

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE REPORT

February 2019
J156455-09

NSW Health Infrastructure
Tweed Valley Hospital

C107778: DL

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Site Details:		Tweed Valley Hospital
Project Number:		J156455-09
Client Name:		NSW Health Infrastructure
Client Number:		C107778
Signatures:		
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Conflict of Interest Statement		Greencap warrants that as at the date of lodgement of the Matters of National Environmental Significance Report, no actual, perceived or potential conflict of interest exists between it or between any one or more of Greencap's officers, employees, consultants or agents and Health Infrastructure, or is likely to arise in relation to the Report that is submitted for this project, and if any conflict of interest arises or is likely to arise Greencap will immediately notify Health Infrastructure in writing of that actual, perceived or potential conflict of interest.

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Version E	Electronic	Sue Folliott	TSA Management on behalf of Health Infrastructure, Senior Project Manager

EXECUTIVE SUMMARY

The proposed development of the new Tweed Valley Hospital (the Project) will provide for the essential healthcare services required by the rapidly growing population of the Tweed and Byron Local Government Areas. The Project is located at 771 Cudgen Road, Cudgen (Lot 11 DP 1246853) within the Tweed Local Government Area (the Site).

Greencap was commissioned by TSA Management (TSA) on behalf of Health Infrastructure to prepare a report that assesses potential impacts of the Project on Matters of National Environmental Significance (MNES) that are listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The northern section of the Site is located on the Tweed River floodplain and is part of an important local wetland (mapped under State Environmental Planning Policy [Coastal Management] 2018). The southern section of the Site is currently a working farm under cultivation. Apart from the windrows, most of the southern section of the Site has been cleared of native vegetation. No Areas of Outstanding Biodiversity Value or areas of geological significance are located on the Site.

Without the implementation of appropriate measures to avoid and minimise impacts, the Project could impact fauna, flora and ecological communities that are potentially Matters of National Environmental Significance (MNES). However, a comprehensive set of measures will be put in place to avoid, mitigate or reduce these impacts to the greatest extent possible. As a result, it has been assessed that with the implementation of the mitigation measures outlined below, the Project will not have any significant impacts on MNES entities. The impacts of the Project have been avoided and minimised by using the following principles to locate the development footprint in areas:

- Where there are no biodiversity values;
- Where the existing native vegetation or threatened species habitat is in poor condition;
- Avoiding habitat for threatened species or ecological communities that are either critically endangered or endangered; and
- Maintaining connectivity, enabling movement of species and genetic material between areas of adjacent or nearby habitat.

Further measures to avoid, mitigate and manage any residual impacts of construction and operations include adaptive management for impacts on biodiversity that are uncertain, which are proposed to be deployed include the following:

- A Biodiversity Management Plan to preserve and enhance current biodiversity values through a Vegetation Management Plan, Fauna Management Plan and Water Quality Management Plan which would involve weed removal and restoration of the exotic grassland in Zone 9 (0.95 ha) with rainforest species, improvement in long-term water quality and ecological monitoring;
- A Landscape Masterplan incorporating native vegetation landscaping, detention basins and buffer plantings that provide stepping stone habitats, appropriate landscaping in accordance with current published guidelines within the mandatory 62m Asset Protection Zone, habitat features such as salvaged rocks, water sensitive urban design principals such as rain gardens, water adapted ground cover vegetation, swales, and car park plantings to reduce impervious surfaces and managing stormwater and groundwater recharge through landscaping;
- A stormwater management system including rain gardens, swales, enviropods and bio-retention basins so that the bulk of the stormwater will be directed to an extended detention basin to settle and will then discharge to the receiving catchment in a controlled manner, hence improving water quality of run-off entering the areas outside the development footprint; and
- A Construction Environmental Management Plan.

In addition to the above measures, the Project Site was selected because it is currently operated as an agricultural enterprise, and therefore the majority of remnant vegetation has already been cleared, there is no conservation management and apart from a single bund on the Site which adjoins an open drain, there is currently no stormwater management system in place. As a result of the proposed mitigation measures outlined above, the Project is likely to have several positive environmental outcomes creating an overall improvement in the habitat and biodiversity values on Site.

There are four Plant Community Types (PCTs) located on Site (divided into eight vegetation zones), as follows:

- Paperbark Swamp Forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion (PCT 1064)
- White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion (PCT 1302)
- Flooded Gum – Brush Box – Tallowwood mesic tall open forest on ranges of the lower North Coast (PCT 1569)
- Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion (PCT 1235)

The Protected Matters Search Tool (PMST) was used to generate a report on any Threatened Ecological Communities (TECs) that were likely to occur within a 5 km radius of the Site. This search identified three TECs that were listed under the EPBC Act as likely to occur within a 5 km radius of the Site. Based on Site surveys undertaken as part of the Biodiversity Development Assessment Report (BDAR) (Greencap 2019), two potential TECs were recorded on the Site, namely; the critically endangered Lowland Rainforest of Subtropical Australia and the endangered Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community. However, based on plot-based survey data collected as part of the BDAR, and an assessment against the listing advice threshold criteria for each TEC the vegetation did not meet the minimum TEC threshold criteria, and therefore it was concluded that the Project was not likely to have any significant impacts on any TECs. Although the potential Lowland Rainforest of Subtropical Australia vegetation does not meet the threshold criteria, as a precaution and due to its conservation significance as an area critical for connectivity and within a mapped fauna corridor, 1.09 ha outside the development footprint will be retained and maintained for its biodiversity values, with any residual impacts mitigated.

The Project will impact 0.95 ha of non-remnant rainforest vegetation in windrows in Zone 4 and 8 (PCT 1302) as a result of vegetation clearance. However, it is important to note that this vegetation type is in low condition and does not meet all of the condition thresholds for a TEC to be considered a MNES as defined under the EPBC Act.

The PMST was used to generate a report to determine whether MNES species protected under the EPBC Act were likely to occur within a 5 km radius of the Site. Based on the PMST there were 57 threatened species (32 fauna species and 25 flora species) and 29 migratory species that were listed under the EPBC Act as likely to occur in the area.

With the exception of three observations of the three-veined laurel *Cryptocarya foetida* plant there were no MNES threatened flora species recorded during the targeted site surveys. It was assessed that the Project would not have a significant impact on *Cryptocarya foetida*, based on addressing the MNES Significant Impact Guidelines 1.1 criteria.

Of the 32 fauna species that were likely to occur in the area, the findings were as follows: 27 species were either not present or were unlikely to be present on Site based on the lack of suitable habitat for these species; one species, the grey-headed flying-fox (*Pteropus poliocephalus*) was likely to be present on Site but it was assessed that the Project would not have a significant impact on this species; and, the presence of four species were assessed as 'possible', including the Koala (*Phascolarctos cinereus*). However, it was assessed that the Project would not have a significant impact on this species.

It was further assessed that the other two 'possible' species (the Southern Pink Underwing Moth and Southern Black-Throated Finch) would not be significantly impacted by the Project because the rainforest vegetation in the proposed development area (Zones 4 and 8) was not likely to be utilised by these species.

The Mitchell's rainforest snail (*Thersites mitchellae*) was recorded on Site in a portion of Zone 2 (one live specimen) opportunistically by Dr Licari and David Milledge. In addition, Mitchell's rainforest snail was recorded in several locations outside the Site boundary adjacent to the Site (Clark 2019; Greencap 2019).

A targeted survey for Mitchell's rainforest snail that was undertaken by Dr Stephanie Clark, a specialist in invertebrate identification, and this survey concluded that rainforest habitat present in the windrows (Zones 4 and 8) was not suitable for the Mitchell's rainforest snail and no evidence of their occurrence was recorded, therefore clearance of Zones 4 and 8 would not significantly impact Mitchell's rainforest snail habitat. Additionally, proposed mitigation measures incorporate revegetation of the exotic grassland in Zone 9 (0.95 ha) with rainforest species and this could potentially provide additional habitat for the Mitchell's rainforest snail. It was therefore assessed that the Project will not have significant impacts on this species.

Matters of National Environmental Significance Report

NSW Health Infrastructure Tweed Valley Hospital

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Glossary, Acronyms and Abbreviations

Abbreviation	Definition
BC Act	<i>Biodiversity Conservation Act 2016</i>
BC Regulation	<i>Biodiversity Conservation Regulation 2016</i>
BAM	<i>Biodiversity Assessment Method Order 2017</i>
Coastal Management SEPP	State Environmental Planning Policy (Coastal Management) 2018
CKPoM	Tweed Coast Comprehensive Koala Plan of Management 2015
EEC	Ecological communities that are listed as ‘endangered’ under the <i>Biodiversity Conservation Act 2016</i> .
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Cth)
LGA	Local Government Area
OEH	Office of Environment and Heritage
PCT	Plant Community Type
PMF	Probable Maximum Flood
PMST	Protected Matters Search Tool
VI	Vegetation Integrity
TEC	Ecological communities that are listed as ‘threatened’ under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and the <i>Biodiversity Conservation Act 2016</i> .
TSC	Tweed Shire Council

1. INTRODUCTION

1.1 Overview

Greencap Pty Ltd (Greencap) was commissioned by TSA Management (TSA) on behalf of Health Infrastructure to prepare a report which documents an assessment of impacts on Matters of National Environmental Significance (MNES), as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) for the proposed development of the new Tweed Valley Hospital (the Project).

1.2 Background

The Northern Rivers is experiencing one of the fastest rates of population growth in New South Wales (NSW). The existing Tweed Hospital is at capacity and a range of clinical service and master planning studies have determined that the existing site is not able to meet the healthcare needs of a rapidly growing population and in particular the increase in the ageing population. The population of the Tweed and Byron Local Government Areas (LGAs) is expected to grow from some 119,100 people in 2011 to more than 147,000 in 2031, a growth rate of 24%.

Aside from the significant forecast population growth in the Tweed-Byron region, the need for the new hospital is being driven by the need for: local access to health care without having to travel beyond the region; delivery of high quality, modern health care services; capacity constraints at the existing hospital; inadequate land area to develop new facilities at the existing hospital; and access issues at the existing hospital during floods. Consequently, on 13 June 2017, the NSW Government announced \$534 million for a new state-of-the-art Tweed Valley Hospital (the Project). A purpose-built referral hospital on a new site will ensure that the growing and changing healthcare needs of the Tweed-Byron community are provided for in the years to come. Furthermore, the proposed development will provide a net economic and employment benefit to the community.

Under the EPBC Act, actions that have or which are likely to have a significant impact on a MNES require referral to, and approval from, the Commonwealth. There are nine MNES listed in the EPBC Act that are potential grounds for referral. Of these, only two categories are relevant to the Project, as follows:

- Listed threatened species and ecological communities; and
- Migratory species protected under international agreements.

The potential for MNES from these two categories to be present on the Site has been identified through a combination of previous desktop and field-based assessments.

This report assesses Project impacts on these categories in accordance with the general guidance provided in *Matters of National Environmental Significance: Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia, 2013) (Significant Impact Guidelines). In addition to the Significant Impact Guidelines, the Commonwealth has also released specific guidance for some listed ecological communities and EPBC Act listed species. These guidelines have been referred to, where applicable, for a particular ecological community or species that is relevant to the Site.

2. SUMMARY OF THE PROPOSED PROJECT AND SITE

In accordance with the Significant Impact Guidelines an 'action' is defined broadly in the EPBC Act to include: a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. The proposed action relevant to the Project encompasses site preparation, construction and operational activities.

The Project will include the following key activities that are relevant to the consideration of whether the action will lead to any potential, significant impacts on MNES:

- The proposed clearing of 0.95 ha of self-sown windrow vegetation which may qualify as a Threatened Ecological Community (TEC);
- Development of the new hospital facility, including green space and other amenities, campus roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure.

2.1 The Site

2.1.1 Overview

The Project is to be located at 771 Cudgen Road, Cudgen (Lot 11 DP 1246853) within the Tweed Shire Council LGA (**Figure 1** and **Figure 2**) (the 'Site'). The Site is defined in this report as the entire Lot 11 DP 1246853 (19.4 ha). The State Significant Development (SSD) application and supporting Environmental Impact Statement (EIS) refer to the Project Site (a 19.38 ha area of land) as part of the former single Lot 102 DP 870722.

The Site is located between the existing residential areas of Kingscliff and Cudgen, situated opposite Kingscliff TAFE. Approximately 16.4 ha of the Site is above the Probable Maximum Flood (PMF), a legislated requirement for hospital developments.

The northern section of the Site is located on the Tweed River floodplain and is part of an important local wetland (mapped under State Environmental Planning Policy (Coastal Management) 2018; Coastal Management SEPP).

The southern section of the Site is a working farm under cultivation (approximately 16.3 ha) and apart from the self-sown windrows along the Site boundary, most of the southern section has been cleared of native vegetation.

No Areas of Outstanding Biodiversity Value or areas of geological significance are located on the Site.

The original Biodiversity Assessment Method (BAM) assessment was conducted prior to the acquisition of the Project Site. This assessment identified PCTs, vegetation zones and Threatened Ecological Communities (TECs) for the former Lot 102 DP 870722. The current vegetation integrity scores for all vegetation zones was retained for the final version of the Biodiversity Development Assessment Report (BDAR) (Greencap 2019). For the purposes of this MNES report, the subject land (the Site) is defined as the Project Site (i.e. Lot 11 DP 1246853).

2.1.2 Site Selection

A two-phase site selection process was undertaken by Health Infrastructure to assess the suitability of a range of greenfield and brownfield sites for the development of the new hospital and more than 50 sites were assessed. In the first phase (August 2017 to March 2018), 35 sites were considered, including around 20 submitted by landowners through an Expression of Interest (EOI) process.

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In recognition of community concerns raised as a result of the first phase, a second phase (April to June 2018) of the selection process sought feedback from the community.

The Site was selected at the end of June 2018 after an extensive due diligence that assessed the biodiversity values of the locations. Other locations were disregarded in favour of the Project's proposed location due to the significant biodiversity values of those sites. The Site was selected because it was operating as an agricultural enterprise, and therefore the majority of remnant vegetation had already been cleared.

Those smaller parts of the Site that contain areas of higher biodiversity value, for example where remnant vegetation has been retained, were identified and removed from the development footprint. On this basis, the Project footprint has been located in an area that avoids directly impacting threatened species and TECs.

Those areas of the Site which are critical for connectivity, such as the northern section of the Site which falls within a mapped fauna corridor, will be maintained for their contribution to biodiversity values. Generally, the Project footprint will be situated in areas which have already been cleared. The only areas of native vegetation to be cleared are parts of the self-sown windrows in the southern section of the Site.

2.2 The Project

2.2.1 Overview

The development application for the Project consists of a State Significant Development application under Section 4.22 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). In addition, all projects which are classified as State Significant Developments also require the preparation of a Biodiversity Development Assessment Report (BDAR) in accordance with the requirements of the *NSW Biodiversity Conservation Act 2016* (BC Act).

- The Project will consist of two Stages as follows:
- A concept development application and detailed proposal for Stage 1 (early and enabling works); and
- A second development application for Stage 2 works which will include detailed design, construction and operation of the Tweed Valley Hospital (Project Application).

The construction and operational footprint for the development is identified in **Appendix B**. A detailed description of the proposed staging of the development is provided in the following sections.

This MNES Report has been prepared based on the Project information made available for Stage 1.

2.2.2 Concept Proposal and Stage 1 Early and Enabling Works

This component seeks approval for a Concept Proposal of the Project and Stage 1 early and enabling works. The Concept Proposal is informed by service planning to 2031/32 and has an expected gross floor area in the range 55,000 m² to 65,000 m². Stage 1 includes early and enabling works (for Site clearance and preparation) and will comprise:

- Construction compound for Stage 1 Works;
- Augmentation and connection of permanent services for the new facility (water, sewer, electricity, telecommunications);

- General clearance of Site vegetation within the footprint of construction works, including tree stumps;
- Chipping of cleared vegetation (excluding weed species) to use on Site for ground stabilisation/ erosion control, or off-site disposal as required;
- Bulk earthworks to establish the required site levels and create a stable landform in preparation for hospital construction;
- Piling and associated works;
- Stormwater and drainage infrastructure for the new facility;
- Rehabilitation and revegetation of part of the wetland area;
- Construction of internal road ways for use during construction and in preparation for final road formations in Stage 2; and
- Retaining walls.

2.2.3 Stage 2: Hospital Delivery - Main Works and Operation

Stage 2 will include the detailed design, construction and operation of the Project. Stage 2 will be subject to a separate application following Stage 1.

3. SOURCES OF INFORMATION

Data and/or resources used or consulted in the assessment include:

- BioNet Threatened Biodiversity Data Collection (TBDC);
- BioNet Atlas;
- BioNet Web Services;
- OEH Data Portal;
- Protected Matters Search Tool (PMST);
- Commonwealth specific guidance for some listed ecological communities and EPBC Act listed species, available at www.environment.gov.au/epbc/publications;
- Ecological constraints analysis prepared by Greencap as part of the planning proposal for the Project; and
- Biodiversity Development Assessment Report (BDAR) prepared to meet the requirements of the *Biodiversity Conservation Act 2017* (NSW) (BC Act). There is extensive cross-over between species listed under the EPBC Act and the BC Act. Preparation of the first version of the BDAR involved extensive field surveys across the Site.

Spatial data used or consulted in the assessment include:

- Cadastre (NSW Department of Finance, Services and Innovation 2018);
- IBRA Regions and Subregions (OEH 2016);
- NSW (Mitchell) Landscapes - version 3.1 (OEH 2016);

- Tweed Shire Council Vegetation Mapping - Tweed LGA Vegetation 2012. VIS_ID 3912 (Tweed Shire Council 2012);
- SEPP Coastal Management (DPE 2018);
- Directory of Important Wetlands in Australia (Australian Government Department of the Environment, Water, Heritage and the Arts)
- Fauna Corridors for North East NSW (OEH 2018);
- Acid Sulfate Soils Risk map (OEH 1998);
- NSW Hydrography (Department of Finance, Services and Innovation 2018); and
- 2018 Aerial imagery (Nearmap 2018).

Consultant reports or advice informing or referenced in the assessment (including those in draft form) include:

- Tweed Valley Hospital MASTERPLAN CONCEPT PLAN AR-SKE-10-006[04] (STH Batesmart)
- Tweed Valley Hospital Noise and Vibration Impact Assessment for State Significant Development (SSD) (Acoustic Studio);
- Aviation SEARS response: Tweed Valley Hospital (AviPro);
- Tweed Valley Hospital – Flooding Component DRAFT (BMT);
- Tweed Valley Hospital Development Design Report (Bonacci Group NSW);
- Tweed Valley Hospital Development Stormwater Management Proposal (Bonacci Group NSW);
- Preliminary and Detailed Site Investigation (Octief);
- Preliminary Geotechnical Investigation (Morrison Geotechnic);
- Tweed Valley Hospital Landscape Masterplan Report draft (Turf Design Studio); and
- Tweed Valley Hospital Project Traffic Impact Assessment (Bitzios Consulting).

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- Former Lot 102
DP870722
- Project Site
Boundary
- Property Boundary
- Road

Lot 11 DP
1246853

CUDGEN ROAD

OXFORD STREET

YALE STREET

CAMBRIDGE COURT

EL ROND DRIVE

TURNOCK STREET

QUIGAN STREET

TURNOCK STREET



0 50 100
m

Scale (@A4): 1:4,500

Client: C107778

Job #: J156455

Author: M. Nunn

Checked: D. Licari

Date: 22/01/2019

Coordinate System: GDA 1994 MGA Zone 56

*Note: All data is approx only & subject to survey.
Imagery 8th August 2018 (7.5 cm) © Nearmap 2018
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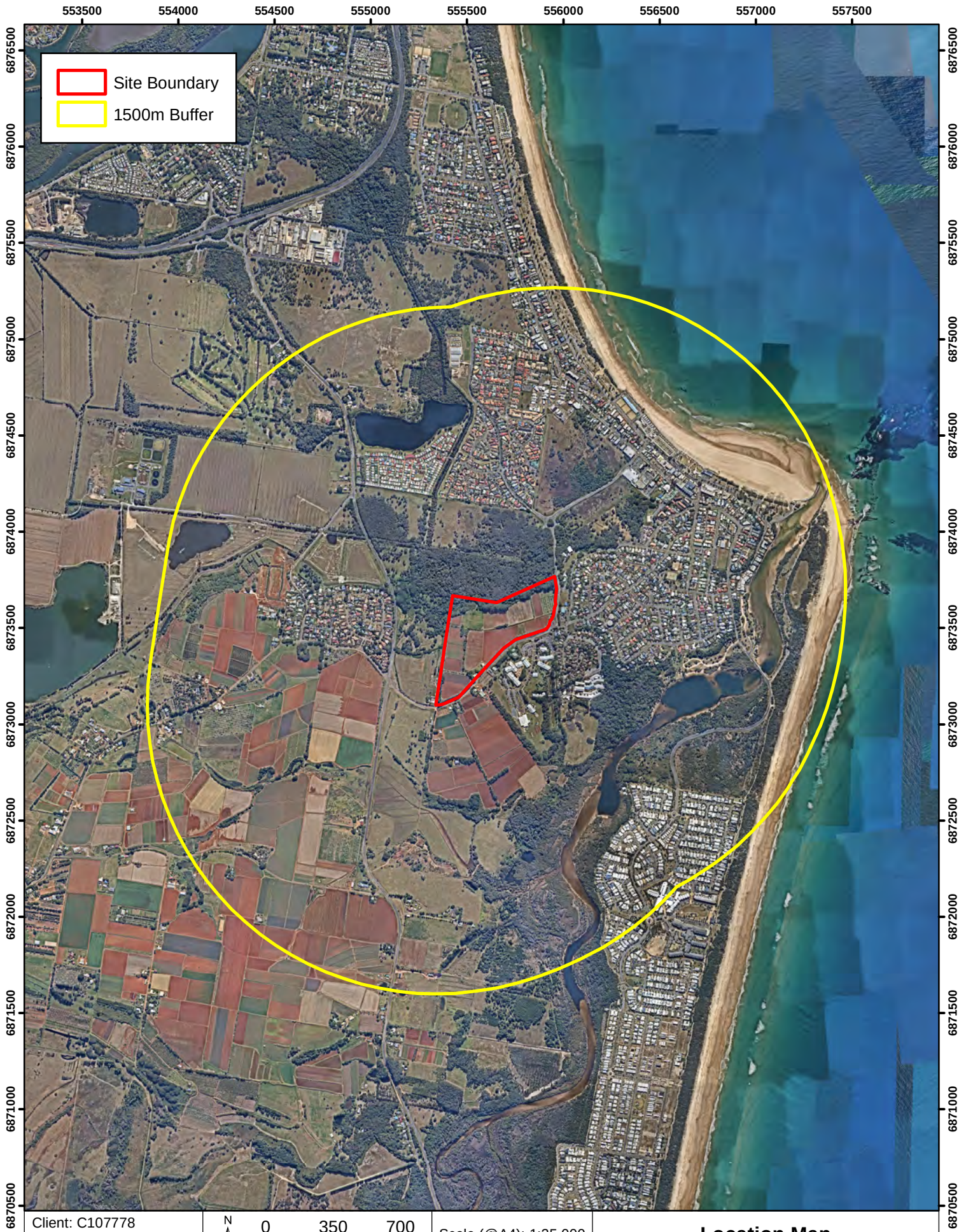
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Site Map (ref: s4.2.1.1 of BAM)

Tweed Valley Hospital MNES Report
771 Cudgen Road
Cudgen NSW

**Figure
1**



Client: C107778

Job #: J156455

Author: M. Nunn

Checked: D. Licari

Date: 22/01/2019

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0 350 700 m

Scale (@A4): 1:25,000

Coordinate System: GDA 1994 MGA Zone 56

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Imagery 8th August 2018 (59.7 cm) © Nearmap 2018*

Location Map (ref: s4.2.1.2 of BAM)

Tweed Valley Hospital MNES Report
771 Cudgen Road
Cudgen NSW

**Figure
2**

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4. DESCRIPTION OF THE REGIONAL AND SITE CHARACTERISTICS

4.1 Landscape Features

The defining geophysical feature of this region is the Mount Warning shield volcano, associated caldera and the Tweed River floodplain. The Site is in the South-East Queensland IBRA Bioregion and the Burringbar-Conondale Ranges IBRA Subregion. The southern section of the Site is located on the Lamington Volcanic Slopes NSW Landscapes which features extensive hills and ridges forming a generally circular pattern of radial drainage centred on Mount Warning. The northern section of the Site is located on the Byron-Tweed Alluvial Plains NSW Landscapes characterised by the watercourses, floodplain, terraces and estuary of the Tweed River (Department of Environment and Climate Change [DECC], 2002; **Figure 3** and **Figure 4**).

The northern section of the Site is located on the Tweed River floodplain and is part of an important wetland mapped under the *State Environmental Planning Policy (Coastal Management) 2018* (Coastal Management SEPP) (**Figure 5**). The wetland is not included in the Directory of Important wetlands and has been mapped with a 50 m riparian corridor.

The wetland is part of a mapped regional fauna corridor which may facilitate the movement of threatened species across their range (Department of Environment, Climate Change and Water [DECCW], 2010; **Figure 6**). At a local scale this forested wetland with associated rainforest components blends eastward into a coastal floodplain wetland (Keith, 2004) that extends to within 200 m of the coast (**Figure 5**).

This area is a significant stepping-stone habitat to the Cudgen Creek estuary located some 800 m to the south-east of the Site. A constructed, east-flowing floodplain drain drains the catchment and strikes roughly north-east through the northernmost portion of the Site (**Figure 3**). Based on mapping provided in the NSW Hydrography dataset, Strahler stream ordering could not be determined. However, with reference to stream order data for the Nambucca Catchment (Department of Infrastructure, Planning and Natural Resources 2005), it was assumed that the drain would constitute a 1st or 2nd order stream at most and has been mapped with a conservative 20 m riparian corridor.

The southern section of the Site is a working farm under cultivation (approximately 16.3 ha) and apart from the windrows planted along the Site boundary, most of the southern section of the Site has been cleared of native vegetation.

4.2 Native Vegetation

4.2.1 Vegetation Class

Observations of the vegetation formation from field surveys conducted by Greencap and correlation with the BioNet Vegetation Classification (OEH, 2018) determined four vegetation classes present at the Site: Coastal Swamp Forest, Coastal Floodplain Wetlands, Subtropical Rainforest and North Coast Wet Sclerophyll Forest (**Table 1**).

The remnant vegetation on Site is Coastal Swamp Forest and Subtropical Rainforest with North Coast Wet Sclerophyll Forest and Coastal Floodplain Wetlands recorded in planted windrows. Windrow vegetation that has self-sown on the linear rock mounds throughout the Site consists of derived early regrowth native rainforest species and woody weeds classified as High Treat Exotics. An exotic grassland monoculture composed of barner grass *Cenchrus purpureus* is located amongst derived and remnant native vegetation in the northern section of the Site.

4.2.2 Vegetation Formations

Observations from field surveys conducted by Greencap indicated the presence of two distinct areas of vegetation. The northern section of the Site that is located on the floodplain is substantially remnant native vegetation. Above the level of the floodplain, the southern section of the Site that is located on a ridge is land that has been cleared of native vegetation. Vegetation formations recorded on the site and presented below are classified in accordance with Keith (2004).

The northern section of the Site is remnant vegetation classified as forested wetland and rainforest formations. Adjoining the remnant vegetation is a large patch of exotic vegetation near the north-west corner and planted eucalypt windrows classified as wet sclerophyll forest shrubby sub-formation. Along the southern edge of this vegetation and extending roughly west to east across the Site rocks that have been cleared from the cultivated fields have formed a steep slope and in some areas have been fashioned into a dry-stone wall up to 3 m high.

Most of the southern section of the Site is cleared land under cultivation. Rocks that have been cleared from the cultivated fields have been piled into linear mounds composed of loosely consolidated rock and soil throughout the Site. Early regrowth rainforest species and woody weeds that are classified as high threat exotics have self-sown in these areas to form windrows classified as rainforest. Along the Cudgen Road/Turnock Street boundary there is a planted slash pine *Pinus elliottii* windrow with an understory also composed of self-sown early regrowth rainforest species and woody weeds. There is also a planted eucalypt windrow in the south-west corner of the Site classified as wet sclerophyll forest shrubby sub-formation. On the eastern boundary of the Site there is a planted casuarina windrow classified as a forested wetland.

4.2.3 Identification of Draft Plant Community Types and Draft Vegetation Zones

Native vegetation communities within the Tweed LGA was mapped in a study commissioned by Tweed Shire Council (Ecograph, 2004) and updated in 2012 (TSC 2012). Originally based on 1996 aerial photography and updated based on 2009 aerial photography, this mapping was conducted at a nominal scale of 1:25000 with a boundary precision of +/-25 m. Consequently, remnant vegetation patches of < 1 ha or connections < 25 m wide could not be resolved (Ecograph, 2004; TSC, 2012).

In conjunction with observations from the initial site inspection, the above vegetation mapping layers were used to conduct an initial assessment of native vegetation extent on the Site, determine draft Plant Community Types (PCT) and then stratify these draft PCTs into draft Vegetation Zones (**Table 1**). For the planted and self-sown windrow vegetation, a draft PCT was assigned which was the most likely original PCT as determined by the assessor.

The entire list of PCTs located on the BioNet Vegetation Classification website (OEH 2018) were exported to facilitate PCT identification. The Data>Filter menu options in Microsoft Excel was used to filter column headings to identify PCTs.

The TECs identified on the Site are outlined in **Section 5.1.1**.

4.2.4 Plot-Based Vegetation Surveys

A systematic field-based floristic vegetation survey using documented and repeatable methods was employed to collect floristic data at the Site in accordance with Tables 2 to 4, Section 5.2.1.8 (b-e) to 5.2.1.11 and Section 5.3 of the BAM. The vegetation survey was designed to survey the expected environmental variation in each draft PCT, the expected environmental variation in each stratified draft vegetation zone and to fill gaps in existing mapping and site information.

Given the relatively small area of each draft PCT (i.e. PCT 1064 = 3.8 ha; PCT 1302 = 2.6 ha; PCT 1569 = 0.7 ha; and PCT 1235 = 0.4 ha), it was considered that the environmental variation on the Site is minimal. Also, given that much of the native vegetation within the development footprint is either derived, planted or self-sown windrows and small in area (**Figure 7** and **Table 1**), the environmental variation in each stratified draft vegetation zone is also minimal. Accordingly, it was considered that a survey effort for each vegetation zone that is in accordance with the minimum number of plots that is indicated in Table 4 of the BAM was appropriate.

Floristic composition data was collected for each vascular plant species recorded in a 400 m² plot (standard 20 m x 20 m or linear 10 m x 40 m) in accordance with Table 2, Table 3 and Sections 5.3.4.8 to 5.3.4.12 of the BAM and included:

- Species name – Scientific (*Genus species*) and common name (Table 2 of the BAM);
- Status – Species status: native, exotic or high threat exotic (Section 5.3.4.11 of the BAM); and
- Growth form – Growth form classes: tree, shrub, grass and grass like, forb, fern and other (Table 2 of the BAM).

Floristic structure data for cover, abundance and stratum in a 400 m² plot (standard 20 m x 20 m or linear 10 m x 40 m) was collected for the following attributes in accordance with Table 2, Section 5.3.4.8 and Sections 5.3.4.13 to 5.3.4.17 of the BAM and included:

- Cover – Percent foliage cover across the plot for each species rooted in or overhanging the plot (Section 5.3.4.13 of the BAM);
- Abundance – For species with ≤5% cover an estimate of the number of individuals or shoots of each species was recorded (Table 2 of the BAM); and
- Stratum – Vegetation layers: upper, middle and ground stratum (Table 2 of the BAM).

Floristic function data for the number of large trees, stem size class, tree regeneration and length fallen logs in a 1000 m² plot (standard 20 m x 50 m or linear 10 m x 100 m) in accordance with Table 3, Section 5.3.4.8 and Sections 5.3.4.18 to 5.3.4.30 of the BAM and included:

- Number of large trees – With reference to the appropriate large tree benchmark for each PCT;
- Tree regeneration – Presence or absence of living trees with < 5 cm diameter at breast height over bark (DBH);
- Tree stem size class – 5-9, 10-19, 20-29, 30-49, 50-79 and >80 cm DBH;
- Length of fallen logs – Total length in metres of all woody material > 10 cm in diameter and >50 cm in length;
- Litter cover – Assessed as the average percentage ground cover of litter recorded in five 1 m² plots evenly located along the central transect; and
- Trees with hollows – Count of the number of trees with hollows that are visible from the ground.

Plot data was collected in the Fulcrum application on a mobile device with GPS capability or on handwritten field sheets. Data that was collected on handwritten field sheets was immediately entered into Fulcrum. Data that was entered into Fulcrum was then downloaded into Microsoft Excel for ease of data manipulation.

Over the course of the vegetation surveys the boundaries of the draft vegetation zone were confirmed by annotating a paper-based map that indicated the base map and draft vegetation zones with the assistance of the Fulcrum application on a mobile device with GPS capability. This handwritten data was then digitised using a GIS application.

Samples of plant species that were not readily identifiable in the field were identified in the lab with the aid of field guides and botanical keys. Those plant species which could not be identified in the lab were identified by the Queensland Herbarium. Once identified, the plant species that were identified in the lab and by the herbarium were transferred into Microsoft Excel.

The flooded gum *E. grandis* dominated windrow that is located in Zone 5 was planted on the edge of a dry-stone wall. On this basis, it was considered as an unsafe area to work in. Consequently, a plot was placed in the windrow in the south-west corner of the Site within the same Vegetation Zone.

The slash pine *Pinus ellioti* windrow is considered to be exotic vegetation and not assessable under the BAM. However, given that derived native vegetation composed of early regrowth rainforest species grows in the understory and the BAM requirement to assess occurrence of threatened species across the Site, a plot based survey was conducted in this area as a precaution (**Table 1**; Zone 8).

Observations from both initial and subsequent Site inspections indicated that vegetation in Zone 9 is exotic vegetation consisting of a banner grass *Cenchrus purpureus* monoculture (3-4m tall) that does not contain native vegetation as well as a small patch of camphor laurel *Cinnamomum camphora* with an understorey of small-leaf privet *Ligustrum sinense* which does not require assessment (**Table 1**). Consequently, no BAM plots were established within this vegetation zone.

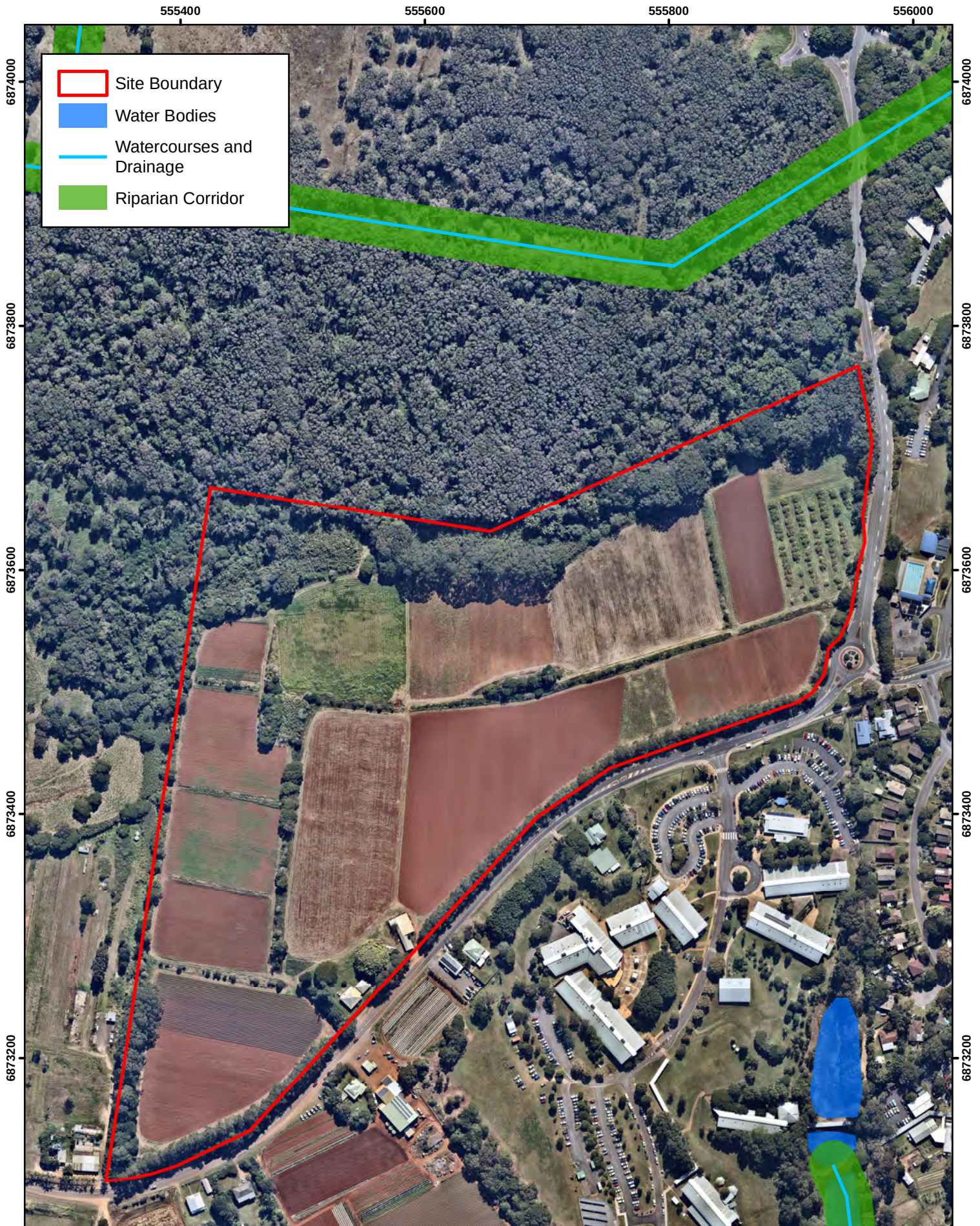
4.2.5 Confirmation of PCTs, Vegetation Zones and Ecological Communities

A combination of the quantitative data recorded in the plot-based floristic vegetation surveys outlined in **Section 4.2.4**, mapping data and Site observations was then used to confirm the identification of PCTs and Vegetation Zones detailed in **Section 4.2.3**. Following confirmation of PCTs the extent of native vegetation on the Site and the location of vegetation zones was then mapped (**Figure 7**).

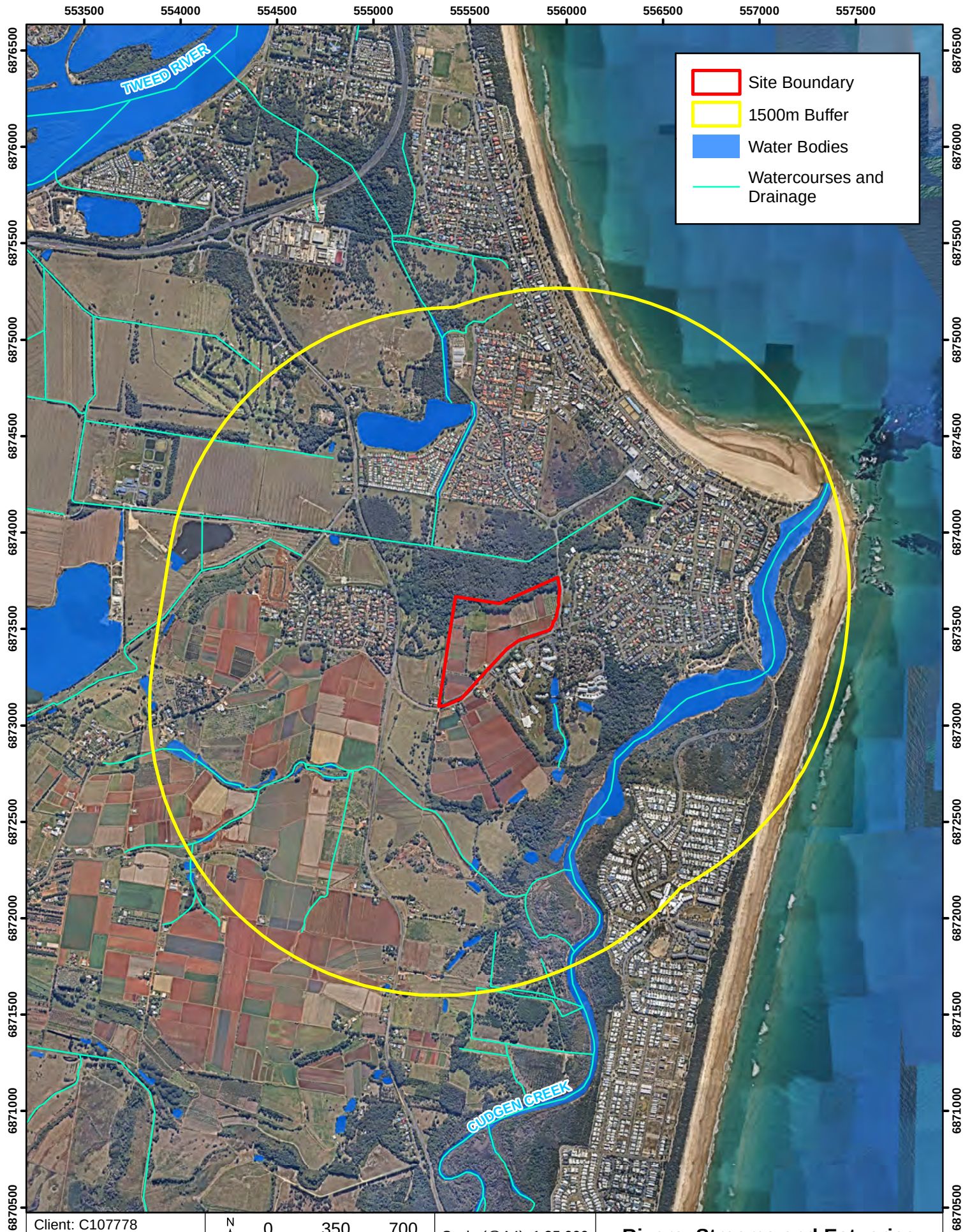
Table 1 Plant Community Types, Vegetation Zones and Number of BAM Plots

PCT	PCT Common Name	Vegetation Zone	Description and condition	Condition class	Area (ha)	No. of plots	BAM plot number. and survey date
1064	Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion	1	Coastal Swamp Forest in moderate condition	Moderate	0.29	2	16 – 10 July 2018 19 – 15 June 2018
1302	White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion	2	Subtropical Rainforest in moderate condition	Moderate	0.73	1	11 – 11 July 2018
		3	Derived regenerating Subtropical Rainforest in low condition, most likely original PCT.	Low	0.36	1	103 – 3 September 2018
		4	Derived regenerating Subtropical Rainforest in low condition, most likely original PCT.	Derived	0.61	1	99 – 11 July 2018
1569	Flooded Gum – Brush Box – Tallowwood mesic tall open forest on ranges of the lower North Coast	5	Planted North Coast Wet Sclerophyll Forest in low condition, best matching PCT based on local species present	Derived	0.57	1	102 – 15 August 2018
		6	Planted North Coast Wet Sclerophyll Forest in low condition, best matching PCT based on local species present.	Derived	0.29	1	101 – 15 August 2018

PCT	PCT Common Name	Vegetation Zone	Description and condition	Condition class	Area (ha)	No. of plots	BAM plot number. and survey date
1235	Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion	7	Planted Coastal Swamp Forest in low condition, best matching PCT based on local species present	Derived	0.05	1	100 – 15 August 2018
1302	White Booyong – Fig subtropical rainforest of the NSW North Coast Bioregion	8	<i>Pinus sp.</i> windrow with understorey of derived regenerating Subtropical Rainforest in low condition, most likely original PCT	Derived	0.75	1	98 – 15 August 2018
N/A	Barner Grass – Camphor Laurel – Small-leaf Privet exotic vegetation	9	<i>Cenchrus purpureus</i> monoculture with <i>Cinnamomum camphora</i> and <i>Ligustrum sinense</i>	N/A	1.02	0	N/A



Client: C107778	 050100 m	Scale (@A4): 1:4,000	Rivers, Streams and Estuaries (ref: s4.2.1.3 & s4.2.1.6 of BAM)	
Job #: J156455				
Author: M. Nunn	Coordinate System: GDA 1994 MGA Zone 56		Tweed Valley Hospital MNES Report 771 Cudgen Road Cudgen NSW Figure 3	
Checked: D. Licari	<i>Note: All data is approx only & subject to survey.</i>			
Date: 22/01/2019	<i>Imagery 8th August 2018 (7.5 cm) © Nearmap 2018</i>			
	<i>Hydrolines and Hydroarea (NSW Hydrography) ©</i>			
	<i>Department of Finance, Services and Innovation (2018)</i>			
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Client: C107778

Job #: J156455

Author: M. Nunn

Checked: D. Licari

Date: 22/01/2019

GREENCAP



0 350 700 m

Scale (@A4): 1:25,000

Coordinate System: GDA 1994 MGA Zone 56

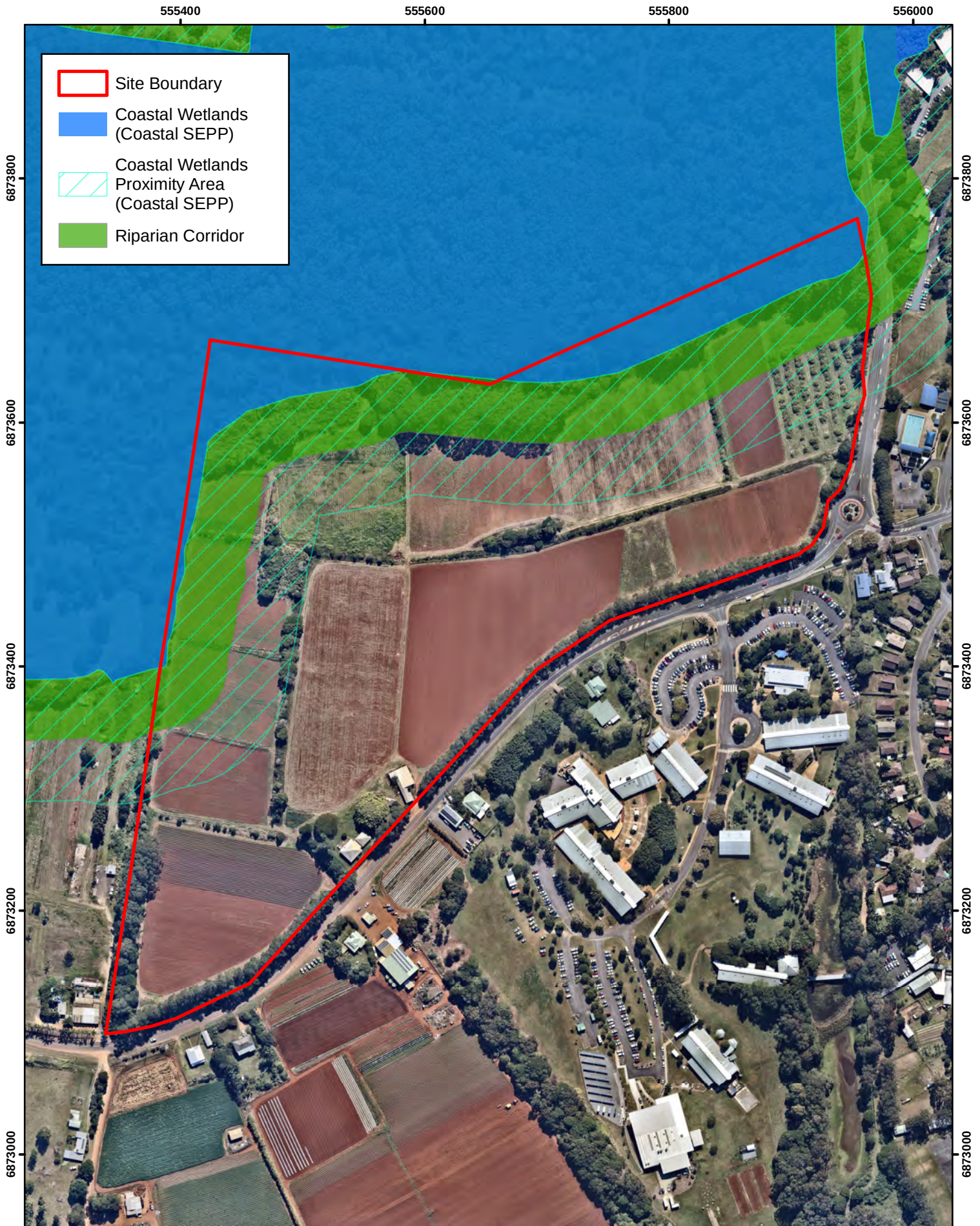
*Note: All data is approx only & subject to survey.
Imagery 8th August 2018 (59.7 cm) © Nearnmap 2018
Hydrolines and Hydroarea (NSW Hydrography) ©
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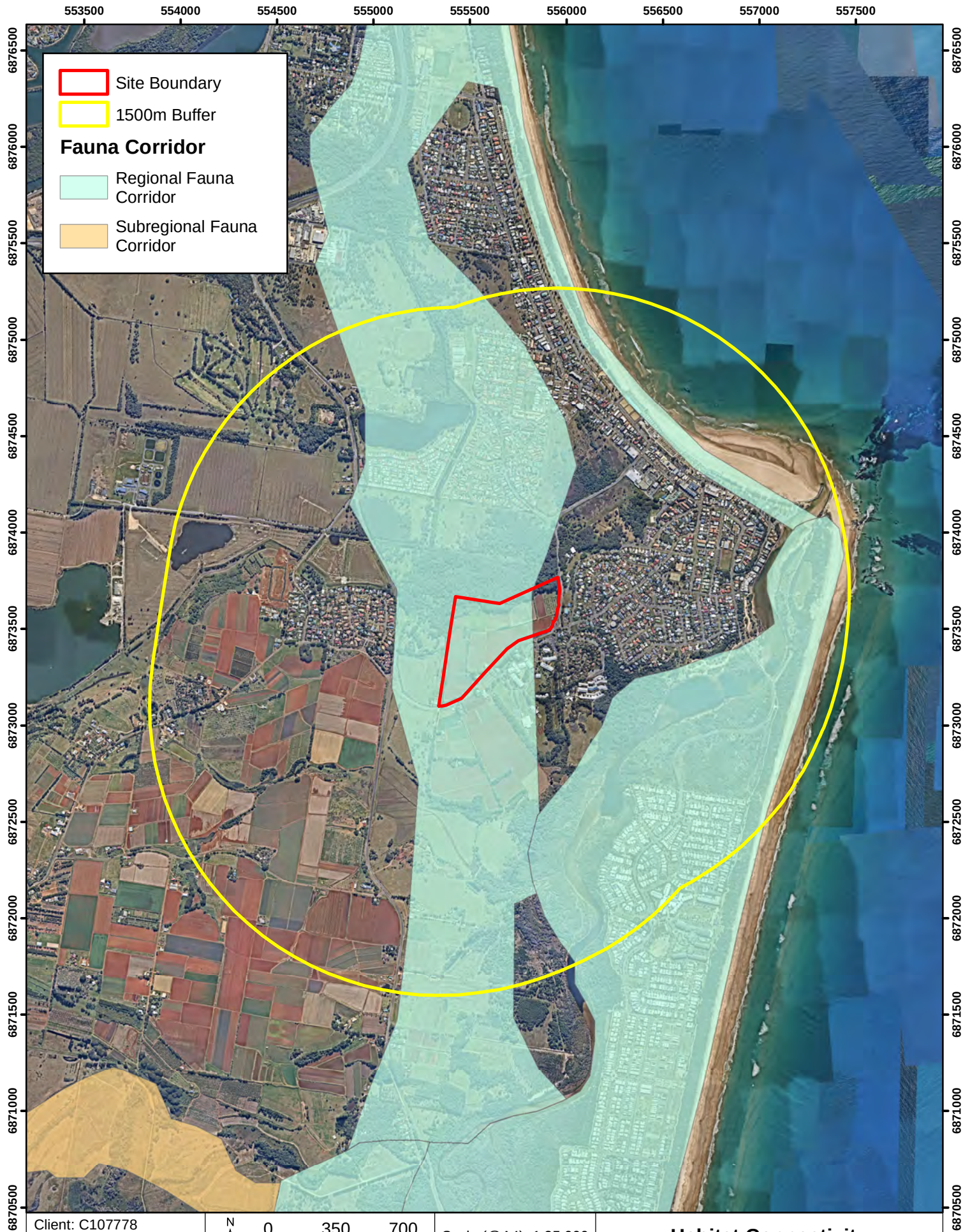
Rivers, Streams and Estuaries (ref: s4.2.1.3 & s4.2.1.6 of BAM)

Tweed Valley Hospital MNES Report
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**Figure
4**

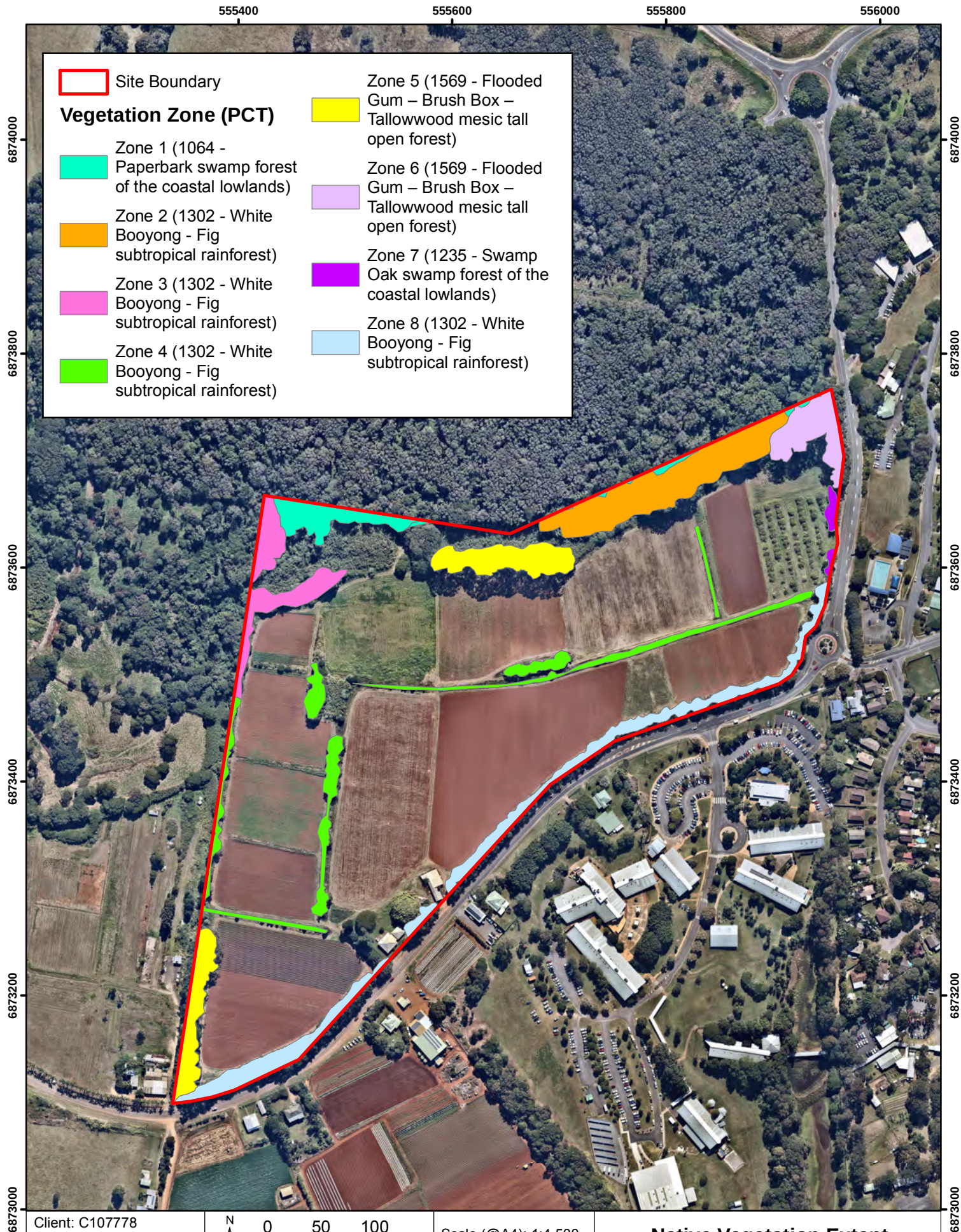


Client: C107778	 050100 m	Scale (@A4): 1:4,000	Wetlands (Site) (ref: s4.2.1.3c & s4.2.1.7 of BAM)			
Job #: J156455						
Author: M. Nunn	Coordinate System: GDA 1994 MGA Zone 56					
Checked: D. Licari	Imagery 8th August 2018 (7.5 cm) © Nearmap 2018 Coastal SEPP mapping © Department of Planning and Environment (DPE) 2018				Tweed Valley Hospital MNES Report	Figure 5
Date: 22/01/2019						
						
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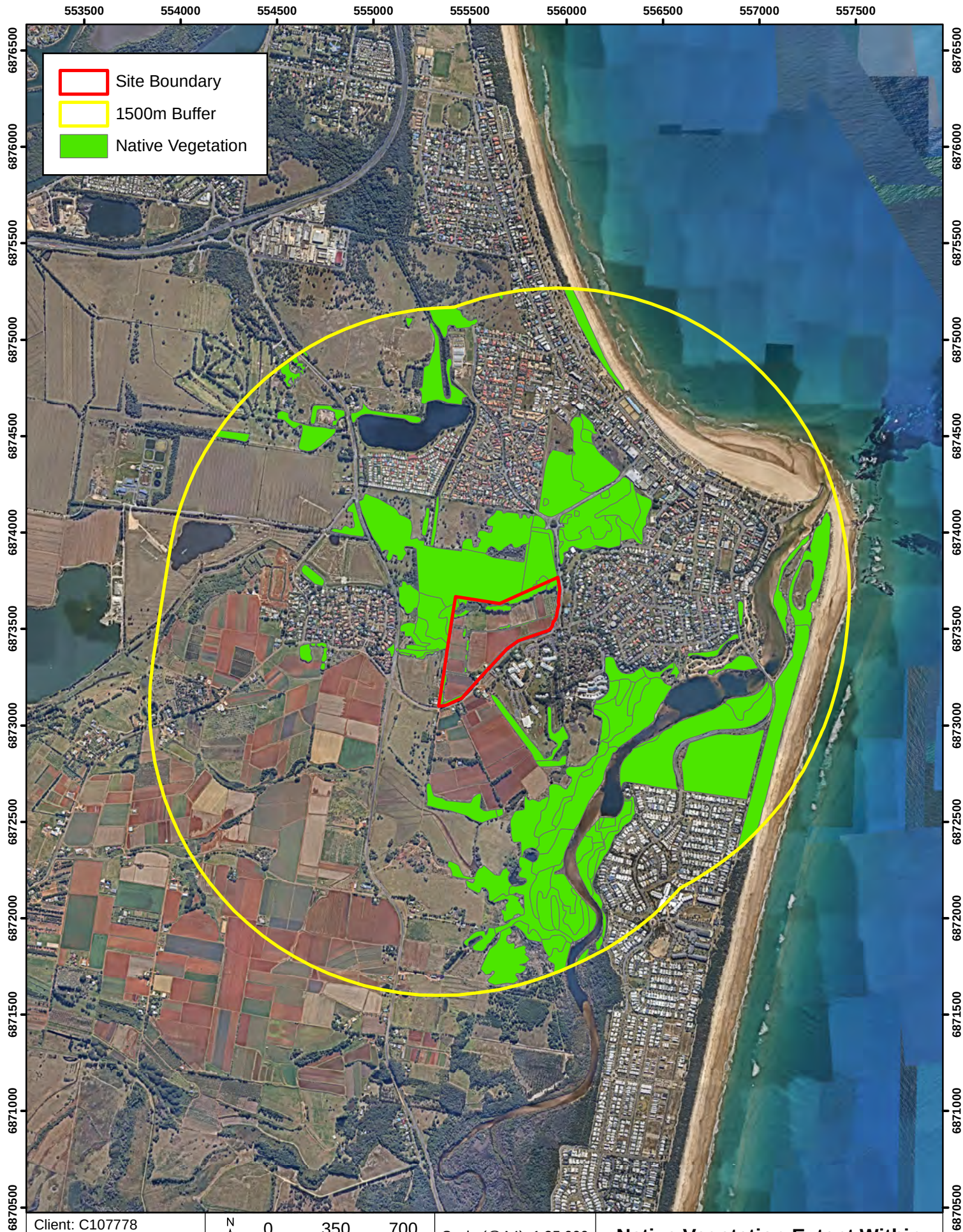
Client: C107778	 0350700 m	Scale (@A4): 1:25,000	Habitat Connectivity (ref: s4.2.1.3d & s4.2.1.9 of BAM)		
Job #: J156455					
Author: M. Nunn	Coordinate System: GDA 1994 MGA Zone 56		Tweed Valley Hospital MNES Report 771 Cudgen Road Cudgen NSW		Figure 6
Checked: D. Licari	<i>Imagery 8th August 2018 (59.7 cm) © Nearmap 2018</i>				
Date: 22/01/2019	<i>Fauna corridors for NE NSW © Office of Environment and Heritage (OEH) 2010.</i>				
		No warranty is given in relation to the data (including accuracy, reliability, completeness or suitability) and accept no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of or reliance upon the data. Data must not be used for direct marketing or be used in breach of privacy laws.			

**Figure
6**



Client: C107778	 050100 m	Scale (@A4): 1:4,500	Native Vegetation Extent on the Site		
Job #: J156455					
Author: M. Nunn	Coordinate System: GDA 1994 MGA Zone 56		Tweed Valley Hospital MNES Report 771 Cudgen Road Cudgen NSW	Figure 7	
Checked: D. Licari	Imagery 8th August 2018 (7.5 cm) © Nearmap 2018 Vegetation mapping: Greencap (2018)				
Date: 24/01/2019					
		No warranty is given in relation to the data (including accuracy, reliability, completeness or suitability) and accept no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of or reliance upon the data. Data must not be used for direct marketing or be used in breach of privacy laws.			

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Client: C107778

Job #: J156455

Author: M. Nunn

Checked: D. Licari

Date: 24/01/2019

GREENCAP



0 350 700
m

Scale (@A4): 1:25,000

Coordinate System: GDA 1994 MGA Zone 56

Imagery 8th August 2018 (59.7 cm) © Nearmap 2018
Vegetation mapping (site): Greencap (2018). Vegetation mapping
(buffer area): Tweed LGA Vegetation 2012. VIS_ID 3912 (Tweed
Shire Council 2012) © OEH 2013

Native Vegetation Extent Within the 1500m Buffer

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**Figure
8**

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5. IMPACTS ON ECOLOGICAL COMMUNITIES, MIGRATORY SPECIES AND THREATENED SPECIES

On 22 January 2019, the EPBC Acts Protected Matters Search Tool (PMST) was used to generate a report to determine whether any MNES were likely to occur within a 5 km radius of the Site. The MNES that relate to listed threatened species, TECs and migratory species were included in the search.

The listed threatened species and migratory species that were identified in the PMST report were filtered to remove species such as marine species that were captured in the 5 km buffer but not relevant to the Site. Based on the PMST and site survey data, threatened and migratory species that were identified in the report were assigned a categorical likelihood of occurrence on the Site (i.e. known, likely, possible, unlikely and not present) based on actual observations and/or the presence of habitat that would be suitable to support the particular species.

It is important to note that in accordance with the EPBC Act:

- *Species in the extinct and conservation dependant categories of species listed under the EPBC Act and listed ecological communities in the vulnerable category of ecological communities listed under the EPBC Act, are not matters of national environmental significance for the purposes of Part 3 of the EPBC Act (requirements for environmental approvals).*
- *Species and ecological communities listed under the EPBC Act may differ from those listed under State and Territory legislation. This is due to the different status of some species and ecological communities in the different States and Territories, and nationally.*

5.1 Matters of National Environmental Significance Assessment

5.1.1 Threatened Ecological Communities

Based on the PMST, three TECs were listed under the EPBC Act as likely to occur within a 5 km radius of the Site. Based on data collected during plot-based surveys undertaken as part of the BDAR (Greencap 2019), two potential TECs were recorded on the Site, namely; the critically endangered Lowland Rainforest of Subtropical Australia in Zones 2, 3, 4 and 8 and the endangered Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community in Zone 7 (**Appendix A**). Based on plot survey data (see **Section 4.2.4**, **Appendix C** and **Appendix D**), the vegetation did not meet the minimum TEC threshold criteria for either of the two potential TECs. However, as a precautionary approach, the area of remnant rainforest vegetation in Zone 2 and 3 (1.09 ha outside the development footprint), is to be considered for its conservation significance and as an area critical for connectivity within a mapped fauna corridor. This vegetation will be retained and maintained to enhance and conserve its biodiversity values, with any residual impacts mitigated are described in **Section 5.4** and in **Appendix E**. Additionally, the area of weedy vegetation in Zone 9 will be rehabilitated with rainforest vegetation as outlined in **Section 5.4** and **Table 10**. The assessment against the listing advice threshold criteria for each TEC is outlined below.

Lowland Rainforest of Subtropical Australia

Condition thresholds are outlined in the listing advice for the Lowland Rainforest of Subtropical Australia and are the minimum level at which patches are to be considered under the EPBC Act for actions that may require referral to the Australian Government (TSSC 2011). National listing focuses legal protection on patches of the ecological community that are most functional, relatively natural and in relatively good condition. Condition thresholds help identify both the ecological community and ecological function using a set of criteria that assist in indicating when the EPBC Act is likely to apply to an ecological community.

Thresholds provide guidance for when a TEC patch retains sufficient conservation value to be considered as a MNES as defined under the EPBC Act. Therefore, the referral provisions of the EPBC Act are focussed on the most valuable elements of Australia's natural environment, while heavily degraded or modified patches will be largely excluded (TSSC 2011).

Based on these considerations, an assessment was undertaken using the plot based survey data to determine whether the Lowland Rainforest of Subtropical Australia qualifies under the condition thresholds to be considered a MNES that would warrant referral (**Table 2**).

The findings of this assessment can be summarised as follows:

- The vegetation condition of the non-remnant (derived) vegetation (patch type C) in the self-sown windrows in Zone 4 and 8 (1.36 ha in extent) does not meet all of the referral criteria condition thresholds, in particular the minimum patch size threshold of ≥ 2 ha, species richness and total native vegetation cover (**Table 2**); and
- The remnant Lowland Rainforest of Subtropical Australia vegetation (patch type A and B) in the northern portion of the Site (Zone 2 and 3), which is classed as moderate to low condition and contributes to the mapped regional fauna corridor (**Figure 6**), does not meet all of the referral criteria condition thresholds (**Table 2**). Based on the BAM plot survey data, species richness and total native vegetation cover do not meet the thresholds for Zone 2 and patch size and species richness do not meet the thresholds for Zone 3. Therefore, these zones do not qualify under all the condition thresholds to be considered MNES.

Table 2 Lowland Rainforest Vegetation Condition Threshold Assessment

Criteria	Lowland Rainforest of Subtropical Australia vegetation: Natural remnant patches (Zone 2)	Lowland Rainforest of Subtropical Australia vegetation: Natural remnant patches (Zone 3)	Lowland Rainforest of Subtropical Australia vegetation: Self-sown windrows (Zone 4 and 8)
Patch type	A - Natural remnant evident by the persistence of mature residual trees from Appendix B.	B - Some residual trees from Appendix B are present plus evidence of either; natural regeneration AND/OR regeneration with active management	C - Non-remnant that has recovered through natural regeneration.
Patch size	Total area of 0.73 ¹ ha does not meet the minimum patch size threshold of ≥ 0.1 ha.	Total area of 0.36 ¹ ha does not meet the minimum patch size threshold of ≥ 1 ha.	Total area of windrow vegetation is 1.36 ¹ ha and this does not meet the minimum patch size threshold of ≥ 2 ha.
Canopy cover ²	Mean canopy cover does not meet the $\geq 70\%$ threshold.	Mean canopy cover does not meet the $\geq 70\%$ threshold.	Mean canopy cover does meet the $\geq 70\%$ threshold.
Species richness	Species richness was 13 species in total which does not meet the ≥ 40 native woody species threshold.	Species richness was 16 species in total which does not meet the ≥ 30 native woody species threshold.	Species richness was 10 total species which does not meet the ≥ 30 native woody species threshold.
Percent of total vegetation cover that is native	Total native vegetation cover was 61% which does not meet the $\geq 70\%$ of native vegetation threshold.	Total native vegetation cover was 50% which meets the $\geq 50\%$ of native vegetation threshold.	Total native vegetation cover was 44% which does not meet the $\geq 50\%$ of native vegetation threshold.

¹ Patch size was determined based on the native vegetation within the site (Lot 11 DP 1246853).

² Canopy cover was determined based on visual assessment of aerial imagery.

Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community

The 'Conservation advice (incorporating listing advice) for the Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community' outlines the key diagnostic features, condition thresholds and supplementary information to identify a patch of native vegetation as being a TEC and to determine whether the referral, assessment, approval and compliance provisions under national environmental law are likely to apply to a patch. Condition thresholds, classes and categories provide guidance on whether a patch retains sufficient conservation values to be considered as a MNES.

In order to be considered a MNES, areas of the ecological community must meet both the key diagnostic characteristics and at least the minimum condition thresholds for Category C. Very small or degraded patches that do not meet the minimum condition thresholds will be excluded from national protection (DEE 2018).

The vegetation condition of the derived vegetation in the windrow in Zone 7 (PCT1235 Swamp Oak swamp forest; 0.05 ha in extent) does not meet all of the referral criteria condition thresholds for a small patch, in particular the minimum patch size threshold of ≥ 0.5 ha. Furthermore, the vegetation in Zone 7 is a planted *Casuarina glauca* windrow located on a ridge, growing in red-brown silty clay soil derived from basalt. The Department of the Environment and Energy (2018) conservation advice (incorporating listing advice) describes that this TEC is associated with grey-back clay loams and sandy loams, on saturated, waterlogged or inundated low-lying alluvial flats and drainage lines associated with coastal floodplains. Consequently, PCT1235 Swamp Oak swamp forest does not conform to the 'Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community' description (DEE 2008).

5.1.2 Listed Migratory Species

Based on the PMST, a total of 29 migratory species potentially occur within a 5 km radius of the Site (**Appendix A**). However, it was assessed that listed migratory species are unlikely to occur on Site and would therefore not be directly impacted by the Project.

5.1.3 Threatened Species

Based on the PMST, a total of 57 threatened species (32 fauna species and 25 flora species) could potentially within a 5 km radius of the Site. An assessment of each species is outlined in **Appendix A** and covers the description of the habitat preferences, habitat suitability, likelihood of occurrence and likely consequence of any impacts of the Project on these species. A summary of the findings is outlined below. For each MNES threatened species outlined below, the potential impacts have been summarised based on addressing the MNES Significant Impact Guidelines criteria. In addition to this a detailed risk assessment describing mitigation measures (including timing, frequency and responsibility) proposed to manage the direct and indirect impacts during both the construction and operation phases of the Project are described in **Section 5.4** and in **Appendix E**.

Plants

Of the 25 threatened flora species that were likely to occur in the area, only three individuals of the three-veined laurel *Cryptocarya foetida* were recorded on Site during the targeted surveys as shown in **Figure 9** (Greencap 2019).

Targeted flora species surveys in Zones 1 to 8 were undertaken on 16 August 2018 by Dr Damian Licari and Annette McKinley and again on 3 September 2018 by Annette McKinley and Christina Maloney, under the direction of Dr Licari, with a survey effort of 32 hours.

Targeted flora surveys were undertaken by assessing all areas of native vegetation on the Site. Targeted flora survey tracks are mapped in **Figure 10**. Note that only the GPS data for the Greencap observer has been provided. An equipment malfunction on the 16th August 2018 meant that the full survey extent was not captured, notably the survey in the Zones 4 and 8.

In Zones 1 to 3, due to the thick swamp and rainforest vegetation with logs on the ground, it was difficult to walk parallel traverses in accordance with published guidelines (OEH 2016). However, with 32 hours of survey effort with two observers used in tandem on two separate days with a total of 32 surveys hours, and given that Zones 1-3 will not be directly impacted by the Project, this was considered to be sufficient and in broad accordance with the guidelines. The length of each windrow in Zones 4 to 8 were inspected from an edge and in cases where a portion of a windrow was too wide for effective inspection from an edge, these areas were inspected from within the windrow.

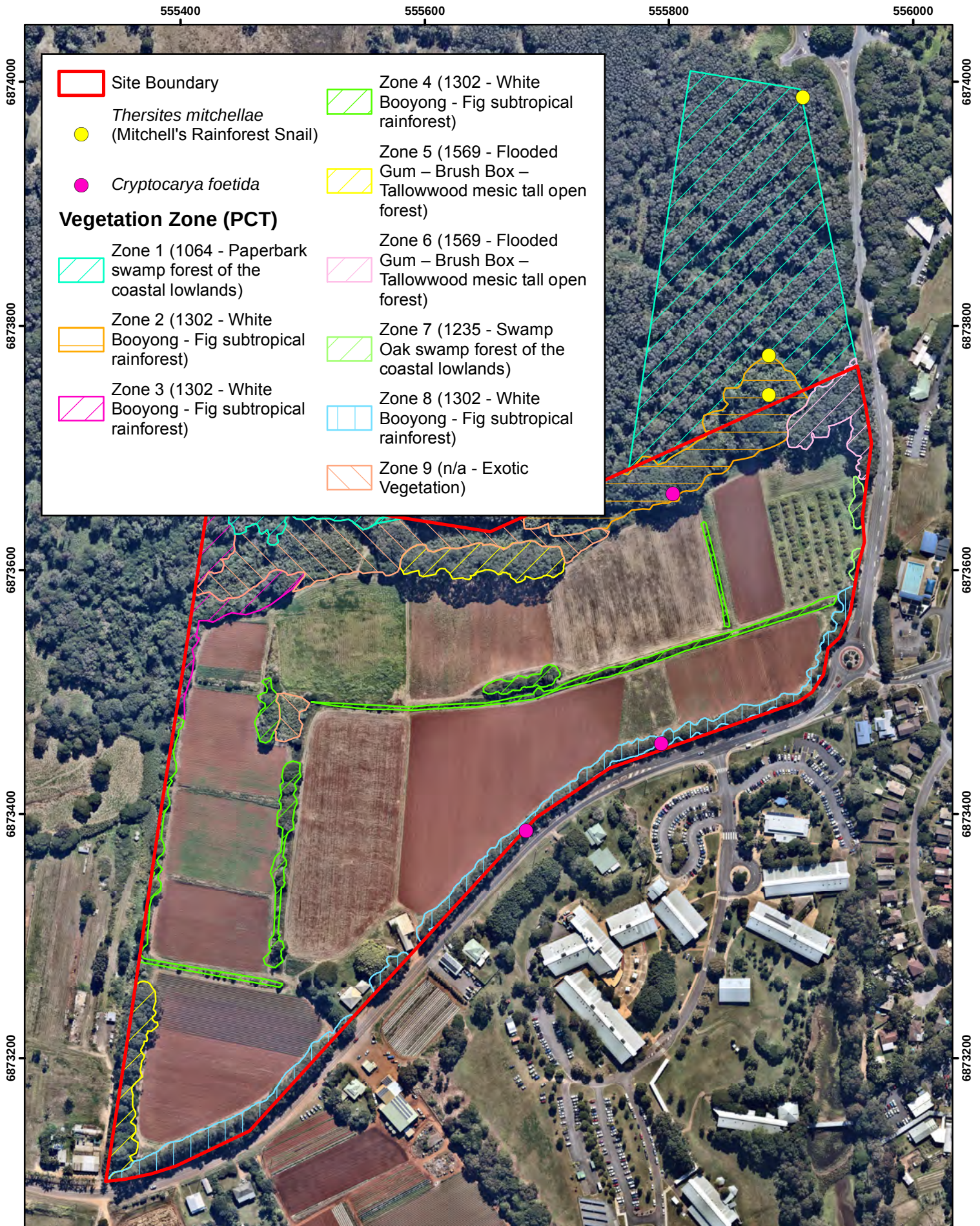
Additional targeted flora surveys for threatened plant species, including *Carronia multisepalea* (host plant for the Southern Pink Underwing Moth *Phyllodes imperialis southern subspecies*) were undertaken on 17 December 2018 by Dr Barbara Stewart in Zones 4 and 8 under the direction of Dr Licari, with a survey effort of four hours. In Zones 1 to 3 parallel traverses were walked at 10 m intervals in accordance with published guidelines (OEH 2016). The length of each windrow in Zones 4 to 8 were inspected from an edge and in cases where a portion of a windrow was too wide for effective inspection from an edge, these areas were inspected from within the windrow.

Table 3 below outlines the potential impacts on this species based on addressing the MNES Significant Impact Guidelines 1.1 criteria.

Table 3 Criteria Response for *Cryptocarya foetida* (Vulnerable Species)

Significant impact Criteria	Response
Lead to a long-term decrease in the size of an important population of a species	Three three-veined laurel <i>Cryptocarya foetida</i> plants were recorded during the targeted flora surveys, with two plants in Zone 8 and one plant in Zone 2. However, considering the low count of individual plants (two), the small magnitude the vegetation proposed to be cleared (0.34 ha) and the fragmented location of the plants, the Project is unlikely to adversely affect the habitat critical for this species survival. Mitigation measures to avoid or reduce impacts of the Project on Three three-veined laurel are outlined in detail in Table 10 and possible indirect impacts of the Project have been avoided and mitigated to a low residual risk level, as described in Appendix E .
Reduce the area of occupancy of an important population	The two individual plants recorded in Zone 8 do not represent an important population.
Fragment an existing population into two or more populations	Given that the two plants in Zone 8 are already in low condition windrow vegetation, the direct impact on these plants will not fragment an existing important population into two or more populations.
Adversely affect the habitat critical to the survival of the species	Considering the low count of individual plants (two) found in the area proposed to be cleared (Zone 4 and 8) and the small magnitude the vegetation proposed to be cleared (0.95 ha), the Project is unlikely to adversely affect the habitat critical to the survival this species.
Disrupt the breeding cycle of an important population	The removal of portion of Zone 8 is not likely to disrupt the breeding cycle of an important population, including impacts on genetic diversity.

Significant impact Criteria	Response
Modify, remove, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Zone 8 currently contributes to habitat connectivity by providing 'stepping stone' habitats for threatened species such as birds, mammals etc. These existing stepping stone areas will be removed as part of the Project. However, it is not likely that the removal of this small area of low quality habitat will cause the species to decline as adjacent high quality key habitat for this species is being retained and protected for biodiversity values.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	Existing vegetation in Zones 4 and 8 contains a high percentage of weeds, including high treat exotic weeds. A Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.
Introduce disease that may cause the species to decline	It is unlikely that the Project will introduce disease that may cause this species to decline. An environmental protection area and buffer zones will be installed to protect the key habitat of remnant vegetation during construction and a Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values.
Interfere substantially with the recovery of the species	The Project aims to support recovery of the species by retaining the key habitat of remnant lowland subtropical rainforest vegetation in Zones 2 and 3 and to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.



Client: C107778

Job #: J156455

Author: M. Nunn

Checked: D. Licari

Date: 24/01/2019

GREENCAP



0 50 100 m

Scale (@A4): 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

Imagery 8th August 2018 (7.5 cm) © Nearmap 2018
Vegetation mapping: Greencap (2018)

Threatened Species Locations

Tweed Valley Hospital MNES Report
771 Cudgen Road
Cudgen NSW

Figure 9

No warranty is given in relation to the data (including accuracy, reliability, completeness or suitability) and accept no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of or reliance upon the data. Data must not be used for direct marketing or be used in breach of privacy laws.

Animals

Of the 32 animal species were likely to occur in the area, the assessment results were as follows:

- Twenty-seven species were either not present or were unlikely to be present based on fauna surveys and the lack of suitable habitat for these species;
- One species, the grey-headed flying-fox (*Pteropus poliocephalus*) was likely to be on Site and the potential impacts on this species are outlined in **Table 4** below;
- Opportunistic observations of the Mitchell's rainforest snail (*Thersites mitchellae*) were recorded on Site (**Figure 9**). However, it was assessed that the Project is unlikely to have any significant impact on this species, based on addressing the MNES Significant Impact Guidelines 1.1 criteria (**Table 5**); and
- The presence of three species were assessed as 'possible', including the Koala (*Phascolarctos cinereus*) (see **Table 6** and **Table 7**). It was assessed that the Project is unlikely to have any significant impact on the other two species, namely; the Pink Underwing Moth (*Phyllodes imperialis smithersi*) and Southern Black-Throated Finch (*Poephila cincta cincta*) because the habitat in the directly impacted Zones 4 and 8 was not likely to be utilised by these species and as a result of the implementation of the mitigation measures outlined in **Table 10** below.

Grey-Headed Flying-Fox

Field assessment of microhabitats recorded no flying fox camps or roosts on the Site. However, around 150 threatened grey-headed flying-fox (*Pteropus poliocephalus*) (listed as vulnerable under the EPBC Act) were recorded during surveys in November 2017 (Ecosure 2018) and is likely to utilise the Site for foraging habitat.

It was assessed that the Project is not likely to have a significant impact on the threatened flying-fox based on addressing the MNES Significant Impact Guidelines 1.1 criteria in **Table 4**. Referral guidelines for management actions in grey-headed and spectacled flying-fox camps (Commonwealth of Australia 2015) were not used in this situation because this Guideline is intended to provide guidance only in relation to management actions taken at or in camps and no flying fox camps or roosts were detected on the Site.

Table 4 Criteria Response for the Grey-Headed Flying-Fox (Vulnerable Species)

Significant Impact Criteria	Response
Lead to a long-term decrease in the size of an important population of a species	Field assessment of microhabitats recorded no grey-headed Flying-fox (GHFF) camps or roosts on the Site. A locally significant population of GHFF may utilise the Site for foraging, however the Project will not decrease the size of this population. Mitigation measures to avoid or reduce impacts of the Project are outlined in detail in Table 10 and possible indirect impacts of the Project on GHFF foraging habitat have been avoided and mitigated to a low residual risk level, as described in Appendix E .
Reduce the area of occupancy of an important population	The non-remnant vegetation in Zone 4 and 8 which is proposed to be cleared contains a few species which are known GHFF blossom and fruit diet, including <i>figus fraseri</i> , <i>figus macrophylla</i> , <i>figus obliqua</i> and <i>melaucua quinquenervia</i> (Edy & Law 2008). However, this species is more likely to utilise the better quality, relatively undisturbed remnant rainforest (Zone 2 and 3) and paperbark swamp forest (Zone 1) for foraging. These areas contribute to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species.

Significant Impact Criteria	Response
Fragment an existing population into two or more populations	Field assessment of microhabitats recorded no GHFF camps or roosts on the Site, there it is not possible for the Project to fragment an existing population into two or more populations.
Adversely affect the habitat critical to the survival of the species	Although Zone 4 and 8 contain GHFF foraging habitat, the windrows are highly degraded which is not quality foraging habitat and the magnitude of the vegetation clearance is small, with only 0.95 ha proposed to be cleared. The GHFF is a highly mobile species and has been recorded travelling up to 2,000 km within a nine month period (DotE 2014). The species is known to forage widely within the vicinity of their roost sites, travelling up to 50 km a night in search of food which comprises a mix of nectar and fruit (DotE 2014). The food sources favoured by the species can be spatially and temporally variable and as such the species moves in response to the abundance of forage resources (DECCW 2009). Therefore, the Project is unlikely to adversely affect the habitat critical for the survival of this species.
Disrupt the breeding cycle of an important population	The Project is unlikely to disrupt the breeding cycle of an important population of this species because field assessment of microhabitats recorded no GHFF camps or roosts on the Site.
Modify, remove, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Zones 4 and 8 currently contribute to habitat connectivity by providing 'stepping stone' habitats for threatened species. These existing stepping stone areas will be removed as part of the Project. However, it is not likely that the removal of this small area of low quality habitat will cause the species to decline as adjacent high quality key habitat for this species is being retained and protected for biodiversity values. The Project includes a helipad on the top of the main building which will result in low level air traffic in the vicinity of the sites. There is a risk that local populations of the threatened grey-headed flying-fox may be flying across the Site in remnant vegetation that is located at the level of the floodplain at the time of aircraft operation. However, the helipad location is considered to be above the flight path altitude of any birds or bats and will therefore not interrupt any local migration or cause death through aircraft strike. At peak operation it is expected that aircraft movements would amount to six movements per week with an estimated flight time of 2 hours per annum and most outbound patient transfers would take place during the day when clinicians are available to make transport decisions. This would therefore avoid aircraft movements in the peak periods of flying fox activity in the hours preceding dusk and dawn. As a consequence, the probability of aircraft strike on flying foxes is negligible.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	Existing vegetation in Zones 4 and 8 contains a high percentage of weeds, including high treat exotic weeds. A Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.
Introduce disease that may cause the species to decline	It is unlikely that the Project will introduce disease that may cause this species to decline. An environmental protection area and buffer zone will be installed to protect the remnant vegetation in the northern section of the Site during construction and a Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values throughout operation of the Project.
Interfere substantially with the recovery of the species	The Project aims to support recovery of the species by retaining the key habitat of remnant rainforest (Zone 2 and 3) and paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor and to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.

Mitchell's Rainforest Snail

There was an opportunistic recording of Mitchell's rainforest snail *Thersites mitchellae* on 19 November 2018 by Dr Licari and David Milledge. One live specimen was recorded in a portion of Zone 2 and one dead snail shell was recorded outside the Site boundary adjacent to Zone 2 as shown in **Figure 9**.

A targeted nocturnal spotlight survey for Mitchell's rainforest snail was conducted on 17-18 December 2018 by Dr Licari and Kyle Spiteri in both Zones 4 and 8. Additional targeted diurnal and nocturnal surveys for the snail concentrating on Zones 4 and 8 were then undertaken on 19-20 December 2018 by Dr Stephanie Clark, a specialist in invertebrate identification. The targeted surveys conducted by Dr Clark included active diurnal habitat searches of logs, rocks, debris and leaf litter on the ground and a nocturnal spotlight survey for active snails. Mitchell's rainforest snail (one living specimen and three dead snail shells) was found on 20 December 2018 outside of the Site boundary, within the Paperbark Forest adjacent and to the north of Zone 1. In addition, there are known records for Mitchell's rainforest snail (Bionet database searched, 7 December, 2018) to the east and west of this location. The targeted survey for Mitchell's rainforest snail undertaken by Dr Clark concluded that the clearance of rainforest vegetation from the proposed development area (Zones 4 and 8) would not significantly impact Mitchell's rainforest snail habitat (Clark 2019). Targeted fauna survey tracks are mapped in **Figure 11**. Note that only the GPS data for the Greencap observer has been provided. An equipment malfunction on the 17th December 2018 meant that the full survey extent was not captured, notably the survey in Zone 8.

It was assessed that the Project is not likely to have a significant impact on the critically endangered Mitchell's rainforest snail based on addressing the MNES Significant Impact Guidelines 1.1 criteria in **Table 5**.

Table 5 Criteria Response for the Mitchell's Rainforest Snail (Critically Endangered Species)

Significant Impact Criteria	Response
Lead to a long-term decrease in the size of the population	Targeted surveys for <i>Thersites mitchellae</i> (Mitchell's Rainforest Snail) did not detect any evidence of the species within Zones 4 and 8 nor along the edges of Zones 2, 3 and 5 (Clark 2019). It was noted that the vegetation present in Zone 8 is not suitable habitat for Mitchell's rainforest snail, as it is dominated by a line of large pines and otherwise very xeric with very few rainforest plants present along the length of the entire zone. Similarly, the vegetation present in Zone 4 was also not considered suitable habitat for Mitchell's rainforest snail due to a high proportion of exotic species present, relatively narrow patches of vegetation with some rainforest species present however, completely surrounded by cleared fields, resulting in the patches being susceptible to drying due to increased exposure to wind (Clark 2019). As described in the Mitchell's rainforest snail listing advice, though breeding populations of the snail can persist in narrow strips of remnant rainforest such as windrow vegetation in Zone 4 and 8, the long-term viability of populations at such sites is uncertain due to the impact of edge effects factors associated with remnants on land snails which are likely to be adverse. Therefore, the local population of this species is not considered to be dependent on the vegetation proposed for clearance. Possible indirect impacts on known Mitchell's snail habitat in Zone 1 and 2 and potential habitat in Zone 3 habitat have been avoided and mitigated to a low residual risk level, as described in Appendix E . Furthermore, habitat will be retained and managed to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species, in particular weeds and rats which are one of the known threats to the Mitchell's rainforest snail (Commonwealth of Australia, 2018). Therefore, it is considered that clearing vegetation in Zone 4 and 8 will not lead to a long-term decrease in the population.

Significant Impact Criteria	Response
Reduce the area of occupancy of the species	The targeted survey for Mitchell's rainforest snail undertaken by Dr Clark concluded that clearance of rainforest vegetation for the Project (Zones 4 and 8) would not significantly impact Mitchell's rainforest snail habitat (Clark 2019). Furthermore, there are larger areas of higher quality intact remnant vegetation adjacent to the windrows which constitute key habitat requirements for the Mitchell's rainforest snail, which are a well-developed leaf litter layer and an intact forest canopy. Therefore it is considered that the species would not be dependent on the vegetation proposed for removal when there is more suitable habitat on the Site. Additionally, under the BMP, the Vegetation Management Plan (VMP) incorporates revegetation of the exotic grassland in Zone 9 (0.95 ha) with rainforest species, regeneration and weed management of retained remnant vegetation in the north of the Site. This plan will be linked to the Landscape Masterplan which is focused on the regeneration of retained windrows, as well as native landscape plantings. These proposed measures will further enhance current habitat and potentially provide increased habitat for the Mitchell's rainforest snail.
Fragment an existing population into two or more populations	The removal of 0.95 ha of vegetation in Zones 4 and 8 will not fragment an existing population because it is not a Mitchell's rainforest snail habitat. However, the existing vegetation in the northern portion of the site where the Mitchell's snail was detected (Zones 1, 2 and 3) contributes to the mapped regional fauna corridor and will be retained, therefore will continue to contribute to connectivity of this part of the habitat. A Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values for areas of regional fauna corridor vegetation.
Adversely affect the habitat critical to the survival of the species	Known Mitchell's snail habitat in Zone 1 and 2 and potential habitat in Zone 3 will be retained and managed to preserve and enhance current biodiversity values and managed under a Biodiversity Management Plan (BMP). Therefore, it is considered that clearing vegetation in Zone 4 and 8 will not adversely affect the habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	Known Mitchell's snail habitat in Zone 1 and 2 and potential habitat in Zone 3 will be retained and managed to preserve and enhance current biodiversity values and managed under a Biodiversity Management Plan (BMP). Therefore, it is considered that clearing vegetation in Zone 4 and 8 will not adversely affect the habitat critical to the survival of the species, therefore clearing 0.95 ha of vegetation in Zone 4 and Zone 8 is not likely to disrupt the breeding cycle of the population.
Modify, remove, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Known Mitchell's snail habitat in Zone 1 and 2 and potential habitat in Zone 3 will be retained and managed to preserve and enhance current biodiversity values and managed under a Biodiversity Management Plan (BMP).
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	Known Mitchell's snail habitat in Zone 1 and 2 and potential habitat in Zone 3 will be retained and managed under a BMP. The BMP will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species. Therefore, it is considered that the Project will likely decrease invasive species that are harmful to the critically endangered Mitchell's rainforest snail.
Introduce disease that may cause the species to decline	It is unlikely that the Project will introduce disease that may cause this species to decline. An environmental protection area and buffer zone will be installed to protect the key habitat in Zones 1, 2 and 3 during construction and a Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values.
Interfere with the recovery of the species	The Project aims to support and improve the recovery of the species by retaining the key habitat of lowland subtropical rainforest and paperbark swamp vegetation in Zones 1, 2 and 3 and to preserve and enhance current biodiversity values,

Significant Impact Criteria	Response
	including the management of invasive species which may be harmful to threatened species.

Koala

It was assessed that the Project is not likely to have a significant impact on the threatened Koala based on addressing the EPBC Act referral guidelines for the vulnerable koala (DOE 2004) criteria in **Table 6** and **Table 7**.

A targeted koala *Phascolarctos cinereus* scat survey was undertaken in a small 0.2 ha area of preferred koala habitat located in Zone 6 that is located outside of the impact area. This vegetation meets the definition of 'Secondary (Class A) Habitat' as defined in the Tweed Coast Comprehensive Koala Plan of Management (CKPoM) and 'Potential Koala Habitat' as defined in State Environmental Planning Policy 44 – Koala habitat protection 44.

The scat survey was conducted in broad accordance with the SAT method (Allen & Phillips 2008) on 13 July 2018 by Dr Licari. Scat searches were undertaken in a 1 m buffer area around the base of 30 trees for two person minutes per tree and no koala *Phascolarctos cinereus* scats were recorded. Whilst undertaking the survey, it was also observed that weedy vegetation and growth of vines would be challenging for koala *Phascolarctos cinereus* to utilise the trees.

Table 6 Results of Koala Habitat Assessment Tool (DOE 2014)

Attribute	Score	Appraisal
Koala occurrence	0	A known koala population is not mapped to occur on the proposed site (Phillips <i>et. al.</i> , 2011; Figure 1).
Vegetation composition	1	A small area (approximately 0.3 ha) of planted eucalypts with a small number of koala food trees is on the site and will not be directly impacted by the proposed development.
Habitat connectivity	0	The proposed site is not part of a contiguous landscape as defined in the koala habitat assessment tool (DOE 2014).
Key existing threats	1	There is evidence of infrequent or irregular koala mortality from vehicle strike or dog attack (Phillips <i>et. al.</i> , 2011).
Recovery value	0	The habitat on the proposed site is unlikely to be important for achieving interim recovery objectives.
Total	2	

Table 7 Response to EPBC Act Referral Guidelines for Koala (Vulnerable)

Significant Impact Criteria	Response
What does the koala need to survive and recover?	Further loss, fragmentation and degradation of habitat critical to the survival of the koala must be avoided and measures implemented to mitigate and manage impacts that are likely to interfere with the recovery of the koala. Any possible indirect impacts on potential koala habitat in have been avoided and mitigated to a low residual risk level, as described in Appendix E .
Could the impacts of your action occur within the modelled distribution of the koala?	The koala was identified in the PMST as a threatened species (part of the Koala population between the Tweed and Brunswick Rivers east of the Pacific Highway), therefore this triggered an assessment of the likely impact of the proposed action on the species.
In what geographic context are you proposing your action?	The 800 mm per annum rainfall isohyet is used to separate the coastal and inland geographic contexts for koala population distribution. BOM data was

Significant Impact Criteria	Response
	obtained from the Kingscliff (Marine Parade) station (Number: 58137). The annual total to Nov this year was 1178.4 mm and 1083.9 mm for 2017. Therefore, the coastal context criteria are to be used when determining whether habitat is critical to the survival of the koala. Coastal habitat on the Site includes; – small, isolated patches of native vegetation in rural, urban or peri-urban areas; – windbreaks and narrow areas of native vegetation along riparian areas or linear infrastructure – Isolated food and/or shelter trees (i.e. on farm lands, in suburban streetscapes, parks and yards).
Could the impact(s) of your action affect koala habitat?	A small 0.2 ha area of preferred koala habitat is located in Zone 6, which is outside of the Project construction footprint impact area and will be retained and managed for its biodiversity values. Therefore, it is unlikely that the Project will have a significant impact on preferred koala habitat, however, some the koala habitat is likely to be affected by some direct and indirect impacts. These impacts will be avoided or minimised to reduce the risk to a low level and provide some environmental benefits.
Have you surveyed for the koala and koala habitat?	Koalas were surveyed for on the Site and found not present, however a small 0.2 ha area of preferred koala habitat is located in Zone 6, which is outside of the Project construction footprint impact area.
Could your impact area contain habitat critical to the survival of the koala?	The koala habitat assessment was conducted for the proposed site in accordance with the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) guidelines and koala habitat assessment tool (DOE 2004) (Table 6). Impact areas that score ≤ 4 do not contain habitat critical to the survival of the koala, are at low risk of resulting in a significant impact.
Will your action adversely affect habitat critical to the survival of the koala?	The Project will meet the interim recovery objectives for the koala by protecting and conserving large, connected areas of koala habitat, particularly large, connected areas that support koalas and maintaining corridors and connective habitat that allow movement of koalas between large areas of habitat. The Project will not adversely affect habitat critical to the survival of the koala as there will be no direct impacts on the small 0.2 ha area of preferred koala habitat (not critical habitat) located in Zone 6. It is likely that there will be some impacts from the Project which may affect adjacent habitat which would be used as connective habitat that support koalas to move between larger areas of preferred habitat. In respect of connectivity, Zones 4 and 8 currently contribute to habitat connectivity by providing 'stepping stone' habitats for threatened species. These existing stepping stone areas will be removed as part of the Project. However, this species is more likely to utilise the better quality remnant Paperbark swamp forest (Zone 1 and 2) and the remnant rainforest (Zone 2 and 3) that contribute to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of hydrogeology, water quality and invasive species which may be harmful to threatened species. The primary impact on movement of threatened species relates to boundary fencing of the site, noting that species would be able to move around the development unless impeded by a boundary fence. In respect of the current fencing of the site, the only existing fencing in proximity to the site is the wildlife fencing along the Turnock St roadside. The development will not impact this existing fencing. In respect of fencing that will be installed as part of the development, temporary fencing will be

Significant Impact Criteria	Response
	installed during the construction phase of the development to facilitate movement of arboreal marsupials such as koala. This fencing will be installed in accordance with the guidance provided in the Tweed Coast Comprehensive Koala Plan of Management (Tweed Shire Council, 2015). This fencing will be removed at the conclusion of the construction phase of the development. Impacts of vehicle strikes will be managed through mitigation measures. Traffic will be restricted to the southern portion of the Site where the project footprint is which is approximately 62m from the intact remnant native vegetation. Construction traffic must maintain low vehicle speeds and operators shall take care and be aware of any wildlife that may be in the area. Should wildlife enter the construction area during operation of the Project wildlife protection and traffic calming measures will mitigate the risk of vehicle strike impact on this species.
Could your action interfere substantially with the recovery of the koala?	Existing vegetation in Zones 4 and 8 contains a high percentage of weeds, including high treat exotic weeds. A Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species. It is unlikely that the Project will introduce disease that may cause this species to decline. An environmental protection area and buffer zone will be installed to protect the remnant vegetation in the northern section of the Site during construction and a Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values throughout operation of the Project. The Project aims to support recovery of the species by retaining the key habitat of remnant rainforest (Zone 2 and 3) and paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor and to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.
Could your action require a referral to the Minister for significant impacts on the koala?	Impact areas that score ≤ 4 do not contain habitat critical to the survival of the koala, are at low risk of resulting in a significant impact. By avoiding direct and indirect impacts and implementing mitigation to the Project will reduce impacts on the koala to a level which is not significant.

Pink Underwing Moth

It was assessed that the Project is not likely to have a significant impact on the Pink Underwing Moth (*Phyllodes imperialis smithersi*) based on addressing the MNES Significant Impact Guidelines 1.1 criteria in **Table 8**.

Table 8 Criteria Response for the Pink Underwing Moth (Endangered Species)

Significant Impact Criteria	Response
Lead to a long-term decrease in the size of the population	The targeted flora survey for Zones 4 and 8 recorded the host plant <i>Carronia multiseppalea</i> as absent. Furthermore, field assessment of Zones 4 and 8 suggested that these linear windrows are subject to high levels of light and are therefore not suitable microhabitats for breeding in Zones 4 and 8. Potential breeding habitat for on the Pink Underwing Moth (<i>Phyllodes imperialis smithersi</i>) is restricted to subtropical rainforest with low light conditions below about 600 m elevation where the caterpillar's host plant <i>Carronia multiseppalea</i> (a native rainforest vine) is found to occur (OEH 2018d). Any possible indirect impacts on potential habitat in Zone 2 and 3 have been avoided and mitigated to a low residual risk level, as described in Appendix E.

Significant Impact Criteria	Response
	Additionally, potential breeding habitat in subtropical rainforest in Zone 2 and 3 will be retained and managed to preserve and enhance current biodiversity values and managed under a Biodiversity Management Plan (BMP). Therefore, it is considered that clearing vegetation in Zone 4 and 8 will not lead to a long-term decrease in the size of the Pink Underwing Moth population.
Reduce the area of occupancy of the species	Field assessment of areas of vegetation to be cleared (Zones 4 and 8) suggested that these linear windrows are subject to high levels of light and are therefore not suitable microhabitats for Pink Underwing Moth breeding in Zones 4 and 8 (Greencap 2019).
Fragment an existing population into two or more populations	The removal of 0.95 ha of vegetation in Zones 4 and 8 will not fragment an existing population because it is not considered to be Pink Underwing Moth habitat. However, potential breeding habitat in subtropical rainforest in Zone 2 and 3 contributes to the mapped regional fauna corridor and will be retained, therefore will continue to contribute to connectivity of this part of the habitat. A Biodiversity Management Plan (BMP) will be developed for the Site to preserve and enhance current biodiversity values for areas of regional fauna corridor vegetation.
Adversely affect the habitat critical to the survival of the species	The removal of 0.95 ha of vegetation in Zones 4 and 8 will not adversely affect the habitat critical to the survival of the species because it is not considered to be Pink Underwing Moth breeding habitat. However, potential breeding habitat in subtropical rainforest in Zone 2 and 3 will be retained and managed to preserve and enhance current biodiversity values under a Biodiversity Management Plan (BMP). Therefore, it is considered that clearing vegetation in Zone 4 and 8 will not adversely affect the habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	The targeted flora survey for Zones 4 and 8 recorded the host plant <i>Carronia multiseptata</i> as absent. Furthermore, field assessment of Zones 4 and 8 suggested that these linear windrows are subject to high levels of light and are therefore not suitable microhabitats for Pink Underwing Moth breeding. Potential breeding habitat in subtropical rainforest in Zone 2 and 3 will be retained and managed to preserve and enhance current biodiversity values under a Biodiversity Management Plan (BMP). Therefore, the removal of 0.95 ha of vegetation in Zones 4 and 8 is not likely to disrupt the breeding cycle of a population.
Modify, remove, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Field assessment of microhabitats on the Site found that it is substantially degraded such that the species is unlikely to utilise the vegetation from the proposed development area (Zones 4 and 8). Therefore, the Project will not decrease the availability or quality of habitat to the extent that the species is likely to decline. Potential breeding habitat in subtropical rainforest in Zone 2 and 3 will be retained and managed to preserve and enhance current biodiversity values under a Biodiversity Management Plan (BMP).
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	Potential breeding habitat in subtropical rainforest in Zone 1 and 2 will be retained and managed to preserve and enhance current biodiversity values and managed under a Biodiversity Management Plan (BMP). The BMP will include the management of invasive species. Therefore, it is considered that the Project will likely decrease invasive species that are harmful to the endangered Pink Underwing Moth.
Introduce disease that may cause the species to decline	It is unlikely that the Project will introduce disease that may cause this species to decline. An environmental protection area and buffer zone will be installed to protect potential key habitat in Zones 2 and 3 during construction and a BMP will be developed for the Site to preserve and enhance current biodiversity values.
Interfere with the recovery of the species	The Project aims to support and improve the recovery of the species by retaining the potential key habitat in Zones 2 and 3 and to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.

Southern Black-Throated Finch

It was assessed that the Project is not likely to have a significant impact on the Southern Black-Throated Finch based on addressing the MNES Significant Impact Guidelines 1.1 criteria in **Table 9**.

Table 9 Criteria Response for the Southern Black-Throated Finch (Endangered Species)

Significant Impact Criteria	Response
Lead to a long-term decrease in the size of the population	Vegetation from the proposed development area (Zones 4 and 8) constitute substantially degraded derived regenerating Subtropical Rainforest which is not preferred habitat for the Southern Black-Throated Finch. Additionally, any possible indirect impacts on potential habitat in Zone 1, 6 and 7 have been avoided and mitigated to a low residual risk level, as described in Appendix E , and will be managed to preserve and enhance current biodiversity values under a BMP. Therefore, the removal of 0.95 ha of vegetation in Zones 4 and 8 will not lead to a long-term decrease in the size of the Southern Black-Throated Finch population.
Reduce the area of occupancy of the species	Vegetation from the proposed development area (Zones 4 and 8) constitute substantially degraded derived regenerating Subtropical Rainforest which is not preferred habitat for the Southern Black-Throated Finch. Therefore, the removal of 0.95 ha of vegetation in Zones 4 and 8 will Reduce the area of occupancy of the species the Southern Black-Throated Finch. However, potential habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 will be retained and managed to preserve and enhance current biodiversity values under a BMP.
Fragment an existing population into two or more populations	Field assessment of microhabitats on the Site found that it is substantially degraded such that the species is unlikely to utilise the vegetation from the proposed development area (Zones 4 and 8). Therefore, the removal of 0.95 ha of vegetation in Zones 4 and 8 will not fragment an existing population. However, potential habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 will be retained and managed to preserve and enhance current biodiversity values under a BMP.
Adversely affect the habitat critical to the survival of the species	The removal of 0.95 ha of vegetation in Zones 4 and 8 will not adversely affect the habitat critical to the survival of the species because it is not considered critical or high value habitat for the endangered Southern Black-Throated Finch. However, potential habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 will be retained and managed to preserve and enhance current biodiversity values under a BMP.
Disrupt the breeding cycle of a population	Field assessment of microhabitats on the Site found that it is substantially degraded such that the species is unlikely to utilise the vegetation from the proposed development area (Zones 4 and 8). Potential habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 will be retained and managed to preserve and enhance current biodiversity values under a Biodiversity Management Plan (BMP). Removal of 0.95 ha of vegetation in Zones 4 and 8 will not disrupt the breeding cycle of a population.
Modify, remove, destroy, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Field assessment of microhabitats on the Site found that it is substantially degraded such that the species is unlikely to utilise the vegetation from the proposed development area (Zones 4 and 8). Furthermore, Zones 4 and 8 constitute derived regenerating Subtropical Rainforest which is not preferred habitat for the Southern Black-Throated Finch. Therefore, the Project will not decrease the availability or quality of habitat to the extent that the species is likely to decline. Potential habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 will be retained and managed to preserve and enhance current biodiversity values under a BMP.

Significant Impact Criteria	Response
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat	Potential habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 will be retained and managed to preserve and enhance current biodiversity values and managed under a BMP. The BMP will include the management of invasive species. Therefore, it is considered that the Project will likely decrease invasive species that are harmful to the endangered Southern Black-Throated Finch.
Introduce disease that may cause the species to decline	It is unlikely that the Project will introduce disease that may cause this species to decline. An environmental protection area and buffer zone will be installed to protect potential key habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 during construction and a BMP will be developed for the Site to preserve and enhance current biodiversity values.
Interfere with the recovery of the species	The Project aims to support and improve the recovery of the species by retaining the potential key habitat in paperbark swamp forest in Zone 1 and flooded gum forest in Zone 6 and 7 and to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.

Other species

Although there will potentially be some indirect impacts, it was assessed that the Project is not likely to have a significant impact on other species which are unlikely to occur at the Site, based on addressing the MNES Significant Impact Guidelines 1.1 criteria for vulnerable, endangered or critically endangered threatened species (**Appendix A**). Furthermore, fauna surveys undertaken as part of the BAM assessment did not record other species likely to occur at the Site (Greencap 2019). The survey effort for fauna is shown in **Figure 11**. Note that only the GPS data for the Greencap observer has been provided. An equipment malfunction on the 17th December 2018 meant that the full survey extent was not captured, notably the survey in Zone 8.

In addition to the Significant Impact Guidelines, the Commonwealth has also released specific guidance for some EPBC Act listed species, therefore where available specific guidance were referred to, for particular species that are relevant to the Site.

5.2 Direct Impacts

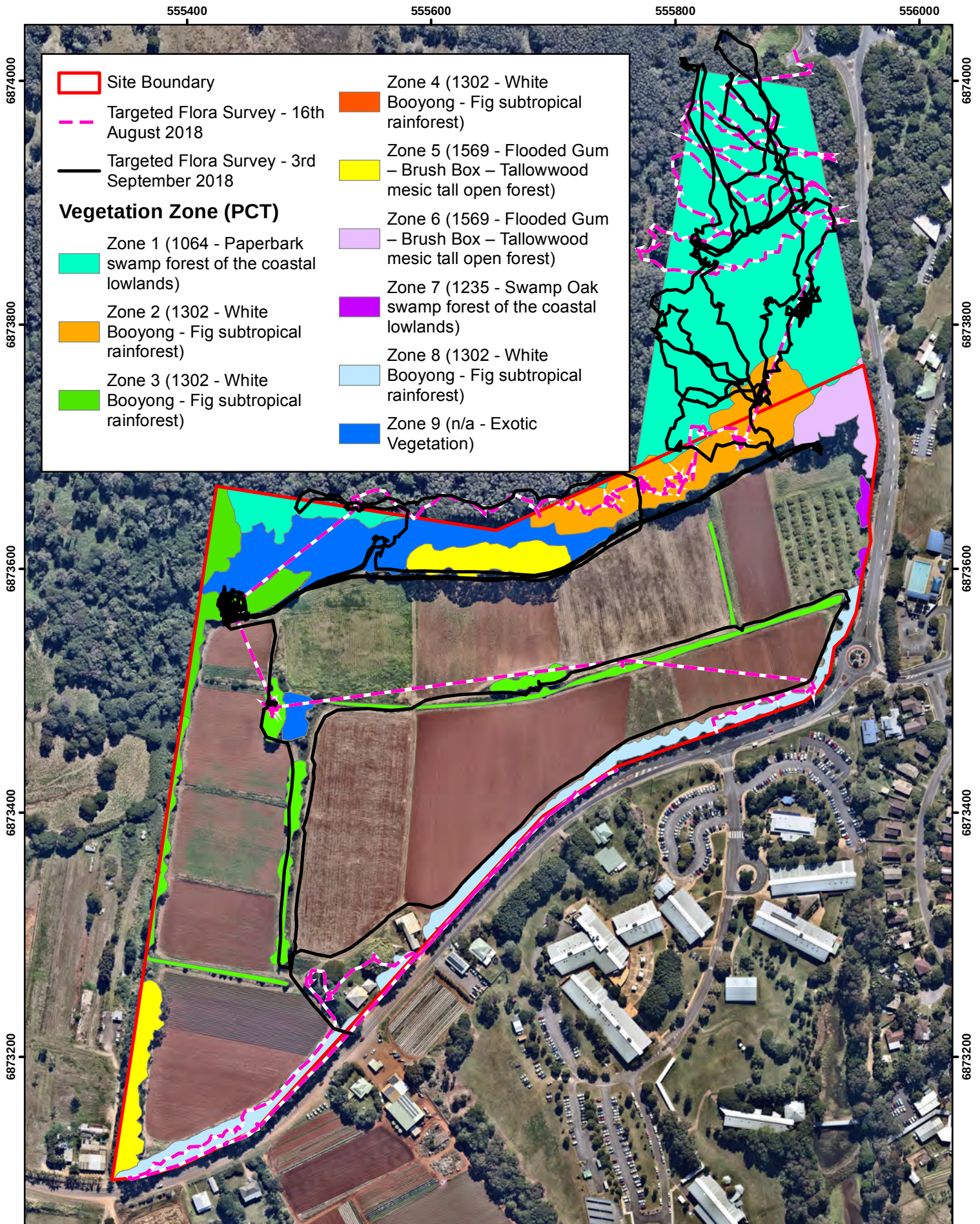
Due to the successful application of the avoid and minimise strategy undertaken as part of the BAM assessment and outlined in **Section 5.4** and **Table 10** below, the Project will only directly impact 0.95 ha of planted or self-sown windrow vegetation in Zone 4 and 8 (Greencap 2019). The vegetation to be retained and removed on Site and the development footprint is outlined in **Figure 12**.

5.3 Indirect and Offsite Impacts

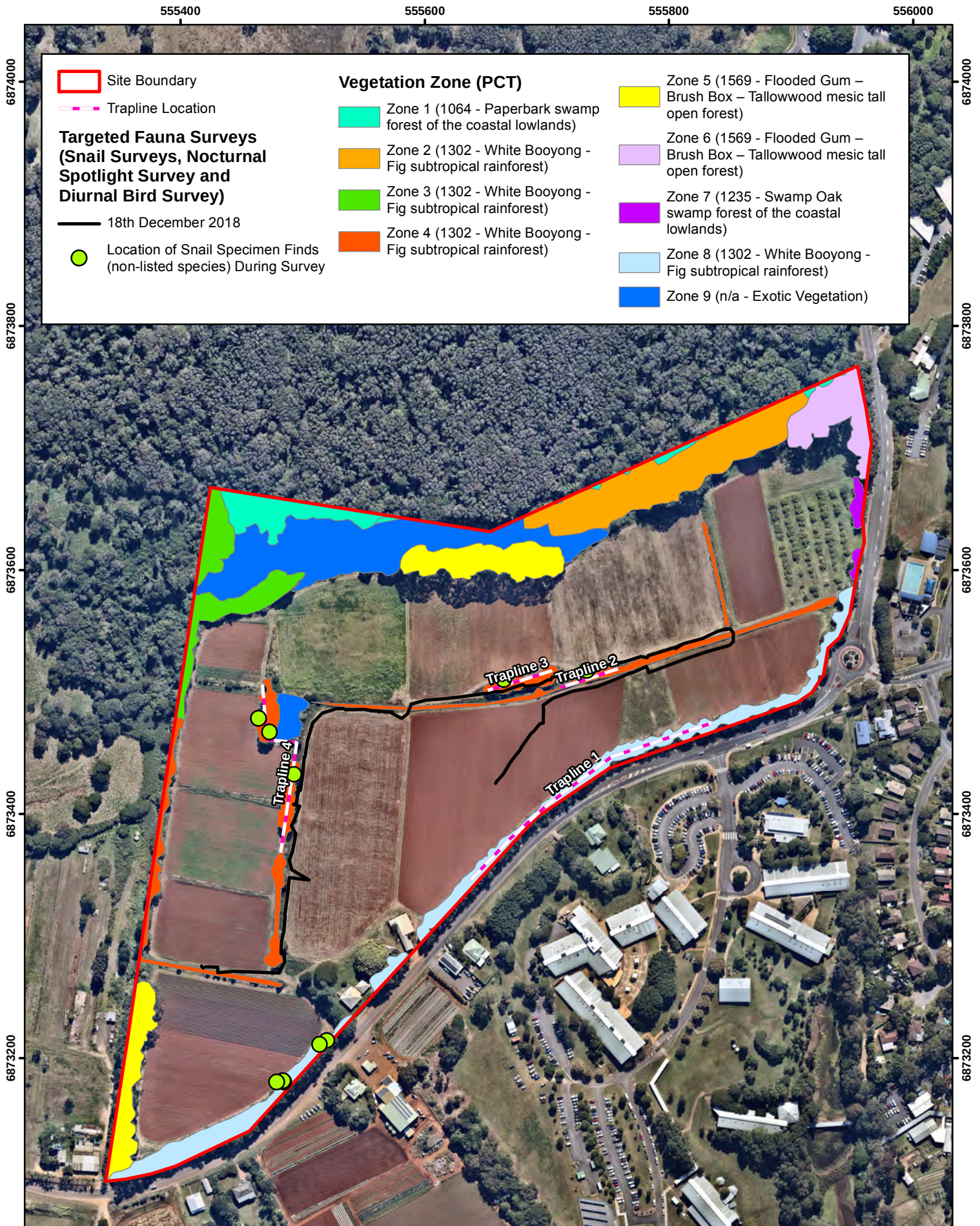
A total of approximately 7.45 ha of native vegetation on Site may be indirectly impacted by the Project. Vegetation condition is moderate, low and derived and vegetation integrity will not decrease. Indirect impacts are addressed in **Appendix E** and generally relate to:

- Noise and vibration;
- Light spill and visual amenity;
- Dust;
- Bushfire and changing fire regimes;
- Damage or removal of retained native vegetation; and
- Weeds.

As a result of the risk assessment of indirect impacts, it was identified that the residual risk following the application of mitigation measures was very low.



Client: C107778	 050100 m	Scale (@A4): 1:4,000	Survey Efforts - Flora	
Job #: J156455				
Author: M. Nunn	Coordinate System: GDA 1994 MGA Zone 56		Tweed Valley Hospital MNES Report 771 Cudgen Road Cudgen NSW	
Checked: D. Licari	Imagery 8th August 2018 (7.5 cm) © Nearmap 2018			
Date: 1/02/2019	Vegetation mapping: Greencap (2018)			
	No warranty is given in relation to the data (including accuracy, reliability, completeness or suitability) and accept no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of or reliance upon the data. Data must not be used for direct marketing or be used in breach of privacy laws.		Figure 10	



Client: C107778

Job #: J156455

Author: M. Nunn

Checked: D. Licari

Date: 1/02/2019

GREENCAP



0 50 100 m

Scale (@A4): 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

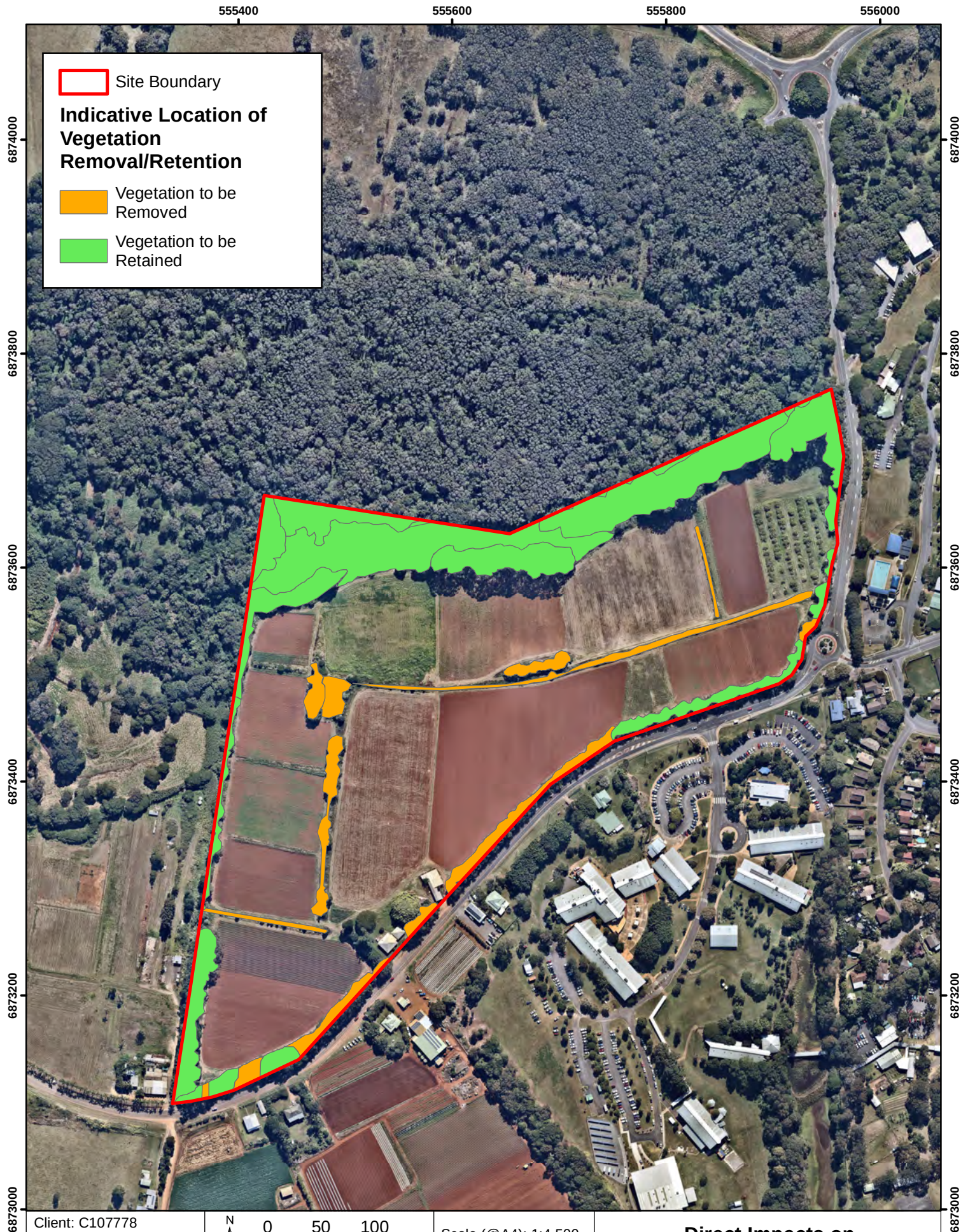
Imagery 8th August 2018 (7.5 cm) © Nearmap 2018
Vegetation mapping: Greencap (2018)

Fauna Survey Effort

Tweed Valley Hospital MNES Report
771 Cudgen Road
Cudgen NSW

**Figure
11**

No warranty is given in relation to the data (including accuracy, reliability, completeness or suitability) and accept no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of or reliance upon the data. Data must not be used for direct marketing or be used in breach of privacy laws.



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5.4 Key Measures to Avoid, Mitigate and Reduce Direct and Indirect Impacts

Without the implementation of appropriate mitigation measures, the Project could potentially result in a number of direct, indirect or offsite impacts on MNES species. However, a comprehensive set of measures will be put in place to avoid, mitigate or reduce these impacts to the fullest extent possible. These measures are detailed in **Table 10** below. Mitigation measures (including timing, frequency and responsibility) proposed to mitigate or manage the direct and indirect impacts during both the construction and operation phases of the Project are outlined in **Appendix E**. These mitigation measures involve several plans and sub plans, including adaptive management for impacts on biodiversity that are uncertain, which are proposed to be deployed for the Project construction and operational phases, including:

- Biodiversity Management Plan;
 - Vegetation Management Plan;
 - Fauna Management Plan;
 - Water Quality Management Plan;
- Landscape Masterplan;
- Construction Environmental Management Plan;
 - Soil and Water Management Plan;
 - Traffic Control Plan; and
 - Access and Movement Plan.

Risk of any residual impacts likely to remain after the mitigation measures have been applied is evaluated in **Appendix E**. Risk assessment criteria for likelihood, consequence and risk level are provided in **Appendix F**. In summary, the impacts of the Project have been avoided and minimised by using the following principles to situate the development footprint in areas:

- *Where there are no biodiversity values:* Those smaller parts of the Project Site which represent areas of higher biodiversity value, for example where remnant vegetation has been retained, were identified and removed from the Project's development footprint. The only areas of native vegetation to be cleared are parts of the windrows in the southern section of the Project Site;
- *Where the existing native vegetation or threatened species habitat is in poor condition:* The Project Site was selected because it is currently operated as an agricultural enterprise, and therefore the majority of remnant vegetation has already been cleared. Apart from a bund that has been constructed along the western boundary of the Site which adjoins an open drain, the working farm had no stormwater management system in place. This contributed to sediment-laden water discharging into the wetland and contributing to the reduction in water quality. For instance, cultivated fields were ploughed across topographic contours enabling sediment-laden stormwater to flow downhill through ploughed furrows and observation of the landholder at work suggested the frequent use of pesticides. Moreover, a Council owned drain carrying untreated stormwater flows from Turnock Street discharges directly into the receiving catchment.

The stormwater management system for the project has been designed to mimic natural flows and thereby minimise indirect impacts on the floodplain habitat in the receiving catchment and wetland located to the north of the Site. The stormwater management system incorporating, rain gardens, swales, enviropods and bio-retention basins. Ultimately the bulk of the stormwater will end up in an extended detention basin to settle and then discharge to the receiving catchment in a controlled manner.

- *Avoiding habitat for threatened species or ecological communities that are either critically endangered or endangered; and*
- *Maintaining connectivity, enabling movement of species and genetic material between areas of adjacent or nearby habitat:* Those areas of the Project Site which are critical for connectivity, such as the northern section of the Site which falls within a mapped fauna corridor, will be maintained for their contribution to biodiversity values.

On this basis, the Project footprint has been located in an area that avoids or minimises direct impacting MNES threatened species, migratory species and TECs.

Table 10 Avoiding and Minimising Impacts on Vegetation, Habitat and Biodiversity Values

Point	Approach	Mitigation	Description
Locating the project to avoid and minimise impacts on native vegetation			
1	Locating a project in areas where there are no biodiversity values	The Project has been located on those portions of the site that are cleared land where there are no biodiversity values.	- A two-phase site selection process was undertaken by Health Infrastructure to assess the suitability of a range of greenfield and brownfield sites for the development of the new hospital where more than 50 sites were assessed. Assessment of impacts on biodiversity was an important component of this due diligence assessment. - Following the site selection process, due diligence assessments, public consultation, and input from the Health Infrastructure Site Selection Committee, the Site was confirmed and publicly announced in June 2018. An ecological constraints analysis was then undertaken for the chosen Site (GreenCap 2018). - The ecological constraints analysis recommended that the areas of the Site that have been identified with high ecological constraint are considered to be areas where development should be avoided and afforded an appropriate level of protection. Moreover, consideration should be given to undertake ecological restoration and management activity that improves the quality of remnant habitat on the Site (GreenCap 2018). - No Areas of Outstanding Biodiversity Value or areas of geological significance are located on the Site.
2	Locating the project in areas where the native vegetation is in the poorest condition (i.e. low VI score)	The Project has been located in an area where the project footprint will only impact areas of native vegetation that are in the poorest condition where the potential for impacting threatened species is low.	- The northern section of the Site is located on the Tweed River floodplain and is part of an important local wetland (mapped under <i>State Environmental Planning Policy (Coastal Management) 2018</i>; Coastal Management SEPP). This section of the site is also mapped regional fauna corridor. The entire northern section of the Site will be retained and maintained for its biodiversity values. - The project development will occur in the southern section of the Site which is currently a working farm under cultivation. Apart from the windrows planted along the Site boundary, most of the southern section of the Site has been cleared of native vegetation. - All areas of remnant native vegetation on Site (Zones 1, 2 and 3) and planted windrow vegetation at the Site (Zones 5, 6 and 7) will be retained and managed in accordance with the vegetation management performance criteria to be set out in an approved Biodiversity Management Plan in order to preserve and enhance current biodiversity values.

Point	Approach	Mitigation	Description
			- Some areas of native vegetation in windrows (Zones 4 and 8) will be cleared, with the remaining vegetation in these windrows regenerated to remove woody weeds and regenerated with native species and woody weeds that are classified as High Threat Exotics in accordance with a Landscape Masterplan. Relevant components of this Landscape Masterplan will be incorporated into the approved Biodiversity Management Plan. - The current VI for Zone 4 falls below the assessment threshold for PCTs that are representative of an Endangered Ecological Communities (i.e. VI ≤ 15). The current VI for Zone 8 is very low (16.8) is very low. . - Based on the above results, there will be no decrease in the overall condition of the potential TECs identified on Site remaining in the IBRA sub region due to impact from the Projects construction or operation.
3	Locating the project in areas that avoid habitat for species that have a high biodiversity risk rating and vegetation that is a CEEC or an EEC, indicated by the biodiversity risk weighting for the species	The Project has been located in an area that avoids impacting on threatened species and vegetation in high threat categories (i.e. Endangered Ecological Communities).	- There are no direct impacts on associated areas of potential habitat which are likely to contribute significantly to the risk of extinction of any threatened species. - There are no hollow bearing trees located in areas to be cleared (Zones 4 and 8). - A detailed site selection process and due diligence assessment as outlined above was undertaken to assess any ecological constraints present at the chosen Site. It was assessed that the Stage 1 project design and the location of the projects ancillary features will minimise direct impacts on threatened species and vegetation in high threat categories.
4	Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained	The Project does not impact on regional connectivity values	- The project will have negligible impact on connectivity values surrounding the development Site. The Site is located within mapped regional fauna corridor; however, the development will not directly impact any areas of intact remnant vegetation or areas of habitat connectivity. - Sections of self-sown windrow vegetation (Zones 4 and 8) will be cleared for the development (1 ha). These windrows may offer marginal foraging habitat and stepping-stone connectivity for some threatened species. However, the fauna species which may potentially utilise these windrows are highly mobile. - Furthermore, regeneration and revegetation of areas detailed in the Landscape Masterplan Report (TURF 2018) will enhance connectivity within the site when compared to the existing land use. - Under the BMP, the Vegetation Management Plan (VMP) incorporates revegetation of the exotic grassland in Zone 9 (0.95 ha) with rainforest

Point	Approach	Mitigation	Description
			species, regeneration and weed management of retained remnant vegetation in the north of the Site. This plan will be linked to the Landscape Masterplan which is focused on the regeneration of retained windrows, as well as native landscape plantings. These proposed measures will further enhance current habitat and potentially provide increased habitat for the critically endangered Mitchell's rainforest snail.
Designing a project to avoid and minimise impacts on native vegetation and habitat			
5	Reducing the clearing footprint of the project	The clearing footprint will be reduced to a minimum in vegetation zones with low vegetation integrity and no remnant native vegetation will be cleared	- Incorporating a multi-level building design for the main hospital building has avoided impacts on habitat, by allowing for a smaller site area to be considered during the site selection process. - All areas of the Site that have been identified with high ecological constraint are located in areas where development will be avoided. No remnant native vegetation will be cleared.
6	Locating ancillary facilities in areas where there are no biodiversity values	Ancillary facilities will be located on land that has been cleared for cultivation	Ancillary facilities will be located occur in the southern section of the Site which is currently a working farm under cultivation. Apart from derived vegetation located in self-sown and planted windrows, most of the southern section of the Site has been previously cleared of native vegetation.
7	Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition	Ancillary facilities will be located on land where native vegetation has low VI	
8	Locating ancillary facilities in areas that avoid habitat for species that have a high biodiversity risk rating and vegetation that is a CEEC or an EEC, indicated by the biodiversity risk weighting for the species	The proposed ancillary facilities have been located in an area that avoids impacting on threatened species and vegetation in high threat categories (i.e. EECs)	See point 5.
9	Providing structures to enable species and genetic material to move across barriers or hostile gaps	Where possible structures will be provided to enable connectivity for species	It is recommended that a wildlife crossing is established to the north-east of the Site where the Turnock Street roadway passes through the remnant vegetation. Fauna management guidelines will be detailed in the Biodiversity Management Plan.

Point	Approach	Mitigation	Description
10	Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site	All remnant native vegetation outside of the development footprint will be protected and maintained	All areas of intact remnant native vegetation on Site and remaining areas of planted or self-sown windrow vegetation at the Site will be retained and managed in accordance with the vegetation management performance criteria to be set out in the Biodiversity Management Plan in order to preserve and enhance current biodiversity values.
Avoiding and minimising prescribed biodiversity impacts during project planning			
1	Impacts of development on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other geological features of significance;	These habitat features have not been identified as present on the Site, impacts are avoided.	While not specific to a particular habitat feature, habitat constraints were considered as part of the site selection process* during project planning, with a preference for sites where known habitat of threatened species or ecological communities could be avoided, and where impacts could not be avoided, where they could be minimised.
2	Impacts of development on the habitat of threatened species or ecological communities associated with rocks.	As part of the current use of the Site, rocks have been moved to form walled areas in the windrows	While not specific to a particular habitat feature, habitat constraints were considered as part of the site selection process during project planning, with a preference for sites where known habitat of threatened species or ecological communities could be avoided, and where impacts could not be avoided, where they could be minimised.
3	Impacts of development on the habitat of threatened species or ecological communities associated with human made structures	Human made structures present on the development site including buildings, stonewalls, and dams have not been identified as habitat for threatened species or ecological communities	NA
4	Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation.	Impacts will be minimised by retaining some windrow vegetation	Sections of self-sown windrow vegetation (Zones 4 and 8) containing non-natives will be cleared for the development (1 ha). These windrows may offer marginal foraging habitat and stepping-stone connectivity for some threatened species. However, the fauna species which may potentially utilise these windrows are highly mobile.

Point	Approach	Mitigation	Description
5	Impacts of development on connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range.	- Site selection processes sought to avoid areas of habitat connectivity of threatened species and the potential to cause habitat fragmentation. - Location of the envelope of surface works will avoid direct impacts on connectivity of different areas of habitat.	- Habitat connectivity and the potential for fragmentation were included in the site selection criteria. - The location of the development area on the site has been selected to avoid and minimise clearing of habitat areas of threatened species, including those that facilitate the movement of those species across their range.
6	Impacts of development on movement of threatened species that maintains their life cycle.	- Locating the project development area away from threatened species habitat areas and establishing a vegetated buffer will minimise impacts on the movement of threatened species that maintains their life cycle. - A 'post and bridge' system will be installed with the temporary boundary fencing during construction to facilitate movement of arboreal fauna. - Permanent boundary fencing will not be installed.	- The location of the development area on the site has been selected to avoid and minimise clearing of habitat areas of threatened species, including those that facilitate the movement that maintains their life cycle. - For construction of the development, the temporary boundary will be fitted with a 'post and bridge' system to facilitate movement of koala - For operation of the development, a boundary fence will not be installed, thereby facilitating movement of threatened species.
7	Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining)	- Selection of a site that avoids the direct impacts to water bodies or water quality. - Avoiding locating the development footprint in areas of the site that directly impact water bodies, or significantly interfere with hydrological processes. - Water quality impacts will be avoided during construction through the use of erosion and sediment control measures. - Impacts to water quality and hydrological processes during operation will be minimised through the use of WSUD measures that maintain flows to	- Direct impacts to water quality, water bodies and hydrological processes that sustain threatened species and ecological communities were avoided through the site selection process by including constraints on sites that would require the development footprint to impede on water bodies. - The location of the development footprint on the Site seeks to minimise interference with hydrological flows through the wetlands including contributions from groundwater. Other than what may be required for piling, subsurface excavations will be at a shallower depth than measured groundwater depths on the site. Piles will be between 800 mm and 1200 mm in diameter and will typically be spaced 8.4 m apart, except under lift and/or stairwell cores where they will be not less than 2m apart. As the piles are not continuous, it is not anticipated that they will create a barrier to any shallow or perched groundwater flow that currently occurs within the development footprint, minimising the potential for the development to impact groundwater contributions to baseflow in the wetlands.

Point	Approach	Mitigation	Description
		the wetlands and maintain or improve water quality.	- Water quality impacts to the wetlands will be avoided by employing effective and properly designed erosion and sediment control measures at prior to the commencement of other construction activities, including adequately sized retention basins that are appropriately monitored and managed. The stormwater management system for operation of the Project will be designed in accordance with the locally appropriate standard (TSC 2016), and it is expected that operation of the Project will result in a net improvement in the quality of stormwater that is discharged from the Site. - The water quality strategy for the site will incorporate swales, enviropods, bioretention basins and extended detention basins. The roof runoff will be directed into the bioretention basin by a pit and pipe system while hardstand runoff will be first treated by enviropods, and then either swales that discharge to the bioretention system or directly into the bioretention systems. Ultimately the bulk of the stormwater will end up in an extended detention basin where it will settle and discharge to the receiving waters in a controlled manner. It is noted, upon the advice of the accredited Bushfire Consultant for the project, that permanent bioretention basins are an appropriate landuse within an APZ provided that the installation of such structures does not increase the fuel load within the APZ, for example, through inappropriate landscaping, and as long as it does not present an impediment to regular maintenance of the APZ. This advice will be factored into the water quality strategy for the site.
8	Impacts of wind turbine strikes on protected animals	No wind turbines are planned as part of this project	N/A
9	Impacts of vehicle strikes on threatened species or animals that are part of a TEC	- Impacts will be minimised by locating the main site entrances on alternative routes than those adjacent to TECs - Where possible impacts will be minimised by providing structures to enable connectivity for species that prevent or avoid crossing roads.	- Main site entrances provided off Cudgen Road - It is recommended that a wildlife crossing is established to the north-east of the Site where the Turnock Street roadway passes through the remnant vegetation. Fauna management guidelines will be detailed in the Biodiversity Management Plan.

* As part of the site selection process, a comprehensive list of constraints from a variety of disciplines were assessed for each proposed site to ensure project needs could be met, and to short list sites for further evaluation to determine the most suitable site overall. Criteria used in this process included:

6. CONCLUSIONS

The Project will directly impact Zones 4 and 8 as a result of clearing of 0.95 ha of vegetation in these areas. However, it is important to note that this vegetation type is in low condition and does not meet all of the condition thresholds for a TEC to be considered a MNES as defined under the EPBC Act.

The implementation of a comprehensive set of mitigation measures will allow for the management and mitigation of any potential indirect and offsite impacts on MNES ecological communities, migratory species and threatened species.

Native vegetation remaining on Site will be retained and managed to enhance and protect the biodiversity values.

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APPENDIX A. PROTECTED MATTERS SEARCH, SPECIES AND TEC RESULTS

Appendix A - Likelihood of Occurrence Table (TECs and Threatened Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/community description	Likelihood of Occurrence (K = Known, U = Unlikely, P = Possible, N = No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
Threatened ecological communities											
Subtropical and Temperate Coastal Saltmarsh		V			Coastal saltmarsh vegetation is comprised of a low diversity of herbs, salt tolerant grasses, sedges and shrubs occurring on tidal influenced estuaries. Vegetation is generally less than 0.5 m in height. (TSSC, 2013).	N	SURVEYED NOT PRESENT	No. This TEC was not found at the Project site.			Threatened Species Scientific Committee (TSSC) (2013). Commonwealth Conservation Advice for Subtropical and Temperate Coastal Saltmarsh. Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/118-conservation-advice.pdf .
Lowland Rainforest of Subtropical Australia		CE			This community differs from littoral rainforest and coastal vine thickets community due to it's proximity and influence to the coast. Lowland rainforest generally occurs greater than 2 km from the coast (however can occasionally integrate with littoral rainforest in some areas). Tree height ranges between 20- 30 m in height and form a closed forest. Species diversity is high (TSSC, 2011).	P	SURVEYED NOT PRESENT	No. Changes to the environment are unlikely to have any significant impact on the TEC. The Project will not have a significant impact on the TEC because the area of native vegetation does not meet the minimum condition thresholds for a Lowland Rainforest of Subtropical Australia TEC (TSSC 2011).			Threatened Species Scientific Committee (TSSC) (2011). Commonwealth Conservation Advice on Lowland Rainforest of Subtropical Australia. Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/101-conservation-advice.pdf .
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland Ecological community		E			This community is typically dominated by swamp oak (<i>Casuarina glauca</i>) and/or paperbark (<i>Melaleuca quinquenervia</i>). The community occurs close to rivers and estuaries. Soils typically are influenced by saline water (DECC, 2007).	P	SURVEYED NOT PRESENT	No. Changes to the environment are unlikely to have any significant impact on the TEC. The Project will not have a significant impact on the TEC because the area of native vegetation does not meet the minimum condition thresholds for a Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (DEE 2018).			Department of Environment and Climate Change (2007). Swamp oak (<i>Joodgahin</i> brost. - Department of Environment and Climate Change, NSW. Department of the Environment and Energy (2018). <i>Conservation advice (Incorporating listing advice) for the Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</i> . Canberra: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/141-conservation-advice.pdf . In effect under the EPBC Act from 20-Mar-2018.
Threatened fauna species											
Antiochaera phrygia	Regent Honeyeater		CE		This species primarily occurs in box-ironbark woodland, but also occurs in other forest types. Primarily feeds on nectar from eucalypts and mistletoes and, to a lesser extent, insects and their exudates (lepers and honeysuckle). It prefers taller and larger diameter trees for foraging. It is nomadic and partly migratory, with some predictable seasonal movements observed. (TSSC 2015)		N/A	No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not box-ironbark woodland and does not contain tall and large trees, therefore the Project is unlikely to reduce the area of occupancy of the species or adversely affect the habitat critical to the survival of the species. In respect of connectivity, Zones 4 and 8 currently contribute to habitat connectivity by providing 'stepping stone' habitats for threatened species such as birds, mammals etc. These existing stepping stone areas will be removed as part of the Project. However, the fauna species which may potentially utilise these windrows are highly mobile. Furthermore, mitigation actions including vegetation buffer zones, native plant landscaping and weed removal will provide new additional stepping stone habitat for these species. The existing vegetation in the northern portion of the site contributes to the mapped regional fauna corridor and will be retained, therefore will continue to contribute to connectivity of this part of the habitat. A Biodiversity Management Plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.	• Impacts of vehicle strikes (including aircraft) on threatened species of animals or on animals that are part of a threatened ecological community; • Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle;	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (TSSC) (2015). Approved Conservation Advice for Antiochaera phrygia (Regent Honeyeater). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/82338-conservation-advice.pdf .
Argynnis hyperbus inconstans	Australian Frillary		CE		The Australian frillary usually occurs around river estuaries or open, swampy coastal regions. The species only occurs in areas where its larval food plant, the arrowhead violet is found. Arrowhead violet usually grows in damp locations in more open areas. (TSSC 2017)	U	N/A	No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not preferred habitat, furthermore its larval food plant, the arrowhead violet is unlikely to be found in the dry exposed windrow vegetation. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to be found in the paperbark swamp forest (Zone 1) and the remnant rainforest (Zone 2 and 3) that contribute to a mapped regional fauna corridor which are being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (2017). Conservation Advice Argynnis hyperbus inconstans (Australian Frillary). Canberra: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/88056-conservation-advice-15082017.pdf .
Botaurus poeciloptilus	Australasian Bittern		E		The Australasian Bittern prefers permanent and seasonal freshwater habitat comprised of 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. (TSSC 2011).	U	N/A	No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. As per the Listing Advice for the Australasian Bittern, the Biggest Threats to this species is the reduction in extent and quality of habitat, due to the diversion of water away from wetlands, the clearing of wetlands for urban development or agriculture and reduced water quality due to increased salinity, siltation and pollution. The Project will not reduce the extent of this species habitat or divert water away from wetlands. Some indirect impact may have an effect on water quality, however measures will be in place to avoid or mitigate these impacts and potentially improve water quality entering the downstream. This species is more likely to utilise the paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.	• Impacts of vehicle strikes (including aircraft) on threatened species of animals or on animals that are part of a threatened ecological community; • Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle;	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (TSSC) (2011). Commonwealth Conservation Advice on Botaurus poeciloptilus (Australasian Bittern). Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1001-conservation-advice.pdf .
Callidris canutus	Red Knot, Knot		E	M	Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours. This species usually forages in soft substrate near the edge of water on intertidal mudflats or sandflats exposed by low tide. They like to roost in open areas far away from potential cover for predators, but close to feeding grounds. Breeding does not occur in Australia. (DEE 2017)	N	N/A	No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A		Callidris canutus – Red Knot (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/aspnrt/public/publicspecies.pl?taxon_id=855

Appendix A - Likelihood of Occurrence Table (TECs and Threatened Species)

Scientific Name	Common Name	EPBC Act Using Threatened Ecological Community	EPBC Act Using Threatened Species	EPBC Act Using Migratory Species	Habitat/community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N = No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Callidris ferruginea</i>	Curlew Sandpiper		CE	M	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, but also around non-tidal swamps, lakes and lagoons near the coast. This species forages on mudflats and nearby shallow water and roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands. (DEE 2017)	U	N/A	No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor, which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Callidris tenuirostris</i> — Great Knot (Department of Environment and Energy) Retrieved: 03 November 2017 from: http://www.environment.gov.au/cgi-bin/afprat/public/publicspecies.pl?taxon_id=856
<i>Callidris tenuirostris</i>	Great Knot		CE	M	This species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats, and roost in large groups in open areas close to feeding grounds. Breeding occurs in the northern hemisphere. (DEE 2017)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	<i>Callidris tenuirostris</i> — Great Knot (Department of Environment and Energy) Retrieved: 03 November 2017 from: http://www.environment.gov.au/cgi-bin/afprat/public/publicspecies.pl?taxon_id=862
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat		V		This species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites particularly box gum woodlands or river/rainforest corridors which are used for foraging (TSSC 2012).	N		No. Field assessment indicated that there is no suitable breeding or foraging habitat for this species at the Project site. Furthermore, a search using the 'Explore Your Area' in the Atlas of Living Australia website indicated that there have been no Large-eared Pied Bat observations recorded on or within 10km of the Project site.	N/A	N/A	Threatened Species Scientific Committee (TSSC) [2012]. Commonwealth Listing Advice on Chalinolobus dwyeri (Large-eared Pied Bat). Department of Sustainability, Environment, Water, Population and Communities, Canberra, ACT: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/183-listing-advice.pdf .
<i>Charadrius leschenaultii</i>	Greater Sand-plover		V	M	This species is mainly found in littoral and estuarine habitats particularly sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks. They feed from the surface of wet sand or mud in open intertidal areas. Roosting occurs adjacent to foraging areas. Breeding occurs in Asia. (TSSC 2016)	U	N/A	No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (2016). Approved Conservation Advice for Charadrius leschenaultii (Greater sand plover). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/877-conservation-advice-09052016.pdf
<i>Charadrius mongolus</i>	Lesser Sand-plover		E	M	This species is mainly found in littoral and estuarine habitats particularly sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks. The lesser sand plover feeds mostly on extensive, freshly-exposed areas of intertidal sandflats and mudflats in estuaries or beaches. They roost near foraging areas. Breeding occurs in Siberia. (TSSC 2016)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not preferred habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (2016). Approved Conservation Advice for Charadrius mongolus (Lesser sand plover). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/879-conservation-advice-09052016.pdf .
<i>Coeranoscopus reticulatus</i>	Three-toed Snake-tooth Skink		V		Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. The Three-toed Snake-tooth Skink lives in loose soil, leaf litter and rotting logs, and feeds on earthworms and beetle grubs. Garden beds and urban yards under leaf litter on alluvial soils. (NSW OEH 2018)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. The main identified threats to the Three-toed Snake-tooth Skink are clearing of habitat; and removal of fallen logs and leaf litter through frequent fire. As per the conservation advice, this species prefers rainforest on loamy or sandy soils and vegetation in Zones 4 and 8 is growing in red-brown silty clay soil derived from basalt and does not represent preferred habitat (DEE 2018). Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the wet sclerophyll forest (Zone 4 and 5) buffer zone and the remnant rainforest (Zone 2 and 3) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species. Furthermore, changes to existing fire regime and / or increased prevalence of fire will be managed through bushfire impact assessment and associated management plans.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Three-toed Snake-tooth Skink - profile - NSW Government - Office of Environment & Heritage, viewed 21 August 2018, https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10172
<i>Cyclopsitta diophthalma cowni</i>	Cown's Fig-Parrot		E		Cown's Fig-Parrot occurs in rainforest habitats including subtropical rainforest, dry rainforest, littoral and developing littoral rainforest, and vine forest. (TSSC 2016)	U	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Threatened Species Scientific Committee (2016). Approved Conservation Advice for Cyclopsitta diophthalma cowni (Cown's fig-parrot). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/59714-conservation-advice-15072016.pdf .
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spotted-tailed Quoll, Tiger Quoll		E		The Spotted-tailed Quoll has been recorded in varied habitats, including rainforests, open forests, woodland, coastal heathland and inland riparian forest. (Strahan 1995). It has been found on the margins of farmland, but its preferred habitat includes escarpments, gullies, saddles and riparian habitat as well as rocky areas, where it finds den sites (DEE 2018).	U		No. The Project is unlikely to have any significant impact, based on addressing the Significant Impact Guidelines for the endangered spot-tailed quoll <i>Dasyurus maculatus maculatus</i> (south-eastern mainland population) and the use of 1080 (DEWHA 2009). Threats to the spot-tailed quoll (south-eastern mainland population) include land clearing and loss of habitat features, such as hollow bearing trees, logs and earth burrows; competition from foxes, wild dogs and feral cats; and mortality from predation, road traffic, poisoning (1080 poison baiting control programs for foxes and wild dogs) and trapping. (DEWHA 2009). This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 which is proposed to be cleared as these self-sown linear windrows are exposed and highly degraded which is not quality or preferred habitat. Furthermore the magnitude of the vegetation clearance is small, with only 0.86 ha proposed to be cleared. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. In respect of connectivity, Zones 4 and 8 currently contribute to habitat connectivity by providing 'stepping stone' habitats for threatened species. These existing stepping stone areas will be removed as part of the Project. However, the spotted-tail quoll which may potentially utilise these windrows are highly mobile. This species is more likely to utilise the Paperbark swamp forest (Zone 1 and 2) and the remnant rainforest (Zone 2 and 3) that contribute to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species. The use of 1080 poison in habitats potentially supporting spot-tailed quolls (south-eastern mainland population) on the Project site will be avoided or conducted in a manner which lowers the risk of poisoning spot-tailed quolls to an acceptable level. Impacts of vehicle strikes on Spotted-tailed Quoll will be managed through mitigation measures. Traffic will be restricted to the southern portion of the Site where the project footprint is which is approximately 62m from the intact remnant native vegetation; Construction traffic must maintain low vehicle speed and operators shall take care and be aware of any wildlife that may be in the area. Should wildlife enter the construction area. During operation of the Project wildlife protection and traffic calming measures will mitigate the risk of vehicle strike impact on this species.	• Impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community; • Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Strahan, R., 1995, The Mammals of Australia, 2nd edn. Sydney, Australia

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Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/Community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N = No)	Survived Present/ Not Present	Significant impacts	Potential direct impact	Potential indirect impact	Source
Deinotia torquata	Adorned Delma, Collared Delma		V		This species occurs in the presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick). (TSSC 2008)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	Threatened Species Scientific Committee (TSSC) (2008). Commonwealth Conservation Advice on Delma torquata (Collared Delma). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/1656-conservation-advice.pdf
Erythroliorchis radiatus	Red Goshawk		V		The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands, with riverine forests are also used frequently. This species nests in large trees, frequently the tallest and most massive in a tall stand, and nest trees are invariably within one km of permanent water. (TSSC 2015)	N		No. It was assessed that there is no suitable habitat for this species at the Project site. Furthermore, a search using the 'Explore Your Area' in the Atlas of Living Australia website indicated that there have been no Red Goshawk observations recorded on or within 10km of the Project site.	N/A	N/A	Threatened Species Scientific Committee (2015). Approved Conservation Advice for Erythroliorchis radiatus (red goshawk). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/5942-conservation-advice-31102015.pdf
Furina dumali	Dumali's Snake		V		Occurs in a broad range of habitats including forests and woodlands on black alluvial cracking clays and various spotted gum, ironbark, white cypress pine and bullock open forest and woodland associations on sandstone derived soils. (TSSC 2014)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	Threatened Species Scientific Committee (TSSC) (2014). Approved Conservation Advice for Furina dumali (Dumali's Snake). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/5942-conservation-advice.pdf
Lathamus discolor	Swift Parrot		CE		Swift Parrot habitat includes forests, woodlands, plantations, banksia, street trees, parks and gardens. (Pizzey & Knight 2012). Swift parrots are migratory. They breed in Tasmania and then move to mainland Australia in autumn for the non-breeding season. Whilst on the mainland the swift parrot disperses widely to forage on flowers and pyllid lerps in Eucalyptus species, with the majority being found in Victoria and New South Wales. Coastal regions tend to support larger numbers of birds when inland habitats are subjected to drought (Conservation Advice DEE 2018).	U	N/A	No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 which is proposed to be cleared as these windrows do not contain Eucalyptus species which the Swift parrot forages on in NSW. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the wet sclerophyll forest (Zone 4, 5 and 6) which is being retained for buffers zones and biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of invasive species which may be harmful to threatened species.	Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and Impacts on movement of threatened species that maintains their lifecycle.	Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; Noise and vibration; Light spill and visual amenity; Dust; Bushfire and changing fire regimes; Damage or removal of retained native vegetation; and Weeds.	Pizzey, G & Knight, K 2012, The Field Guide to the Birds of Australia, 9th edn, Australia
Litoria longiburensis	Olongburra Frog Wallum Sedge Frog		V		The wallum sedge frog is most commonly found in sandy coastal lowlands, known as 'wallum', within the species' distribution (see Section 2). Wallum vegetation consists of heathlands, shrublands, woodlands or forests primarily occurring on sand dunes or flats at elevations above tidal influence. Suitable breeding habitats for the species occur in acidic (between pH 3.5 and 6.0), permanent to ephemeral, freshwater wetlands with emergent vegetation, most notably sedges, reeds or ferns, and occasionally Melaleuca (paperbark) woodlands. These wetlands (wallum swamps, bogs, lakes or creeks) typically overlie deep, low nutrient, sandy soils where groundwater levels are characteristically high (DSEWPC 2018).	U		No. The Project is unlikely to have any significant impact, based on addressing the Draft referral guidelines for the vulnerable wallum sedge frog, Litoria longiburensis criteria (DSEWPC 2018). This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 which is proposed to be cleared as this is not a wetland or swamp is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) and the east-flowing floodplain drain which is being retained for biodiversity values and managed under a Biodiversity Management Plan (BMP). The BMP will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. Greenacop conducted surface water sampling to assess water quality under the existing land use which found that the pH of the water at the Site was only slightly acidic, ranging from 5.70 to 6.68 pH and that most water bodies were heavily infested with the aquatic weed Salvinia molesta. The presence of salvinia Salvinia molesta has substantially degraded this microhabitat such that the species is unlikely to utilise it. Under the current land use the ploughing regime directs sediment-laden stormwater to discharge directly into the receiving catchment and wetland located to the north of the Site. Furthermore, a Council owned drain carrying untreated stormwater flows from Turncock Street discharges directly into the receiving catchment. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and Impacts on movement of threatened species that maintains their lifecycle.	Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; Damage or removal of retained native vegetation; and Weeds.	Olongburra Frog - profile - (NSW Government - Office of Environment & Heritage), viewed 31 October 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10489
Mixophyes fleayi	Fleay's Frog		E		A restricted distribution on the eastern side of the ranges in south-east Queensland (south from Conondale ranges) and northeast NSW. Rainforest and wet eucalypt forest of the escarpment and foothills, usually close to gravelly streams. The species occurs along stream habitats from first to third order streams (i.e. small streams close to their origin through to permanent streams with grades of 1 in 50) but is not found in ponds or ephemeral pools. A nest is constructed in the shallow running water that occurs between pools in relatively wide, flat sections of the stream. Eggs are deposited in a shallow excavation in the stream bed or pasted directly onto bed rock. Individuals have been found hundreds of metres away from streams.	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. Threats impacting Fleay's frog include disease, habitat loss and fragmentation, invasive species, habitat damage by domestic stock and invasive weeds. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 which is proposed to be cleared as the nearest suitable habitat is in the coastal wetland area that is located at least 100m from Zone 4 and at least 50m from Zone 8 and the paperbark swamp forest (Zone 1). Consequently, there is no suitable microhabitat located within Zones 4 and 8 and the species is unlikely to utilise these Zones. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) and the east-flowing floodplain drain area that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan (BMP). The BMP will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. Greenacop conducted surface water sampling to assess water quality under the existing land use which found that most water bodies on Site were heavily infested with the aquatic weed Salvinia molesta. The presence of salvinia Salvinia molesta has substantially degraded this microhabitat such that the species is unlikely to utilise it. Under the current land use the ploughing regime directs sediment-laden stormwater to discharge directly into the receiving catchment and wetland located to the north of the Site. Furthermore, a Council owned drain carrying untreated stormwater flows from Turncock Street discharges directly into the receiving catchment. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and Impacts on movement of threatened species that maintains their lifecycle.	Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; Damage or removal of retained native vegetation; and Weeds.	https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10537

Appendix A - Likelihood of Occurrence Table (TECs and Threatened Species)

Scientific Name	Common Name	EPBC Act Using Threatened Ecological Community	EPBC Act Using Threatened Species	EPBC Act Using Migratory Species	Habitat/community description	Likelihood of Occurrence (U = Unlikely, P = Possible, N = Likely, V = Very Unlikely, V=Vo)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Mixophyes iteratus</i>	Giant Barred Frog		E		This species is found along freshwater streams with permanent or semi-permanent water, most commonly (but not always) at lower elevation. (NSW DEH 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. Threats impacting Giant Barred Frog include disease, habitat loss and fragmentation, invasive species, habitat damage by domestic stock and invasive weeds. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 which is proposed to be cleared as the nearest suitable habitat is in the coastal wetland area that is located at least 100m from Zone 4 and at least 50m from Zone 8 and the paperbark swamp forest (Zone 1). Consequently, there is no suitable microhabitat located within Zones 4 and 8 and the species is unlikely to utilise these Zones. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) and the east-flowing floodplain drain area that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan (BMP). The BMP will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. GreenCap conducted surface water sampling to assess water quality under the existing land use which found that most water bodies on Site were heavily infested with the aquatic weed <i>Salvinia molesta</i> . The presence of <i>Salvinia molesta</i> has substantially degraded this microhabitat such that the species is unlikely to utilise it. Under the current land use the ploughing regime directs sediment laden stormwater to discharge directly into the existing catchment and wetland located to the north of the Site. Furthermore, a Council owned drain carrying untreated stormwater flows from Turned Street discharges directly into the receiving catchment. The Project proposes to improve water quality downstream of the Site through VSLO features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Damage or removal of retained native vegetation; and • Weeds.	Giant Barred Frog - profile - (NSW Government - Office of Environment & Heritage), viewed 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10538
<i>Numenius madagascariensis</i>	Eastern Curlew, Far Eastern Curlew		CE	M	This migratory species is commonly found within sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats. It forages on soft sheltered intertidal sandflats or mudflats. This species breed in the northern hemisphere. (TSSC 2015)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zones 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (TSSC) (2015). Approved Conservation Advice for <i>Numenius madagascariensis</i> (Eastern Curlew). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/847-conservation-advice.pdf
<i>Pterodroma volans</i>	Greater Glider		V		The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. (TSSC 2016)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	Threatened Species Scientific Committee (2016). Approved Conservation Advice for <i>Pterodroma volans</i> (greater glider). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/253-conservation-advice.pdf
<i>Pteropalea penicillata</i>	Brush-tailed Rock-wallaby		V		This species prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. (DEE 2017)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	<i>Pteropalea penicillata</i> – Brush-tailed Rock-wallaby Department of Environment and Energy Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/epa/public/publicspecies.pl?axon_id=225
<i>Phascogalea cinereus</i>	Koala		V		The koala occurs in a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by eucalyptus trees. Koalas feed almost exclusively on a few preferred primary and secondary food tree species that may vary widely on a regional, local and possibly seasonal basis. (DEE 2013)	P	SURVEYED NOT PRESENT	No. The Project is unlikely to have any significant impact, based on addressing the EPBC Act referral guidelines for the vulnerable koala criteria. Please see Table 8 for response to guideline criteria.	• Impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community; • Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	N/A	DoE 2013b, Draft EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and ACT). Department of Environment, Commonwealth of Australia.
<i>Phyllodes imperialis smithersi</i>	Pink Underwing Moth		E		This species is found in undisturbed subtropical rainforest on rich volcanic soils and fertile alluvium, commonly below the altitude of 600 m. A vine, <i>Carmania multispalae</i> , provides the food and habitat the moth requires in order to breed. (TSSC 2008)	P		No. It was assessed that there is no suitable habitat for this species at the Project site. The targeted flora survey for Zones 4 and 8 recorded <i>Carmania multispalae</i> as absent. Furthermore, field assessment of Zones 4 and 8 suggested that these linear windrows are subject to high levels of light and are therefore not suitable microhabitats for breeding in Zones 4 and 8. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant rainforest (Zone 2 and 3) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (TSSC) (2008). Commonwealth Conservation Advice on <i>Phyllodes imperialis</i> (southern subsp. - ANIC 3333). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/publications/67453-conservation-advice.pdf .
<i>Poephila cinerea cinerea</i>	Southern Black-throated Finch		E		This species occurs mainly in grassy, open woodlands and forests, typically dominated by Eucalyptus, Corymbia and Melaleuca. Occasionally this species occurs in tussock grasslands, riparian vegetation and often along or near watercourses, or in the vicinity of water. (DEE 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 or the land currently under cultivation in the southern portion of the Site as it is not suitable habitat for breeding or foraging. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Poephila cinerea cinerea</i> — Southern Black-throated Finch Department of Environment and Energy Retrieved 06 November 2017 from: http://www.environment.gov.au/cgi-bin/epa/public/publicspecies.pl?axon_id=64447
<i>Potorous tridactylus</i>	Long-nosed Potoroo		V		This species inhabits coastal heath and dry and wet sclerophyll forests. An important habitat requirement is relatively thick ground cover and it seems to be more densely populated in areas where the soil is light and sandy. (Strahan 2005)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	Strahan, R. 1995, The Mammals of Australia, 2nd edn, Sydney, Australia
<i>Pseudomys novaehollandiae</i>	New Holland Mouse, Pookla		V		The New Holland Mouse is known to inhabit open heathland, open woodland with a heathland understorey, and vegetated sand dunes. This species prefers deeper top soils and softer substrates for digging burrows. (TSSC 2010)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	Threatened Species Scientific Committee (TSSC) (2010). Commonwealth Conservation Advice on <i>Pseudomys novaehollandiae</i> (New Holland Mouse). Canberra: ACT: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/publications/67453-conservation-advice.pdf

Appendix A - Likelihood of Occurrence Table (TECs and Threatened Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N = No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox		V		Grey-headed Flying-fox are found in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. They can also be found in urban gardens and cultivated fruit crops. The roosting camps for this species are commonly located within 20 km of a regular food source and are often found in gullies, close to water and in vegetation with a dense canopy. (NSW OEH 2017)	L		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria.	• Impacts of vehicle strikes (including aircraft) on threatened species of animals or on animals that are part of a threatened ecological community; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Grey-headed Flying-fox - profile - (NSW Government - Office of Environment & Heritage), viewed 31 October 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10697
<i>Rostratula australis</i>	Australian Painted Snipe		E		This species prefers shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. This species prefers shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby for ideal breeding habitat. (TSSC 2013)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the paperbark swamp forest (Zone 1) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Threatened Species Scientific Committee (TSSC) (2013). Commonwealth Conservation Advice on <i>Rostratula australis</i> (Australian Painted Snipe). Canberra: Department of Sustainability, Environment, Water, Population and Communities. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/77037-conservation-advice.pdf .
<i>Theristes mitchellae</i>	Mitchell's Rainforest Snail		CE		Mitchell's Rainforest Snail are found in remnant areas of lowland subtropical rainforest as well as swamp forest on alluvial soils. (NSW OEH 2017). The favoured habitat generally consists of slightly higher ground around the edges of wetlands with palms and fig trees. (NSW OEH 2017)	K	SURVEYED PRESENT (Zone 2)	No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species was surveyed for by nocturnal spotlight survey on foot and diurnal habitat searches on foot as per the BDAR (Greencap 2019) and was not found at the Project site in Zones 4 and 8. Zones 4 and 8 currently contribute to habitat connectivity by providing 'stepping stone' habitats for threatened species such as birds, mammals etc. These existing stepping stone areas will be removed as part of the Project. However, it is not likely that the removal of this small area of low quality habitat will cause the species to decline as adjacent high quality key habitat (containing habitat components of well-developed leaf litter layer and an intact forest canopy) for this species is being retained and protected for biodiversity values. Therefore, the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. However, based on the opportunistic recordings of one live specimen in Zone 2 and one dead shell in Zone 3, this species is more likely to utilise remnant rainforest (Zone 2 and 3) that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan (BMP). This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. In particular weeds and rats which are one of the known threats to the Mitchell's Rainforest Snail (Commonwealth of Australia, 2018). Therefore, it is considered that clearing 0.95 ha of vegetation in Zone 4 and Zone 8 will not lead to a long-term decrease in the size of the population. The BMP will also address proposed measures that will contribute to the recovery of the Mitchell's rainforest snail that are consistent with the published recovery plan (NPWS 2011).	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Mitchell's Rainforest Snail - profile - (NSW Government - Office of Environment & Heritage), viewed 31 October 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10801
<i>Turnix melanogaster</i>	Black-breasted Button-quail		V		The Black-breasted Button-quail is restricted to rainforests and forests, with a preference for drier low dosed forests. Optimum habitat are located on highly fertile soils where there is a larger foliage drop maintaining a deep litter layer which is important foraging habitat. (TSSC 2015)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	Threatened Species Scientific Committee (2015). Approved Conservation Advice for <i>Turnix melanogaster</i> (black-breasted button-quail). Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/923-conservation-advice-31102015.pdf .
<i>Xeromyia myoides</i>	Water Mouse, False Water Rat, Yirrkoo		V		Water mouse habitat includes mangrove communities and adjacent sedgelands, grasslands and freshwater wetlands. (DEE 2017)	N		No. It was assessed that there is no suitable habitat for this species at the Project site.	N/A	N/A	<i>Xeromyia myoides</i> — Water Mouse, False Water Rat, Yirrkoo (Department of Environment and Energy) Retrieved 06 November 2017 from: http://www.environment.gov.au/cgi-bin/epbc/public/publicspecies/pfaaxon_id=66
Threatened flora species											
<i>Acronychia littoralis</i>	Scented Acronychia		E		Grows in littoral rainforest on sand; rare and endangered, from Iluka to Kingscliff. (Richards & Harden 1991)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Richards, P.G & Harden G.J. 1991. NEW SOUTH WALES FLORA ONLINE Acronychia littoralis, viewed on 01 November 2017, http://plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=mswfl&vl=sp&name=Acronychia%20littoralis
<i>Arthraaxon hispidus</i>	Hairy Jointgrass		V		Grows in rainforest, north from Gibraltar Range. (Jacobs and Wall 1993)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Jacobs S. W. L. & Wall C. A. 1993. NEW SOUTH WALES FLORA ONLINE Arthraaxon hispidus, viewed on 01 November 2017, http://plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=mswfl&vl=sp&name=Arthraaxon%20hispidus
<i>Baloghia marmorata</i>	Marbled Baloghia, Jointed Baloghia		V		This species is found in subtropical rainforest/notophyll vine forest and wet sclerophyll forest (brush box woodland) with rainforest understorey. It is found at an altitude between 150 and 550 m. Soils are rich black or dark brown clay and loam derived from basalt. (TSSC 2008)	U	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Threatened Species Scientific Committee (2008). Commonwealth Conservation Advice on <i>Baloghia marmorata</i> (Marbled Baloghia). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/8463-conservation-advice.pdf .
<i>Bosticoo transversa</i>	Yellow Satinheart		V		Grows in rainforest to an altitude of 150 m, north of Mullumbimby. (Richards 1977)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Richards, P. G & Hartley T.G. 1977. NEW SOUTH WALES FLORA ONLINE Arthraaxon hispidus, viewed on 01 November 2017, http://plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=mswfl&vl=sp&name=Bosticoo%20transversa
<i>Cryptocarya foetida</i>	Stinking Cryptocarya, Stinking Laurel		V		Found in littoral, warm temperate and subtropical rainforest, wet sclerophyll forest and Camphor laurel forest usually on sandy soils, but mature trees are also known on basalt soils. (NSW OEH 2017)	L	SURVEYED PRESENT	No. Changes to the environment are unlikely to have any significant impact. Please see Table 4 for response to MNES Significant Impact Guidelines criteria.	• Vegetation clearance in Zone 8 of 0.34 ha	• Weeds.	Stinking Cryptocarya - profile (NSW Government - Office of Environment & Heritage), viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10186
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid		V		Occur in a wide variety of habitats including heathlands, sedgelands, forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests, dry and wet sclerophyll forests. Prefers soils that are moist and sandy, but has also been known to grow in dry or peaty soils. (TSSC 2008)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Threatened Species Scientific Committee (2008). Commonwealth Conservation Advice on <i>Cryptostylis hunteriana</i> . Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/19533-conservation-advice.pdf .
<i>Cynanchum elegans</i>	White-flowered Wax Plant		E		Distribution and occurrence: Rare, recorded from rainforest gullies scrub and scree slopes; from the Gloucester district to the Wollongong area and inland to Mt Dangar.	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Text by G. J. Harden & J. B. Williams. Taxon concept: Flora of NSW 3 (1992) NEW SOUTH WALES FLORA ONLINE Cynanchum elegans, viewed on 21 August 2018. http://plantnet.rbg Syd.nsw.gov.au/cgi-bin/NSWfl.pl?page=mswfl&vl=sp&name=Cynanchum%20elegans

Appendix A - Likelihood of Occurrence Table (TECs and Threatened Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, X = No)	Surveyed Present/ Not Present	Significant impacts	Potential direct impact	Potential indirect impact	Source
<i>Desmodium aconthodacum</i>	Thorny Pea		V		The Thorny Pea can be found in dry rainforest and fringes of riverine subtropical rainforest. On basalt-derived soils at low elevations. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Thorny Pea - profile (NSW Government - Office of Environment & Heritage), viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?i=d-10218
<i>Diospyros nabaecae</i>	Red-fruited Ebony		E		This species usually grows as an understorey tree in lowland subtropical rainforest, often close to rivers. Soils are generally basalt-derived or alluvial. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Red-fruited Ebony - profile (NSW Government - Office of Environment & Heritage), viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesApp/profile.aspx?i=d-10227
<i>Diplotortrix campbellii</i>	Small-leaved Tamarind		E		The habitat in which the species occurs varies from lowland subtropical rainforest to drier subtropical rainforest with a Bush Box open overstorey. The Small-leaved Tamarind occurs on basalt-derived soils and also on poorer soils such as those derived from quartz monzonite. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Small-leaved Tamarind - profile (NSW Government - Office of Environment & Heritage), viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?i=d-10231
<i>Endiandra floydii</i>	Floyd's Walnut		E		The Crystal Creek Walnut can be found in warm temperate, subtropical rainforest or wet sclerophyll forest with Brush Box overstorey, and in Camphor Laurel forest. The species can occur in disturbed and regrowth sites. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			NSW Government - Office of Environment & Heritage 2017, Crystal Creek Walnut - profile, viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?i=d-10269
<i>Endiandra hayesii</i>	Rusty Rose Walnut, Velvet Laurel		V		This species can be found in sheltered moist gullies in lowland subtropical and warm temperate rainforest on alluvium or basaltic soils. The species occurs in regrowth and highly modified forms of these habitats. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			NSW Government - Office of Environment & Heritage 2017, Rusty Rose Walnut - profile, viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?i=d-10270
<i>Fontainea australis</i>	Southern Fontainea		V		This species mainly occurs in lowland subtropical rainforest and complex notophyll vine forest on basaltic alluvial flats and well drained, bright reddish-brown alluvial clay loam. (TSSC 2008)	U	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Threatened Species Scientific Committee (2008). Commonwealth Conservation Advice on Fontainea australis. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/15202-conservation-advice.pdf
<i>Gossia fragrantissima</i>	Sweet Myrtle, Small-leaved Myrtle		E		This species is a multi-stemmed shrub or small tree, about 4 –10 m tall found mostly on basalt-derived soils. Ideal habitat is dry subtropical and riverine rainforest. Often found where rainforest has been cleared, or in paddocks/regrowth as it readily coppices from remaining root system. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			NSW Government, Office of Environment and Heritage, Threatened species search, Sweet Myrtle - profile. Retrieved 06 November from: http://www.environment.nsw.gov.au/threatenedspeciesApp/profile.aspx?i=d-10079
<i>Hicksbeachia pinnatifolia</i>	Red Boppal Nut, Monkey Nut, Boppie Nut, Red Boppie, Red Boppie Nut, Red Nut, Red Boppal Apple Nut, Red Boppal Nut, Ivory Silky Oak		V		Subtropical rainforest, moist eucalypt forest and Brush Box forest. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			NSW Government - Office of Environment & Heritage 2017, Red Boppal Nut - profile, viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?i=d-10405
<i>Macadamia integrifolia</i>	Macadamia Nut, Queensland Nut Tree, Smoothshelled		V		Macadamia Nut grows in remnant rainforest, preferring partially open areas such as rainforest edges. Found on a wide range of landforms including hill crests, hill slopes, scree slopes and foot slopes, gullies, benches and terrace plains. Prefers high nutrient alluvial and volcanic soils predominate often with considerable exposure of rock fragments or substrate, mostly basalt and diorite. (TSSC 2008)	P	SURVEYED NOT PRESENT	No. Changes to the environment are unlikely to have any significant impact. A number of <i>Macadamia integrifolia</i> x <i>tetraphylla</i> plants were recorded in Zones 3 and 4, the identity of which has been confirmed by the National Herbarium of NSW.			Threatened Species Scientific Committee (TSSC) (2008). Commonwealth Conservation Advice on Macadamia integrifolia. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/7326-conservation-advice.pdf
<i>Macadamia tetraphylla</i>	Macadamia, Bush Nut, Nut Oak		V		Found in subtropical rainforest, usually near the coast. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. Changes to the environment are unlikely to have any significant impact. A number of <i>Macadamia integrifolia</i> x <i>tetraphylla</i> plants were recorded in Zones 3 and 4, the identity of which has been confirmed by the National Herbarium of NSW.			NSW Government - Office of Environment & Heritage 2017, Rough-shelled Bush Nut - profile, viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?i=d-10408
<i>Marsdenia longiloba</i>	Clear Milkvine		V		Clear Milkvine prefers open eucalypt forest, or margins of subtropical and warm temperate rainforest, and in areas of rocky outcrops. (TSSC 2008)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Threatened Species Scientific Committee (2008). Commonwealth Conservation Advice on Marsdenia longiloba. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/7294-conservation-advice.pdf
<i>Ochrosia moorei</i>	Southern Ochrosia		E		This species is found growing on deep alluvial or basalt derived, well drained soils. Prefers hillsides near drainage lines, in warm subtropical rainforest or complex notophyll vineforest, at elevations between 100–1000 m. (TSSC 2008)	U	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Threatened Species Scientific Committee (2008). Commonwealth Conservation Advice on Ochrosia moorei. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/141260-conservation-advice.pdf
<i>Phaius australis</i>	Southern Swamp Orchid		E		Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas. (NSW OEH 2017)	L	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			NSW Government - Office of Environment & Heritage 2017, Southern Swamp Orchid - profile, viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?i=d-10260
<i>Randia moorei</i>	Spiny Gardenia		E		Spiny Gardenia occurs in subtropical, riverine, littoral and dry rainforest. It is found along moist scrubby water courses at altitudes up to 360 m asl, with most records below 100 m asl. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			NSW Government - Office of Environment & Heritage 2017, Spiny Gardenia - profile, viewed on 01 November 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?i=d-10226
<i>Sophora fraseri</i>	Brush Sophora		V		This species prefers moist habitats, often in hilly terrain at altitudes from 60–660 m on shallow soils along rainforest margins in eucalypt forests or in large canopy gaps in closed forest communities. (TSSC 2008)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			Threatened Species Scientific Committee (2008). Commonwealth Conservation Advice on Sophora fraseri. Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/15935-conservation-advice.pdf
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly, Smooth-bark Rose Apple		V		The Red Lilly Pilly is most often found in riverine and subtropical rainforest on rich alluvial or basaltic soils. (NSW OEH 2017)	P	SURVEYED NOT PRESENT	No. This species was surveyed for and not found at the Project site.			NSW Government - Office of Environment & Heritage 20

Appendix A – Likelihood of Occurrence Table (Migratory Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N= No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Apus pacificus</i>	Fork-tailed Swift			M	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and headlands and also over islands and sometimes well out to sea. The Fork-tailed Swift does not breed in Australia. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Apus pacificus</i> — Fork-tailed Swift (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=678
<i>Ardea alba</i>	Great Egret, White Egret			M	The Eastern Great Egret has been reported in a wide range of wetland habitats, including freshwater and estuarine zones. The species usually frequents shallow waters. Eastern Great Egrets usually nest in colonies and rarely as solitary pairs and breeding sites are located in wooded and shrubby swamps (DEE 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Additionally, the nearest sightings have been recorded over 60 km to the east where suitable habitat exist amongst the ranges. This species is highly mobile and there are vast areas of similarly structured habitat surrounding the impacted area. Therefore, the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Ardea modesta</i> — Eastern Great Egret (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59541
<i>Ardea ibis</i>	Cattle Egret			M	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. (DEE 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Ardea ibis</i> — Cattle Egret (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59542
<i>Arenaria interpres</i>	Ruddy Turnstone			M	In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. They mainly forage between lower supralittoral and lower littoral zones of foreshores, from strand-line to wave-zone. This species roosts on beaches, above the tideline, among rocks, shells, beachcast seaweed or other debris. They have also been observed roosting on rocky islets among grassy tussocks, and on mudflats and sandflats. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Arenaria interpres</i> — Ruddy Turnstone (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=872
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper			M	The Sharp-tailed Sandpiper prefers muddy edges of shallow sedges, grass, saltmarsh or other low vegetation. They forage at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water. Roosting occurs in similar areas to foraging. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Calidris acuminata</i> — Sharp-tailed Sandpiper (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=874
<i>Calidris alba</i>	Sanderling			M	This species is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. Less often the species occurs on more sheltered sandy shorelines of estuaries, inlets and harbours. They roost on/behind: bare sand high on the beach, clumps of washed-up kelp, coastal dunes, rocky reefs and ledges. Breeding does not occur in Australia. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Calidris alba</i> — Sanderling (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=875

Appendix A – Likelihood of Occurrence Table (Migratory Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/Community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N= No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Callidris ruficollis</i>	Red-necked Stint			M	This species is found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats and forages on bare wet mud on intertidal mudflats or sandflats, or in very shallow water. They roost on sheltered beaches, spits, banks or islets, of sand, mud, coral or shingle, sometimes in saltmarsh or other vegetation. They do not breed in Australia. (DEE 2017)	U		Changes to the environment are unlikely to have any significant impact.			Callidris ruficollis — Red-necked Stint (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=860
<i>Charadrius bicinctus</i>	Double-banded Plover			M	This species is found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. This species breeds on sandy, shelly or shingle beaches, especially around estuaries. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Charadrius bicinctus — Double-banded Plover (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=895
<i>Charadrius veredus</i>	Oriental Plover, Oriental Dotterel			M	This species usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground. This species forage among short grass or on hard stony bare ground and roosts adjacent to tidal mudflats and beaches. Breeding does not occur in Australia. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Charadrius veredus — Oriental Plover, Oriental Dotterel (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=882
<i>Cuculus optatus</i>	Oriental Cuckoo, Horsfield's Cuckoo			M	A summer visitor to Australia and prefers dense to open woodlands and forests, especially the edges of riparian areas. Eats insects and favours caterpillars. (Menkhorst et al 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, P., Franklin, K. (2017) The Australian Bird Guide, CSIRO Publishing, Clayton South, Victoria, Australia
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe			M	They usually inhabit open, freshwater wetlands with low, dense vegetation but have occurred in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. They roost on the ground near (or sometimes in) their foraging areas which are exposed or nearly exposed mudflats. Preferred habitat usually includes sites that provide some degree of shelter. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Gallinago hardwickii — Latham's Snipe, Japanese Snipe (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=863
<i>Trudapus caudacutus</i>	White-throated Needletail			M	The White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground and almost always forage aerially. They prefer to roost in trees in forests and woodlands, preferring dense foliage in the canopy or in hollows. Breeding does not occur in Australia. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Trudapus caudacutus — White-throated Needletail (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=682

Appendix A – Likelihood of Occurrence Table (Migratory Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N= No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Limosa lapponica</i>	Bar-tailed Godwit			M	This species is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, herbours, coastal lagoons and bays. Forages near the edge of water or in shallow water, mainly in tidal estuaries and harbours. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Limosa lapponica</i> — Bar-tailed Godwit (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=844
<i>Limosa limosa</i>	Black-tailed Godwit			M	This species is found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats and often roost on low banks of mud, sand or shell, bars, islets and beaches in sheltered areas. Foraging occurs on wide intertidal mudflats or sandflats, in soft mud or shallow water and occasionally in shallow estuaries. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Limosa limosa</i> — Black-tailed Godwit (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=845
<i>Monarcha melanopsis</i>	Black-faced Monarch			M	This species mainly occurs in rainforest ecosystems including vine thickets, notophyll vine forests and is sometimes found in nearby Eucalypt woodlands with dense shrubby understoreys. (DEE 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Monarcha melanopsis</i> — Black-faced Monarch (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=609
<i>Monarcha trivirgatus</i>	Spectacled Monarch			M	Spectacled monarch commonly occur in rainforest, dense water-side vegetation, including mangroves and occasionally wet eucalypt forest. (Menkhurst et al 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Menkhurst, P., Rogers, D., Clarke, R., Davies, J., Maysack, P., Franklin, K. (2017) The Australian Bird Guide, CSIRO Publishing, Clayton South, Victoria, Australia</i>
<i>Motacilla flava</i>	Yellow Wagtail			M	The yellow wagtail occurs in a variety of damp or wet habitats with low vegetation. Typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland. (Menkhurst et al 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Menkhurst, P., Rogers, D., Clarke, R., Davies, J., Maysack, P., Franklin, K. (2017) The Australian Bird Guide, CSIRO Publishing, Clayton South, Victoria, Australia</i>

Appendix A – Likelihood of Occurrence Table (Migratory Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/Community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N= No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Myiagra cyanoleuca</i>	Satin Flycatcher			M	Satin Flycatchers mainly inhabit eucalypt woodlands with open understorey and grass ground cover, often near wetlands or watercourses. (DEE 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Myiagra cyanoleuca</i> — Satin Flycatcher (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=612
<i>Numenius minutus</i>	Little Curlew, Little Whimbrel			M	Commonly found in dry grassland and sedge/land, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Also found in modified landscapes including gardens, recreation areas, road verges and airstrips. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Numenius minutus</i> — Little Curlew, Little Whimbrel (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=848
<i>Numenius phaeopus</i>	Whimbrel			M	The Whimbrel is often found on the intertidal mudflats of sheltered coasts. Foraging generally occurs on intertidal mudflats of estuaries and coastal lagoons. This species prefer roosting in mangroves and other structures flooded at high tide. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Numenius phaeopus</i> — Whimbrel (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=849
<i>Pandion cristatus</i>	Eastern Osprey			M	The Eastern Osprey prefers coastal areas, especially the mouths of large rivers, lagoons and lakes. Eastern Osprey nests are made high up in dead trees or in dead crowns of live trees, most commonly within one kilometre of the sea (NSW DEH 2017).	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Eastern Osprey - profile- (NSW Government - Office of Environment & Heritage)</i> viewed 31 October 2017. http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10385
<i>Pandion haliaetus</i>	Osprey			M	Osprey occur in littoral and coastal habitats and terrestrial wetlands. They require extensive areas of open fresh, brackish or saline water for foraging. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Pandion cristatus</i> — Eastern Osprey (Department of Environment and Energy) Retrieved 03 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=952

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Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/Community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N= No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Pluvialis fulva</i>	Pacific Golden Plover			M	This species usually inhabits coastal habitats mostly on beaches, mudflats and sandflats or in sheltered areas including harbours, estuaries and lagoons. It forages on sandy or muddy shores (including mudflats and sandflats) or in the margins of sheltered areas such as estuaries and lagoons, though it also feeds on rocky shores, islands or reefs. Does not breed in Australia. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Pluvialis fulva</i> — Pacific Golden Plover (Department of Environment and Energy) Retrieved 06 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=25545
<i>Pluvialis squatarola</i>	Grey Plover			M	Grey Plovers occur in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats. This species usually forage on large areas of exposed mudflats, beaches of sheltered coastal shores such as inlets, estuaries and lagoons and roost on sand spits, sheltered beaches and other sheltered environments. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Pluvialis squatarola</i> — Grey Plover (Department of Environment and Energy) Retrieved 06 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=865
<i>Rhipidura rufifrons</i>	Rufous Fantail			M	The Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts. They occasionally occur in secondary regrowth, following logging or disturbance in forests or rainforests. Foraging occurs mainly in the middle strata of forests. (DEE 2017)	P		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Rhipidura rufifrons</i> — Rufous Fantail (Department of Environment and Energy) Retrieved 06 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=592
<i>Sterna albibrons</i>	Little Tern			M	Little tern habitat is predominantly coastal, favouring sheltered environments; although it may occur several kilometres from the sea in harbours, inlets and rivers. The little tern nests in small, separated colonies in low dunes or on sandy beaches above high tide mark close to estuary mouths or adjacent to coastal lakes and islands. (NSW DEH 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Little tern - profile - NSW Government - Office of Environment & Heritage) viewed 30 October 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10769
<i>Tringa brevipes</i>	Grey-tailed Tattler			M	This species is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. Grey tailed tattler forage in shallow water, on hard intertidal substrates, such as reefs and rock platforms, in rock pools and among rocks and coral rubble, over which water may surge. Roosting preference is for branches in mangroves. Breeding occurs in the northern hemisphere. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Tringa brevipes</i> — Grey-tailed Tattler (Department of Environment and Energy) Retrieved 06 November 2017 from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=851

Appendix A – Likelihood of Occurrence Table (Migratory Species)

Scientific Name	Common Name	EPBC Act Listing Threatened Ecological Community	EPBC Act Listing Threatened Species	EPBC Act Listing Migratory Species	Habitat/community description	Likelihood of Occurrence (K = Known, L = Likely, P = Possible, U = Unlikely, N= No)	Surveyed Present/ Not Present	Significant Impacts	Potential direct impact	Potential indirect impact	Source
<i>Tringa stagnatilis</i>	Marsh Sandpiper, Little Greenshank			M	The Marsh Sandpiper prefers permanent or ephemeral wetlands of varying salinity. This may include swamps, lagoons, billabongs, saltponds, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats. (DEE 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	<i>Tringa stagnatilis</i> — <i>Marsh Sandpiper, Little Greenshank</i> (Department of Environment and Energy) Retrieved 06 November 2017 From: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?axon_id=833
<i>Xenus cinereus</i>	Terek Sandpiper			M	On the Australian continent this species has been recorded on coastal mudflats, lagoons, creeks and estuaries. The Terek Sandpiper favours mudbanks and sandbanks found near mangroves, they may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. This species will generally roost communally surrounding mangroves or dead trees, often with related wader species. (NSW OEH 2017)	U		No. The Project is unlikely to have any significant impact, based on addressing the MNES Significant Impact Guidelines 1.1 criteria. This species is unlikely to utilise the non-remnant native vegetation in Zone 4 and 8 as it is not suitable habitat. Therefore the Project is unlikely to adversely affect the habitat critical for this species, lead to a long-term decrease in the size of the population or disrupt the breeding cycle of a population. This species is more likely to utilise the remnant native vegetation in the northern end on the Site that contributes to a mapped regional fauna corridor which is being retained for biodiversity values and managed under a Biodiversity Management Plan. This plan will be developed for the Site to preserve and enhance current biodiversity values, including the management of water quality and invasive species which may be harmful to threatened species. The Project proposes to improve water quality downstream of the Site through WSUD features which are likely to improve the stormwater quality that flows into the downstream forested wetland and the east-flowing floodplain drain receiving environment.	• Impacts on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range; and • Impacts on movement of threatened species that maintains their lifecycle.	• Impacts on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; • Noise and vibration; • Light spill and visual amenity; • Dust; • Bushfire and changing fire regimes; • Damage or removal of retained native vegetation; and • Weeds.	Terek Sandpiper - profile (NSW Government - Office of Environment & Heritage), viewed 31 October 2017, http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10843

Matters of National Environmental Significance Report

NSW Health Infrastructure Tweed Valley Hospital

APPENDIX B. TWEED VALLEY HOSPITAL MASTERPLAN



LEGEND

- SITE BOUNDARY
- MAXIMUM PLANNING ENVELOPE ABOVE GROUND LEVEL
- MAXIMUM PLANNING ENVELOPE BELOW GROUND LEVEL
- TREE TRUNK LINE
- APZ OFFSETS
- PROBABLE MAXIMUM FLOOD LINE
- AGRICULTURAL BUFFER
- INDICATIVE BUILDING ENTRIES

N

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FIXTURES, FITTINGS & EQUIPMENT SPECIFICATIONS
SUBSTITUTE FF&E EQUIPMENT SPECIFICATIONS
THE FIT-OUT DESIGN AND DOCUMENTATION HAS BEEN COMPLETED ON THE BASIS OF FF&E AND EQUIPMENT ADVISED TO THIS OFFICE AT THE TIME OF BRIEFING THE DESIGN. THE DESIGN PROVISIONS FOR FF&E AND EQUIPMENT INCORPORATES SPATIAL ALLOCATIONS, SERVICING, LOADING AND ACCESS CLEARANCES AND WHERE APPROPRIATE SERVICES REQUIREMENTS, HAVING DUE REGARD FOR SURROUNDING FIXTURES AND FITTINGS. IT SHOULD BE NOTED THAT SUBSTITUTES FF&E OR EQUIPMENT WITH ALTERNATE SPECIFICATIONS SHOULD NOT BE PROCURED PRIOR TO VALIDATING THOSE SPECIFICATIONS AGAINST THE ITEM CONTROL SCHEDULE AND DESIGN PROVISIONS IN THE MODEL. THIS OFFICE ACCEPTS NO RESPONSIBILITY FOR THE PROCUREMENT OF SUBSTITUTE FF&E AND EQUIPMENT WHICH HAS NOT BEEN REVIEWED AND VALIDATED AGAINST THE ORIGINAL DESIGN PROVISIONS

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PROJECT MANAGER

CLIENT

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771 Cudgen Road, Cudgen

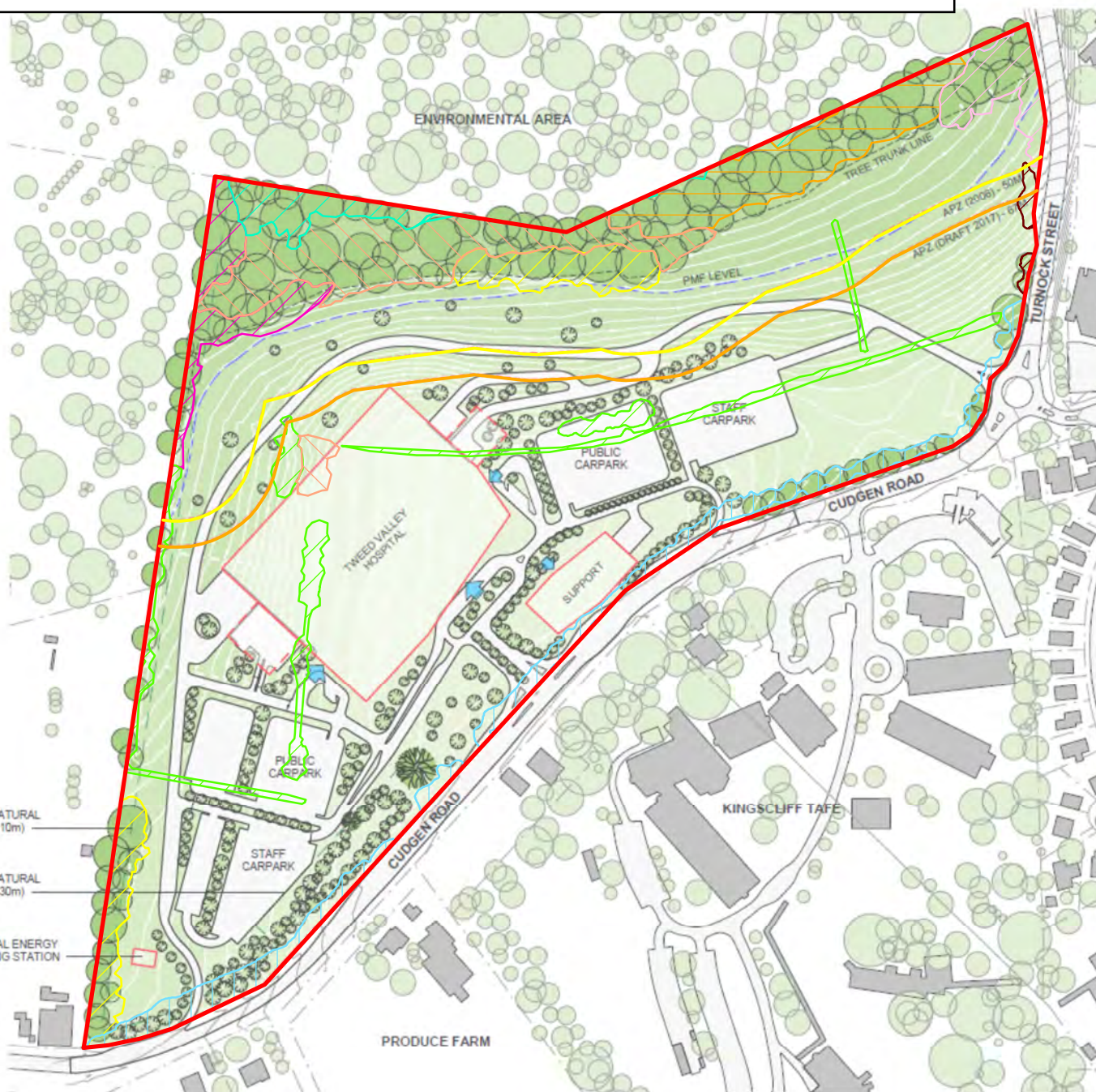
DRAWING TITLE
MASTERPLAN
CONCEPT PLAN

SCALE
0 25 50 75 100 125 m

SCALE 1:2500 **DATE** 9/01/2019 **DRAWN BY** CE **CHECKED**

PROJECT No 10363.00 **DRAWING No** AR-SKE-10-006 **REVISION** 06

- Vegetation Zone (PCT)**
- Zone 1 (1064 - Paperbark swamp forest of the coastal lowlands)
 - Zone 2 (1302 - White Booyong - Fig subtropical rainforest)
 - Zone 3 (1302 - White Booyong - Fig subtropical rainforest)
 - Zone 4 (1302 - White Booyong - Fig subtropical rainforest)
 - Zone 5 (1569 - Flooded Gum – Brush Box – Tallowood mesic tall open forest)
 - Zone 6 (1569 - Flooded Gum – Brush Box – Tallowood mesic tall open forest)
 - Zone 7 (1235 - Swamp Oak swamp forest of the coastal lowlands)
 - Zone 8 (1302 - White Booyong - Fig subtropical rainforest)
 - Zone 9 (n/a - Exotic Vegetation)
- Site Boundary
- APZ (2006) - 50m
- APZ (Draft 2017) - 67m



Client: C107778

Job #: J156455

Author: M. Nunn

Checked: D. Licari

Date: 24/01/2019

GREENCAP

0 50 100
m

Scale (@A4): 1:4,000

Coordinate System: GDA 1994 MGA Zone 56

Imagery 8th August 2018 (7.5 cm) © Nearmap 2018

Vegetation mapping: Greencap (2018)

Masterplan: Georeferenced version of AR-SKE-10-006[06] - 9/1/2019 (Sth Batesmart)

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Masterplan and Vegetation Zones

Tweed Valley Hospital MNES Report
771 Cudgen Road
Cudgen NSW

**Figure
B-2**