planning Act 2016* (Qld)
PR	Planning Regulation 2017 (Qld)
SARA	State Assessment Referral Agency (part of DLGRMA)
SPP	State Planning Policy 2017 (Qld)
VMA	*Vegetation Management Act 1999* (Qld)

Abbreviations

ASRIS	Australian Soil Resource Information System
DAMS	Development Assessment Mapping System (administered by SARA)
DBH	Diameter at Breast High
GBO	General Biosecurity Obligation
MCU	Material Change of Use
MLES	Matters of Local Environmental Significance
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
PDA	Priority Development Area
PMAV	Property Map of Assessable Vegetation
PMST	Protected Matters Search Tool
ROL	Reconfiguration of a Lot
RVMM	Regulated Vegetation Management Map
SAT	Spot Assessment Technique
SBAR	Significant Biodiversity Assessment Report
SDAP	State Development Assessment Provisions
SHG	Saunders Havill Group
SPRAT	Species Profile and Threats Database
SRI	Significant Residual Impact
SRZ	Structural Root Zone
SVMM	Supporting Vegetation Management Map
TPZ	Tree Protection Zone

WWBW	Waterway Barrier Works

1. Introduction

Saunders Havill Group (SHG) was engaged by Orchard Development Management Pty Ltd. (trading as Orchard Property Group) to prepare a Significant Biodiversity Assessment Report (SBAR) in response to Economic Development Queensland's (EDQ) *PDA Implementation Guideline No. 14 (Environmental values and sustainable resources* - IG14) and *PDA Implementation Guideline No.17 (Remnant Vegetation and Koala Habitat Obligations in Greater Flagstone and Yarrabilba PDAs)* (IG17*)* for a proposed residential development located at 176-228 Mountain Ridge Road, South Maclean.

As the site is located within the Greater Flagstone Priority Development Area (PDA) it is subject to assessment by EDQ as the administrative authority for development in PDAs. This SBAR provides a review of the site's ecological values in accordance with Commonwealth and State Government legislation and is intended to support the submission of a development application to EDQ.

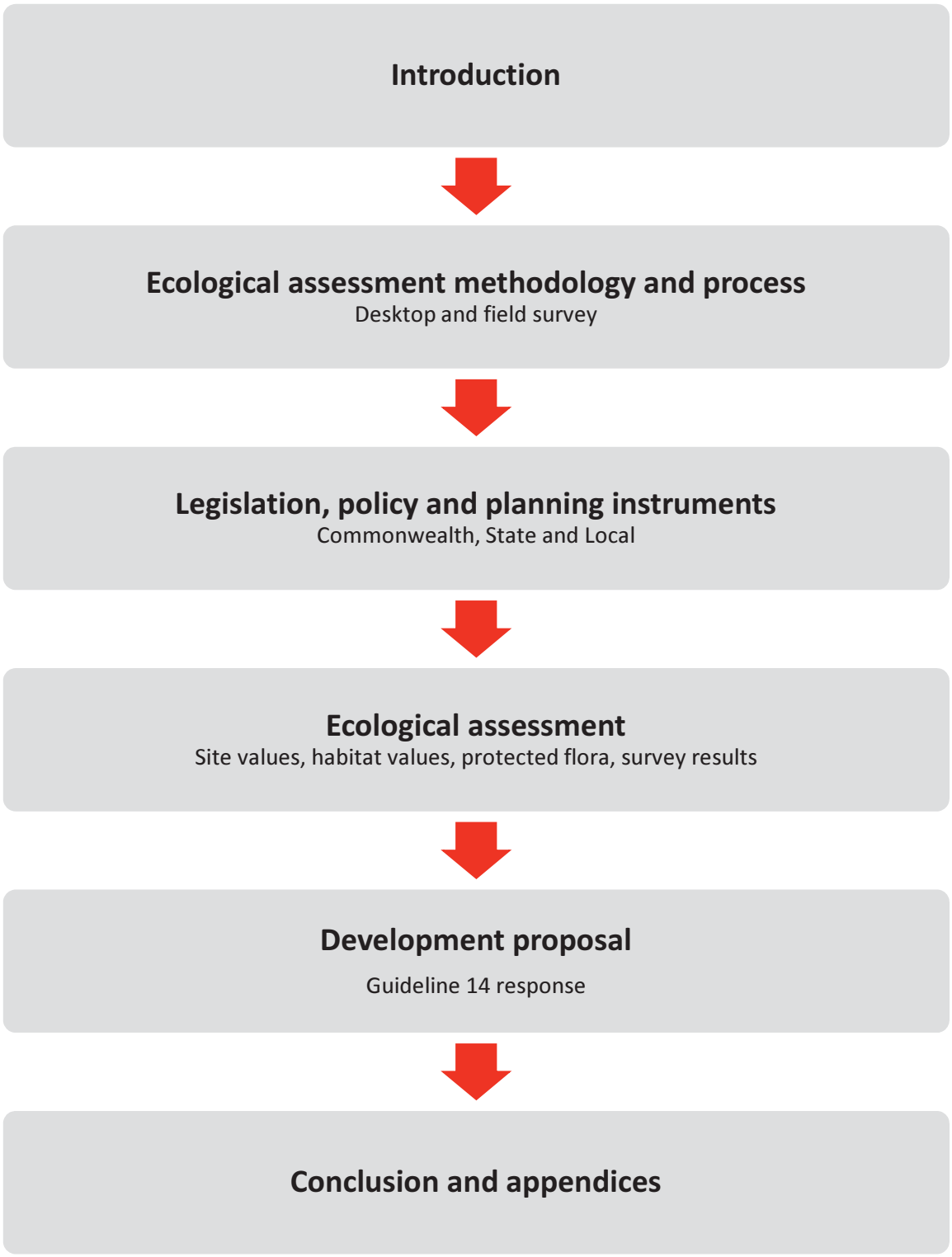
1.1. Property summary

Table 1: Property summary

Address	176-228 Mountain Ridge Road, South Maclean
Lot / plan	Lot 30 on SP309195
Area	40.71 ha
VMA 1999	Category X (non-remnant), Category B (Endangered & Least Concern), Essential Habitat (Koala) & watercourse
Fisheries 1994	High risk waterway for waterway barrier works
State planning provisions	Biodiversity (MSES – Regulated Vegetation intersecting a watercourse, Wildlife Habitat, Regulated Vegetation Category B, Regulated Vegetation Essential Habitat)
Koala habitat	Outside SPRP Koala Assessable Development Area Low & Medium Value Bushland & Low & Medium Value Rehabilitation
LGA	Logan City Council
Planning scheme	Greater Flagstone PDA Development Scheme
Greater Flagstone PDA	Zone – Urban Living Development Constraints – Waterway, Q100 Flood Natural Values – Waterway
Existing land use	Vacant land
Proposed land use	Residential

1.2. Report structure

This SBAR adopts the following structure:



1.3. Context and background

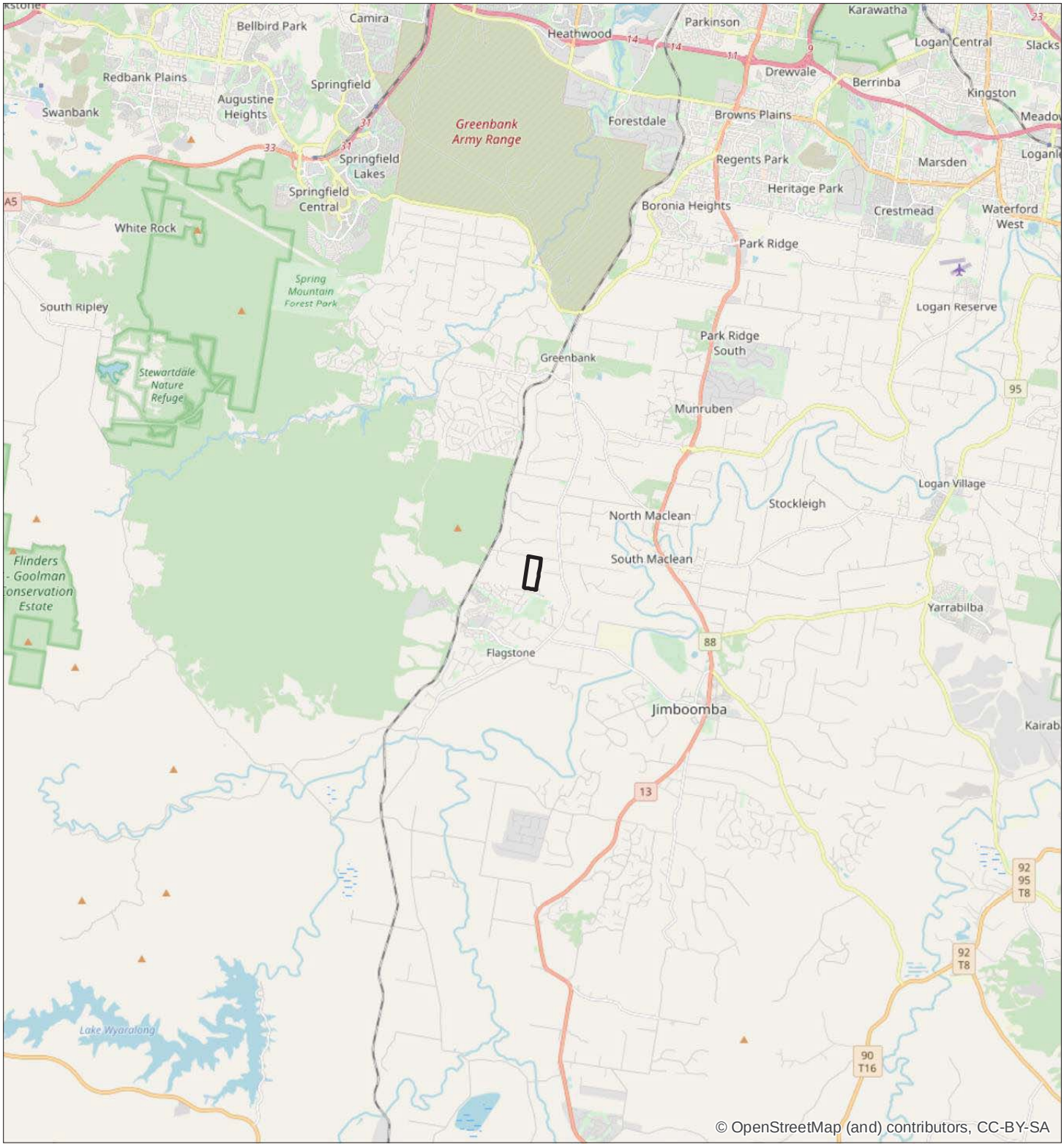
The site contains one lot, described as Lot 30 on SP309195 and can be accessed from Mountain Ridge Road along the northern property boundary.

Contextually, the site forms part of the eastern portion of the Greater Flagstone Priority Development Area (PDA). The future development land of Flagstone West lies to the west. The Jimboomba Town Centre is located approximately 7 kilometres to the south-east and Springfield CBD approximately 14km north-west (refer Figure 1 for site context and Figure 2 for site aerial).

Topography of the site ranges from approximately 50 metres in elevation in the north, to 30m in the central portion of the site (waterway). Adjoining allotments are included within the PDA and are either earmarked for or are under development (refer **Plan 1**). Many of these adjoining developments already possess determinations under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and approvals under the *Economic Development Act 2012*. Plan 1 gives the context of the site in relation to the Greater Flagstone PDA, current and future residential development and connectivity along Flagstone Creek. As indicated, much of the site's surrounds are highly modified and connectivity through the site is facilitated by the Flagstone Creek corridor.

The allotment includes approximately 30.5 hectares (Ha) of remnant vegetation and approximately 9.8Ha of non-remnant vegetation. Flagstone Creek traverses the site, and flows from north-west to south-east. Essential habitat mapping for the Koala (*Phascolarctos cinereus*) occurs over all of the remnant vegetation on-site. Overall, the site was found to be relatively intact, with areas of the site disturbed by weed species, particularly within the waterway. The site has been subject to flora and fauna assessments to address various approval requirements including targeted surveys carried out specifically for assessment against the EPBC Act and assessment against IG14 and IG17. The results of these assessments are summarised and presented in this report.

The project site will be developed in accordance with the proposed development plan (refer **Appendix A**). The development plan refines outcomes of the site in alignment with the *Greater Flagstone Priority Development Area Development Scheme* (Development Scheme), as implemented by EDQ.



Legend

Site DCDB

Figure 1

Site Context

Orchard Development Management Pty Ltd

File ref. 9534 E Figure 1 Site Context A
Date *19/02/2019*
Project *Mountain Ridge Road, South Maclean*

0 0.5 1 2 3 4 5 *km*

N

Scale (A4): 1:175,000 [GDA 1994 MGA Z56]

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Layer Source: *© State of Queensland (Department of Natural Resources, Mines and Energy) 2019*

Legend

Site DCDB

Qld DCDB

Figure 2

Site Aerial

Orchard Development Management Pty Ltd

File ref. 9534 E Figure 2 Site Aerial A
Date *19/02/2019*
Project *Mountain Ridge Road, South Maclean*

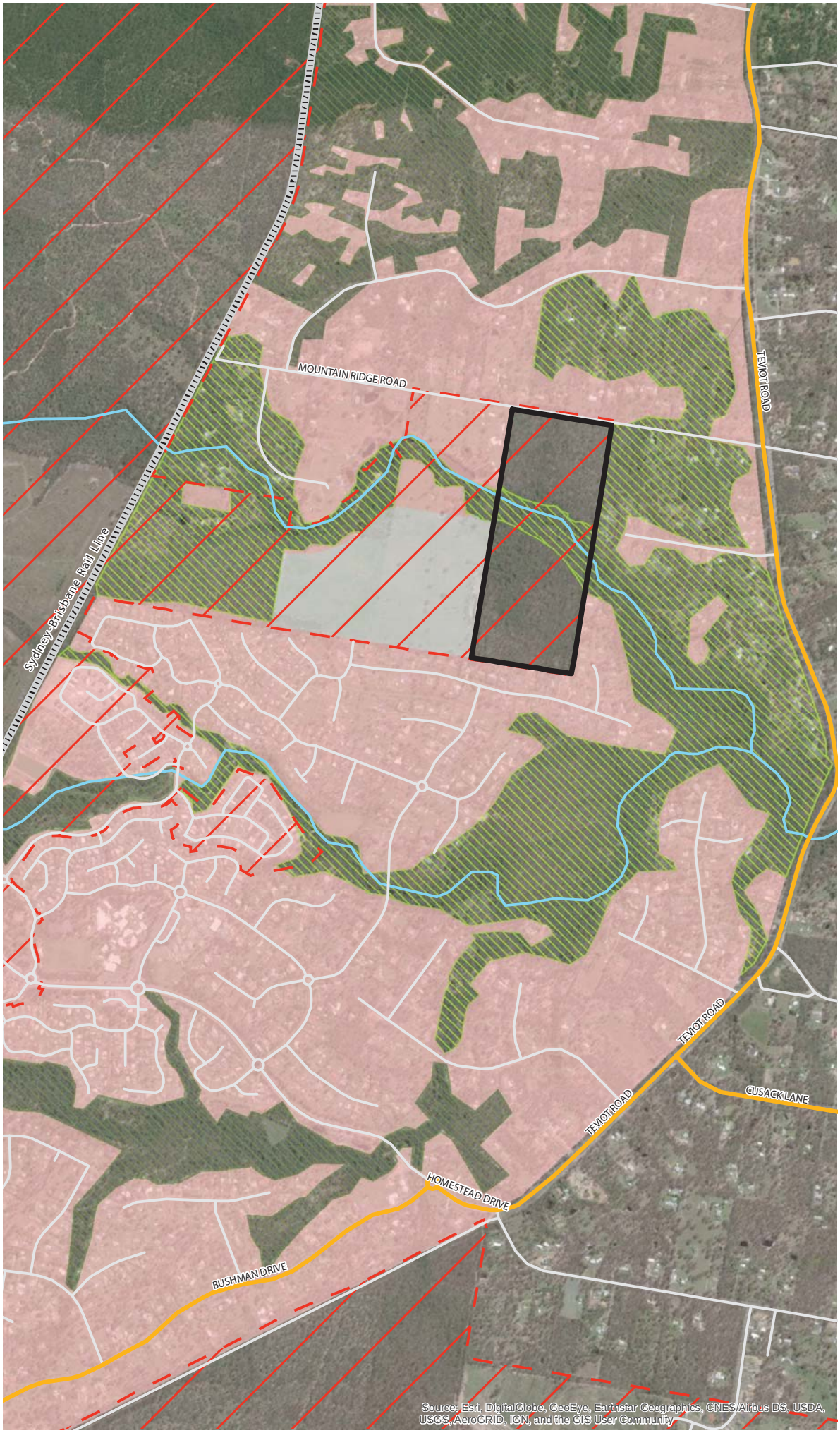
0 50 100 200 *m*

N

Scale (A4): 1:6,000 [GDA 1994 MGA Z56]

Layer Source: © State of Queensland (Department of Natural Resources, Mines and Energy) 2019, Aerial (Nearmap 2019)

1. Fragmentation Analysis



NOTES
This plan was prepared as a desktop assessment tool.
The information on this plan is not suitable for any other purpose. Property dimensions, areas, numbers of lots and contours and other physical features shown have been compiled from existing information and may not have been verified by field survey. These may need verification if the development application is approved and development proceeds, and may change when a full survey is undertaken or in order to comply with development approval conditions. No reliance should be placed on the information on this plan for detailed design or for any financial dealings involving the land. Saunders Havill Group therefore disclaim s any liability for any loss or damage whatsoever or howsoever incurred, arising from any party using or relying upon this plan for any purpose other than as a document prepared for the sole purpose of accompanying a development application and which may be subject to alteration beyond the control of the Saunders Havill Group. Unless a development approval states otherwise, this is not an approved plan.

Layer Sources
Qld State Cadastre and Mapping layers © State of Queensland (Department of Natural Resources and Mines) 2018. Updated data available at http://qldspatial.information.qld.gov.au/catalogue//
Aerial Imagery © Nearmap, 2018

*This note is an integral part of this plan/data. Reproduction of this plan or any part of it without this note being included in full will render the information shown on such reproduction invalid and not suitable for use.

Legend

- Site DCDB
- Greater flagstone Priority Development Area
- Waterway to retain
- Highway
- Major arterial road
- Minor road/street
- Rail line

Fragmentation analysis

- Connectivity area - 267.5ha
- Bush
- Future development
- Residential/highly modified

Issue	Date	Description	Drawn	Checked
A	20/02/2019	Preliminary	MP	OS

0 70 140 280 420 560 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:15,000 @ A3

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Orchard Development Management Pty Ltd
ATF Orchard Development Management Unit Trust

Mountain Ridge Road, South Maclean

ADDRESS/RPD: 3RP133386 | 20/02/2019 | 9534 E01 Fragmentation Analysis A

2. Ecological assessment methodology and process

The following steps were undertaken in the preparation of this assessment:

1. Desktop analysis;
2. Legislation and policy review;
3. Field survey;
4. Impact assessment and development analysis; and
5. Conclusion and recommendations.

Details of the methodology undertaken for each of the assessment phases is provided in the following sections.

2.1. Desktop analysis methodology

Prior to the commencement of field surveys, a desktop analysis was conducted of Commonwealth, State and Local environmental databases and overlay mapping including the following:

- Commonwealth Matters of National Environmental Significance protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on and around the site using the Protected Matters Search Tool (PMST);
- *Nature Conservation Act 1992* (NCA) listed threatened species on and around the site using the Wildlife Online Database;
- Public Environmental Databases including Atlas of Living Australia;
- State Government Environmental Overlay Mapping including:
    - Regulated Vegetation Maps under the *Vegetation Management Act 1999* (VMA);
    - Flora Survey Trigger Areas under the *Nature Conservation Act 1992*;
    - Fish habitat under the *Fisheries Act 1994*;
    - Watercourses under the *Water Act 2000*;
    - Weeds under the *Biosecurity Act 2014*;
    - Matters of State Environmental Significance under the State Planning Policy (i.e. wetland protection areas, koala habitat etc.); and
- PDA Planning Scheme Documents and Maps.

A review of aerial photography history was undertaken to assist with the broad delineation of vegetation communities and to determine historical patterns to local vegetation communities.

2.2. Field survey methodology

A field survey utilising the following methods was conducted to describe site ecological value.

2.2.1 Observational survey for significant flora and fauna, habitat trees and biodiversity values

The site was walked to ensure species (flora and fauna) were recorded and identified. Particular attention was paid to any threatened species that were listed as possibly occurring on or within the vicinity of the application area and specific micro-assemblages which may support these threatened species. This included observations for vertebrate fauna present on or that may utilise the study area, including faunal lists and significance status of species under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) including the JAMBA, CAMBA, ROKAMBA and the Bonn Convention, and Queensland's *Nature Conservation Act 1992* (NCA).

The observational survey included identification of ecological features and values such as broad vegetation communities, fauna habitat. Specific attention was paid to Commonwealth and State listed significant flora and fauna species.

2.2.2 Ground-truthing of vegetation communities

Vegetation was ground-truthed and assessed again current VMA regional ecosystem (RE) mapping and pre-clear mapping. This included reviewing the accuracy and extent of mapped RE types in addition to the broad condition.

2.2.3 Diurnal active searches

Active searching primarily focuses on detecting reptiles and amphibians yet will also detect small terrestrial mammals and signs of other cryptic species.

This technique involved scanning for active animals as well as turning rocks and logs, raking through leaf litter, looking under bark and in crevices and other suitable microhabitat for cryptic animals. During these searches, other signs were also recorded (when observed) where they could confidently be attributed to species (e.g. tracks, scats, nests and feeding signs). During searches, habitat was reinstated, such as re-rolling logs and rocks back into place and avoiding the removal of whole sheets of exfoliating bark. This survey methodology did not involve capturing any fauna species.

2.2.4 Nocturnal active searches and spotlighting

This non-intrusive technique is the most effective method to obtain estimates of nocturnal arboreal mammal incidence and abundance in wooded habitats. This survey technique involved detecting eye-shine. Spotlighting also targets medium to large terrestrial nocturnal mammals, and can detect other nocturnal taxon groups (e.g. frogs, reptiles, nocturnal birds, spiders, etc). Spotlighting was undertaken from dusk to more than 1 hour after dusk. Survey date and weather conditions are presented in **Section 4.4**.

2.2.5 Koala habitat and SAT surveys

Tools for determining localised levels of use by *Phascolarctos cinereus* (Koala) included regularised, grid-based (RGB) sampling using the Spot Assessment Technique (SAT) methodology. SAT surveys were undertaken

on-site in accordance with the methodology developed by the Australian Koala Foundation (as per Phillips & Callaghan 2011) and specified in the EPBC Act Referral Guidelines for the vulnerable Koala. Additional general observations and habitat features across the site were also recorded.

The SAT method is an assessment of Koala activity involving a search for any Koalas and signs of Koala usage. The SAT involves identifying the non-juvenile tree of any species under the pre-determined point, and recording any evidence of Koala usage of that tree including presence, identifiable scratches or scats. The nearest non-juvenile tree is then identified and the same data recorded. The next closest non-juvenile tree to the first tree is then assessed and so on until 30 trees have been surveyed. Assessment of each tree involves a systematic search for Koala scats beneath the tree within 1 metre radius of the trunk. After approximately 2 minutes of searching for scats, the base of the trunk is observed for scratches and the crown for Koala. The number of trees showing evidence of Koala activity is expressed as a percentage of the total number of trees sampled to indicate the frequency of Koala usage (refer Phillips & Callaghan 2011). Six SAT surveys were completed across the site – results are presented in **Section 4.5**.

2.2.6 Habitat condition assessments

Habitat quality assessments were conducted across the site using the 'Guide to determining terrestrial habitat quality – A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy Version 1.0 September 2014' (the Guideline). As per the Guideline, the site was divided into Habitat Assessment Units based on regional ecosystem mapping and other prevailing ecological and topographical features, with each containing multiple data collection transects depending on its size.

Within each Habitat Assessment Unit, site condition, site context and the species habitat index are determined based on field transects and observations and desktop studies. The purpose of the transects was to determine attribute scores for site condition. A total of six habitat quality transects were conducted across the site – results are present in **Section 4.2**.

2.2.7 Motion sensor cameras

Camera trapping involves setting up a fixed motion sensor camera to capture video of animals which pass in front of camera. It is a non-invasive technique ideally designed to detect medium to large sized animals as they pass, although it is possible to detect smaller animals with the right set-up. This set-up identifies fauna activity beyond the scope of direct observational studies and in the absence of potential observer impacts.

Two infrared sensing cameras, with an infrared flash and utilise motion to trigger, were deployed on 28 November 2018 and collected on 7 December 2018. Ideally, cameras were attached 30-50 cm from the ground on a tree or post, and directed towards the bait/bait cage which is placed about 1.5-2 m from camera. The recommended bait is dependent on target species, however for generic survey sites, the recommended bait base is rolled oats mixed with peanut butter. These cameras were situated on-site for a total of 9-days to record, meeting the recommendation of no longer than 2-weeks and a minimum of 4-nights. The programming was consistent across all cameras, and cameras were set up in a consistent manner to maintain similar detection probabilities.

2.2.8 Flying-fox roost searches

This search was conducted via meanders during the day within the site, watching for flying bats and listening for their distinctive calls. This search is not only for flying fox camps, but the presence of food plants to assess the potential importance of the survey area to the species. During dusk to a more than 1 hour afterwards, the site was meandered using a spotlight to survey for individual Flying-foxes using the site for foraging.

3. Legislation, policy and planning instruments

3.1. *Environment Protection and Biodiversity Conservation Act 1999*

The Australian Government's key piece of environmental legislation is the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act aims to protect and manage matters of environmental significance which include nationally and internationally important flora, fauna, ecological communities and heritage places.

A search using the Commonwealth's Protected Matters Search Tool (PMST) for the site. The search provides a list of wetlands of international significance, threatened ecological communities and threatened species which have the potential to be temporarily or permanently located within a 5 km radius from the central point of the site. **Table 2** lists a summary of these results relevant to the site. The complete results of this search are included in **Appendix B.**

Table 2: EPBC Act PMST search results

Wetlands of international importance		
Moreton Bay (20-30km upstream)		
Threatened ecological communities		
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 the area) **Swamp Tea-tree (*Melaleuca irbyana*) Forest of Southeast Queensland –**Critically Endangered (Community likely to occur within area) **White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland** – Critically Endangered (Community may occur within area)		
Threatened species		
Scientific name	**Common name**	**Status**
Birds		
Anthochaera Phrygia	Regent Honeyeater	Critically Endangered
Botaurus poiciloptilus	Australasian Bittern	Endangered
Calidris ferruginea	Curlew Sandpiper	Critically Endangered
Dasyornis brachypterus	Eastern Bristlebird	Endangered
Erythrotriorchis radiatus	Red Goshawk	Vulnerable
Geophaps scripta scripta	Squatter Pigeon (southern)	Vulnerable

Threatened species		
Scientific name	**Common name**	**Status**
Grantiella picta	Painted Honeyeater	Vulnerable
Lathamus discolor	Swift Parrot	Critically Endangered
Numenius madagascariensis	Eastern Curlew	Critically Endangered
Poephila cincta cincta	Southern Black-throated Finch	Endangered
Rostratula australis	Australian Painted Snipe	Endangered
Turnix melanogaster	Black-breasted Button-quail	Vulnerable
Fish		
Maccullochella mariensis	Mary River Cod	Endangered
Insects		
Argynnis hyperbius inconstans	Australian Fritillary	Critically Endangered
Mammals		
Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat	Vulnerable
Dasyurus maculatus maculatus	Spot-tailed Quoll	Endangered
Petauroides volans	Greater Glider	Vulnerable
Petrogale penicillta	Brush-tailed Rock-Wallaby	Vulnerable
Phascolarctos cinereus	Koala	Vulnerable
Potorous tridactylus tridactylus	Long-nosed Potoroo	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-Fox	Vulnerable
Plants		
Bosistoa transversa	Three-leaved Bosistoa	Vulnerable
Cycas ophiolitica	-	Endangered
Dichanthium setosum	Bluegrass	Vulnerable
Macadamia integrifolia	Macadamia Nut	Vulnerable
Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable
Notelaea ipsviciensis	Cooneana Olive	Critically Endangered
Notelaea lloydii	Lloyd's Olive	Vulnerable
Phaius australis	Lesser Swamp Orchid	Endangered
Samadera bidwillii	Quassia	Vulnerable
Thesium australe	Austral Toadflax	Vulnerable
Reptiles		
Delma torquata	Collared Delma	Vulnerable

Threatened species		
Scientific name	**Common name**	**Status**
Furina dunmalli	Dunmall's Snake	Vulnerable
Saiphos reticulatus	Three-toed Snake-tooth Skink	Vulnerable

3.2. *Nature Conservation Act 1992*

The *Nature Conservation Act 1992 (*NCA) classifies and protects significant areas (Protected Areas) and protects Threatened plant and animal species. The Nature Conservation (Wildlife) Regulation 2006 (NCWR) lists plant and animal species presumed extinct, endangered, vulnerable, near threatened, least concern, international or prohibited. The schedules of this regulation were considered in this report using a Wildlife Online Database Search with a 5km radius from the site. Species listed under the NCWR with the potential to occur around the subject site are shown in **Table 3**. Refer to **Appendix C** for full search results.

Table 3: NCA wildlife online search results

Scientific name	Common name	Queensland Status
Birds		
Calyptorhynchus lathami lathami	Glossy Black-Cockatoo	Vulnerable
Mammals		
Phascolarctos cinereus	Koala	Vulnerable
Petauroides volans volans	Southern Greater Glider	Vulnerable
Plants		
Melaleuca irbyana	-	Endangered

The Protected Plants regulatory framework under the NCA commenced on 31 March 2014, establishing approval triggers and processes for clearing protected plants. A Protected Plant is defined as all extinct, endangered, vulnerable and/or near threatened (EVNT) plant species listed by name in schedules 1-5 of the NCWR and least concern wildlife, not listed by name but identified as a plant indigenous to Australia in schedule 6.

Under the amended NCA, a protected plant that is in the wild must not be 'taken', which includes being cleared, unless taking is under:

- A conservation plan applicable to the plant;
- A license, permit or other authority under a regulation; or
- An exemption under a regulation.

A search of the protected plants flora survey trigger map identified that the site is located within a 'high risk' area for protected plants (refer to **Appendix D -** environmental searches). As such, a Protected Plants Clearing Permit is required to be submitted to DES.

It should be noted that two (2) live specimens and one (1) dead juvenile specimen of *Melaleuca irbyana* were recorded, towards the South West property corner. As such An Impact Management Plan will need to be submitted to DES to address the removal of these specimens (offsets may be required).

3.3. *Vegetation Management Act 1999*

The VMA is the key mechanism by which the Queensland Government protects the state's environmental resources pertaining to vegetation. Under the VMA, a series of maps delineate vegetation features across the landscape, which are each assigned a conservation value directly related to the remaining extent of these features in the landscape. The VMA also protects 'essential habitat' vegetation where listed threatened species have been known to occur.

Regulated vegetation management mapping shows vegetation categories used to determine clearing requirements. While areas shown on the map as category X are not regulated under the VMA, those shown as category A, B, C or R are subject to clearing requirements. The latter vegetation categories can only be cleared in accordance with an exemption, self-assessable vegetation clearing code, and area management plan or development approval. A supporting map defining regional ecosystems, wetlands, watercourses and essential habitat, is provided with the regulated vegetation management map.

A property search of the regulated vegetation management map identifies the site is mapped predominantly as category B (remnant) vegetation, with an area of category X (non-remnant) (refer to **Figure 3**). The supporting vegetation management map shows the referral area is mapped within Endangered, and Least Concern regional ecosystems, with all of the remnant vegetation mapped as essential habitat for the Koala. A watercourse is mapped on-site (refer **Figure 4). Table 4** provides descriptions of the mapped regional ecosystems on-site.

Of note, the provisions of the VMA do not apply within Priority Development Areas.

Table 4: Regional ecosystem descriptions

Status	Code	Description
Endangered	RE 12.3.3	*Eucalyptus tereticornis woodland. Eucalyptus crebra and E. moluccana are sometimes present and may be relatively abundant in places, especially on edges of plains and higher level alluvium. Other species that may be present as scattered individuals or clumps include Angophora subvelutina or A. floribunda, Corymbia clarksoniana, C. intermedia, C. tessellaris, Lophostemon suaveolens and E. melanophloia. Occurs on Quaternary alluvial plains, terraces and fans where rainfall is usually less than 1000mm/y. (BVG1M: 16c)*

Status	Code	Description
Least Concern	RE 12.3.7	*Narrow fringing woodland of Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca viminalis. Other species associated with this RE include Melaleuca bracteata, M. trichostachya, M. linariifolia. North of Brisbane Waterhousea floribunda commonly occurs and may at times dominate this RE . Melaleuca fluviatilis occurs in this RE in the north of the bioregion. Lomandra hystrix often present in stream beds. Occurs on fringing levees and banks of rivers and drainage lines of alluvial plains throughout the region. (BVG1M: 16a)*
Least Concern	RE 12.9-10.2	*Corymbia citriodora subsp. variegata open forest or woodland usually with Eucalyptus crebra. Other species such as Eucalyptus tereticornis, E. moluccana, E. acmenoides and E. siderophloia may be present in scattered patches or in low densities. Understorey can be grassy or shrubby. Shrubby understorey of Lophostemon confertus (whipstick form) often present in northern parts of bioregion. Occurs on Cainozoic and Mesozoic sediments. (BVG1M: 10b)*

3.4. *Biosecurity Act 2014*

The *Biosecurity Act 2014*, which commenced on 1 July 2016, establishes a framework to regulate and control invasive plants and animals. Under the act, land owners are responsible for taking all reasonable and practical steps to minimise the risks associated with invasive plants and animals under their control. This is known as the general biosecurity obligation (GBO).

The act categorises restricted matter (restricted plants and animals) into the following:

- Category 1: must be reported to an inspector within 24 hours (includes Red Imported Fire Ants, amongst others).
- Category 2: must be reported within 24 hours Biosecurity Queensland on 13 25 23.
- Category 3: must not be distributed either by sale or gift, or released into the environment.
- Category 4: must not be moved.
- Category 5: must not be kept.
- Category 6: must not be fed (animals).
- Category 7: Must be euthanised (animals).

Restricted matters observed in the site area discussed in **Section 4**.

3.5. *Fisheries Act 1994*

The *Fisheries Act 1994* deals with the use, conservation and improvement of Queensland's fisheries resources and fish habitats. The legislation deals with the impact from coastal development on marine fish habitat, including protected marine plants, and declared fish habitat areas. Development proposals that modify, or

have a temporary or permanent loss of fish habitat are assessed by the Department of Agriculture and Fisheries (DAF).

The site is mapped as containing one High (red) risk waterway for waterway barrier works (WWBW) under SARA's Development Mapping Assessment System (DAMS) (refer **Figure 5**). Although not anticipated, should any works be undertaken within the mapped waterway, a response to State Code 18: Waterway Barrier Works may be required.

Legend

- Site DCDB
- Qld DCDB

Regulated Vegetation

- Category A area - *Vegetation Offset/Compliance notices/VDecs*
- Category B area - *Remnant vegetation*
- Category C area - *High value regrowth vegetation*
- Category R area - *Reef regrowth watercourse vegetation*
- Category X area - *Vegetation not regulated under the VMA*
- Water
- Area not categorised

Figure 3

Regulated Vegetation Management Map

Orchard Development Management Pty Ltd

File ref. 9534 E Figure 3 RVMM A
Date *19/02/2019*
Project *Mountain Ridge Road, South Maclean*

0 50 100 200 *m*

N

Scale (A4): 1:6,000 [GDA 1994 MGA Z56]

saunders havill group

Layer Source: © State of Queensland (Department of Natural Resources, Mines and Energy) 2019, Aerial (Nearmap) 2019

Legend

- Site DCDB
- Qld DCDB
- VM Watercourses
- VM Essential Habitat
- VM Wetland

Regional Ecosystems mapping

- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem

Figure 4

Regulated Vegetation Supporting Map

Orchard Development Management Pty Ltd

File ref. 9534 E Figure 4 RVSM A
Date *20/02/2019*
Project *Mountain Ridge Road, South Maclean*

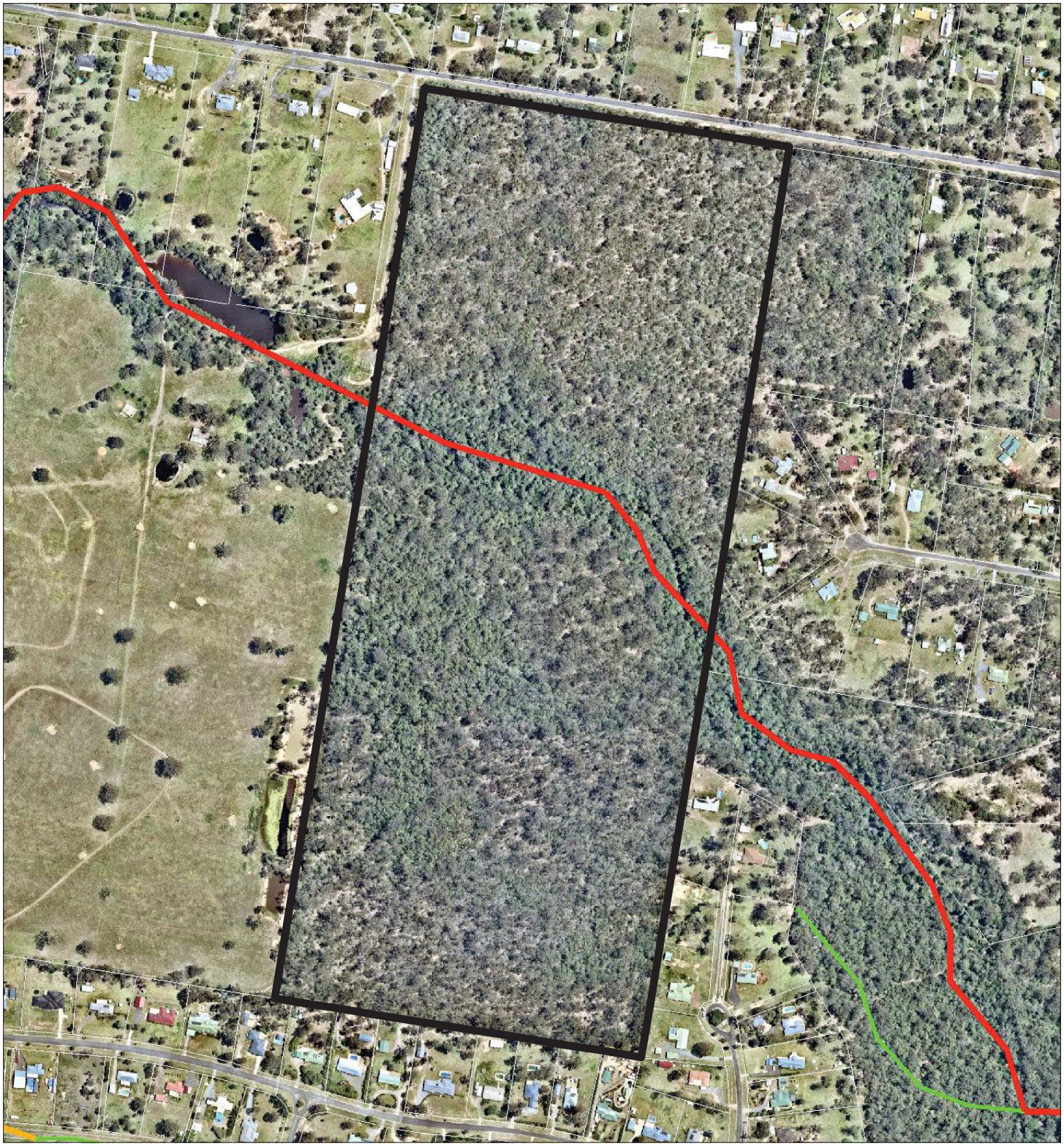
0 50 100 200 *m*

N

Scale (A4): 1:6,000 [GDA 1994 MGA Z56]

saunders havill group

Layer Source: © State of Queensland (Department of Natural Resources, Mines and Energy) 2019, Aerial (Nearmap 2019)



Legend

Site DCDB

Fish habitat area

Qld DCDB

Waterways

Risk of Impact

1 - Low

2 - Moderate

3 - High

4 - Major

Tidal waterway

Figure 5

Fisheries - Waterways for Waterway Barrier Works

Orchard Development Management Pty Ltd

File ref. 9534 E Figure 5 Fisheries A
Date *19/02/2019*
Project *Mountain Ridge Road, South Maclean*

0 10 20 40 60 80 *m*

N

Scale (A4): 1:6,000 [GDA 1994 MGA Z56]

saunders havill group

Layer Source: © State of Queensland (Department of Natural Resources, Mines and Energy) 2019, Aerial (Nearmap 2018)

3.6. Other Queensland environmental legislation

Other Queensland environmental legislation has been reviewed in the context of the proposed development. **Table 5** lists other relevant Queensland legislation that is not triggered by the proposed development, the purpose of the legislation, and its relevance to the proposed development site.

Table 5: Site relevant to other Queensland environmental legislation

Legislation	Purpose	Relevance to Development Site
Coastal Protection and Management Act 1995	The act seeks to protect the coastal resources of the coastal zone.	The site does not contain any coastal areas. Therefore, a response to State Code 8 is not required.
State Planning Policy 2017 (SPP)	Provides interim development assessment requirements which ensures that state interests are considered by local government when assessing development applications where the local government planning scheme does not yet integrate the State interests in the SPP. Matters of State Environment Significance (MSES) include Biodiversity, Coastal Environment, and Water Quality.	The site is mapped as containing MSES – Wildlife Habitat, Regulated Vegetation Category B, Regulated Vegetation Essential Habitat and Regulated Vegetation Intersecting a Watercourse. These overlays have been incorporated into the Site layout where relevant.
Planning Regulation 2017 – Schedule 11	Deals with development within mapped Koala Habitat Areas by regulating the clearing of mapped Koala habitat and stipulating how it must be cleared. Schedule 10 Part 10 Division 1 of the Regulation outlines what is and is not prohibited development in a Koala habitat area. Schedule 11 of the Regulation sets the benchmarks for assessment in Koala Assessable Development Areas.	The site is located outside of any Koala Assessable Development Area. As such, the provisions of Schedule 11 do not apply. The site is mapped as containing Low and Medium value Bushland, and Low and Medium Value for Rehabilitation.

Refer to environmental searches in **Appendix D** for the location of the development site in regards to the above mapping layers.

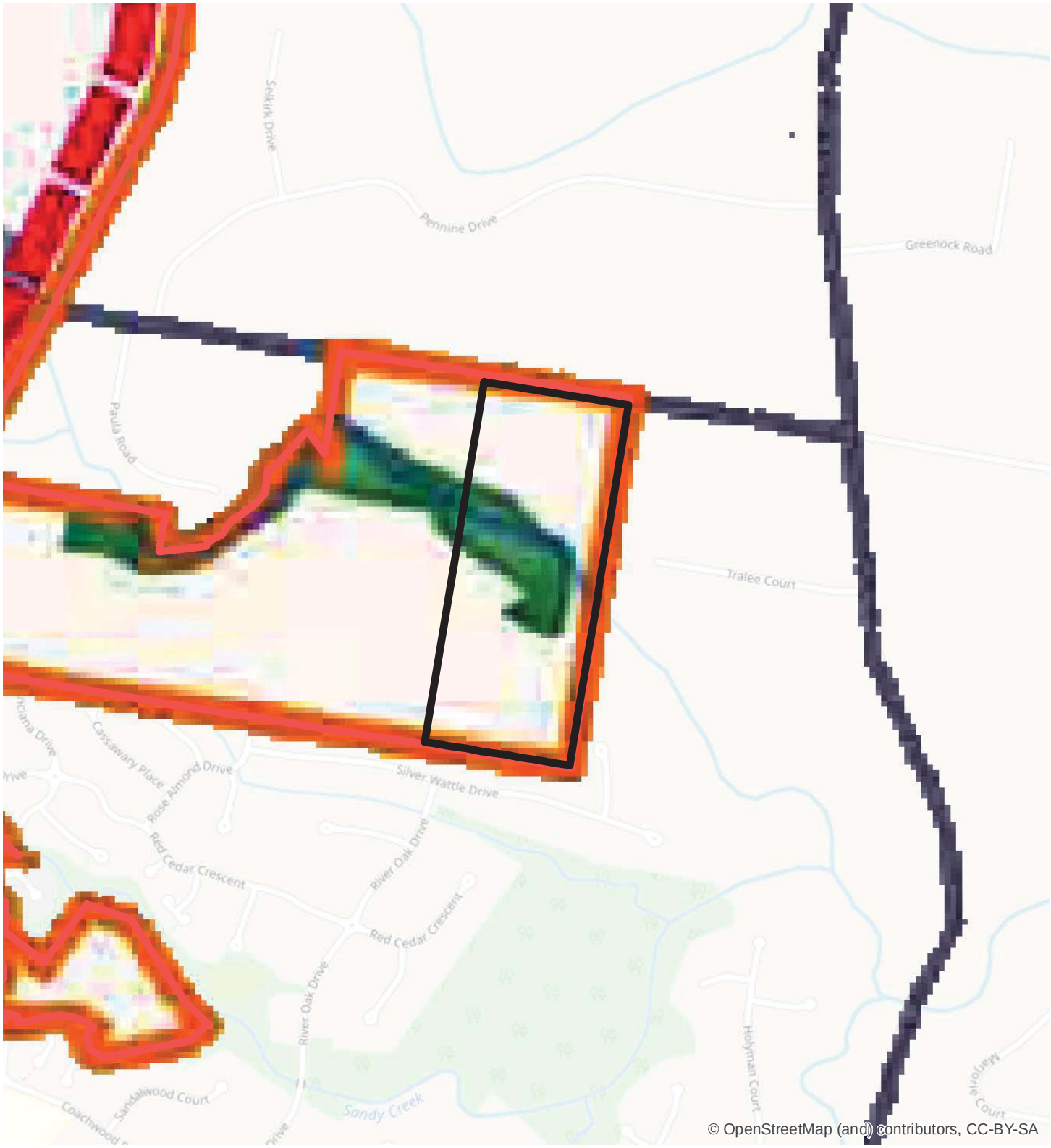
3.7. Town planning instruments

The development proposal occurs within the Greater Flagstone Priority Development Area, declared under the *Urban Land Development Authority Act 2007,* now replaced by the *Economic Development Act 2012* (ED Act). This legislation supersedes the requirements of Local Government planning provisions (in this case, the Logan Planning Scheme) and selective other state legislation (e.g. *Planning Act 2017*, VMA, and others).

On 8 October 2011, the Greater Flagstone PDA Development Scheme (Development Scheme) was approved by the State Government. The Development Scheme is the primary planning instrument which regulates development within the Greater Flagstone PDA. The Development Scheme zones the entire site as Urban

Living (refer **Figure 6**). It is noted that the central east-west waterway is mapped as a Biodiversity Corridor under the Development Scheme (refer **Figure 7**).

Development applications referred to EDQ for assessment against the Development Scheme will be assessed against the EDQ's Implementation Guidelines. Specifically, IG 14 and IG 17.



Legend

- Site DCDB
- Greater Flagstone PDA boundary
- Urban living
- Major centre
- Industry & business
- Environmental protection

Figure 6

Greater Flagstone PDA - Zoning

Orchard Development Management Pty Ltd

File ref. 9534 E Figure 6 EDQ GF PDA Zoning A
Date *19/02/2019*
Project *Mountain Ridge Road, South Maclean*

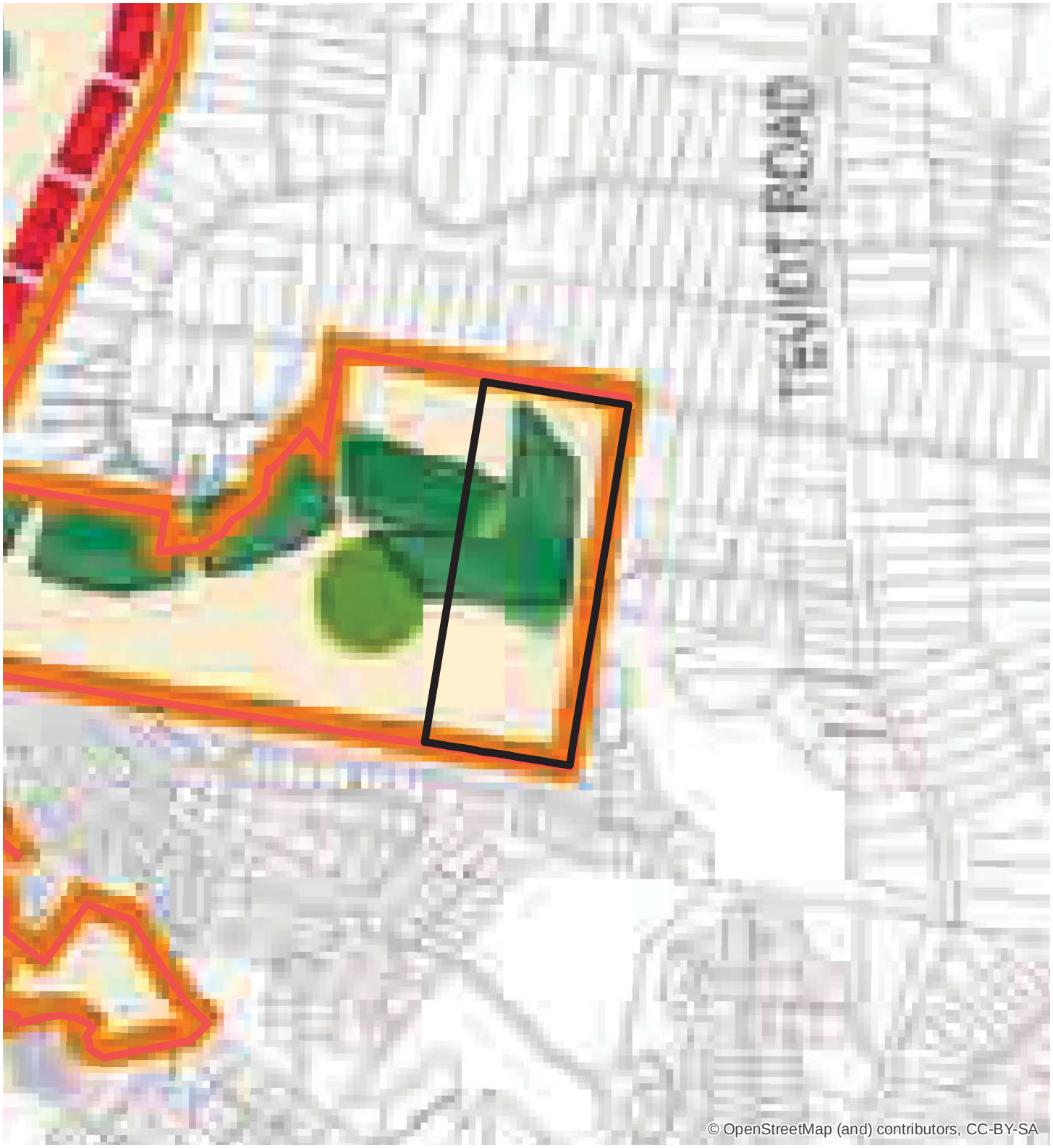
0 100 200 400 600 *m*

N

Scale (A4): 1:15,000 [GDA 1994 MGA Z56]

saunders havill group

Layer Source: © State of Queensland (Department of Natural Resources, Mines and Energy)



Legend

- Site DCDB
- Greater Flagstone PDA boundary
- Urban living
- Environmental protection
- Biodiversity Corridor
- District Recreation Park

Figure 7

Greater Flagstone PDA - Community Greenspace Network

Orchard Development Management Pty Ltd

File ref. 9534 E Figure 7 Flagstone Greenspace A
Date *19/02/2019*
Project *Mountain Ridge Road, South Maclean*

0 100 200 400 600 *m*

N

Scale (A4): 1:15,000 [GDA 1994 MGA Z56]

saunders havill group

Layer Source: © State of Queensland (Department of Natural Resources, Mines and Energy)

4. Ecological survey results

The proposed residential development area has been subject to on-ground surveys by SHG to identify existing ecological values at the site. The following sections present results from flora and fauna surveys conducted at the site with a focus on the presence or absence of threatened values and assessment of the potential for the residential development to impact on these matters.

Two (2) ecologists from Saunders Havill Group (SHG) assessed the application-site for five full-days on 28 November, 6 December and 7 December 2018, and 16 and 17 January 2019 with weather conditions recorded as per below (refer to **Table 6** for detailed weather conditions). The CVs of the ecologists are located in **Appendix E**. The entire site was walked to ensure all vegetation communities and species were recorded. Particular attention was paid to any threatened flora and habitat for any threatened fauna species that were listed as possibly occurring on or within the vicinity of the site, and specific micro assemblage which may support these threatened species. Primary focus was placed on *Phascolarctos cinereus* (Koala) and *Melaleuca irbyana* (Swamp Tea-tree) as they are known to occur in the region. *Pteropus poliocephalus* (Grey-headed Flying-fox) specific surveys were also conducted as likelihood analyses suggested the occurrence of this species on-site was possible. The survey effort is shown in **Plan 2**.

Table 6: Field survey weather conditions

Date	Min. Temperature (°C)	Max. Temperature (°C)	Rainfall (mm)
28 November 2018	21.4°C	37.2°C	0 mm
06 December 2018	14.5°C	27.3°C	0 mm
07 December 2018	15.4°C	26.0°C	0 mm
16 January 2019	20.0°C	35.1°C	0 mm
17 January 2019	20.5°C	33.4°C	0 mm

4.1. General site observation

Contextually, the site is located east of the Brisbane to Sydney Railway line and south of Mountain Ridge Road. The site is amongst rural residential lots, particularly to the north and west. South and east of the site are low density residential lots.

The site includes a single property totalling 40.71hectares and is located at 176-228 Mountain Ridge Road, South Maclean. The property is largely vegetated and is mapped as containing category B (remnant) vegetation including 'least concern' and 'endangered' regional ecosystem communities as well as an area mapped as category X (non-remnant).

Based on the ecological surveys completed, broad observations and results across the site are as follows:

- The EPBC Act PMST listed four (4) Threatened Ecological Communities (TECs) that may occur in, or relate to, the subject site (refer **Section 3.1**). These are described as the following:
    - The Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland Ecological community occurs in coastal catchments, mostly at elevations of less than 20 m above sea level that are typically found within 30 km of the coast however distance can vary by catchment. The canopy layer is dominated by *Casuarina glauca* (Swamp Oak) and in Queensland is represented by RE12.1.1 or RE12.3.20. None of these RE communities occur on-site or within the immediate vicinity of the site.
    - The Lowland Rainforest of Subtropical Australia TEC typically has high species richness. In Queensland, this TEC is part of a number of RE communities including 12.3.1, 12.5.13, 12.8.3, 12.8.4, 12.8.13, 12.11.1, 12.11.10, 12.12.1 and 12.12.16. None of these RE communities occur on-site or within the immediate vicinity of the site.
    - The Swamp Tea-tree (*Melaleuca irbyana*) Forest of South-east Queensland TEC typically lacks taller tree species, and is characterised by a diverse ground layer of native forbs, twiners, grasses, sedges and ferns. Common emergent species include Silver-leaved Ironbark, Narrow-leaved Ironbark, Grey Box, Forest Red Gum and Lemon-scented Gum. This community is usually associated with RE12.3.3c and RE12.9-10.11 in South-east Queensland occurring in an arc from the west to south of Brisbane in the Moreton Basin subregion.
    - The White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is characterised by a species rich understorey of native tussock grasses, herbs and scattered shrubs and the dominance of White Box, Yellow Box or Blakely's Red Gum trees. This community is usually associated with regional ecosystems 11.8.2, 11.8.8, 11.9.9, 13.3.1, 13.11.8 and 13.12.9. These regional ecosystems occur mainly to the west of the Great Dividing Range.
    - No TECs, nor any conditions to support them, were observed on-site. Additionally, 10 threatened plant species were identified as potentially occurring within and/or in the vicinity of the site. No flora species listed as threatened under the EPBC Act were recorded throughout the investigation area.
- A search of the NCA wildlife online database listed one (1) threatened flora species as possibly occurring within the area, *Melaleuca irbyana* (refer **Section 3.2** and **Appendix C** for full NCA search results). Throughout the survey effort, two (2) specimens were recorded (refer to **Photos 1 and 2**).

Photos 1 & 2: Two *M. irbyana* specimens observed on-site.

- Regional ecosystem mapping shows the site as containing both remnant and non-remnant vegetation. Vegetation along Flagstone Creek is mapped as containing both 'endangered' RE12.3.3 as well as 'least concern' RE12.3.7. The balance of the site south of Flagstone Creek is mapped as containing 'least concern' RE12.9-10.2 and the northern portion of the site is mapped as containing the same regional ecosystem community. The northern boundary and north-west corner of the site is mapped as containing category X (non-remnant) vegetation. The following table provides a summary of these communities.

Table 7: Summary of vegetation community descriptions

Vegetation Community	Regional Ecosystems	Site Conditions
1	Least Concern RE12.3.7	This regional ecosystem community is described as a fringing regional ecosystem community with conditions suitable to the edges of Flagstone Creek. Species which represent this RE and recorded on-site include *Eucalyptus tereticornis* (Forest Red Gum), *Casuarina cunninghamiana* (River She Oak) and *Melaleuca viminalis* (Weeping Bottlebrush). Other scattered species representing this RE and recorded throughout Flagstone Creek

Vegetation Community	Regional Ecosystems	Site Conditions
		were identified as *Waterhousia floribunda* (Weeping Lillipilly) and *Lomandra hystrix* (Mat Rush).
2	Endangered 12.3.3	The two polygons on the fringe of the Least Concern RE12.3.7 are mapped as containing this Endangered RE. Species observed within this portion include *Eucalyptus tereticornis* (Forest Red Gum) and *Angophora subvelutina* (Broad-leaved Apple). It is noted that the extent of Landzone 3 is less than that what is mapped. The portion of Flagstone Creek represented within the investigation area is relatively steep with little to no flood plain observed, conditions typical for this regional ecosystem community.
3	Least Concern RE12.9-10.2	The vegetation on both the north and south side of Flagstone Creek are mapped as containing the Least Concern RE12.9-10.2. Flora species recorded within each of these polygons contain elements of this regional ecosystem community including *Corymbia citriodora* (Spotted Gum) and *Eucalyptus crebra* (Narrow Leaf Ironbark) as well as *Eucalyptus moluccana* (Gum Topped Box) and *Lophostemon confertus* (Brush Box).

- Generally, the flora species identified throughout the survey are consistent with each of the regional ecosystem communities mapped on-site. There are minor variations in the boundary of the Endangered RE12.3.3 due to land zone characteristics however species representing each community where observed on-site.
- The site can be broadly separated into four (4) distinct vegetation communities (refer to **Plan 3**). Within each of these areas there remain sub-areas and ecotonal changes which alter the balance of features based on factors including topography, drainage, aspect, level of ongoing maintenance and other weed access points. Communities are discussed below.

4.2. Bio - Condition Assessment Results

4.2.1 Vegetation Community 1 – Least Concern RE12.3.7

Vegetation along the embankment of Flagstone Creek is mapped as containing 'least concern' RE12.3.7. This regional ecosystem community is a fringing vegetation community generally dominated by *Casuarina cunninghamiana* (River She Oak) and *Melaleuca viminalis* (Weeping Bottle brush), with *Eucalyptus tereticornis* (Forest Red Gum) recorded throughout the canopy layer (**Photos 3 and 4**).

This vegetation community contains the highest diversity of flora species, particularly within the shrub and ground layers, however, is also severely influenced by weed invasion, particularly *Lantana camara* (Lantana). Flagstone Creek varies in width between approximately 5m and 8m with the 'least concern' RE12.3.7.

A habitat quality transect was not carried out.

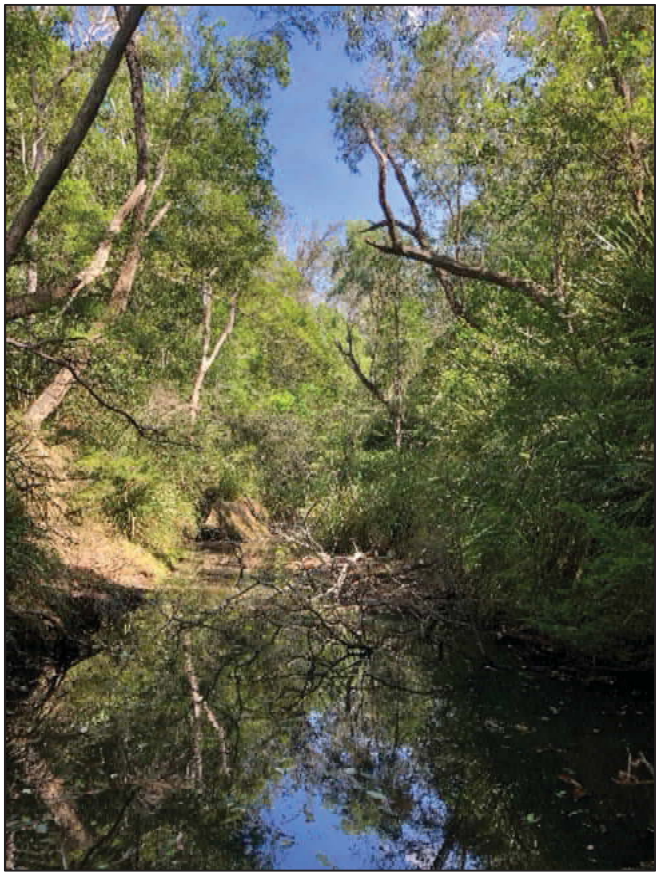


Photo 3: Flagstone Creek and embankment

Photo 4: Flagstone Creek and embankment

4.2.2 Vegetation Community 2 – Endangered RE12.3.3

The 'endangered' regional ecosystem 12.3.3 is mapped along the outer edges of Flagstone Creek in a lineal form with a mapped remnant polygon extending downstream throughout the adjacent properties and local park areas. This RE is mapped as covering 3.55 ha of the total 40.36 ha on-site. Two (2) habitat transects (Transects 4 and 6) were carried out within Vegetation Community 2 as part of the habitat quality assessment on-site. The findings suggest that the vegetation community is broadly consistent with the mapped Endangered RE12.3.3.

Native Plant Species Richness

- The T1 layer within Vegetation Community 2 is dominated by *Eucalyptus tereticornis* (Forest Red Gum). Other canopy species recorded are identified as *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia intermedia* (Pink Bloodwood), *Eucalyptus moluccana* (Gum-topped Box), *Corymbia tessellaris* (Moreton Bay Ash), *Angophora subvelutina* (Broad-leaved Apple) and *Lophostemon suaveolens* (Swamp Box). The flora species recorded throughout this regional ecosystem community are consistent with RE12.3.3.
- The sub-canopy species richness was recorded at 230% of the benchmark for RE12.3.3. Species recorded within the sub-canopy layer within this vegetation community include *Acacia disparrima* (Hickory Wattle), *Alphitonia excelsa* (Soap Tree), *Ficus coronata* (Sandpaper Fig), *Acacia fimbriata* (Brisbane Wattle), *Grevillea robusta* (Silky Oak) *and Leptospermum petersonii* (Lemon-scented Tea Tree).

The abundance in species recorded within the sub-canopy layer can be attributed to the diversity of vegetation communities adjoining Vegetation Community 2.

- Scattered occurrences of *Corymbia citriodora* (Spotted Gum) was also recorded within the mapped RE12.3.3 area. This species is generally associated with the 'least concern' RE12.9-10.2, however its presence highlights the transition between each regional ecosystem community. The embankment is relatively steep in these areas providing more evidence of land zone changes.
- 75% of the benchmark shrub species richness was recorded within this vegetation community, with species including *Leptospermum petersonii* (Lemon-scented Tea Tree), *Grevillea robusta* (Silky Oak), *Alchornea illicifolia* (Native Holly), *Acacia fimbriata* (Brisbane Wattle) and *Daviessia ulcifolia* (Native Gorse).
- Three (3) grass species were recorded across the two (2) transects, these being *Themeda triandra* (Kangaroo Grass), *Oplismenus aemulus* (Creeping Beard Grass) and *Imperata cylindrica (*Blady Grass) (27.27% of the benchmark for RE12.3.3).
- Native perennial grass cover averaged 8.51% per quadrat. This may be attributed to a very high percentage of weed cover within the vegetation community (65%), dominated by infestations of *Lantana camara* (Lantana) (**Photo 5**). Other weed species recorded include *Passiflora suberosa* (Corky Passion Vine), *Lantana montevidensis* (Creeping Lantana), *Asparagus aethiopicus* (Asparagus Fern), *Ochna serrulata* (Ochna) and *Oxalis corniculata* (Creeping Oxalis).

Height and Canopy Cover

- Tree canopy height within this vegetation community is 96.30% of the benchmark (27 m). Tree canopy cover was also recorded at 91.32% of the benchmark (53 %), suggesting the canopy within this vegetation community is highly reflective of RE12.3.3. Conversely, the sub-canopy height was recorded at 83.33% and sub-canopy cover well above the benchmark values (769.44%). This exceptionally high reading for sub-canopy cover may be attributed to historical land use practices and clearing.
- Remnant vegetation is defined under the VMA as vegetation where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and dominated by species characteristics of the vegetation's undisturbed canopy. While this vegetation community does meet the height and canopy cover percentages to be classified as remnant, an average of six large trees across the two transects using the benchmark of 380mm DBH was recorded. The large trees recorded are well below the benchmark values which indicates that historical land use practices, including logging have resulted in juvenile 'remnant' vegetation community.

Photo 5: Weed infestation at Vegetation Community 2

4.2.3 Vegetation Community 3 – 'Least concern' RE12.9-10.2

- Least Concern RE12.9-10.2 is the dominant regional ecosystem community across the property, equating to 24.28 ha of 40.36ha in total. This regional ecosystem community is represented on both sides of Flagstone Creek with the larger of the polygons located within the southern portion of the property.
- Two (2) terrestrial habitat transects (Transects 1 and 5) were carried out within this vegetation community as part of the habitat quality assessment. The findings of this assessment suggest that the vegetation is broadly consistent with this mapping.

Native Plant Species Richness

- The T1 Layer within Vegetation Community 3 is dominated by *Corymbia citriodora* (Spotted Gum) with several small patches observed containing *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus moluccana* (Gum Topped Box), *Eucalyptus tereticornis* (Forest Red Gum), and *Eucalyptus siderophloia* (Grey Ironbark). These findings are consistent with the regional ecosystem mapping and represent the Least Concern RE12.9-10.2.

- *Corymbia intermedia* (Pink Bloodwood) and *Lophostemon suaveolens* (Swamp Box) were also observed within Vegetation Community 3 very sporadically.
- Sub-canopy tree species recorded within the habitat assessment include *Acacia disparrima* (Hickory Wattle), *Alphitonia excelsa* (Soap Tree), *Angophora leiocarpa* (Smooth-barked Apple) and *Acacia leiocalyx* (Early Black Wattle) (**Photo 6**).
- The native tree species richness was recorded as being 158.33% of the benchmark. This abundance in native tree species richness within this vegetation community may be attributed to the range of regional ecosystems adjoining and immediately adjacent to this vegetation community. It should be noted that pre-clear regional ecosystem mapping identifies the non-remnant vegetation on-site as containing a composite regional ecosystem of RE12.9-10.2/12.9-10.12-12.9-10.7.
- Only two (2) species were recorded within the native shrub species richness category, *Lantana camara* (Lantana) and *Pultanea sp.*
- Native grass species identified within this vegetation community included *Oplismenus aemulus* (Creeping Beard Grass), *Themeda triandra* (Kangaroo Grass), *Imperata cylindrica* (Blady Grass), *Entolasia stricta* (Wiry Panic) and *Heteropogon contortus* (Black Spear Grass). Native grass species richness within this vegetation community was calculated to be 57.14% of the benchmark for this RE. Further, native perennial grass cover was well below the benchmark value (21 %). The lack of grass cover can be attributed to the relatively high presence of weeds, in particular, *Lantana camara* (Lantana) (**Photo 7**).

<u>Height and Canopy Cover</u>

- Tree canopy height (22 m) met the benchmark for the regional ecosystem, while the tree canopy cover was approximately half of the specified benchmark. Conversely the sub-canopy layer was observed at 83.33% of the benchmark height, while the sub-canopy cover well exceeded the benchmark values (599.17%). This exceptionally high sub-canopy coverage reflects the highly disturbed and regrowth nature of the vegetation community. The historical disturbances are further supported by the high percentage of non-native plant cover recording throughout this vegetation community.
- As previously outlined, remnant vegetation is defined under the VMA as vegetation where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and dominated by species characteristics of the vegetation's undisturbed canopy. While this vegetation community does meet the height and canopy cover percentages to be classified as remnant, an average of only seven (7) large trees across the two (2) transects using the benchmark of 380mm DBH were recorded. The large trees recorded are well below the benchmark values which indicates that historical land use practices, including logging have resulted in juvenile 'remnant' vegetation community.

Photo 6: Canopy and sub-canopy species found at Vegetation Community 3

Photo 7: Lantana and high proportion of organic litter at vegetation community 3

4.2.4 Vegetation Community 4 – Non-remnant vegetation

- The mapped non-remnant polygon along the northern property boundary and towards the north - east property corner contained elements of 'least concern' RE12.9-10.2, 'endangered' RE12.9-10.12 and 'of concern' RE12.9-10.7 which is representative of the pre-clear vegetation communities within the broader landscape. However, the dominant species recorded represented the 'least concern' RE12.9-10.2 and 'of concern' RE12.9-10.7.
- Species such as *Eucalyptus seeana* (Narrow Leaf Red Gum), *Angophora leiocarpa* (Smooth Bark Apple) and *Corymbia intermedia* (Pink Bloodwood) which represent the 'endangered' RE12.9-10.12 were recorded in isolated small patches throughout the broader non-remnant polygon.
- The height and canopy density of the canopy species fail to meet the remnant definition suitable to all regional ecosystem communities mapped within the non-remnant area. The dominant species recorded throughout the entire non-remnant polygon is *Acacia disparrima* (Hickory Wattle) and *Lophostemon suaveolens* (Swamp Box).
- The mapped non-remnant vegetation represents 9.8 ha of the total 40.36 ha of the investigation area. Following general ecological site inspections, habitat quality transects and a review of pre-clear mapping, Vegetation community 4 has been divided into two polygons for carrying out a habitat quality assessment. A polygon totalling 4.7ha on the far northern portion of the site has been determined to predominantly contain elements of 'least concern' RE12.9-10.2, while a polygon 4.5ha in size adjacent to the eastern property boundary predominantly contains elements of 'of concern' RE12.9-10.7.

<u>Non-remnant polygon containing elements of RE12.9-10.7</u>

Native Plant Species Richness

- The Terrestrial Habitat Quality Assessment guidelines state that at least two (2) transects should be carried out for an assessment unit <60ha. As this assessment unit is only approximately 4.5ha in size, a single transect was carried out within this vegetation community (Transect 2) as part of the site habitat quality assessments.
- The T1 Layer is dominated by *Eucalyptus tereticornis* (Forest Red Gum), along with scattered *Corymbia tessellaris* (Moreton Bay Ash). The sub-canopy contained *Alphitonia excelsa* (Soap Tree), *Lophostemon suaveolens* (Swamp Box), *Acacia disparrima* (Hickory Wattle), *Acacia leiocalyx* (Early Black Wattle), *Allocasuarina littoralis* (Black She-oak) and *Corymbia intermedia* (Pink Bloodwood). These species represent the Of Concern RE12.9-10.7.
- The native tree species richness (266.67 %) was observed to be well above the benchmark values. This high tree species richness may be attributed to the pre-clear vegetation community representing three (3) separate regional ecosystems.
- Conversely, the native shrub species richness was well below the benchmark values as *Lantana camara* (Lantana) dominated the outer edges of this polygon with evidence of edge effects from adjacent houses and road networks (**Photo 8**).

- Further, native grass and forb species richness were calculated to be 50% and 23.08% of the benchmark. Native grass species recorded include *Themeda triandra* (Kangaroo Grass), *Heteropogon contortus* (Black Spear Grass), *Oplismenus aemulus* (Creeping Beard Grass), and *Entolasia stricta* (Wiry Panic). Forbs and other non-grass ground species recorded include *Lomandra multiflora* (Many Flowered Mat Rush*), Goodenia rotundifolia* (Star Goodenia), *Lobelia purpurascens* (White Root), *Cyanthilllium cinereum* (Vernonia), *Cheilanthes distans* (Bristle Cloak Fern) and *Gahnea aspera* (Saw Sedge).

Height and Canopy Cover

- Tree canopy height within this vegetation community was calculated to be 95.24% of the benchmarked 21 m, while canopy coverage was measured to be only 4% of the benchmarked 40%. As previously outlined, remnant vegetation is defined under the VMA as vegetation where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and dominated by species characteristics of the vegetation's undisturbed canopy. These results show this vegetation community does meet the height requirements, but fails to meet the canopy coverage to be considered remnant vegetation.
- Further, sub-canopy height was recorded to be 100% of the benchmarked 10m, while sub-canopy cover was measured at 1111.25% of the benchmarked 8%. This very high reading for sub-canopy coverage can be attributed to the dominance of regrowth species within this transect (**Photo 9**), characteristic of the vegetation community's history of vegetation clearing and consequent non-remnant status.

<u>Non-remnant polygon containing elements of RE12.9-10.2</u>

Native Plant Species Richness

- As previously outlined, the Terrestrial Habitat Quality Assessment guidelines state that at least two (2) transects should be carried out for an assessment unit <60ha. As this vegetation community is only approximately 4.7ha in size, a single transect was carried out within this polygon (Transect 3) as part of the site habitat quality assessments.
- The T1 layer is dominated by *Corymbia citriodora* (Spotted Gum), along with scattered *Eucalyptus tereticornis* (Forest Red Gum), and *Eucalyptus seeana* (Narrow-lead Red Gum). The sub-canopy contained *Acacia disparrima* (Hickory Wattle) dominated regrowth, with *Lophostemon suaveolens* (Swamp Box), *Allocasuarina littoralis* (Black Sheoak), *Corymbia intermedia* (Pink Bloodwood), *Alphitonia excelsa* (Soap Tree) and *Melaleuca quinquenervia* (Broad-leaved Paperbark). These species represent the Least Concern RE12.9-10.2.
- The native tree species richness meets the benchmark values for RE12.9-10.2, while the shrub species richness was observed to be well below the benchmark (7.14 %) and was dominated by species such as *Alphitonia excelsa* (Soap Tree), *Acacia leiocalyx* (Early Flowering Black Wattle) and *Lophostemon suaveolens* (Swamp Box).

- Native grasses recorded include *Entolasia stricta* (Wiry Panic), *Themeda triandra* (Kangaroo Grass), *Heteropogon contortus* (Black Spear Grass), *Oplismenus aemulus* (Creeping Beard Grass) and *Imperata cylindrica* (Blady Grass). Native grass species richness consequently was calculated to be 71.43% of the benchmark. Native forbs included *Ozothamnus diosmifolius* (Rice Flower), *Cheilanthes distans* (Bristle Cloak Fern), *Lomandra multiflora* (Many Flowered Mat Rush), *Eustrephus latifolius* (Wombat Berry), *Stepahnia japonica* (Tape Vine), *Lobelia purpurascens (*White Root) and *Chrysocephalum apiculatum* (Yellow Buttons), returning a value of 61.54% of the benchmark.
- Weed cover was recorded at only 10%. Weed species recorded on-site included *Asparagus aethiopicus* (Asparagus Fern), *Passiflora suberosa* (Corky Passion Flower) and *Corymbia torrelliana* (Cadaghi).

Height and Canopy Cover

- Tree canopy height within this assessment unit was measured to be 24m, 114.29% of the benchmarked 21m, while canopy coverage was measured to be 45.31% of the benchmarked 64%. As previously outlined, remnant vegetation is defined under the VMA as vegetation where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and dominated by species characteristics of the vegetation's undisturbed canopy. These results show this vegetation community does meet the height requirements, but fails to meet the canopy coverage to be considered remnant vegetation.
- Further, sub-canopy height was recorded to be 116.67% of the benchmarked 12m, while sub-canopy cover was measured at 610.83% of the benchmark

Photo 8: Lantana camara (Lantana) infestation on western boundary

Photo 9: Dominance of regrowth species at vegetation community 4 RE12.9-10.7

4.3. Flora survey results – Additional Findings

The following flora observations have been made based on detailed field survey:

- The total of 121 flora species were identified across the site, of which 76 species are native flora species and the remaining 45 are introduced or weed species (refer to **Table 8** for the native flora species list and **Table 9** for the introduced species list).
- Of the 45 introduced species recorded throughout the survey period, nine are listed under Queensland's *Biosecurity Act 2014,* as 'Class 3'.
    - 'Class 3' listed restricted matters must not be distributed, meaning it must not be given as a gift, sold, traded or released into the environment unless the distribution or disposal is authorised in a regulation or under a permit. Deliberate human distribution or disposal contrary to the legislation is a key source of spread into other areas of the state.
    - Introduced species were recorded throughout the majority of the site, with a larger number of species recorded along the edges of the mapped waterway (**Photos 10** and **11**). Dense *Lantana camara* (Lantana) was observed across the site, in particular in greatest density along the waterway corridor, and a *Dolichandra unguis-cati* (Cats Claw Creeper) infestation was observed in one location along the waterway.

Photos 10 & 11: Areas within waterway corridor containing weed infestations

Table 8: Native flora species list

Scientific name	Common name
Acacia disparrima	Hickory Wattle
Acacia fimbriata	Fringed Wattle
Acacia leiocalyx	Early-flowering Black Wattle
Acacia leptostachya	Slender Wattle
Acacia maidenii	Maiden's Wattle
Acacia melanoxylon	Australian Blackwood
Alchornea ilicifolia	Native Holly
Allocasuarina littoralis	Black Sheoak
Alphitonia excelsa	Red Ash
Angophera subvelutina	Broad-leaved Apple
Angophora leiocarpa	Smooth-barked Apple
Aphananthe philippinensis	Rough-leaved Elm
Araucaria cunninghamii	Hoop Pine
Banksia integrifolia	Coast Banksia
Brachychiton acerifolis	Illawarra Flame Tree
Breynia oblongifolia	Coffee Bush
Bursaria spinosa	Black Thorn
Casuarina cunninghamiana	River She-oak
Cheilantes distans	Bristle Cloak Fern
Chrysocephalum apiculatum	Yellow Buttons
Citrus australis	Native Lime
Corymbia citriodora	Spotted Gum

Scientific name	Common name
Corymbia intermedia	Pink Bloodwood
Corymbia tessellaris	Moreton Bay Ash
Cryptocarya triplinervis	Three Veined Laurel
Cupaniopsis anacardiodes	Tuckeroo
Cyanthillium cinereum	Vernonia
Cymbopogon refractus	Barbed Wire Grass
Cyperus polystachyos	Bunchy Sedge
Daviesia ulicifolia	Native Gorse
Dianella caerulea	Blue Flax Lily
Duboisia myoporoides	Corkwood
Entolasia stricta	Wiry Panic
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus mollucana	Gum-topped Box
Eucalyptus seeana	Narrow-leaved Red Gum
Eucalyptus siderophloia	Northern Grey Ironbark
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus torelliana	Cadaghi
Eustrephus larifolius	Wombat Berry
Ficus coronata	Sand Paper Fig
Fimbristylis dichotoma	Common Fringe-rush
Gahnia aspera	Rough Saw-sedge
Glochidion fernandii	Cheese Tree
Glycine tabacina	Variable Glycine
Goodenia rotundifolia	Star Goodenia
Grevillea robusta	Silky Oak
Hardenbergia violacea	False Sarsparilla
Heteropogon contortus	Black Speargrass
Juncus usitatus	Common Rush
Lastreopsis marginans	Glossy Shield Fern
Leptospermum petersonii	Lemon-scented Teatree
Leptospermum polygalifolium	Tantoon
Lobelia purpurascens	White Root
Lomandra hystrix	Green Mat-Rush
Lomandra longifolia	Matrush
Lomandra multiflora	Many-headed Mat Rush
Lophostemon sauveolens	Swamp Box
Lygodium microphyllum	Climbing Maidenhair Fern

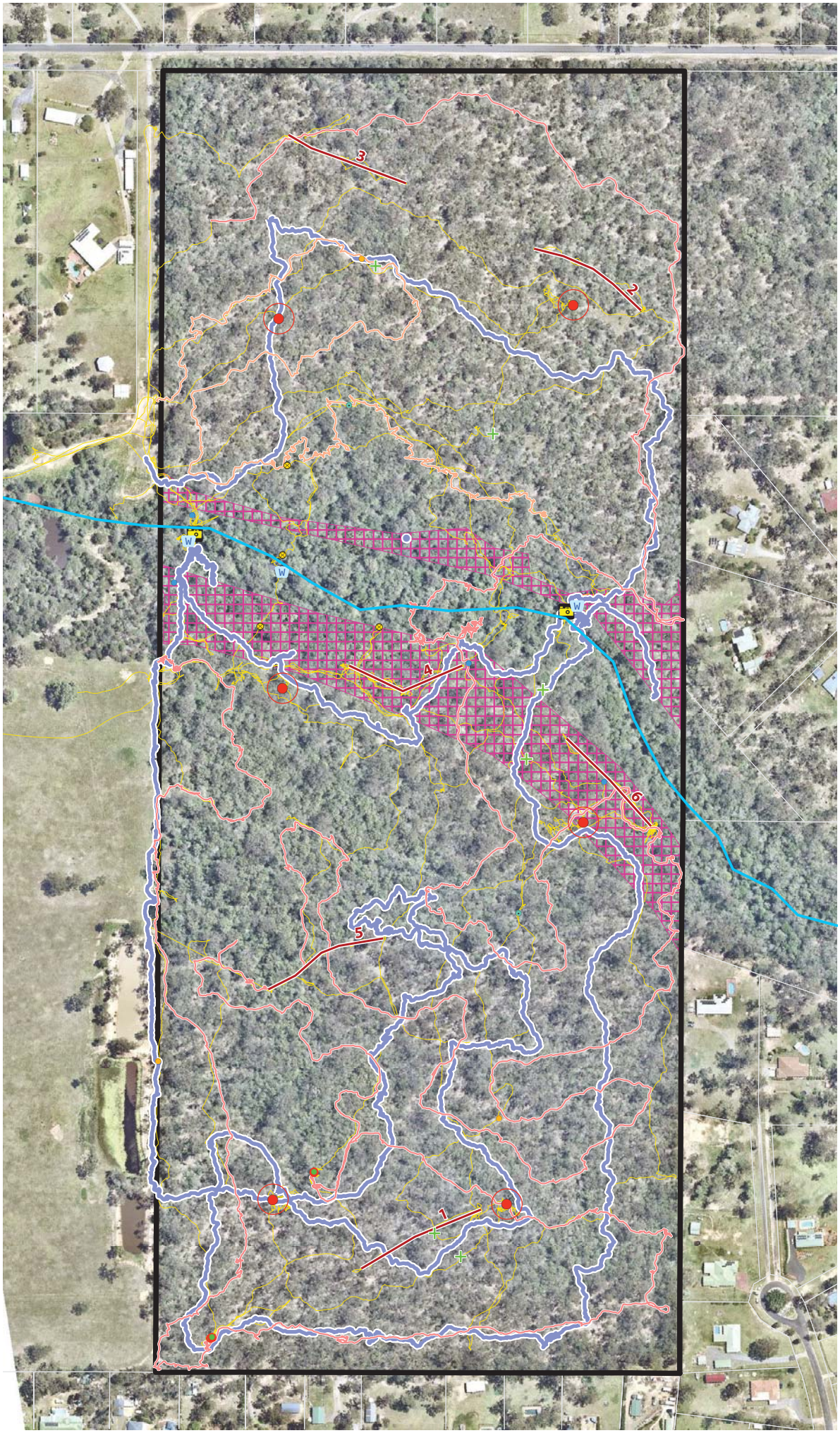
Scientific name	Common name
Melaleuca irbyana	Swamp Tea Tree
Melaleuca quinquenervia	Broad-leaved Paperbark
Melaleuca viminalis	Weeping Bottlebrush
Nephrolepis cordifolia	Fishbone Fern
Oplismenus aemulus	Creeping Beard Grass
Ozothamnus diosmifolius	Rice Flower
Parsonsia straminea	Monkey Rope Vine
Pellaea nana	Dwarf Sickle Fern
Persicaria decipiens	Slender Knowtweed
Petalostigma pubescens	Quinine Bush
Pittosporum undulatum	Australian Mock Orange
Pteridium esculentum	Bracken Fern
Pultenaea villosa	Hairy Pea Bush
Smilax australis	Barbwire Vine
Stephania japonica	Tape Vine
Themeda triandra	Kangaroo Grass
Trema tomentosa	Poison Peach

Table 9: Introduced species list

Scientific name	Common name	Biosecurity Act listed species
Abrus precatorius subsp. africanus	Crab's Eye Creeper	
Ageratina riparia	Mistweed	
Ageratum houstonianum	Blue Billygoat Weed	
Aloe vera	Aloe	
Ambrosia artemisiifolia	Annual Ragweed	Class 3
Asclepias curassavica	Red Headed Cotton Bush	
Asparagus aethiopicus	Asparagus Fern	Class 3
Asparagus africanus	Climbing Asparagus Fern	Class 3
Baccharis halimifolia	Groundsel	Class 3
Bidens pillosa	Cobblers Peg	
Callisia repens	Creeping Inch Plant	
Celtis sinensis	Chinese Elm	Class 3
Conyza sp.	Fleabane	
Cuscuta campestris	Golden Dodder	
Cynodon dactylon	Couch	
Duranta erecta	Duranta	

Scientific name	Common name	Biosecurity Act listed species
Dolichandra unguis-cati	Cat's Claw Creeper	Class 3
Eleusine indica	Crowsfoot Grass	
Gomphocarpus physocarpus	Balloon Cotton Bush	
Heliotropium amplexicaule	Blue Heliotrope	
Hippeastrum sp.	Hippeastrum	
Hypocheris radicata	Flatweed	
Imperata cylindrica	Blady Grass	
Jacaranda mimosifolia	Jacaranda	
Lantana camara	Lantana	Class 3
Lantana montevidensis	Creeping Lantana	Class 3
Maclura cochinchinensis	Cockspur Thorn	
Megathyrsus maximus	Guinea Grass	
Ochna serrulata	Mickey Mouse Plant	
Oxalis stricta	Common Wood Sorrel	
Paspalum mandiocanum	Broadlead Paspalum	
Passiflora edulis	Edible Passionfruit	
Passiflora suberosa	Corky Passionflower	
Phyllanthus sp.	Phyllanthus	
Richardia brasiliensis	Mexican White Eye	
Sanguinaria canadensis	Blood Root	
Sansieveria trifasciata	Mother-in-laws Tongue	
Senecio madagascariensis	Fireweed	Class 3
Senna pendula	Easter Cassia	
Sida cordifolia	Flannel Weed	
Solanum nigrum	Blackberry Nightshade	
Solanum seaforthianum	Brazilian Nightshade	
Sporobolus pyramidalis	Giant Rat's Tail Grass	
Syagrus romanzoffiana	Cocos Palm	
Tradescantia zebrina	Wandering Jew	

2. Field Survey Effort



NOTES
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Legend

- Site DCDB
- Qld DCDB
- Waterway to retain
- Qld VMA Endangered REs to retain

Survey assessment

- Drainage feature
- Edge of waterway
- General observation
- Irbyana spp.
- Motion Camera
- SAT location
- Vegetation assessment
- Waterway Assessment
- Dense weed understory
- Habitat Quality Assessment
- NCA floral meander transect
- Spot-lighting trail
- GPS tracklog

Issue	Date	Description	Drawn	Checked
A	19/02/2019	Preliminary	MP	OS

0 10 20 40 60 80 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:2,900 @ A3

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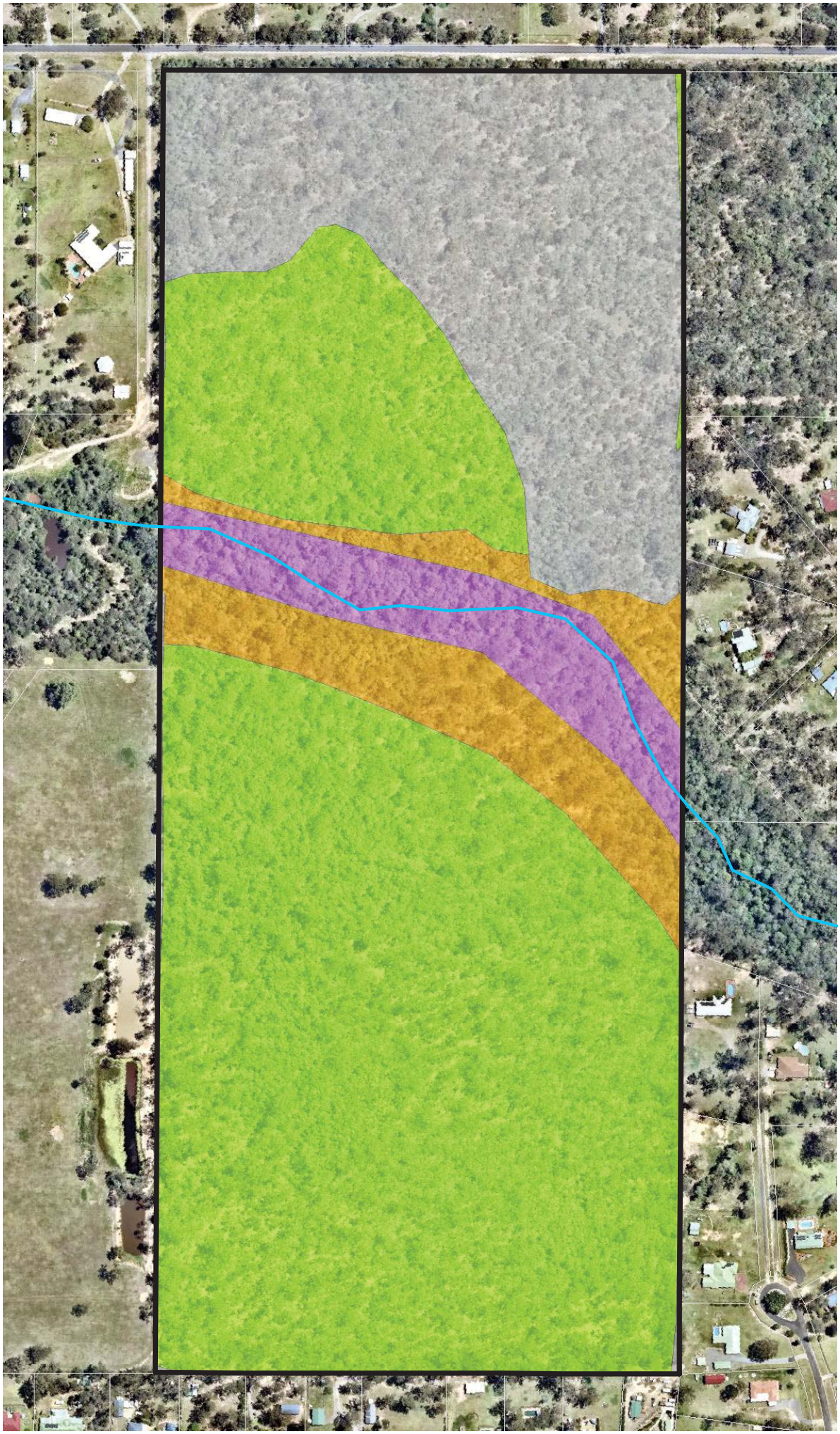
Orchard Development Management Pty Ltd
ATF Orchard Development Management Unit Trust

Mountain Ridge Road, South Maclean

ADDRESS/RPD: 3RP133386 | 19/02/2019 | 9534 E 02 Field Survey Effort A

3. Vegetation Assessment Zones



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Legend

- Site DCDB
- Qld DCDB

Vegetation assessment zones

- *Vegetation Community 1*
  Least-concern RE 12.3.7
- *Vegetation Community 2*
  Endangered RE 12.3.3
- *Vegetation Community 3*
  Least-concern RE 12.9-10.2
- *Vegetation Community 4*
  Non-remnant vegetation

Issue	Date	Description	Drawn	Checked
A	28/08/2019	Preliminary	MP	OS
B	28/08/2019	Veg zone updates	TC	HS

0 10 20 40 60 80 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:2,900 @ A3

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Orchard Development Management Pty Ltd
ATF Orchard Development Management Unit Trust

Mountain Ridge Road, South Maclean

4.4. Fauna survey results

A basic fauna assessment was conducted across the site to identify and describe on-ground habitat features (e.g. habitat trees, fallen logs, termite mounts, roosting sites etc.), signs of fauna activity (e.g. scats, tracks, scratch marks on trees, nests etc.) and observations of species present within the area. Both general and targeted species surveys were undertaken across the survey period each day constitutes a combined total of 16hours survey effort for that particular day (refer **Table 10** and **Plan 2**). A summary of the weather events prior to and during field survey effort is provided in **Table 11**. Consideration was also given to the ecological significance of the site in the context of the local area and the broader region. No specific surveys for reptiles (e.g. pitfall traps) were undertaken during field surveys.

Table 10: Field survey dates

	28 November 2018	6 December 2018	7 December 2018	16 January 2019
Observational surveys	✓	✓	✓	✓
Koala habitat and SAT surveys	✓	-	-	-
Motion sensor cameras	Installed on-site	-	Removed from site	-
Nocturnal active searches and spotlighting	-	-	-	✓
Flying-fox roost search (on-site)	-	-	✓	✓

Table 11: Summary of local weather prior to and during survey events

Date	Rainfall (mm)**	Temperature (°C min)***	Temperature (°C max)***
22/11/18	4.4	21.6	29.9
23/11/18	16.6	12.9	29.4
24/11/18	0	8.6	30.3
25/11/18	0	11.2	33.7
26/11/18	0	11.9	34.2
27/11/18	0	13.2	29.0
28/11/18*	1	21.4	37.2
29/11/18	0	17.1	34.4
30/11/18	0	15.4	32.7
01/12/18	0	18.3	36.3
02/12/18	0	20.1	38.1
03/12/18	0.2	20.2	31.4

Date	Rainfall (mm)**	Temperature (°C min)***	Temperature (°C max)***
04/12/18	3.8	16.8	30.4
05/12/18	0	17.1	28.4
06/12/18*	0	14.5	27.3
07/12/18*	0	15.4	26.0
10/01/19	0.4	22.3	31.6
11/01/19	0.2	18.1	31.6
12/01/19	0	15.4	31.6
13/01/19	0	16.7	32.2
14/01/19	0	17.5	31.8
15/01/19	0	17.6	33.8
16/01/19*	0	20.0	35.1

* Indicates that a field survey was undertaken on this date. ** Source: BoM Station 040542 (Maclean Bridge). *** Source: BoM Station 140009 (Greenbank Defence).

The following observations were made during site surveys regarding fauna:

- A total of 45 fauna species are identified during field survey, consisting of eight mammals, five reptiles, two amphibians, and 30 bird species (see **Table 12**). This included species that were either heard or observed within the referral area (including evidence of their existence on-site, *i.e.* scats), or observed as fly-overs.
- The avian species included a variety of common avi-fauna, which are likely to be utilising the site as part of a broader home range. The majority of fauna species identified on-site are relatively common and to be expected on a site of this nature, and containing a creek corridor (refer **Photo 12** for common fauna example).
- Motion sensor cameras were deployed in two locations within the waterway corridor to record the use of the site by fauna. This was considered to be where most fauna would be detected (see **Plan 2** for locations). Cameras were left to record for 9-days on-site (refer **Table 10** for survey dates). The weather during the camera trapping period was typical for that time of year, where rainfall was largely absent (refer **Table 11**). The cameras were generally set to capture video when triggered. Although only one camera recorded fauna over the survey period, a number of species were identified utilising the site and are presented in **Table 12**.
- Spotlighting over the 2 nights did not detect the presence of any significant nocturnal or arboreal fauna. Only common species such as the Red-Necked Wallaby (*Macropus rufogriseus*), Brush Bronzewing (*Phaps elegans),* Cane Toad (*Rhinella marina*) and Brushtail Possum (*Trichosurus vulpecula*) were observed during spotlighting, with the exception of the Grey-headed Flying-fox (*Pteropus poliocephalus*) which was observed as a flyover during this nocturnal survey.

- Additional habitat features identified during field survey included two large dead stags that contained a number of hollows (one bearing 3 hollows and the other bearing 4), which were located central to the site. Numerous hollow logs were noted during the field survey (**Photo 13**). No rocky outcrops were noted during assessment.

Photos 12 & 13: Common fauna on-site and hollow logs providing potential habitat

Table 12: Fauna species list

Scientific name	Common name	Recording type
BIRDS		
Alectura lathami	Australian Brush-turkey	Visual
Climacteris picummus	Brown Treecreeper	Visual
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Call
Corvus orru	Torresian Crow	Call, Visual
Coturnix ypsilophora	Brown Quail	Visual
Cracticus nigrogularis	Pied Butcherbird	Call, Visual
Dacelo novaeguineae	Laughing Kookaburra	Call, Visual
Gralllina cyanoleuca	Magpie-lark	Visual
Gymnorhina tibicen	Australian Magpie	Call
Macropygia amboinensis	Brown Cuckoo-Dove	Visual
Malurus cyaneus	Superb Fairy Wren	Call, Visual
Malurus melanocephalus	Red-backed Fairy-wren	Visual
Manorina melanocephala	Noisy Minor	Call, Visual
Meliphaga lewinii	Lewin's Honeyeater	Visual

Scientific name	Common name	Recording type
Merops ornatus	Rainbow Bee-eater	Call
Microcarbo melanoleucos	Little Pied Cormorant	Camera
Milvus migrans	Black Kite	Visual
Philemon corniculatus	Noisy Friarbird	Call, Visual
Platycercus adscitus	Pale-headed Rosella	Visual
Podargus strigoides	Tawny Frogmouth	Visual
Psophodes olivaceus	Eastern Whipbird	Call
Rhipidura fuliginosa	Grey Fantail	Visual
Rhipidura leucophrys	Willie Wagtail	Visual
Scythrops novaehollandiae	Channel-billed Cuckoo	Call, Visual
Strepera graculina	Pied Currawong	Visual, Call
Taeniopygia bichenovii	Double-barred Finch	Visual
Threskiornis molucca	Australian White Ibis	Camera
Todiramphus macleayii	Forest Kingfisher	Visual
Trichoglossus haematodus	Rainbow Lorikeet	Call, Visual
Vanellus miles	Masked Lapwing	Call, Visual
AMPHIBIANS		
Litoria fallax	Eastern Sedgefrog	Call
Rhinella marinus	Cane Toad	Visual
REPTILES		
Demansia psammophis	Yellow-face Whip Snake	Visual
Diporiphora australis	Tommy Round Head	Visual
Lampropholis delicata	Grass Skink	Visual
Physignathus lesueurii	Eastern Water Dragon	Visual
Varanus varius	Lace Monitor	Tracks, Visual
MAMMALS		
Canis lupus familiaris	Domestic Dog	Tracks
Macropus giganteus	Grey Kangaroo	Visual
Macropus rufogriseus	Red-necked Wallaby	Camera
Petaurus norfolcensis	Squirrel Glider	Camera
Phascolarctos cinereus	Koala	Scats
Pseudocheirus peregrinus	Common Ringtail Possum	Camera
Trichosurus vulpecula	Common Brushtail Possum	Camera

4.5. Threatened Fauna Species

A number of threatened fauna species were identified as having the potential to occur within the area surrounding the site under the EPBC Act and NCA (refer **Appendices B** and **C** for full search lists). Likelihood of Occurrence analyses were undertaken to assess site characteristics for suitable habitat for listed threatened species (refer **Appendix F**). Two (2) species, the Koala and Grey-headed Flying-fox, were considered likely to occur based on desktop assessment of vegetation characteristics and known occurrence in the area. These species were targeted as part of this survey effort.

4.5.1 Koala

Tools for determining localised levels of use by *Phascolarctos cinereus* (Koala) included regularised, grid-based (RGB) sampling using the Spot Assessment Technique (SAT) methodology, as described in **Section 2.2.5**.

Surveys of Koala utilisation of the site were conducted across the subject site to determine the likelihood of occurrence throughout the entire extent, and identify whether there was any concentrated occurrence. Six Koala SATS were conducted (refer **Plan 2**). Of the six SAT surveys, three yielded low usage scores. **Table 13** presents the Koala usage scores for the six SAT surveys completed (refer **Appendix G** for full data sets).

Table 13: Summary of SAT survey results

SAT Site Number	Evidence of Koala Use (%)	Koala Use (High/Medium/Low)
1	3.33	Low
2	0	Nil
3	3.33	Low
4	0	Nil
5	0	Nil
6	3.33	Low

The Australian Koala Foundation koala activity level classification table (following Philips and Callaghan 2011) provides an estimate of koala utilisation based on defined Activity Categories. The East Coast (med-high) Activity Category is appropriate for the site. The evidence suggests that while the site is utilised by Koalas, it is considered relatively poor habitat for the species. The relatively low levels of koala usage at the site may be a result of major changes in the immediate landscape from recent high density residential development.

Opportunistic searches for Koalas was also undertaken as part of the field survey effort. No Koalas were observed on the site.

5. Impact Assessment and Development Analysis

5.1. Proposed Development

The development proposal is for a residential subdivision, new roads and linear park containing Flagstone Creek. The development will be accessed off Mountain Ridge Road and from the neighbouring development. The site is zoned as Urban Living under the Greater Flagstone PDA Development Scheme and remains one of the few parcels of land within the PDA without an approval for residential development. Refer to **Appendix A** for Development Proposal.

While the entire site is zoned Urban Living, lot layout has been guided by physical constraints and ecological values informed by specialist consultant reports, including this SBAR. As such, the proposed site design is considered to be in-line with on-ground values and the planning intent of the area.

The proposed development will result in the removal of vegetation across the site, including mapped Least Concern Regional Ecosystems and mapped Category X (non-remnant) vegetation. While the proposal will result in encroachment within the mapped Least Concern vegetation, it is noted that the VMA does not apply within the PDA.

With the exception of *Melaleuca irbyana*, no other threatened flora species listed under the EPBC Act nor NCA were recorded nor are they considered likely to occur on-site. The two (2) *M. irbyana* specimens, were recorded within the south western extent of the site. The specimens will be removed through the proposed development; however, a permit will be sought from DES to undertaken clearing of protected plants. Further, an Impact Management Plan including details of any offsets required will be submitted to DES for approval.

The impacts on the Koala and Koala habitat will be dealt with through a referral under the EPBC Act, and an approval is expected to include associated offsets and management plans. Of note, a referral has been made and the Preliminary Documentation is being prepared. No other threated fauna species listed under the EPBC Act nor NCA were recorded, nor are they considered likely to occur or utilise the site.

Flagstone Creek will be retained and rehabilitated through the development, and retains a buffer of 50m from the Centreline, or 50m from the High Bank, whichever is larger. Areas of mapped Endangered vegetation will also be retained within the Creek corridor. Impacts to waterway buffers during construction will be subject to rehabilitation as will rehabilitation to the retained areas of vegetation in the corridor.

The proposed development is not considered to have an impact on significant or unique ecological features located on the site. As previously outlined the Flagstone Creek corridor and surrounding mapped Endangered vegetation, identified as the areas of highest ecological significance on-site, will be retained and rehabilitated through development. This area is also identified as a Biodiversity Corridor and Potential Greenspace under the Development Scheme. Retention of this area ensures continued connectivity through the Flagstone PDA

and the wider Logan area. Further, given the designation of the site as Urban Living within the PDA development of the site is considered to be in-line with the planning intent for the area.

5.2. Potential Impacts

The following are considered key potential ecological impacts associated with the development proposal:

5.2.1 Vegetation clearing

Clearing of vegetation to support the development will reduce vegetation cover and habitat for flora and fauna dependent on those ecosystems. Koala habitat and *Melaleuca irbyana* specimens were identified within the clearing area. Site-based management plans will be implemented in accordance with relevant legislation and approvals to ensure the impact to vegetation communities will be appropriately managed. Impacts to Koala habitat will be managed through referral under the EPBC Act and is expected to included offsets and management plans, whilst impacts to *M. irbyana* specimens will be managed under the NC Act.

5.2.2 Weeds

Increased vehicle movement during the construction phase has the potential to increase the spread of weeds in the area, particularly during the vegetation clearing phase. With implementation of site-based management plans, the project is likely to result in a negligible impact to ecological values due to the potential introduction/spread of weeds.

5.2.3 Vehicle movements

During construction, a large number of vehicles will be required on the subject site. Direct impacts from vehicle movements on threatened species and vegetation communities include:

- damage or destruction of vegetation or fauna habitat by vehicles traversing these areas; and
- fauna strike.

Indirect impacts from vehicle movements include:

- interference of fauna through visual and noise impacts. This in turn can affect feeding, roosting, breeding or nesting behaviour;
- introducing and/or spreading weeds or feral animals carried on or in vehicles, resulting in deterioration or loss of vegetation and important fauna habitat; and
- damage or destruction of vegetation and fauna habitat through smothering by dust generated by vehicles traversing the project area.

With implementation of standard mitigation measures detailed in a Construction Environmental Management Plan, the project is likely to result in a temporary and minor impact to ecological values due to vehicular movements during construction.

5.2.4 Earthworks

Construction activities have the potential to generate dust emissions. Dust emissions during construction will be temporary. The main sources of dust will be generated via:

- wheel-generated dust from the haul roads created for the construction phase;
- dust lift-off from exposed surfaces (e.g. construction roads and pads);
- earthworks, including construction of the embankments, and moving, dumping and shaping material; and
- vegetation and soil clearing of the land.

Excessive deposition of dust on leaves of plants can suppress the growth and photosynthesis, resulting in reduced habitat quality for fauna. High levels of airborne dust can irritate the respiratory systems of fauna and potentially result in ingestion of dust-coated seeds and other foods. Excessive deposition of dust on open water bodies may also degrade water quality and overall habitat quality for fauna. With implementation of site-based management plans, the project is likely to result in a temporary and minor impact to ecological values due to the generation of dust.

5.2.5 Light emissions during construction

Artificial light can affect both nocturnal and diurnal animals by disrupting behavioural patterns, with quality of light (e.g. wavelength, colour), intensity and duration potentially evoking different faunal responses. Impacts from increased light levels include disorientation from, or attraction toward, artificial sources of light; mortality from collisions with structures; and effects on light-sensitive cycles of species (e.g. breeding and migration for fauna and flowering in plants). An artificial increase in lighting can also affect abundance of predators.

Presence and intensity of artificial light in the project area will temporarily increase during the construction phase; however, night works will not be common. Lighting will be directed to construction areas within the project area. Some light spillage will be inevitable and is likely to be contained. Potential impacts associated with light emissions will be temporary and unlikely to be significant.

With implementation of site-based management plans, the project is likely to result in a negligible impact to ecological values due to the use of light pollution during construction.

5.2.6 Noise and vibration

Noise levels greater than existing ambient noise levels are expected during the construction within the project area. Sources of noise are likely to consist of noise in short, intense pulses from mobile plant equipment, and more prolonged noise, with consistent vibration, pitch and volume from generators, excavators and pumps, in addition from noise from vehicles.

Both steady continuous and single noise events have the potential to lead to ecological impacts. Construction noise is expected to elicit some avoidance response from fauna using the surrounding vegetation though, with consideration of the extent of habitat available in the study area, this is likely to be a temporary and negligible to minor impact.

5.2.7 Waste disposal

Inappropriate disposal of non-hazardous wastes can attract vermin and other wildlife to site. This may exacerbate potential impacts (e.g. road mortality). Litter may also enter surrounding environments. With implementation of site-based management plans, the project is likely to result in a negligible impact to ecological values due to the generation and handling of waste.

5.2.8 Hazardous and dangerous goods

Spills and leaks from transfers (e.g. fuel and/or chemicals) and inadequate storage of dangerous goods and hazardous wastes could result in point-source contamination of surrounding land. Direct adverse impacts could include toxic impacts on vegetation (resulting in degradation or loss of vegetation and habitats), direct toxic impacts on fauna (from contact, inhalation or ingestion) or indirect impacts on threatened and migratory species from habitat loss. Direct adverse impacts on surface and groundwater quality are also possible.

With the application of site-based management plans, impacts from liquid and solid waste disposal will be avoided or localised and small in scale. Further to this, the likelihood of significant spillages is considered low. Therefore, the project is likely to result in a negligible impact to ecological values due to potential spills and leaks.

5.2.9 Increased human presence

Increased human activity during construction has the potential to disturb fauna within adjacent habitat areas. Resulting impacts to fauna include heightened vigilance and predator avoidance, which can disrupt foraging and roosting efficiency or deter wildlife from using particular areas. Impacts essentially represent a reduction in core habitat due to edge effects. The project is likely to result in a temporary and minor impact to ecological values due to increased human presence on-site during the construction period.

5.3. Ongoing disturbances

After completion of construction, the ongoing presence of infrastructure and increased human activity can continue to have adverse direct and indirect impacts. The key continuing risks to ecological values include:

- weed incursion;
- vehicle movements;
- noise and light pollution; and
- increased human presence.

Each potential impact associated with ongoing use of the site is described in detail in the following sections.

5.3.1 Weed incursion

Landscaped gardens will introduce a variety of new and exotic species to the area. Vegetation common in garden landscapes have the potential to be introduced into adjacent bushland areas through dispersal vectors such as birds, wind and runoff. Weed incursion will be ongoing and can be difficult to prevent.

However, the problem is often mostly constrained to edges of bushland that abut gardens and riparian zones of urban waterways.

With implementation of site-based management plans, the project is likely to result in minor impacts to ecological values due to the introduction and spread of weed species. Of note, Orchard Development Management is not responsible for ongoing mitigation measures for landscaped gardens in private properties. It is recommended that weed management, in accordance with an approved Rehabilitation Plan, is conditioned as part of the approvals packaged.

5.3.2 Vehicle strike

Upon completion of the development, vehicle traffic will increase significantly (compared to baseline conditions), increasing the likelihood of fauna strike. The probability of fauna strike is reduced due to the fact that most fauna will generally avoid urban areas. Notwithstanding, a low number of macropods, as well as reptiles (i.e. snakes and lizards attracted to heated bitumen roads) may occasionally enter the area and be at risk of vehicular strike.

In order to mitigate and manage impacts, the proposed development will include road design and wildlife signage in accordance with DTMR Design Manual. Measures will include 50km/hour speed limits, traffic calming and fauna crossing signage. Directional lighting will also be utilised within roadways adjoining the corridor area to reduce the potential for vehicle strike for all species.

5.3.3 Noise and light

Noise levels are likely to increase once the extension is operational as there will be increased vehicular and pedestrian traffic. Road noise will be the primary source of noise impact. The establishment and use of garden paths through landscaped areas will also provide a source of noise and light due to pedestrian traffic. However, this is expected to be minor.

Artificial light from residences may affect nocturnal and diurnal animals by disrupting patterns, with quality of light (e.g. wave length and colour), intensity and duration potentially evoking different responses. Impacts from increased light levels include disorientation from or attraction toward artificial sources of light; mortality from collisions with structures; and effects on light-sensitive cycles of species (e.g. breeding and migration for fauna and flowering in plants). The presence and intensity of artificial light will have the most impact at the edge of adjacent vegetation communities. Furthermore, the project is likely to result in a negligible impact to wildlife due to light spillage with the implementation of directional lighting in accordance with DTMR Design Manual. Directional lighting will also be utilised within roadways adjoining the corridor area to reduce the potential for vehicle strike for all species.

5.3.4 Increased human presence

Increased human activity associated with land uses within the development has the potential to disturb fauna that exist within the broader area. Examples of impacts included heightened vigilance and predator avoidance, which can disrupt foraging and roosting efficiency, or deter wildlife from using particular areas.

Increased human presence is expected to have a minor to moderate impact to wildlife and vegetation.

5.4. Management and compensatory measures

A number of management and compensatory measures are proposed to minimise and offset impacts associated with the development. These measures are discussed within the following subsections. These measures have further been discussed in the Natural Environment Site Strategy (NESS). Additional field work including habitat quality transects within the Flagstone Creek Corridor may be required, and will be completed at the Operational Works stage to provide further information for the following management plans.

5.4.1 Vegetation Management Plan

A Vegetation Management Plan (VMP) forms part of the broader management document submitted as part of the development application for the project site.

The VMP covers clearing of all vegetation listed in this report and include details on:

- trees marked for removal;
- all civil works likely to impact existing vegetation;
- temporary and permanent exclusion and protection fencing;
- roles and responsibilities for site contractors, the developer and the consultant group;
- stockpiling and site access locations;
- a clearing sequence plan showing the commencement of clearing and direction of removal (this should be in conjunction with the Fauna Management Plan (FMP) to allow for the appropriate flushing of fauna towards safe havens and/or the application of an appropriate relocation program);
- links to weed management and revegetation proposals; and
- stock piling and reuse of cleared vegetation.

5.4.2 Fauna Management Plan

A FMP has been prepared for potential impacts of the construction phase covering the loss of vegetated areas, isolated trees and likely barriers and impediments to local dispersal.

The FMP links closely with the VCFMP and includes details on:

- species surveyed utilising the site, focusing on those most likely impacted by development works;
- a list of relevant State and Commonwealth legislation constraints and controls for fauna potentially affected by development works;
- a plan showing existing habitat opportunities and locations;
- details of the threats to existing fauna species;
- the clearing sequence plan from the VCFMP;
- management and mitigation measures – i.e. temporary use of fauna exclusion fencing;
- description of fauna spotter role, contacts and certification; and

- specific fauna management procedures for potential or known habitat trees.

5.4.3 Impact Management Plan

An Impact Management Plan (IMP) will be prepared to support a permit to DES for works within 100 m of retained *Melaleuca irbyana* specimens recorded on the project site. The IMP will include information on:

- The location of the two *M. irbyana* specimens.
- Works methodology to ensure the specimens are clearly identified and protected.
- Links to the Rehabilitation Plan to ensure complementary plantings and sensitive weed management techniques are implemented.

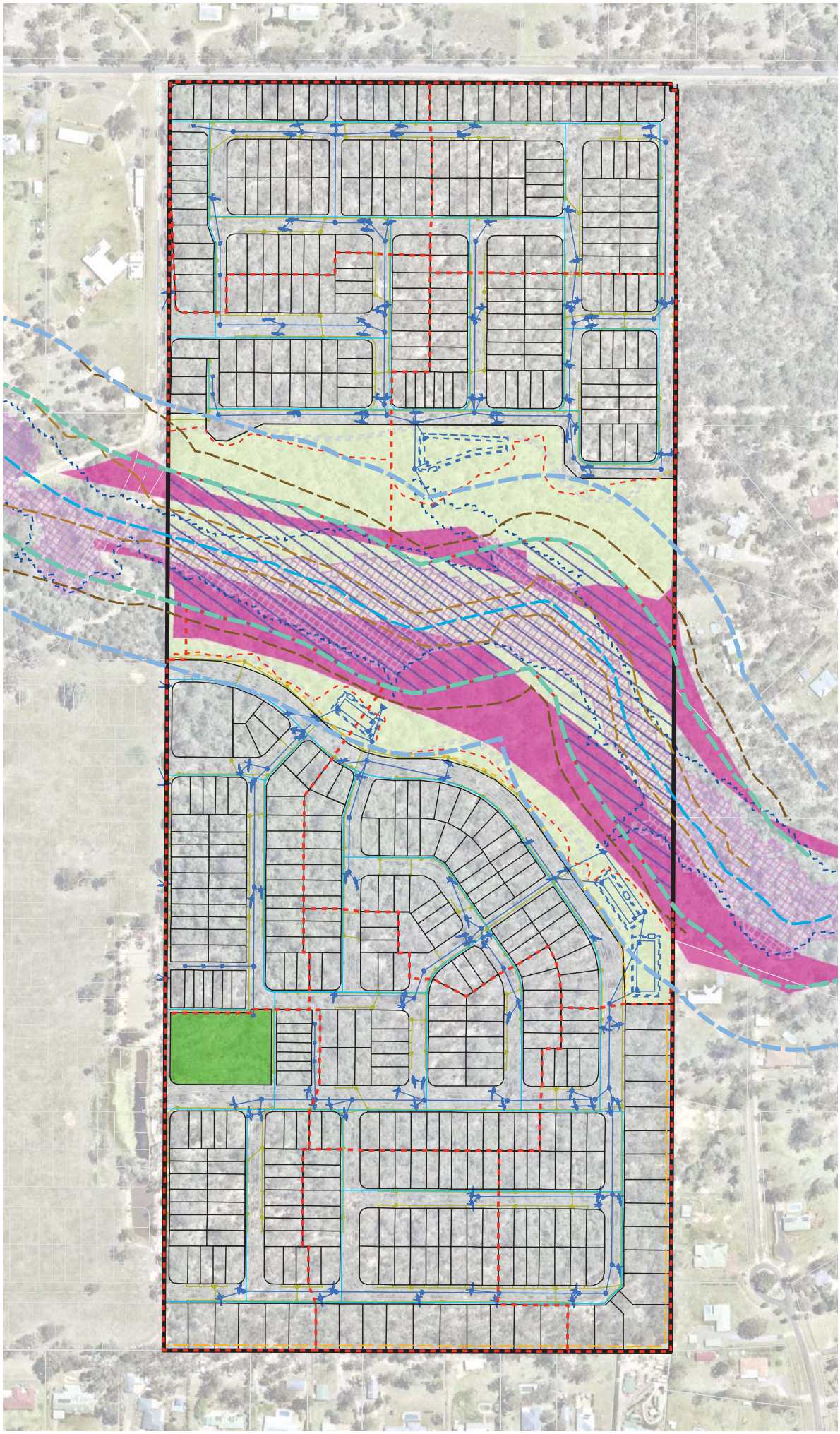
5.4.4 Rehabilitation Plan

A Rehabilitation Plan should form part of the broader management document submitted as part of the operational works drawings for the project site, and will generally include information on:

- rehabilitation approaches in accordance with SEQ Ecological Restoration Guidelines (SEQRF);
- existing and proposed contours;
- locations of services/earthworks;
- existing vegetation to be retained and/or removed;
- location of waterways and waterbodies;
- major weed infestations and proposed treatments; and
- trail and path systems.

Refer to **Plan 4** for Development Assessment.

4. Development Assessment



NOTES
This plan was prepared as a desktop assessment tool.
The information on this plan is not suitable for any other purpose.
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Layer Sources
Qld State Cadastre and Mapping layers © State of Queensland (Department of Natural Resources and Mines) 2020. Updated data available at http://qldspatial.information.qld.gov.au/catalogue//
Aerial Imagery © Nearmap, 2018

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Legend

- Site DCDB
- Qld DCDB

Waterway

- Flagstone Creek centreline
- 100m waterway corridor extent
- 200m waterway corridor extent
- Approximate high bank - derived from slope analysis utilising lidar data
- 50m high bank offset
- Engangered remnant vegetation to retain
- Riparian zone (5.1ha)
- 1 in 5 ARI

Development

- Stage boundaries
- Proposed development layout
- 4m wide landscape interface buffer
- Future neighbouring layout
- Q100
- Bio-basin batter top
- Bio-basin and stormwater services
- Batter toe
- Batter top
- Lot design
- Road design
- Indicative footpath design
- Sewer services
- Water services
- Openspace - Park
- Openspace - Linear Park (9.7 ha)

Issue	Date	Description	Drawn	Checked
A	25/02/2019	Preliminary	MP	OS
E	23/01/2020	Design update	MP	HS

0 10 20 40 60 80 m

Transverse Mercator | GDA 1994 | Zone 56 | 1:3,000 @ A3

saunders havill group

Orchard Development Management Pty Ltd
ATF Orchard Development Management Unit Trust

Mountain Ridge Road, South Maclean

ADDRESS/RPD: 3RP133386 | 23/01/2020 | 9534 E 04 Development_Assessment E

6. Conclusion

This SBAR was prepared by SHG on behalf of Orchard Development Management Pty Ltd (Orchard) in response to Economic Development Queensland's (EDQ) *PDA Implementation Guideline No. 14 (Environmental values and sustainable resources)* and *PDA Implementation Guideline No.17 (Remnant Vegetation and Koala Habitat Obligations in Greater Flagstone and Yarrabilba PDAs*) for a proposed residential development located at 176-228 Mountain Ridge Road, South Maclean.

The following conclusions can be made based on ecological assessment:

- A search using the PMST for MNES under the EPBC Act, identified the potential for four TECs, 10 threatened flora species and 24 threatened fauna species to occur on-site.
    - No TECs nor threatened flora species were recorded or considered likely to occur on-site.
    - Of the listed fauna species, only evidence of Koala utilisation was recorded in the form of scats. Koala SAT surveys undertaken over the site indicated a "low" overall usage of this site, suggesting that whilst the site is utilised by Koalas it is relatively poor habitat for the species.
    - The site is also considered to contain suitable habitat for Koala and potential foraging habitat for Grey-headed Flying-fox; two listed species known to occur in the area. However, given the significantly disturbed state of the site and existing surrounding threats (e.g. rail, road and dogs), the quality of habitat on the site is considered low in context to the broader area.
- A Wildlife Online search for threatened species under the NCA identified the potential for three threatened fauna species and one threatened flora species, *Melaleuca irbyana*, to occur.
    - Two (2) *Melaleuca irbyana* specimens were recorded across the subject site. A permit will be required from DES for protected plants clearing.
- The site is predominantly mapped as containing Category B Least Concern vegetation with two centrally mapped polygons of Endangered RE12.3.3 on the northern and southern extents of Flagstone Creek. The northern extent of the site is mapped as containing Category X (non-remnant) vegetation. Of note, the VMA does not apply within the PDA, however mapped Endangered vegetation will be protected through the proposed development.
- The site is mapped as containing one high (red) risk waterway for waterway barrier works (WWBW) under the *Fisheries Act 1994*. This waterway is identified as Flagstone Creek and traverses the central portion of the site. All works are to be undertaken in accordance with the Accepted Development Requirements or will require a permit for WWBW from SARA.
- Although the central waterway was noted to be disturbed, it did contain some areas with evident bed and banks heavily infested with weeds, and the feature forms a potential ecological corridor through the development through its retention and will help facilitate east-west biodiversity connectivity.
- The project area contains a diverse array of flora species typically found within a pastoral landscape. A total of 121 flora species were recorded within the application area. Of these species, 76 were native

and 45 were introduced or planted species typical of rural residential land uses. Nine (9) species are listed as restricted plants under the *Biosecurity Act 2014* and will require specific levels of management.

- Fauna recorded across the site included common mammals, small reptiles and avifauna, which are likely to utilise the application area as part of a much broader home range. These species are considered common to the area and are typically encountered throughout urban areas within the Greater Flagstone PDA.

6.1. Guideline 14 – Environmental Values and Sustainable Resource Use

Guideline 14 outlines the values and strategies for protecting the environment and optimising resource use in PDAs and includes the following strategies:

- Environmental values
- Pollution sources
- Climate change issues
- Natural resources

A response to Guideline 14, with respect to the project site, is presented below:

Ecological Processes and Systems

Values	Strategies	Comments
1. Significant terrestrial biodiversity values Areas of significant biodiversity value may include: ▪ Land mapped in the applicable PDA development scheme as having significant biodiversity values ▪ Mapped biodiversity corridors identified in the applicable PDA development scheme ▪ Other areas of significance identified in the applicable PDA development scheme ▪ Viable areas of remnant vegetation containing endangered regional ecosystems as defined in Appendix 1 ▪ Listed threated species habitat	Identify significant terrestrial biodiversity values within and adjoining the development area by undertaking: ▪ Robust field surveys ▪ Desktop assessments using local, state and commonwealth environment databases and mapping searches Demonstrate how the development minimises impacts on significant biodiversity values by minimising vegetation clearing generally within the area and by specifically: ▪ Retaining and enhancing areas of viable remnant vegetation containing endangered regional ecosystems as defined in Appendix 1 ▪ Avoiding, minimising or off-setting the clearing of non-viable remnant vegetation containing endangered regional ecosystems as defined in Appendix 1 ▪ Minimising the clearing of remnant and regulated regrowth vegetation within the area ▪ Providing adequate buffers between development and any identified significant biodiversity value within or adjoining the development site	The project site and surrounding area has been subject to both desktop and on ground ecological assessments by SHG to identify existing ecological values at the site. The results of which have been presented in this SBAR. Desktop reporting was undertaken to inform on ground ecological surveys which included ground truthing flora, fauna, habitat and waterway field assessments over the entire project extent. Ecological surveys were undertaken in accordance with Commonwealth and State survey guidelines and best practice methods. Target flora and fauna surveys were undertaken specifically to identify the potential presence of listed threatened species and locate ecologically significant areas. The results have been used to describe various on-site habitat and vegetation characteristics. As discussed in this SBAR, Flagstone Creek traverses the central portion of the site. This area contains viable endangered regional ecosystems and is mapped as a Biodiversity Corridor under the Greater Flagstone PDA Development Scheme. As such, the Flagstone Creek corridor is considered to be an area of significant biodiversity value.

Values	Strategies	Comments
	▪ Providing management plans to reduce and control clearing and manage other development and construction impacts in the area.	The entire project site, and immediate surrounding area within the PDA is zoned as Urban Living. This zone has been strategically identified as containing areas suitable for urban development as to minimise impacts on landscape scale significant biodiversity values. The project site is mapped predominantly as Category B Least Concern vegetation, with an area of Category X (non-remnant) vegetation in the northern extent and Category B Endangered RE within the Flagstone Creek Corridor. The mapped Endangered RE on-site will be retained and protected through development. Only viable Endangered Remnant Vegetation is identified as significant under IG 14. The site is mapped as containing areas of Medium Value and Low Value Bushland and Medium Value and Low Value Rehabilitation habitat for Koalas. This mapping appears to be based on aerial imagery of vegetation cover at a point in time the mapping layer was created. However, as described within this SBAR, ecological field survey determined that the site contains relatively poor habitat for the koala, and low levels of koala usage were observed. Removal of Least Concern remnant vegetation is required to facilitate a practical development footprint in accordance with Development Scheme intent and density requirements.

Values	Strategies	Comments
		Two (2) *Melaleuca irbyana* specimens, a species listed as Endangered under the *Nature Conservation Act 1992* were recorded on-site, and will be removed under the proposal. A permit to clear individuals will be obtained for the Department of Environment and Science. This application will be supported by an Impact Management and is subject to DES approval. Offsets will be provided as directed by DES. No significant biodiversity values will be impacted by clearing. Importantly, the proposal retains and rehabilitates areas of highest ecological significance on-site, being the Flagstone Creek corridor to ensure east-west connectivity is maintained across the site. Further, the proposal provides sufficient buffers between the development and these areas to ensure edge effects associated with the development are minimised.
2. Ecological connectivity	▪ Identify priority vegetation patches, fauna habitat features and fauna movement corridors in and beyond the application-site through detailed site assessments completed in accordance with the relevant local government authority guidelines or planning scheme policies for ecological assessment ▪ Retain vegetation connections between priority vegetation patches, fauna habitat features and fauna linkages to ensure	Ecological assessments completed by SHG in accordance with Guideline 14 requirements did not identify any priority vegetation patches, habitat features or strategic fauna corridors within the proposed Development Area. SHG considers "priority vegetation patches" to be ecologically viable Endangered remnant vegetation, and given the context of the site with Flagstone Creek providing a biodiversity corridor, it was considered to be the only "strategic fauna corridor" on-site.

Values	Strategies	Comments
	ecological connectivity is maintained or enhanced ▪ Minimise locating major infrastructure through identified corridor linkages ▪ Undertake strategic rehabilitation of degraded land where required to improve or create functioning corridors.	Surveys confirmed the central waterway, Flagstone Creek, to be the most valuable ecological feature within site bounds, and is recognised to provide some east-west connectivity potential for fauna movement across the project area. Note, fauna movement to the west of the site is partially influenced by the Brisbane to Sydney Railway Line – where noise associated with trains may deter movement. However, large culverts exist facilitating fauna movement beneath the railway line, presenting opportunities for continued safe fauna passage. It is anticipated that through rehabilitation efforts of the riparian corridor of Flagstone Creek, potential fauna movement will continue to exist to the west. Teviot Road is situated to the east of the site and currently interferes with fauna movement potential associated with Flagstone Creek. Culverts exist beneath the road crossing, however, no specific fauna movement measures or mechanisms have been incorporated into infrastructure design. Further, no evidence of fauna utilisation (*i.e.* scats, tracks, scratches) were observed proximal to Teviot Road during field survey effort. Potential may exist for future fauna management mechanisms to be employed, including riparian rehabilitation efforts. Connectivity to the south is also impeded by existing high density residential development, and by Mountain Ridge Road and rural-residential properties to the north. Domestic dogs were observed on the majority The Flagstone Creek corridor will be retained

Values	Strategies	Comments
		in an environmental corridor and rehabilitated as part of the development to ensure fauna movement opportunities are not only maintained but enhanced as a result of the proposal. Further, the proposed development provides a sufficient buffer (more than 100 m corridor width) to this waterway to ensure edge effects from the development are minimised. The development layout has been informed by detailed ecological assessment, as outlined within this SBAR. As a result, the Flagstone Creek corridor and adjacent mapped Endangered RE are protected and retained through development. Given the planning intent of the area, more development is anticipated to be approved surrounding the subject site. As such, retention and rehabilitation of the Flagstone Creek corridor is considered appropriate to mitigate environmental impacts of clearing and development in the context of the PDA. A rehabilitation plan will be prepared at the Operational Works stage and will include detail on how fauna movement opportunities will be maintained and enhanced through the development.
3. Sustainable landscaping practices	▪ Incorporate biodiversity friendly landscape principles and practices such as retaining habitat trees in road reserves and opens space areas	Sustainable landscape principles and practices will be incorporated within the development area under the proposal. These will include plantings from a localised native species pallet and the retention of trees within

Values	Strategies	Comments
	▪ Maximise use of locally occurring native species in landscaping ▪ Identified opportunities for revegetation and rehabilitation along waterways and biodiversity corridors	the open space areas along the mapped central and north-western waterway.
4. Bushfire risk management	▪ Ensure significant biodiversity values are protected from exempt clearing by ensuring new built infrastructure is adequately set back from identified biodiversity areas ▪ Where a firebreak is required to protect new infrastructure ensure clearing associated with the firebreaks is located external to significant biodiversity areas.	A Bushfire Management Plan is addressed separately. Due to the proposed development and post development vegetation settings bushfire is not considered to pose a risk to the retained vegetation on the site or the proposed development

Waterways and Wetlands

Values	Strategies	Comments
1. Wetlands	▪ Identify and accurately map the extent of, and describe the values for, any identified wetlands of high ecological significance and referrable wetlands ▪ Provide adequate buffers between development and wetlands that are in and adjacent to the PDA (where feasible incorporate open space, storm water treatment or fauna corridors within wetland buffers) ▪ Where a wetland of high ecological significance occurs, a minimum buffer of 50	SARA Wetland Protection Area mapping and SPP MSES mapping does not identify protected wetlands within or adjacent to the proposal area. Surveys by SHG confirmed that no natural wetland values were identified across the site.

Values	Strategies	Comments
	metres between the development proposal and the wetland is recommended	
2. Waterways	▪ Identify and accurately map waterways in accordance with DES' stream order hierarchy (1-5). ▪ Determine existing and proposed waterway values of site stream orders (e.g. Intact remnant vegetation, riparian values, fauna connectivity, natural water quality function, watercourse stability). ▪ Retain waterways in their undisturbed condition by minimising disturbance to natural drainage. Where this is not proposed provide a detailed waterway assessment report justifying encroachment or removal of waterway areas. ▪ Provide adequate buffers between development and retained waterways to provide waterway protection including temperature, bank stability, light, aquatic habitat, terrestrial habitat. ▪ Where waterways have been designated or identified to provide dual use (fauna corridor, open space connection, stormwater conveyance) provide additional buffer setback.	One high risk waterway for waterway barrier works is mapped as traversing the central portion of the subject site, known as Flagstone Creek. Flagstone Creek was ground-truthed through an ecological assessment and was found to be accurately mapped. The proposed development provides a substantial buffer of up to 100m from the centreline to Flagstone Creek. The Creek will be buffered by an ecological corridor, including existing mapped Endangered RE's. Stormwater Management and Erosion and Sediment Control Plans will be prepared as part of this application and will manage and minimise potential impacts on the mapped waterways.
3. Water Quality	▪ Water discharge to on-site and adjacent water systems (freshwater, estuarine and marine) must meet water quality standards under current Queensland legislation.	Stormwater Management and Erosion and Sediment Control Plans will be prepared as part of this application and will manage and minimise potential impacts on mapped waterways.

Values	Strategies	Comments
	▪ Soil disturbance must be managed to avoid associated contaminants entering adjacent water systems. ▪ Identify nutrient hazard areas and appropriately manage soil and groundwater disturbance to avoid or minimise nutrient mobilisation that may increase the risk of coastal algal blooms. ▪ Avoid or minimise waste water discharge from the site in accordance with a waste water management plan prepared by a suitably qualified person. ▪ Avoid areas with highly permeable soils or a high water table when locating waste disposal activities or facilities. ▪ Provide adequate buffers for water quality between development and retained waterways.	

6.2. Guideline 17 – Koala Habitat Obligations

Impacts on Koala habitat values will potentially be managed through the measures outlined in the Implementation Guidelines, and where impacts occur at the level outlined in IG17, offsets will be triggered.

The development, management and offset of site values may also be governed through an approval from the Commonwealth Department of the Environment and Energy, which is likely to be principally interested in achieving the same outcomes for the site.

As such, it is anticipated that an offset for Koala habitat values, either as a Commonwealth offset or IG 17 contribution, will be conditioned on approval.

7. Appendices

Appendix A

Development Layout

Appendix B

Environment Protection and Biodiversity Conservation Act 1999

Protected Matters Search Tool Results

Appendix C

Nature Conservation Act 1992

Wildlife Online Search Results

Appendix D

Environmental Searches

Appendix E

Curricula Vitae

David Havill & Dr Andrew Ridley

Appendix F

Likelihood of Occurrence Assessment

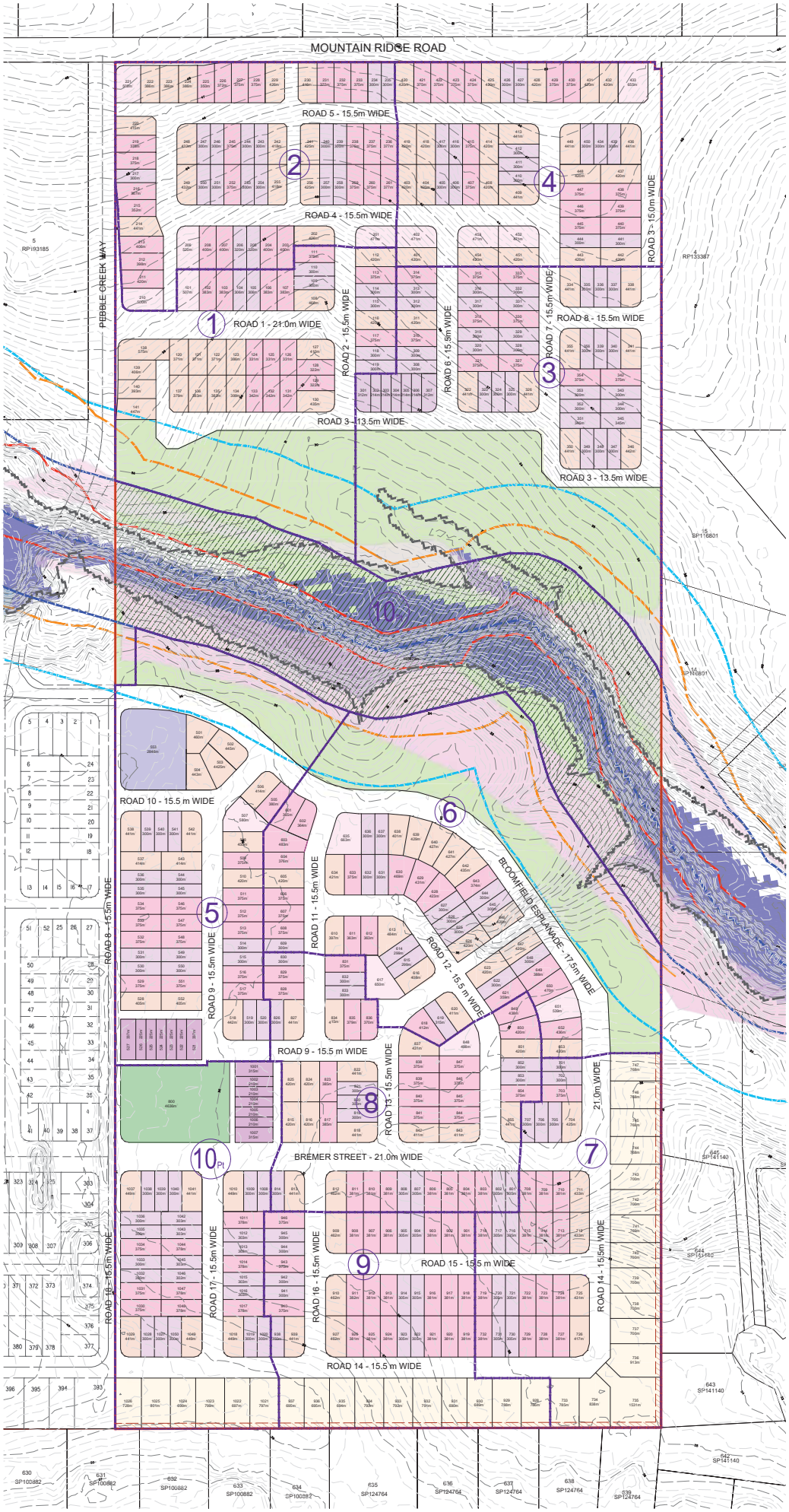
Appendix G

SAT Survey Results

Appendix A

Development Layout

CONCEPT PLAN



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NOTES

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LEGEND

- Site Boundary
- Major Contour (1.0m interval)
- Minor Contour (0.25m interval)
- Flagstone Creek Centreline
- 50m Centreline Waterway Buffer
- 100m Centreline Waterway Buffer
- Approx High Bank - Derived from Slope analysis utilising lidar data
- 50m High Bank Offset
- 1 in 5 ARI
- Riparian Zone - 5.051 ha
- Linear Park 9.739 ha
- Remnant Endangered Mapping
- 4m wide Landscape Interface Buffer
- Previous Road Alignment
- Staging Boundary
- (10) Staging Number
- Q100

DEVELOPMENT STATISTICS

Development Area	40.709 ha	
Laneway Terrace Lots	14	2.7%
Terrace Lots	7	1.4%
Villa	157	30.5%
Premium Villa	170	33.0%
Courtyard	122	23.7%
Premium Courtyard	14	2.7%
Interface Lots	31	6.0%
Total Residential Allotments	515	100%
Riparian Zone	5.051 ha	12.4%
Linear Park	9.739 ha	23.9%
Local Park	4636 m²	1.1%
Child Care Centre	2846 m²	0.7%
Area New Road	8.039 ha	19.8%
Length New Road	5175 m	

RP DESCRIPTION: Lot 30 on SP309195

SCALE @A1 1:1500 @A3 1:3000 - LENGTHS ARE IN METRES

20 0 20 40 60 80 100 120 140 160 180

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ORCHARD DEVELOPMENT MANAGEMENT PTY LTD ATF ORCHARD DEVELOPMENT MANAGEMENT UNIT TRUST

MOUNTAIN RIDGE ROAD, SOUTH MACLEAN • 19/12/2019 • 9534 P 03 Rev L -PRO 01

Appendix B

Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool Results

Australian Government
Department of the Environment and Energy

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: 07/12/18 11:56:01

No Image Available

Coordinates
Buffer: 5.0Km

No Image Available

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:	2
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	34
Listed Migratory Species:	16

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	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:	1
Regional Forest Agreements:	None
Invasive Species:	38
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	20 - 30km upstream
Moreton bay	20 - 30km 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
Swamp Tea-tree (Melaleuca irbyana) Forest of South-east Queensland	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community 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 likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
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 may occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	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
Fish		
Maccullochella mariensis Mary River Cod [83806]	Endangered	Translocated population known to 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 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 known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to 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		
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
Cycas ophiolitica [55797]	Endangered	Species or species habitat likely to occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to 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

Name	Status	Type of Presence
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
Notelaea ipsviciensis Cooneana Olive [81858]	Critically Endangered	Species or species habitat may occur within area
Notelaea lloydii Lloyd's Olive [15002]	Vulnerable	Species or species habitat likely to 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
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Saiphos reticulatus Three-toed Snake-tooth Skink [88328]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely 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 likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat 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 known 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

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely 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 likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may 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 may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	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
Koolena	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
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		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]		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

Name	Status	Type of Presence
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-27.7932 152.9721

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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix C

Nature Conservation Act 1992 Wildlife Online Search Results

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: Rare and threatened species
Records: Confirmed
Date: Since 1980
Latitude: -27.7932
Longitude: 152.9721
Distance: 5
Email: hannahsilcox@saundershavill.com
Date submitted: Wednesday 21 Aug 2019 15:17:00
Date extracted: Wednesday 21 Aug 2019 15:20:06

The number of records retrieved = 4

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cacatuidae	*Calyptorhynchus lathami lathami*	glossy black-cockatoo (eastern)		V		1
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		V	V	57
animals	mammals	Pseudocheiridae	*Petauroides volans volans*	southern greater glider		V	V	1/1
plants	land plants	Myrtaceae	*Melaleuca irbyana*			E		3/3

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.

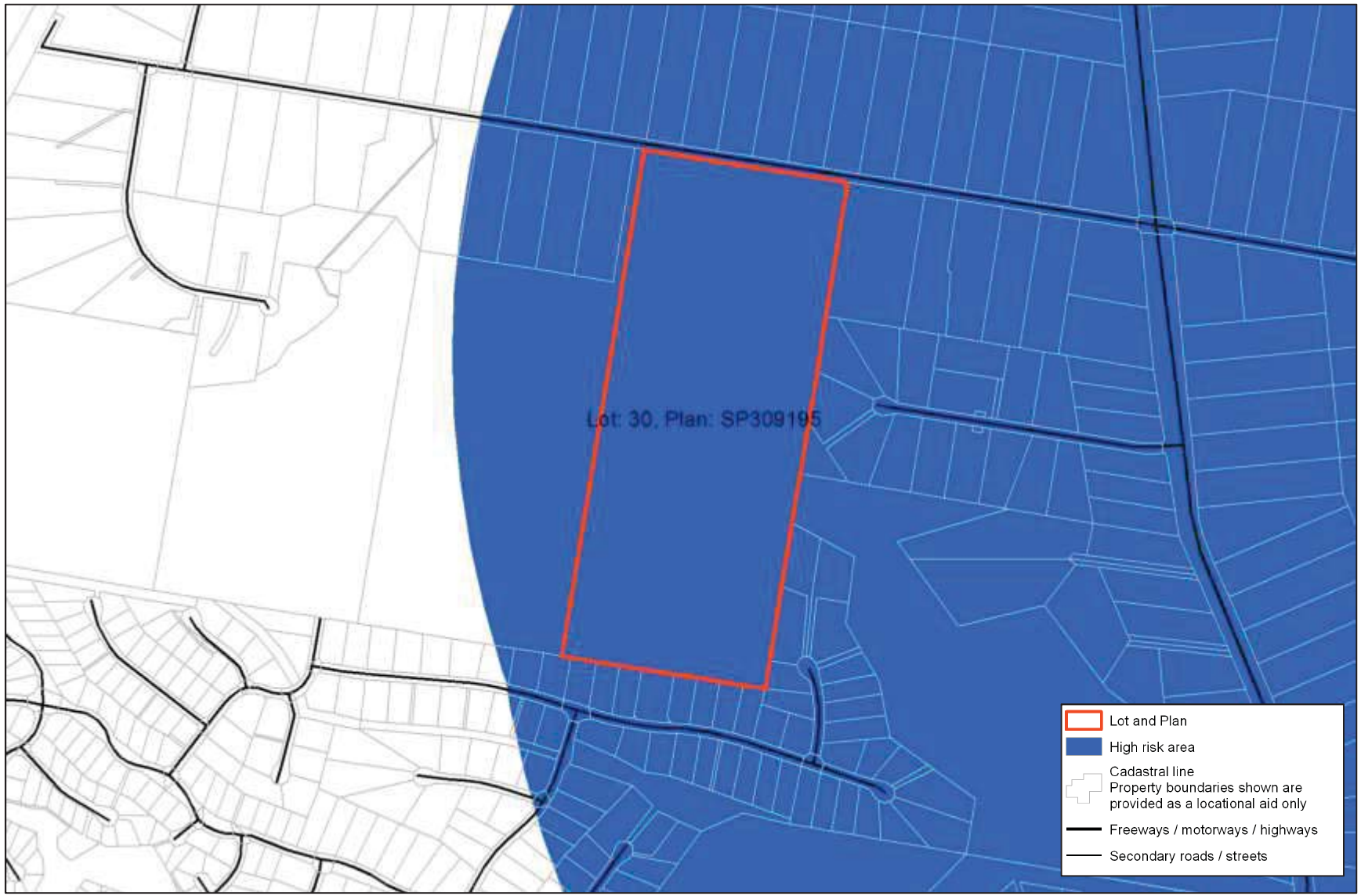
Appendix D

Environmental Searches

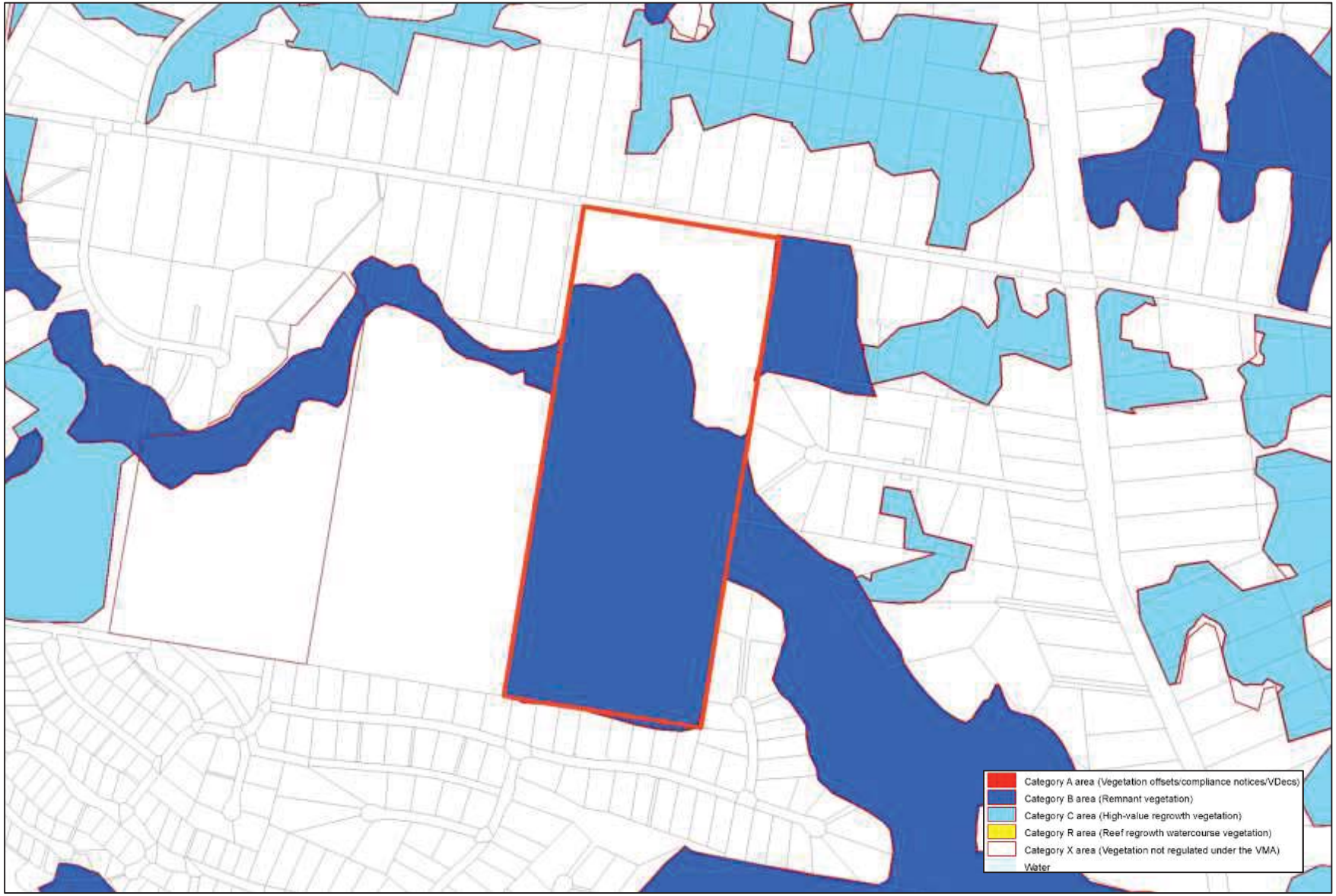
Summary (SHG Ref: E6830)	
176-228 Mountain Ridge Road, South Maclean (Lot 30 on SP309195)	
Area: 40.71 hectares	
Aerial	Qld Globe
Protected Plants	Within High Risk Area
VMA	Category X (Non-Remnant), Category B (Endangered & Least Concern), Essential Habitat (Koala) & Watercourse
Koala SPRP	Outside Koala Assessable Development Area
Koala Habitat	Low & Medium Value Bushland, Low & Medium Value Rehabilitation
SARA Provisions	Fish Habitat Areas (High Value Waterway)
State Planning Provisions	Biodiversity (Wildlife Habitat, Regulated Vegetation Category B, Regulated Vegetation Intersecting a Watercourse, Regulated Vegetation Essential Habitat) Water Quality (Water Resource Catchments) Natural Hazards (Medium and High Potential Bushfire Intensity & Potential Impact Buffer)
Council	Logan City Council
Planning Scheme / Local Plan	Greater Flagstone PDA
Greater Flagstone PDA	Zone (Urban Living) Community Greenspace Network (Biodiversity Corridor & District Recreation Park)

Aerial

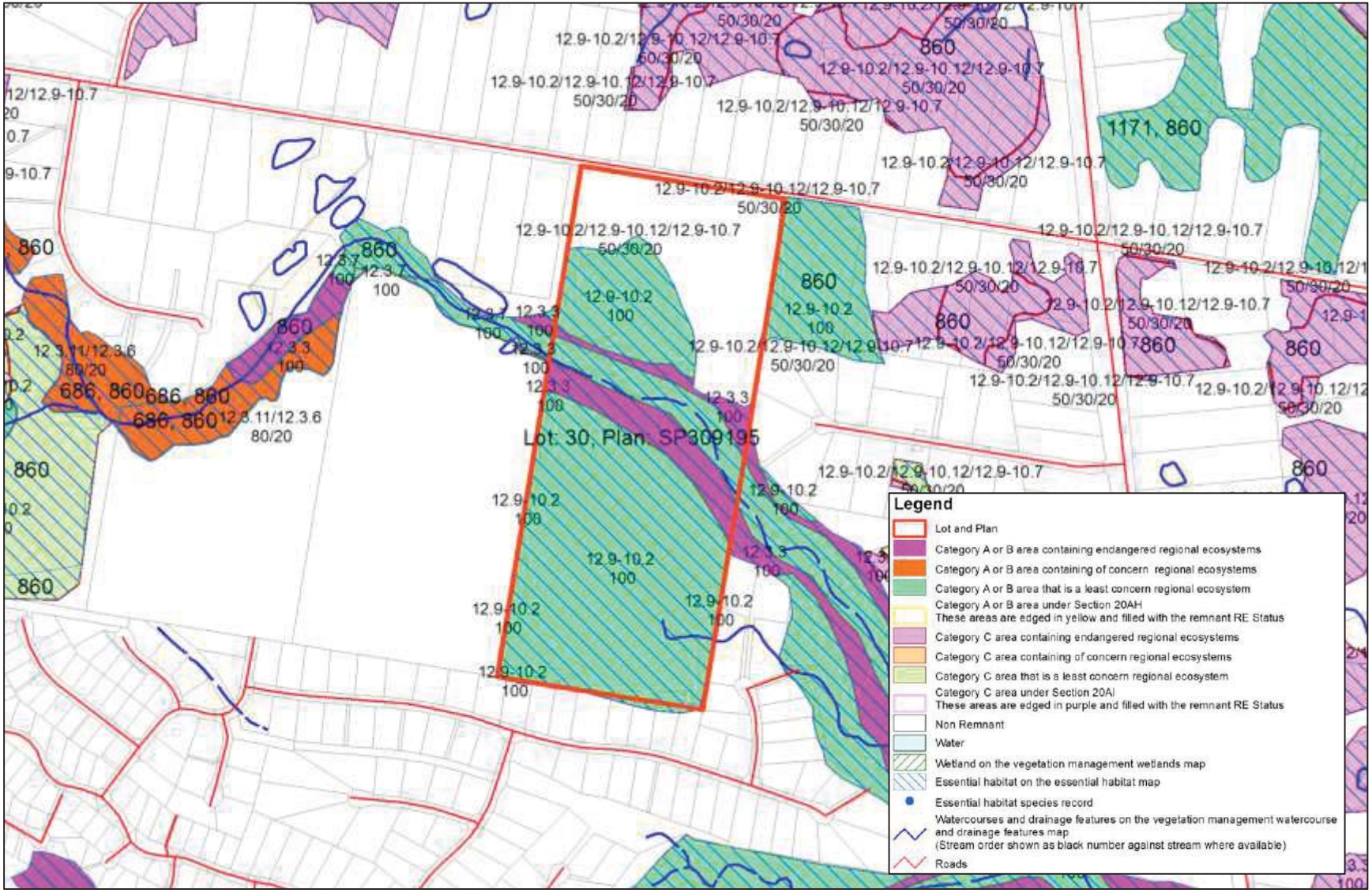
NCA Protected Plants Survey Trigger Map



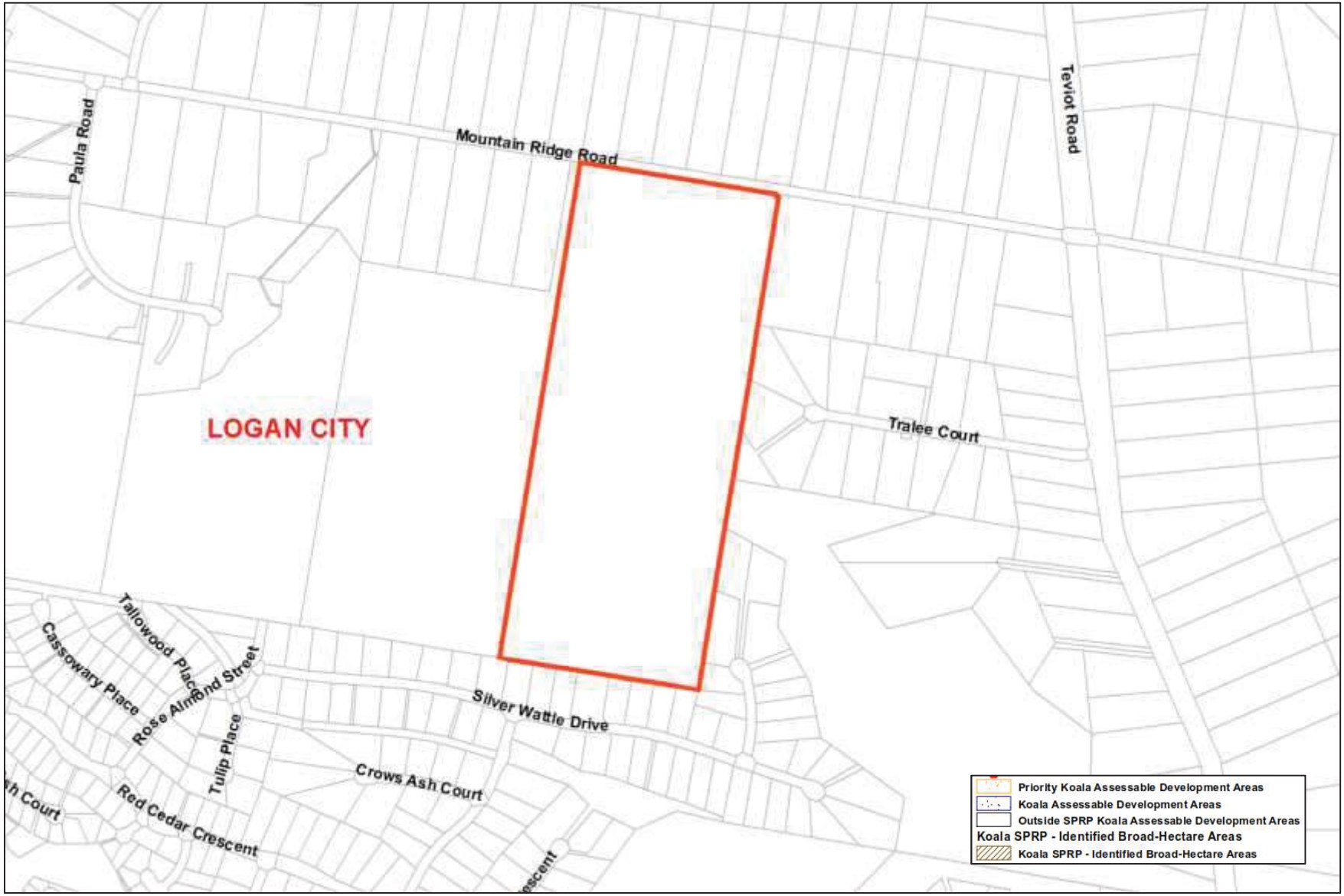
Regulated Vegetation Management Map



Vegetation Management Supporting Map

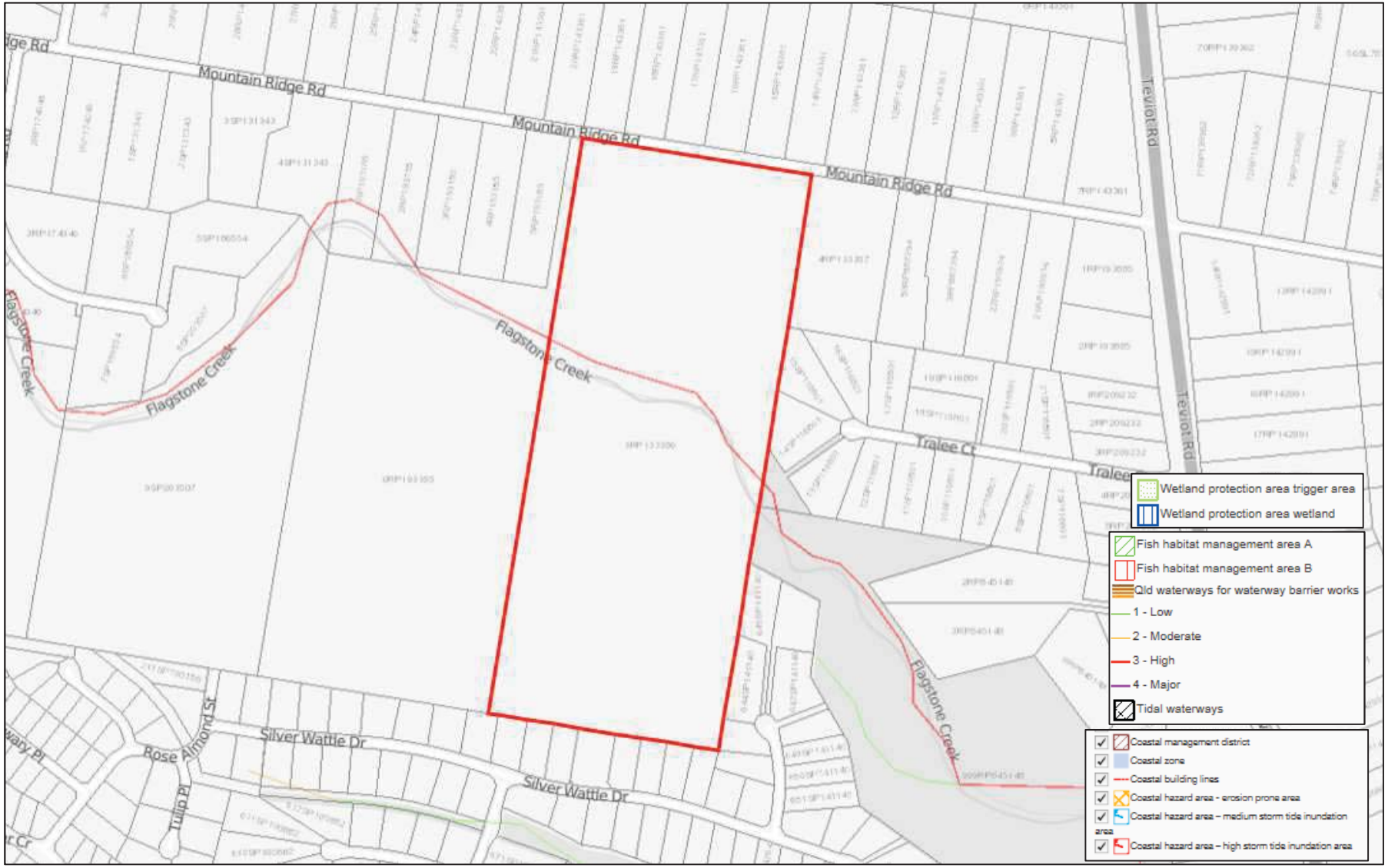


Koala SPRP

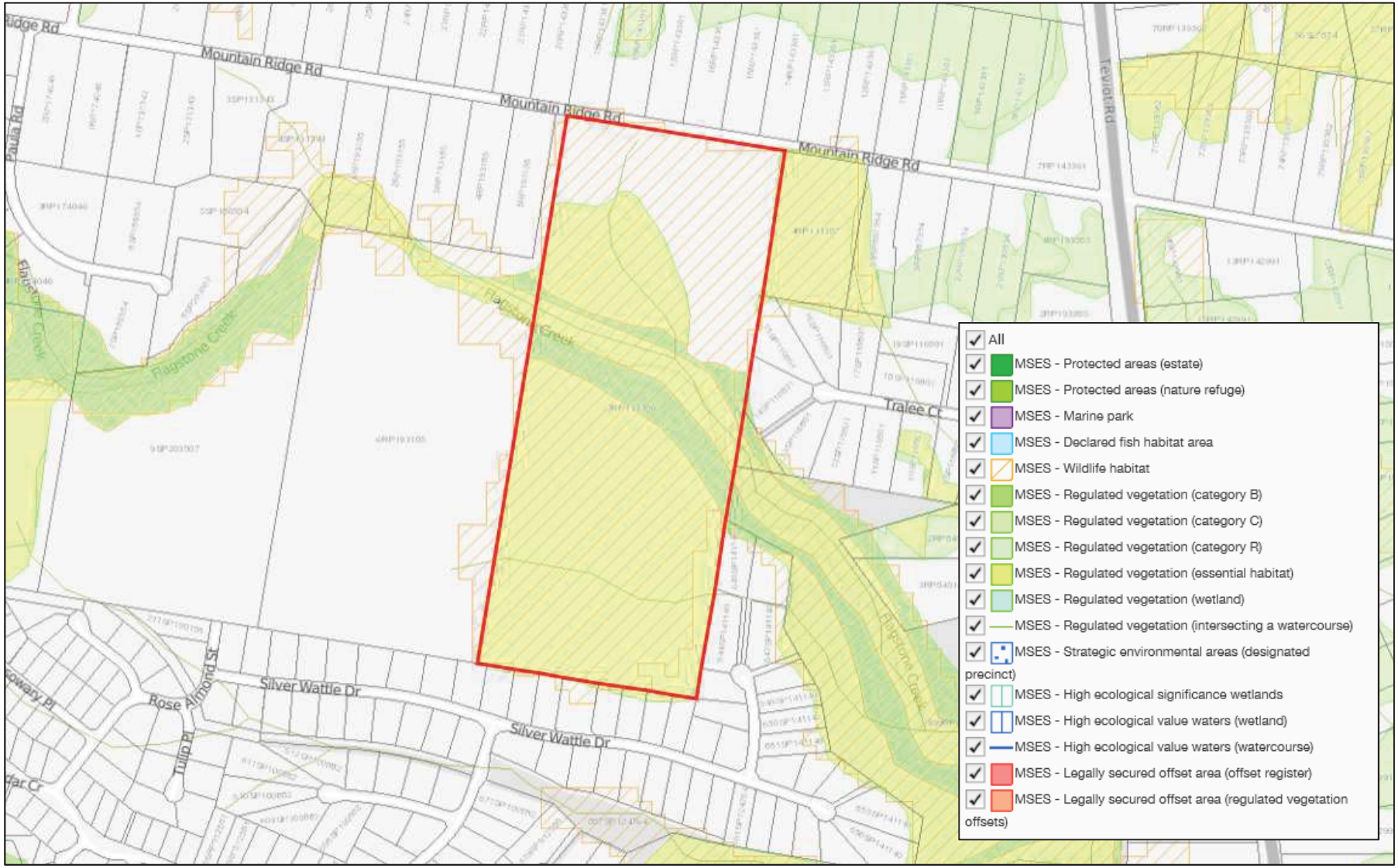

Paula Road
Mountain Ridge Road
Teviot Road
LOGAN CITY
Tralee Court
Tallowood Place
Cassowary Place
Rose Almond Street
Silver Wattle Drive
Tulip Place
Crows Ash Court
Red Cedar Crescent
Priority Koala Assessable Development Areas
Koala Assessable Development Areas
Outside SPRP Koala Assessable Development Areas
Koala SPRP - Identified Broad-Hectare Areas
Koala SPRP - Identified Broad-Hectare Areas

Koala Habitat SPP

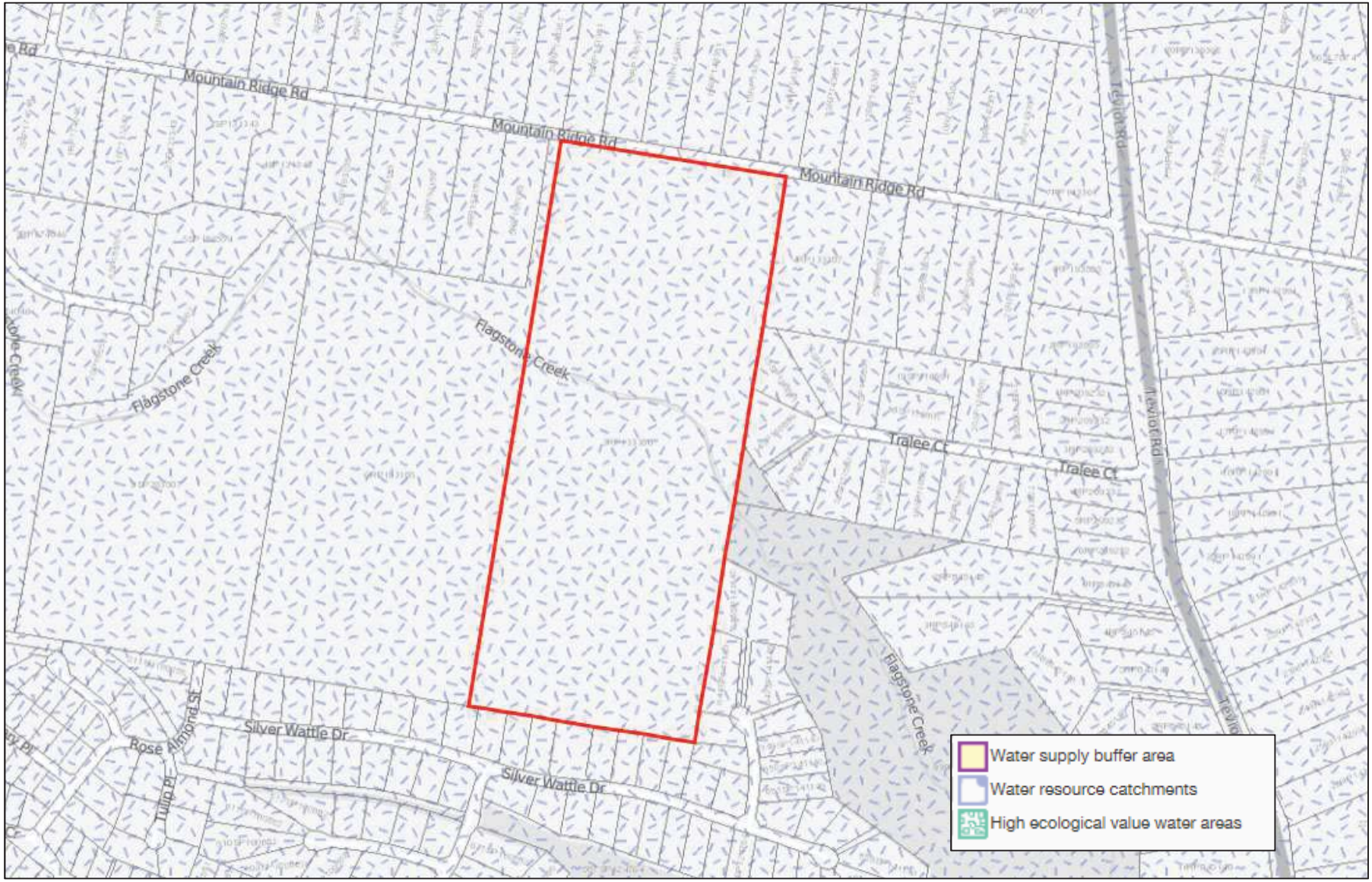
SARA -Coastal Protection, Wetland Protection and Fish Habitat Areas Mapping



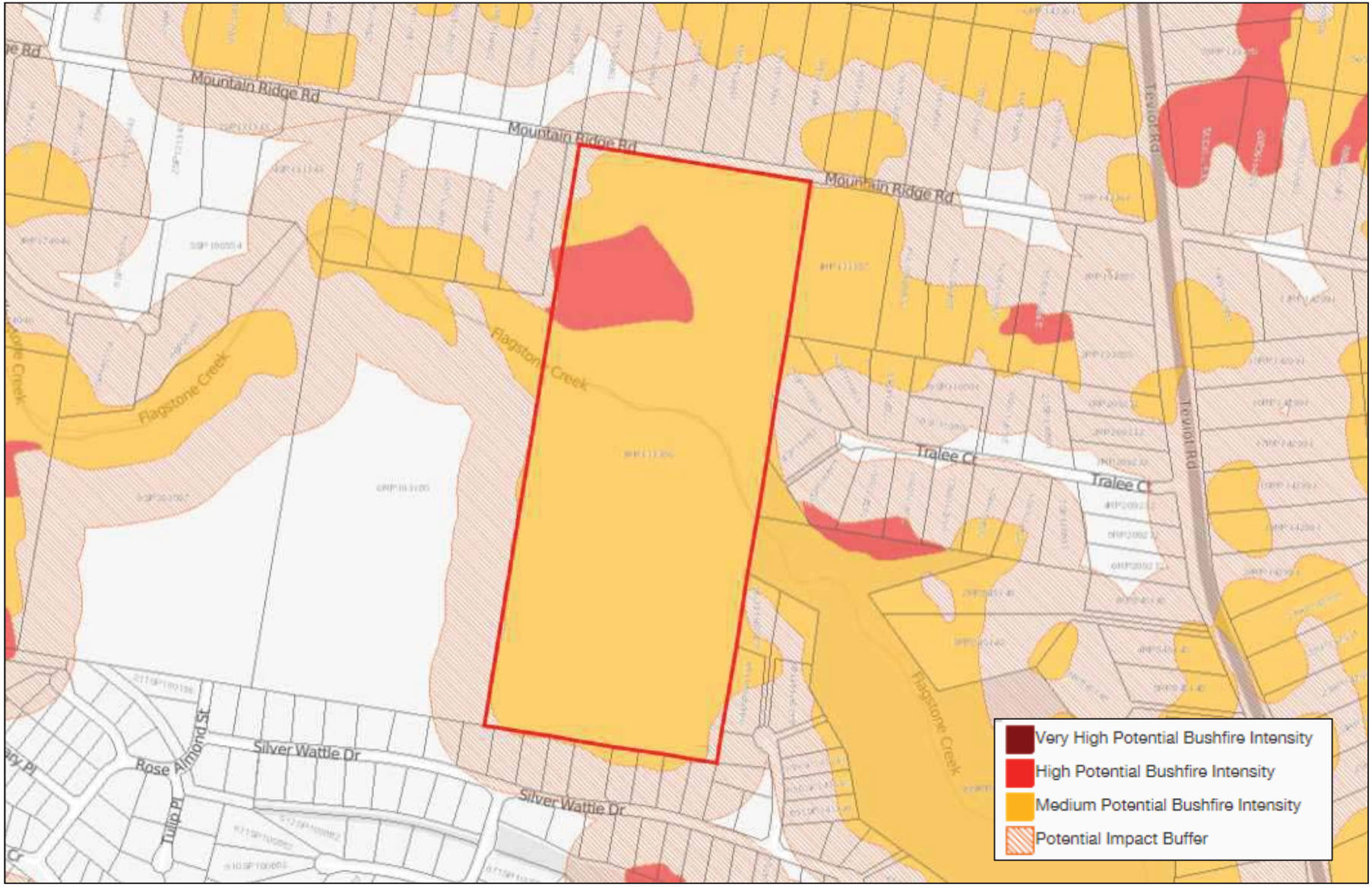
State Planning Policy- Biodiversity (MSES)



SPP – Water Quality

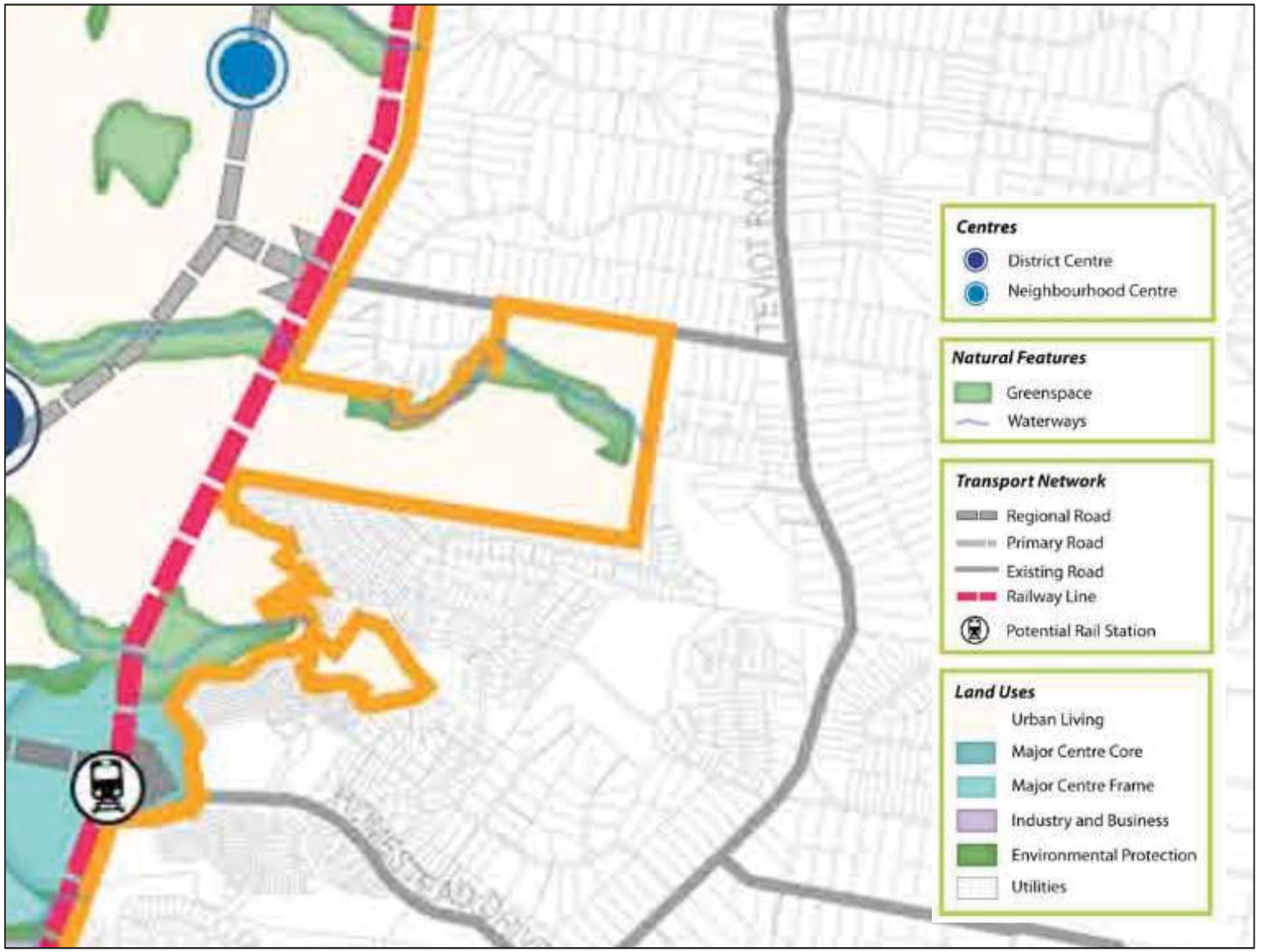


SPP - Natural Hazards Risk and Resilience



Greater Flagstone PDA – Zoning

Greater Flagstone PDA – Vision



Greater Flagtsone PDA – Community Greenspace Network

Appendix E

Curricula Vitae

David Havill & Dr Andrew Ridley

Senior Ecologist – David Havill

David Havill has significant practical experience in the areas of ecological site assessments (flora and fauna), weed management programs, large scale revegetation projects, wetland rehabilitation and waterway restoration.

He has a strong understanding of the intricate workings of the *Vegetation Management Act 1999, Nature Conservation Act 1992* and *Environment Protection and Biodiversity Conservation Act 1999* and the complex codes and policies which influence site vegetation constraints.

David's expertise relates to the on-site identification and spatial mapping of fauna and flora species including endangered, rare and vulnerable plants and animals. He has an accurate understanding of site survey processes and standards developed by the State and Commonwealth Governments. This provides the ability to challenge the various inaccuracies that occur within broad scale vegetation mapping developed by these Government agencies.

David works closely with our in-house team of GIS, environmental planning, and landscape rehabilitation specialists to document findings of ecological survey and prepare targeted restoration and rehabilitation strategies. He has a strong understanding of construction techniques associated with development projects and can prepare practical flora and fauna management plans to assist in guiding the construction process within sensitive areas. Given David's experience and qualifications, he is considered a suitably qualified person by the Department of Environment and Science.

Qualifications
Bachelor of Applied Science (Natural Systems and Wildlife Management), The University of Queensland (1998).

Senior Environmental Scientist – Dr Andrew Ridley

Andrew has extensive field experience gained while working as an ecological research scientist with the Department of Agriculture and Fisheries. Andrew comes to Saunders Havill Group with documented expertise in data acquisition, analysis and project delivery having published scientific articles in peer reviewed journal and presented at international conferences.

At Saunders Havill Group, Andrew uses his ecological expertise to assess sites against a variety of biodiversity overlays. He has a strong understanding of the science driving assessment methodologies and knowledge of Queensland flora and fauna. Andrew's experience within the academic area provides him with the 'know how' to maintain data integrity through the project flow path. His skills are applicable across the entire spectrum of project requirements at SHG, from instigation and formulation through development and production to client delivery.

Qualifications
Bachelor of Science (Honours), The University of Queensland (1999)
Doctor of Philosophy, The University of Queensland (2006)

Appendix F

Likelihood of Occurrence Assessment

9534 HABITAT ASSESSMENT FOR LISTED EPBC SPECIES 5km Search

Matters of National Environmental Significance

Name		Status	Proximity	Description of Community	Likelihood of Occurrence	Likelihood
Wetlands of International Importance	Moreton Bay	RAMSAR Listed	20 - 30 kilometers upstream	The site is located approximately 40 kilometres inland of Moreton Bay.	There will be no measurable effect on Moreton Bay.	**Unlikely**

Listed Threatened Ecological Communities

Name	Status	Type of Presence	Description of Community	Likelihood of Occurrence	Likelihood
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.	Endangered	This Threatened Ecological Community is listed as a community that may occur within the area.	In Queensland, this ecological commnity coincides with two regional ecosystem communities including Of Concern RE12.1.1 (Casuarina glauca +/- mangroves woodland) as well as areas where the canopy is dominated by Casuarina glauca within 12.3.20 (Melaeuca quinquenervia, Casuarina glauca +/- Eucalyptus tereticonris, Eucalyptus siderophloia open forest on low coastal alluvial plains).	Casuarina glauca was not identified throughout the survey area, nor regional ecosystem communities associated with this TEC.	**Unlikely**
Lowland rainforest of Subtropical Australia	Critically Endangered	This Threatened Ecological Community is listed as a community that may occur within the area.	Typically there is a relatively low abundance of species from the genera *Eucalyptus, Melaleuca* and *Casuarina.* Buttresses are common as is an abundance and diversity of vines. This community is usually associated Regional Ecosystems 12.3.1, 12.5.13, 12.8.3, 12.8.4, 12.8.13, 12.11.1, 12.11.10, 12.12.1, and 12.12.16.	No species representing these characteristics or vegetation communities were observed within the assessment area. A large portion of the investigation area contains regional ecosystem communities associated with land zone 9-10, which is not suitable to this threatened ecological community, and the RE 12.3.3 and 12.3.7 along the waterway is not tyically associated with this TEC.	**Unlikely**
Swamp Tea-tree (Melaleuca irbyana) Forest of South East Queensland.	Critically Endangered	This Threatened Ecological Community is listed as a community that is likely to occur within the area.	The Swamp Tea-tree forest also is listed as Endangered regional ecosystems 12.9-10.11 and 12.3.3c under Queenslands Vegetation Management Act. Melaleuca irbyana is the domiant species recorded within this vegetation community.	Although two individual Melaleuca irbyana specimens have been identified on site and a small area of RE 12.3.3 is mapped on site, the specimens were located outside of the endangered remnant vegetation and no areas were dominated by this species.	**Unlikely**
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	This Threatened Ecological Community is listed as a community that may occur within the area.	This threatened community is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs and the dominance of White Box, Yellow Box, or Blakely's Red gum trees. This community is usually associated with Regional Ecosystem 11.8.2a, 11.8.8, 11.9.9a, 13.3.1, 13.11.8, and 13.12.9. It can also be a small component of Regional Ecosystem 11.3.23, 12.8.16, 13.3.4, 13.11.3 and 13.11.4.	No species representing these characteristics or vegetation communities were observed within the assessment area. The majority of vegetation on-site is mapped as land zone 9-10, and within Bioregion 12, which is generally not suitable for this threatened ecological community.	**Unlikely**

Birds

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Anthochaera phrygia	Regent Honeyeater	Endangered	82338	Regent Honeyeaters mostly occur in dry Box-Ironbark Eucalypt woodland and dry sclerophyll forest associations in areas of low to moderate relief, wherein they prefer moister, more fertile sites. These areas are generally associated with creek flats and river valleys and foothills. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. They are a generalist forager, which mainly feed on nectar from a wide range of eucalypts and mistletoes.	The site is covered in both remnant and regrowth vegetation communities dominated by Eucalypt, Corymbia and Lophostemon species, with other species common in the subcanopy (ie. Acacia and Allocasuarina). The site is not dominated by box and ironbark species, and this species relies on vegetation with a diversity of species and abundance of mistletoe for food resources throughout the year, which is generally absent on site.	**Unlikely**
Botaurus poiciloptilus	Australasian Bittern	Endangered	1001	The Australasian Bittern occurs in terrestrial wetlands and, rarely, estuarine habitats, mainly in the temperate southeast and southwest. It favours wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and / or reeds or cutting grass growing over muddy or peaty substrate. The Australasian Bittern occurs in the far South-East of Queensland; it has been reported North to Baralaba and West to Wyandra, although in most years it is probably confined to a few coastal swamps. It is rarely recorded in Queensland, and possibly survives only in protected areas such as the Cooloola and Fraser regions.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	856	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas such as estuaries, bays, inlets and lagoons, and also aroundnon-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. Though less often, they are also recorded inland, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges or mud or sand.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Dasyornis brachypterus	Eastern Bristlebird	Endangered	533	The Eastern Bristlebird inhabits low dense vegetation in a broad range of habitat types including sedge land, heathland, swampland, shrub land, sclerophyll forest and woodland, and rainforest. It occurs near the coast, on tablelands and in ranges. The Eastern Bristlebird is found in habitats with a variety of species compositions, but is defined by a similar structure of low, dense, ground or understorey vegetation.	Low dense vegetation in a broad range of habitat types is not found in the assessment area. No suitable habitat was observed throughout the assessment area.	**Unlikely**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Erythrotriorchis radiatus	Red Goshawk	Vulnerable	942	A wide ranging and highly mobile species generally observed over eucalypt habitats. This species prefers forest and woodland with a mosaic of vegetation types, large prey populations (birds) and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest and rainforest margins. Habitat has to be open enough for fast attack and manoeuvring in flight, but provide cover for ambushing of prey.	Due to a lack of records within the local area, it is unlikely that this species will occur. However, possible foraging habitat occurs throughout the mapped remnant areas within and adjacent to the referral area. There is no evidence of permanent residence on site and very few areas containing permanent water.	**Unlikely**
Geophaps scripta scripta	Squatter Pigeon (southern)	Vulnerable	64440	This species inhabits open grasslands and woodlands typically with a native understorey although may occur in artificial pasture.	No confirmed local records, and this species is very rarely observed in southern Queensland.	**Unlikely**
Grantiella picta	Painted Honeyeater	Vulnerable	470	The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips	Due to the lack of mistletoe observed on site, and lack of records within the local area and south east Queensland, it is highly unlikely that this species will occur. However, vegetation communities typical of this species preferred habitat is observed throughout the investigation area.	**Unlikely**
Lathamus discolour	Swift Parrot	Endangered	744	Swift Parrots breed in Tasmania during spring to early summer. During autumn and winter the species migrates to the mainland where it follows a nomadic existence linked to the availability and timing of flowering of trees in various locations. While the species is very uncommon in south-east Queensland, its occurrence cannot be completely discounted. There are suitable winter flowing species present on the site which may attract birds during flowing (e.g. E. tereticornis).	Due to its extreme rarity and a lack of records within the local area and south east Queensland, it is highly unlikely that this species will occur.	**Unlikely**
Numenius madagascariensis	Eastern Curlew	Critically Endangered	847	The Eastern Curlew is found on sheltered coasts, mangrove swamps, bays, harbours and lagoons that contain mudflats and sandflats, often with beds of seagrass. At high tide they often move to saltpans, sand dunes and other open areas where they roost above the high water.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Peophila cincta cincta	Black-throated Finch (southern)	Endangered	64447	The Black-throated Finch (southern) occurs mainly in grassy, open woodlands and forests, typically dominated by Eucalyptus, Corymbia and Melaleuca, and occasionally in tussock grasslands or other habitats (for example freshwater wetlands), often along or near watercourses, or in the vicinity of water. It occurs at two general locations: in the Townsville region, where it is considered to be locally common at a few sites around Townsville and Charters Towers; and at scattered sites in central-eastern Queensland (between Aramac and Great Basalt Wall National Park). It has been absent from Brisbane and its surrounds since the 1930s.	Due to a lack of records within the local area, it is highly unlikely that this species will occur.	**Unlikely**
Rostratula australis	Australian Painted Snipe	Endangered	77037	The Australian Painted Snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. The species has a scattered distribution throughout many parts of Australia, with a single record from Tasmania.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Turnix melanogaster	Black-breasted Button-quail	Vulnerable	923	Typical habitat occurs in dry rainforest and vegetation immediately adjacent to rainforest. However the species has also been recorded in a variety of low coastal heathlands around Frazer Island and nearby mainland. Deep leaf litter in which the species can forage appears to be particularly favoured.	Rainforest habitats do not exist on or adjacent to the site. Although this species is known to favour areas with a dense shrub layer, including thick Lantana camara patches, no evidence (i.e.: platelets) has been observed on site.	**Unlikely**
Fish						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Maccullochella mariensis	Mary River Cod	Endangered	83806	The Mary River Cod occurs mainly in pools within relatively undisturbed tributaries. They prefer relatively large and deep shaded pools with abundant, slowly flowing water.	No suitable habitat to support this species was observed throughout the assessment area. The lack of abundant slowly flowing water and deep shaded pools was apparent from the traverse of the waterways associated with the site.	**Unlikely**
Insects						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**
Argynnis hyperbiius inconstans	Australian Fritillary	Critically Endangered	88056	The Australian Fritillary is restricted to SEQ and Northern NSW in open swampy coastal areas where the larval food plant Viola betonicifolia (Arrowhead Violet) occurs.	*Viola betonicifolia* (Arrowhead Violet) was not identified throughout the investigation area and therefore it is unlikely that this species would occur.	**Unlikely**
Mammals						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	183	The Large-eared Pied Bat roosts on sandstone cliffs and fertile woodland valley habitat within close proximity of each other. However in South-east Queensland habitat includes rainforest and moist eucalypt forest habitats at high elevations.	No typical roost habitat was identified in the assessment area, with no records of caves, mines, rock overhangs or crevices. There are no confirmed local records of this uncommon species, with the closest sighting over 40km to the south in Lamington National Park. Although the site contains a riparian corridor, these are not high elevation, moist forest habitats.	**Unlikely**
Dasyurus maculatus maculatus	Spot-tailed Quoll	Endangered	75184	The Spot-tailed Quoll occurs in south-east Queensland: coastally from Bundaberg to the border and inland to Monto and Stanthorpe. Occurrences from five broad geographic areas are known: four from coastal ranges and the Great Dividing Range from the NSW border to Gladstone. The fifth is centred on the eastern Darling Downs-Inglewood Sandstone provinces of the Brigalow Belt South Bioregion. The Spot-tailed Quoll is recorded from a wide range of habitats, but has preference for mature wet forest habitat. Unlogged forest or forest that has been less disturbed by timber harvesting is also preferable. This predominantly nocturnal species rests during the day in dens. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves. Individuals require an abundance of food such as birds and small mammals, and large areas of relatively intact vegetation through which to forage. Latrines of the Spot-tailed Quoll are sites where groups of individuals repeatedly urinate and defecate over long periods of time, resulting in the bleaching of the soil substrate and an accumulation of scats. For a highly cryptic species such as the Spot-tailed Quoll, these sites provide focal points for studies into distribution, diet, habitat, population structure, and management. Latrines are typically found in rocky creek beds, at the bases of cliffs, and on roads. The mean home range for males is 992 ± 276 ha, and 244 ± 72 ha for females.	This species appears both within the Wildlife Online search and Protected Matters Search Tool. The Wildlife Online search shows 13 records within a 10km radius, with Wildlife Online data showing the closest sightings being largely old sightings approximately 4-10km to the north/north-east towards Munruben and Greenbank, and approximately 9km to the south-east towards Jimboomba. No evidence of this species was found throughout the field assessment, including with the motion camera footage. Searches for latrine sites, tracks or scats, including of their predators (which may contain quoll hair and bone fragments) did not detect evidence of this species on site. There was a relative lack of suitable breeding or den sites across the site, that is, some observations of hollow logs, but a lack of rock outcrops or caves. It is possible that the species could use the referral site for movement purposes, particularly the riparian corridor, however the site does not provide ideal breeding and foraging habitat. Historical clearing practises have deteriorated portions of the site and surrounds, and likely to have resulted in reduced prey abundance (eg. Greater Gliders), greater predator incursion, and changed fire regimes. It is noted that predation from Red Foxes, Wild Dogs and Domestic Dogs are current threats to quolls, and evidence of wild or domestic dogs in particular have been observed on site.	**Unlikely**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Petauriodes volans	Greater Glider	Vulnerable	254	The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with topography ranging from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west, and another in the Einasleigh Uplands. The Greater Glider is found in highest abundance typically in taller, montane, moist eucalypt forests. During the day it shelters in tree hollows, with a particular selection for large hollows in large, old trees. In southern Queensland, greater gliders require at least 2–4 live den trees for every 2 ha of suitable forest habitat. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Home ranges are typically relatively small (1–4 ha), but are larger in lower productivity forests and more open woodlands (up to 16 ha).	Despite spotlighting searches, no evidence of this species was found throughout the field assessment. Hollow-bearing trees appear to be the most important factor in habitat selection in southern Queensland. And although greater gliders have a relatively small home range they are reported to be absent from forests with fewer than six habitat trees per hectare. The majority of the investigation area has historically undergone clearing practices., and very few old growth trees were observed that contained hollows to sustain this species. That is, only two (2) large dead stags with large hollows were recorded within the survey period. The referral area contains an abundance of eucalypts, however, the referral area fails to contain taller, montane, moist eucalypt forest, with the vegetation communities on site consisting of either non-remnant scattered eucalypts or remnant eucalypt woodland. According to the Conservation Advice for this species, modelling suggests that they require native forest patches of at least 160 km2 to maintain viable populations.	**Unlikely**
Petrogale penicillata	Brush-tailed Rock-wallaby	Vulnerable	225	Brush-tailed Rock-wallaby habitat includes refuge habitat, feeding habitat, and routes in between. Refuge habitat includes rock faces or outcrops with large tumbled boulders, ledges and caves (often with vegetation cover) that provide shelter and some protection from predators. Rock refuges are usually on a steep slope (e.g. cliff lines, river banks, gorges, outcrops from hillsides, plateau edges). Most populations have been found on north facing slopes but have been recorded on south facing slopes. This species browses on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Habitat critical to survival of the species includes rocky refuge habitat, foraging habitat and commuting routes between the two. Prior to European settlement, the Brush-tailed Rock-wallaby may have also occurred in non-rocky forests and woodlands, especially those on steep slopes and with cover in the form of dense vegetation and large fallen logs or trees (Jarman & Bayne 1997). The apparent restriction of Brushtailed Rock-wallabies to rocky habitats may be relatively recent, and is probably a consequence of threatening processes operating on the species.	According to Wildlife Online sightings data, the closest sighting of this species occurs over 14km to the west, in the rocky habitat areas of Undullah and Mt Elliot. Opportunistic searches and incidental surveys were conducted throughout the entire survey period across the referral area. No evidence of Petrogale penicillata (Brush-tailed Rock Wallaby) was observed throughout all site assessments. Although some foraging resources may be present on site, refuge habitat is lacking, that is, rocky habitat on steep slopes.	**Unlikely**
Phascolarctos cinereus	Koala	Vulnerable	85104	They are found in a range of habitats, from coastal islands and tall eucalypt forests to low woodlands inland. The species is known from the surrounding area and evidence has been recorded on-site.	No Koalas were sighting during the multiple days of field survey, however koala surveys did detect the presence of koala scats. Six SAT surveys were conducted across the site following the identification of a koala scat, and three of these surveys showed 'Low' koala usage (10% or less scat evidence).	**Known**
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE Mainland)	Vulnerable	66645	The Long-nosed Potoroo 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, fernr or heath, or of low chrub of tea-trees or melaleucas. A sandy loam soil is also a common feature.	No suitable habitat was observed throughout the assessment area, with limited dense vegetation for shelter.	**Unlikely**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Pteropus poliocephalus	Grey-headed Flying Fox	Vulnerable	186	Species generally roosts in camps in trees adjacent to larger permanent watercourse. The Grey-headed flying fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feed son commercial fruit crops. The primary food source is blossom from Eucalyptus and related genera.	No camps were observed throughout the assessment area, with the nearest camp over 2km to the south (Homestead Drive, Undullah). Although no individuals were recorded on site, one individuals was recorded as a flyover, and it is considered that this species has the potential to occur when the Eucalypts are in flower.	**Likely**
Plants						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**
Bosistoa transversa	Three-leaved Bosistoa	Vulnerable	16091	The Three-leaved Bosistoa is conserved within Mt Warning National Park, Numbinbah Nature Reserve, Limpinwood Nature Reserve and Whian Whian State Forest. While population information is unavailable, it is thought to be common in its range. It generally grows in wet sclerophyll forest, dry sclerophyll forest and rainforest up to 3oo meters in altitude. It is commonly associated with Argyrodendron trifoliolatum, Syzygium hodgkinsoniae, Endiandra pubens, Dendrocnide photinophylla, Acmena ingens, Diploglottis australis and Diospyros mabacea.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Cycas ophiolitica		Endangered	55797	Cycas ophiolitica inhabits open forest and woodland communities with a grassy understorey. It will grow on hills and slopes in sparse, grassy open forest at altitudes ranging from 80-620m above sea level.	The site contains limited sparse open forest with a grassy understorey, and therefore this species is unlikely to occur.	**Unlikely**
Dichanthium setosum	Bluegrass	Vulnerable	14159	Bluegrass is associated with heavy basaltic black soils and re-brown loams with clay subsoil. Associated species include Eucalyptus albens, Eucalyptus melanophloia, Eucalyptus melliodora, and Eucalyptus viminalis. It is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Macadamia integrifolia	Macadamia Nut	Vulnerable	7326	Macadamia integrifolia grows in remnant rainforest, preferring partially open areas such as rainforest edges.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	6581	Rough shelled bush nut generally occurs in subtropical rainforest and complex notophyll vineforest, at the margins of these forests and in mixed sclerophyll forest. It usually grow son moderate to steep hillslopes on alluvial soils at well-drained sites.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Notelaea ipsviciensis	Cooneana Olive	Critically Endangered	81858	The Cooneana Olive survives as an understorey plant in degraded, eucalypt dominated dry sclerophyll vegetation communities. Soils are of low fertility and sandstone based.	This is regarded as one of the rarest plants in Australia with the extent of occurrence less than 2km2 in the Ipswich area (3 sub-populations). This species is unlikely to occur on site.	**Unlikely**
Notelaea lloydii	Lloyd's Olive	Vulnerable	15002	This species occurs on undulating to hilly terrain either in moist gullies or on gentle to steep dry slopes, but is rarely found on rocky outcrops. It is generally found in the ecotone between eucalypt forests and vine thickets.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Phaius australis	Lesser Swamp Orchid	Endangered	5872	The Lesser Swamp-orchid is commonly associated with coastal wet heath/sedge land wetlands, swampy grassland or swampy forest and often where Broad-leaved Paperbark or Swamp Mahogany are found. Typically, the Lesser Swamp-orchid is restricted to the swamp-forest margins, where it occurs in swamp sclerophyll forest (Broad-leaved Paperbark/Swamp Mahogany/Swamp Box (Lophostemon suaveolens), swampy rainforest (often with sclerophyll emergent), or fringing open forest. It is often associated with rainforest elements such as Bangalow Palm (Archontophoenix cunninghamiana) or Cabbage Tree Palm (Livistona australis).	No suitable habitat was observed throughout the assessment area.	**Unlikely**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Samadera bidwillii	Quassia	Vulnerable	29708	Quassia commonly occurs in lowland rainforest or on rainforest margins, but has also been founnd in other forest types such as open forest and woodland. Common ly found in areas adjacent to both temporary and permanent watercoarses.	This species favours lowland rainforest or rainforest margins which are absent from the site, and no local records exist, and thus Quassia is unlikely to be present on site.	**Unlikely**
Thesium australe	Austral Toadflax	Vulnerable	15202	Austral toadflax is semi-parasitic on roots of a range of grass species, most notably, Themeda triandra (Kangaroo Grass). It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams. The Austral Toadflax occurs in shrubland, grassland or woodland, often on damp sites. Vegetation types include open grassy heath dominated by Swamp Myrtle (Leptospermum myrtifolium), Small-fruit Hakea (Hakea microcarpa), Alpine Bottlebrush (Callistemon sieberi), Woolly Grevillea (Grevillea lanigera), Coral Heath (Epacris microphylla) and Poa spp.; Kangaroo Grass grassland surrounded by Eucalyptus woodland; and grassland dominated by Barbed-wire Grass (Cymbopogon refractus).	Wildlife Online sightings data does not identify a record of this species in the local region, with the closest sighting approximately 45km to the south-west in Boonah. A large number of sightings are concentrated in the west towards Toowoomba. This species was not recorded on site during field assessment. Native grasses such as Kangaroo Grass and Barbed Wire Grass were present on site, however given the location of sightings data, absence of native grasslands and a sparse grassy understorey on site, and the relative lack of damp areas which are favoured, the likelihood of this species occurring on site is considered unlikely.	**Unlikely**
Reptiles						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**
Saiphos reticulatus	Three-toed Snake-tooth Skink	Vulnerable	59628	Found mostly in closed forest and possibly open layered Eucalyptus forest. Generally recorded in moist layered forest on loamy basaltic soils, but also found in closed forest overlying silica sand dunes at Cooloola. Within forests, this species is found in well-mulched, loose, friable rainforest soil in leaf litter, often immediately adjacent to fallen tree trunks. Much of the lowland closed forest within its range has been cleared for agriculture and grazing, pasture improvement, crop production, tropical fruit production, and native forest logging. Suitable habitat has generally been reduced to patches, especially in lowland areas.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Delma torquata	Collared Delma	Vulnerable	1656	In general, the species occurs on rocky hillsides on basalt and lateritic soils supporting open eucalypt and Acacia woodland with a sparse understorey of shrubs and tussocks or semi-evergreen vine thicket.	The provisions of suitable canopy species are present within the referral area, however, a lack of microhabitat (rocky outcrops), and the presence of Lantana and introduced grasses in the understorey means there is lack of suitable habitat for the Collared Delma.	**Unlikely**
Furina dunmalli	Dunmall's Snake	Vulnerable	59254	Dunmall's Snake has been found in a broad range of habitats, including forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow other Wattles, native Cypress or Bull-oak, and various Blue Spotted Gum, Ironbark, White Cypress Pine and Bull oak open forest and woodland associations on sandstone derived soils. Dunmall's Snake occurs primarily in the Brigalow Belt region in the South-eastern interior of Queensland. Records indicate sites at elevations between 200–500 m above sea level. The snake is very rare or secretive with limited records existing. It has been recorded at Archokoora, Oakey, Miles, Glenmorgan, Wallaville, Gladstone, Lake Broadwater, Mount Archer, Exhibition Range National Park, roadside reserves between Inglewood and Texas, Rosedale, Yeppoon and Lake Broadwater Conservation Park.	Due to a lack of records within the local area, it is highly unlikely that this species will occur. Further, the referral area sits at an elevation below 200-500m ASL, which is preferred by the species.	**Unlikely**
Listed Migratory Species						
Migratory Marine Birds						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Risk**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Apus pacificus	Fork-tailed Swift	Migratory	678	This species is almost exclusively aerial and mostly occur over inland palins but sometimes above foothills or in coastal areas.	Possible as a fly over species however no impact to this species is likely to occur.	**Unlikely**
Migratory Terrestrial Species						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**
Cuculus optatus	Oriental Cuckoo	Migratory	86651	Non-breeding habitat only: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. Frequently at edges or ecotones between habitat types	Site contains possible non-breeding habitat, however it is not ideal for this species.	**Unlikely**
Hirundapus caudacutus	White-throated Needle tail	Migratory	682	The White-throated needle tail is almost exclusively aerial. This species has been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows. The species breeds in wooded lowlands and sparsely vegetated hills, as well as mountains covered with coniferous forests.	Low potential to occur on site within roosting periods.	**Unlikely**
Monarcha melanopsis	Black-faced Monarch	Migratory	609	The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine thickets, complex notophyll vine forests, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and occasionally cool temperate rainforest.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Monarcha trivirgatus	Spectacled Monarch	Migratory	610	The Spectacled Monarchs natural habitats are subtropical or tropical moist lowland forests, subtropical or tropical mangrove forests, and subtropical or tropical moist montane forests. Its preference is for thick understorey areas.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Myiagra cyanoleuca	Satin Flycatcher	Migratory	612	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt dominated forests and taller woodlands, and on migration occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Motacilla flava	Yellow Wagtail	Migratory	644	This insectivorous bird inhabits mostly well-watered open grasslands and the fringes of wetlands Roosts in mangroves and other dense vegetation. Listed as an extremely uncommon migrant to Australia under the draft referral guideline for 14 birds listed as a migratory species under the EPBC Act.	Observations of this species have been primarily from NSW. No suitable habitat was observed throughout the assessment area.	**Unlikely**
Rhipidura rufifrons	Rufous Fantail	Migratory	592	The Rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by Eucalypts such as Eucalyptus microcorys, Eucalyptus pilularis, Eucalyptus resiniferia and a number of other Eucalyptus species.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Migratory Wetland Species						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**
Actitis hypoleucos	Common Sandpiper	Migratory	59309	This species urilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity and is mostly found around muddy margins or rocky shores and rarely on mudflats.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Calidris acuminata	Sharp-tailed Sandpiper	Migratory	874	The sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Calidris melanotos	Pectral Sandpiper	Migratory	858	The Pectoral Sandpiper prefers shallow fresh to saline wetlands. This species is found in coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. This species is usually found in coastal or near coastal habitat but occasionally found further inland.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Pandion haliaetus	Osprey	Migratory	952	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Gallinago hardwickii	Latham's Snipe	Migratory	863	Latham's Snipe occurs in permanent and ephemeral wetlands. They usually inhabit open, freshwater wetlands with low, dense vegetation.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Tringa nebularia	Common Greenshank	Migratory	832	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. The species is known to forage at the edges of wetlands in soft mud or mudflats.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Other Matters Protected by the EPBC Act						
Listed Marine Species (others not listed above)						
Species	**Common Name**	**Status**	**EPBC Code**	**Description of Community / Habitat**	**Likelihood of Occurrence**	**Likelihood**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Anseranas semipalmata	Magpie Goose	Migratory	978	The magpie goose is mainly found in shallow wetlands with dense growth or rushes or sedges.	No suitable habitat was observed throughout the assessment area.	**Unlikely**
Ardea alba	Great Egret	Migratory	59541	The Great Egret has been recorded in a wide range of wetland habitats including inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial.	Although a number of small dams were observed upstream of the assessment area, no wetland area suiable for this species were observed on site.	**Unlikely**
Ardea ibis	Cattle Egret	Migratory	59542	The Cattle egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It often forages away from water on low lying grasslands, improved pastures and croplands and is commonly found in cattle fields and other farm areas that contain livestock.	Due to residential development replacing rural development, and lack of grasslands and livestock over the site, this common species is unlikely to be found on site.	**Unlikely**
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory	943	The White-bellied Sea-eagle is found in coastal habitats and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats are characterised by the presence of large areas of open water.	May be recorded as a fly over, however unlikely to be found on site.	**Unlikely**
Merops ornatus	Rainbow Bee-eater	Migratory	670	The Rainbow bee-eater occurs mainly in open forests and woodlands, shrub lands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation.	Potential wooded habitat on site for this species.	**Likely**
Rostratula benghalensis	Painted Snipe	Endangered/ Migratory	889	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps and clay pans. The also utilise inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains.	No suitable habitat was observed throughout the assessment area.	**Unlikely**

9534 HABITAT ASSESSMENT FOR LISTED EPBC SPECIES 5km Search					
Melaleuca irbyana	Swamp Tea-tree	Endnagered	The Swamp Tea-tree forest grows on poorly draining soils on the plains and low hills of the Moreton Basin. Often occurs in association with Eucalypt trees including Eucalyptus crebra, Eucalyptus melanophloia, Eucalyptus moluccana or Eucalyptus tereticornis.	**Although Melaleuca irbyana species has been identified contextually to the site, it was not idnetified throughout the investigation area.**	**On Site**
Phascolarctos cinereus	Koala	Vulnerable	They are found in a range of habitats, from coastal islands and tall eucalypt forests to low woodlands inland. The species is known from the surrounding area and evidence has been recorded on-site.	No Koalas were sighting during the multiple days of field survey, however koala surveys did detect the presence of koala scats. Six SAT surveys were conducted across the site following the identification of a koala scat, and three of these surveys showed 'Low' koala usage (10% or less scat evidence).	**Known**
Pteropus poliocephalus	Grey-headed Flying Fox	Vulnerable	Species generally roosts in camps in trees adjacent to larger permanent watercourse. The Grey-headed flying fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feed son commercial fruit crops. The primary food source is blossom from Eucalyptus and related genera.	No camps were observed throughout the assessment area, with the nearest camp over 2km to the south (Homestead Drive, Undullah). Although no individuals were recorded on site, one individuals was recorded as a flyover, and it is considered that this species has the potential to occur when the Eucalypts are in flower.	**Likely - Foraging**

Species	Common Name	Status	EPBC Code	Description of Community / Habitat	Likelihood of Occurrence	Likelihood
Petauriodes volans	Greater Glider	Vulnerable	The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with topography ranging from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west, and another in the Einasleigh Uplands. The Greater Glider is found in highest abundance typically in taller, montane, moist eucalypt forests. During the day it shelters in tree hollows, with a particular selection for large hollows in large, old trees. In southern Queensland, greater gliders require at least 2–4 live den trees for every 2 ha of suitable forest habitat. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Home ranges are typically relatively small (1–4 ha), but are larger in lower productivity forests and more open woodlands (up to 16 ha).	Despite spotlighting searches, no evidence of this species was found throughout the field assessment. Hollow-bearing trees appear to be the most important factor in habitat selection in southern Queensland. And although greater gliders have a relatively small home range they are reported to be absent from forests with fewer than six habitat trees per hectare. The majority of the investigation area has historically undergone clearing practices., and very few old growth trees were observed that contained hollows to sustain this species. That is, only two (2) large dead stags with large hollows were recorded within the survey period. The referral area contains an abundance of eucalypts, however, the referral area fails to contain taller, montane, moist eucalypt forest, with the vegetation communities on site consisting of either non-remnant scattered eucalypts or remnant eucalypt woodland. According to the Conservation Advice for this species, modelling suggests that they require native forest patches of at least 160 km2 to maintain viable populations.	**Unlikely**	

Appendix G

SAT Survey Results

SAT 1				
Date: 28.11.2018		**Lot 30 on SP309195**	**Project No.: E7578**	
No.	**Species Name**	**Common Name**	**DBH (mm)**	**Scats**
1	*Eucalyptus tereticornis*	Forest Red Gum	560	Yes
2	*Lophostemon suaveolens*	Swamp Box	220	No
3	*Acacia disparrima*	Hickory Wattle	140	No
4	*Lophostemon suaveolens*	Swamp Box	130	No
5	*Acacia disparrima*	Hickory Wattle	180	No
6	*Lophostemon suaveolens*	Swamp Box	200	No
7	*Alphitonia excelsa*	Red Ash	150	No
8	*Acacia disparrima*	Hickory Wattle	140	No
9	*Acacia disparrima*	Hickory Wattle	100	No
10	*Acacia disparrima*	Hickory Wattle	160	No
11	*Lophostemon suaveolens*	Swamp Box	150	No
12	*Lophostemon suaveolens*	Swamp Box	110	No
13	*Alphitonia excelsa*	Red Ash	150	No
14	*Acacia disparrima*	Hickory Wattle	190	No
15	*Lophostemon suaveolens*	Swamp Box	110	No
16	*Lophostemon suaveolens*	Swamp Box	200	No
17	*Eucalyptus tereticornis*	Forest Red Gum	190	No
18	*Lophostemon suaveolens*	Swamp Box	110	No
19	*Alphitonia excelsa*	Red Ash	200	No
20	*Lophostemon suaveolens*	Swamp Box	190	No
21	*Lophostemon suaveolens*	Swamp Box	190	No
22	*Lophostemon suaveolens*	Swamp Box	170	No
23	*Acacia disparrima*	Hickory Wattle	140	No
24	*Lophostemon suaveolens*	Swamp Box	160	No
25	*Acacia disparrima*	Hickory Wattle	140	No
26	*Alphitonia excelsa*	Red Ash	150	No
27	*Acacia disparrima*	Hickory Wattle	150	No
28	*Acacia disparrima*	Hickory Wattle	140	No
29	*Lophostemon suaveolens*	Swamp Box	100	No
30	*Lophostemon suaveolens*	Swamp Box	190	No
Total Trees Recorded with Scats				**1**
Total Percentage of Koala Use				**3.33**
Koala Use				**East Coast (Low)**

SAT 2				
Date: 28.11.2018		**Lot 30 on SP309195**	**Project No.: E7578**	
No.	**Species Name**	**Common Name**	**DBH**	**Scats**
1	*Eucalyptus tereticornis*	Forest Red Gum	620	No
2	*Lophostemon suaveolens*	Swamp Box	200	No
3	*Acacia disparrima*	Hickory Wattle	130	No
4	*Acacia disparrima*	Hickory Wattle	120	No
5	*Acacia disparrima*	Hickory Wattle	150	No
6	*Lophostemon suaveolens*	Swamp Box	240	No
7	*Lophostemon suaveolens*	Swamp Box	150	No
8	*Lophostemon suaveolens*	Swamp Box	160	No
9	*Corymbia intermedia*	Pink Bloodwood	230	No
10	*Alphitonia excelsa*	Red Ash	130	No
11	*Lophostemon suaveolens*	Swamp Box	140	No
12	*Lophostemon suaveolens*	Swamp Box	240	No
13	*Lophostemon suaveolens*	Swamp Box	190	No
14	*Acacia disparrima*	Hickory Wattle	150	No
15	*Lophostemon suaveolens*	Swamp Box	120	No
16	*Alphitonia excelsa*	Red Ash	210	No
17	*Lophostemon suaveolens*	Swamp Box	180	No
18	*Lophostemon suaveolens*	Swamp Box	140	No
19	*Eucalyptus tereticornis*	Forest Red Gum	150	No
20	*Lophostemon suaveolens*	Swamp Box	210	No
21	*Corymbia tessellaris*	Moreton Bay Ash	220	No
22	*Acacia disparrima*	Hickory Wattle	150	No
23	*Acacia disparrima*	Hickory Wattle	200	No
24	*Lophostemon suaveolens*	Swamp Box	210	No
25	*Lophostemon suaveolens*	Swamp Box	160	No
26	*Lophostemon suaveolens*	Swamp Box	180	No
27	*Lophostemon suaveolens*	Swamp Box	180	No
28	*Lophostemon suaveolens*	Swamp Box	140	No
29	*Eucalyptus tereticornis*	Forest Red Gum	160	No
30	*Eucalyptus tereticornis*	Forest Red Gum	220	No
Total Trees Recorded with Scats				**0**
Total Percentage of Koala Use				**Nil**
Koala Use				**No Use**

SAT 3				
Date: 28.11.2018		**Lot 30 on SP309195**	**Project No.: E7578**	
No.	**Species Name**	**Common Name**	**DBH**	**Scats**
1	*Eucalyptus crebra*	Narrow-leaved Ironbark	440	No
2	*Acacia disparrima*	Hickory Wattle	120	No
3	*Alphitonia excelsa*	Red Ash	160	No
4	*Alphitonia excelsa*	Red Ash	100	No
5	*Corymbia intermedia*	Pink Bloodwood	190	No
6	*Corymbia tessellaris*	Moreton Bay Ash	160	No
7	*Eucalyptus crebra*	Narrow-leaved Ironbark	200	No
8	*Eucalyptus crebra*	Narrow-leaved Ironbark	320	No
9	*Eucalyptus siderophloia*	Northern Grey Ironbark	190	No
10	*Eucalyptus mollucana*	Gum-topped Box	270	Yes
11	*Corymbia intermedia*	Pink Bloodwood	120	No
12	*Acacia leiocalyx*	Early-flowering Black Wattle	120	No
13	*Angophora leiocarpa*	Smooth-barked Apple	110	No
14	*Eucalyptus mollucana*	Gum-topped Box	170	No
15	*Eucalyptus mollucana*	Gum-topped Box	150	No
16	*Eucalyptus mollucana*	Gum-topped Box	220	No
17	*Lophostemon suaveolens*	Swamp Box	160	No
18	*Angophora leiocarpa*	Smooth-barked Apple	190	No
19	*Eucalyptus crebra*	Narrow-leaved Ironbark	170	No
20	*Corymbia intermedia*	Pink Bloodwood	190	No
21	*Corymbia intermedia*	Pink Bloodwood	220	No
22	*Eucalyptus siderophloia*	Northern Grey Ironbark	280	No
23	*Alphitonia excelsa*	Red Ash	120	No
24	*Corymbia intermedia*	Pink Bloodwood	160	No
25	*Acacia disparrima*	Hickory Wattle	210	No
26	*Corymbia citriodora*	Spotted Gum	210	No
27	*Eucalyptus mollucana*	Gum-topped Box	120	No
28	*Corymbia citriodora*	Spotted Gum	140	No
29	*Corymbia intermedia*	Pink Bloodwood	180	No
30	*Corymbia citriodora*	Spotted Gum	290	No
Total Trees Recorded with Scats				**1**
Total Percentage of Koala Use				**3.33**
Koala Use				**East Coast (Low)**

SAT 4				
Date: 28.11.2018		**Lot 30 on SP309195**	**Project No.: E7578**	
No.	**Species Name**	**Common Name**	**DBH**	**Scats**
1	*Corymbia intermedia*	Pink Bloodwood	220	No
2	*Eucalyptus tereticornis*	Forest Red Gum	180	No
3	*Lophostemon suaveolens*	Swamp Box	150	No
4	*Corymbia intermedia*	Pink Bloodwood	180	No
5	*Corymbia intermedia*	Pink Bloodwood	120	No
6	*Lophostemon suaveolens*	Swamp Box	160	No
7	*Alphitonia excelsa*	Soap Tree	140	No
8	*Eucalyptus tereticornis*	Forest Red Gum	200	No
9	*Corymbia intermedia*	Pink Bloodwood	190	No
10	*Eucalyptus crebra*	Narrow leaved Ironbark	320	No
11	*Eucalyptus mollucana*	Gum-topped Box	220	No
12	*Eucalyptus mollucana*	Gum-topped Box	240	No
13	*Lophostemon suaveolens*	Swamp Box	180	No
14	*Acacia disparrima*	Hickory Wattle	140	No
15	*Alphitonia excelsa*	Soap Tree	140	No
16	*Corymbia citriodora*	Spotted Gum	180	No
17	*Lophostemon suaveolens*	Swamp Box	160	No
18	*Lophostemon suaveolens*	Swamp Box	100	No
19	*Lophostemon suaveolens*	Swamp Box	120	No
20	*Corymbia intermedia*	Pink Bloodwood	300	No
21	*Lophostemon suaveolens*	Swamp Box	160	No
22	*Corymbia intermedia*	Pink Bloodwood	270	No
23	*Corymbia intermedia*	Pink Bloodwood	140	No
24	*Alphitonia excelsa*	Soap Tree	130	No
25	*Alphitonia excelsa*	Soap Tree	120	No
26	*Corymbia intermedia*	Pink Bloodwood	180	No
27	*Acacia disparrima*	Hickory Wattle	130	No
28	*Eucalyptus tereticornis*	Forest Red Gum	170	No
29	*Lophostemon suaveolens*	Swamp Box	160	No
30	*Lophostemon suaveolens*	Swamp Box	170	No
Total Trees Recorded with Scats				**0**
Total Percentage of Koala Use				**Nil**
Koala Use				**No Use**

SAT 5				
Date: 28.11.2018		**Lot 30 on SP309195**	**Project No.: E7578**	
No.	**Species Name**	**Common Name**	**DBH**	**Scats**
1	*Eucalyptus crebra*	Narrow-leaved Ironbark	550	No
2	*Corymbia citriodora*	Spotted Gum	140	No
3	*Eucalyptus siderophloia*	Northern Grey Ironbark	360	No
4	*Corymbia citriodora*	Spotted Gum	120	No
5	*Eucalyptus tereticornis*	Forest Red Gum	180	No
6	*Acacia disparrima*	Hickory Wattle	190	No
7	*Alphitonia excelsa*	Red Ash	140	No
8	*Acacia disparrima*	Hickory Wattle	170	No
9	*Lophostemon suaveolens*	Swamp Box	110	No
10	*Corymbia citriodora*	Spotted Gum	230	No
11	*Angophora leiocarpa*	Smooth-barked Apple	140	No
12	*Corymbia citriodora*	Spotted Gum	140	No
13	*Corymbia citriodora*	Spotted Gum	250	No
14	*Corymbia citriodora*	Spotted Gum	160	No
15	*Eucalyptus crebra*	Narrow-leaved Ironbark	290	No
16	*Eucalyptus crebra*	Narrow-leaved Ironbark	340	No
17	*Acacia disparrima*	Hickory Wattle	160	No
18	*Acacia disparrima*	Hickory Wattle	150	No
19	*Eucalyptus crebra*	Narrow-leaved Ironbark	410	No
20	*Corymbia citriodora*	Spotted Gum	210	No
21	*Acacia disparrima*	Hickory Wattle	190	No
22	*Acacia disparrima*	Hickory Wattle	160	No
23	*Acacia disparrima*	Hickory Wattle	110	No
24	*Acacia disparrima*	Hickory Wattle	140	No
25	*Eucalyptus crebra*	Narrow-leaved Ironbark	430	No
26	*Acacia disparrima*	Hickory Wattle	140	No
27	*Acacia disparrima*	Hickory Wattle	190	No
28	*Eucalyptus crebra*	Narrow-leaved Ironbark	440	No
29	*Corymbia citriodora*	Spotted Gum	160	No
30	*Acacia disparrima*	Hickory Wattle	160	No
Total Trees Recorded with Scats				**0**
Total Percentage of Koala Use				**Nil**
Koala Use				**No Use**

SAT 6				
Date: 28.11.2018		**Lot 30 on SP309195**	**Project No.: E7578**	
No.	**Species Name**	**Common Name**	**DBH**	**Scats**
1	*Eucalyptus tereticornis*	Forest Red Gum	490	No
2	*Acacia disparrima*	Hickory Wattle	120	No
3	*Eucalyptus tereticornis*	Forest Red Gum	340	No
4	*Acacia disparrima*	Hickory Wattle	120	No
5	*Acacia disparrima*	Hickory Wattle	130	No
6	*Acacia disparrima*	Hickory Wattle	220	No
7	*Lophostemon suaveolens*	Swamp Box	180	No
8	*Alphitonia excelsa*	Red Ash	120	No
9	*Eucalyptus crebra*	Narrow-leaved Ironbarl	340	No
10	*Alphitonia excelsa*	Red Ash	130	No
11	*Eucalyptus crebra*	Narrow-leaved Ironbarl	600	Yes
12	*Acacia leiocalyx*	Early-flowering Black Wattle	140	No
13	*Acacia disparrima*	Hickory Wattle	150	No
14	*Acacia disparrima*	Hickory Wattle	120	No
15	*Alphitonia excelsa*	Red Ash	100	No
16	*Eucalyptus crebra*	Narrow-leaved Ironbarl	470	No
17	*Acacia disparrima*	Hickory Wattle	180	No
18	*Eucalyptus crebra*	Narrow-leaved Ironbarl	260	No
19	*Eucalyptus crebra*	Narrow-leaved Ironbarl	390	No
20	*Eucalyptus crebra*	Narrow-leaved Ironbarl	420	No
21	*Alphitonia excelsa*	Red Ash	140	No
22	*Eucalyptus crebra*	Narrow-leaved Ironbarl	520	No
23	*Acacia leiocalyx*	Early-flowering Black Wattle	100	No
24	*Lophostemon suaveolens*	Swamp Box	160	No
25	*Acacia leiocalyx*	Early-flowering Black Wattle	160	No
26	*Corymbia intermedia*	Pink Bloodwood	360	No
27	*Corymbia intermedia*	Pink Bloodwood	160	No
28	*Alphitonia excelsa*	Red Ash	140	No
29	*Alphitonia excelsa*	Red Ash	160	No
30	*Acacia disparrima*	Hickory Wattle	120	No
Total Trees Recorded with Scats				**1**
Total Percentage of Koala Use				**3.33**
Koala Use				**East Coast (Low)**