205-209 Grange Avenue, Marsden Park

Flora and Fauna Assessment

M Development Group

22 March 2021

Final

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The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Glossary

Abbreviation	Definition
AHD	Australian Height Datum
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Regulation	NSW *Biodiversity Conservation Regulation 2017*
BMP	Biodiversity Management Plan
BOS	Biodiversity Offsets Scheme
CBD	Central Business District
CEEC	Critically Endangered Ecological Community
CPW	Cumberland Plain Woodland
DoE	Commonwealth Department of Environment
DoEE	Department of Environment and Energy
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
FFA	Flora and Fauna Report
GPS	Global Positioning System
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The area within a 5km radius of the subject site
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
RFEF	River Flat Eucalypt Forest
Subject Land	Comprises 205-209 Grange Ave, Marsden Park (Lot 1 DP 781987 and Lots 3 and 4 (Section J) DP 193074)
Subject Site	Comprises the non-biocertified area and area mapped as Existing Native Vegetation within Lot 1 DP781987
TEC	Threatened Ecological Community
The Project	Refers to the development at 205-209 Grange Ave, Marsden Park commissioned by M Development Group Pty Ltd.
VIS	Vegetation Information System
VMP	Vegetation Management Plan

1. Introduction

Cumberland Ecology was commissioned by M Development Group Pty Ltd (the 'proponent') to undertake a Flora and Fauna Assessment (FFA) of 205-209 Grange Avenue, Marsden Park (Lot 1 DP 781987 and Lots 3 and 4 (Section J) DP 193074) (the 'subject land') for a proposed development (the 'Project') (see **Figure 1**). This FFA will support a development application under Part 4 of the New South Wales (NSW) Environmental *Planning and Assessment Act 1979* (EP&A Act).

Although the Project will span from 205, 207 and 209 Grange Avenue and include three lots, the majority of the subject land is located on biocertified lands under the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 ('Growth Centre SEPP') and consequently does not require any further ecological assessment (see ***Section 1.4.4***). The entirety of the subject land has been included in this FFA for contextual information, however the impact assessment is restricted to the non-biocertified area and the area mapped as Existing Native Vegetation under the Growth Centre SEPP as shown in **Figure 2** (hereafter referred to as the 'subject site').

1.1. Purpose

The purpose of this report is to document the findings of ecological investigations completed across the subject land (see **Figure 1**). Biodiversity values considered include threatened species and ecological communities protected under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main objective of this report is to determine whether the Project is likely to significantly affect threatened biodiversity values and to outline how the Project will incorporate the biodiversity conservation principles of 'avoid, minimise and mitigate' into its planning.

Specifically, the objectives of this FFA are to:

- Document the reasons why the Biodiversity Offsets Scheme (BOS) under the BC Act does not apply to the Project;
- Describe and map vegetation communities of the subject site, identifying threatened ecological communities (TECs) listed under the BC Act and/or the EPBC Act;
- Identify and map the location of threatened flora and fauna species (if present);
- Assess the likelihood of threatened flora and fauna species occurring within the subject site;
- Describe the types and extent of potential direct and indirect impacts arising from the Project;
- Describe the impact of the proposed stormwater discharge/outlet into Bells Creek located on the adjacent lot;
- Describe any impact to native vegetation within the Existing Vegetation Area within the subject site; and
- Where relevant, recommend mitigation measures to reduce the impacts of the proposed development on biodiversity values.

1.2. Project Description

The Project involves the consolidation of three lots into one Torrens Title lot, along with Torrens title subdivision of the consolidated lot into three lots. This will be followed by construction of three residential flat buildings and associated works, including roads, demolition of structures, tree removal, access driveways to basement car parking, stormwater drainage and landscaping works. The extent of construction impacts of the Project is hereafter referred to as the 'Project footprint'. The layout of the Project is shown in **Figure 3**.

1.3. Background

1.3.1. Location

The subject land is wholly located within the Blacktown City Council Local Government Area (LGA); approximately 50 km from the Sydney Central Business District (CBD) and 12 km from the Blacktown CBD. The subject land is bound to the south and west by semi-rural properties, to the north by Grange Avenue, and to the east by an unoccupied lot which includes Bells Creek and associated riparian area. **Figure 1** illustrates the immediate locality of the subject land.

1.3.2. Description of Subject Land

The subject land is approximately 3.28 ha and is located within the Marsden Park Precinct under the Growth Centre SEPP. The subject land currently consists of single-storey brick dwellings and sheds and is surrounded by typical rural garden plantings, paddocks and native and exotic vegetation. However, the subject land also contains a small area of River Flat Eucalypt Forest which is listed as an Endangered Ecological Community (EEC) under the BC Act and Critically Endangered Ecological Community (CEEC) under the EPBC Act, as well as scattered trees consistent with Cumberland Plain Woodland which is listed as a CEEC under both the BC Act and EPBC Act.

The subject land is contained on natural depression which runs from west (highest point) to east (lowest point) into Bells Creek located in the adjacent lot.

The subject land contains an existing drainage line in the south-eastern corner which runs in a south to west direction from the dam located in Lot 3 (Section J) DP 193074 through into Bells Creek on the adjacent lot located east of the subject land. This drainage line is mapped as a 1st order watercourse by NSW Department of Primary Industries. Consequently, the subject land is considered to be flood prone.

Note that the dam located in the adjacent lot is not proposed to be dewatered as part of the Project and therefore does not require a Dam Dewatering Plan.

1.3.3. Zoning and Land Use

The subject land contains multiple zonings, with the majority of the subject land zoned as SP2 – Local Drainage, E3 – Environmental Management and R3 – Medium Density Residential under the Marsden Park Precinct Plan. The subject land is currently being used for residential purposes but has been used for grazing of livestock in the past.

1.4. Relevant Legislation

1.4.1. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the overarching planning legislation in NSW. This Act provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the consideration of environmental and biodiversity values, which is addressed in Section 5A (Significant effect on species, populations or ecological communities or their habitats) should a land use change be proposed. This includes threatened species, communities, habitat and processes as listed under the BC Act and *Fisheries Management Act 1994* (FM Act).

1.4.2. Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the EPBC Act as Matters of National Environmental Significance (MNES). Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES (including nationally listed threatened ecological communities, species, and listed migratory species) must be referred to the Australian Government Minister for the Environment (the Minister). The purpose of the referral is to allow a decision to be made about whether an action requires approval on a Commonwealth level. If an action is declared a "controlled action", then Commonwealth approval is required.

1.4.3. NSW Biodiversity Conservation Act 2016

The *NSW Biodiversity Conservation Act 2016* (BC Act) is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act is supported by a number of regulations, including the *Biodiversity Conservation Regulation 2017* (BC Regulation).

The BC Act requires consideration of whether a development or an activity is likely to significantly affect threatened species. For Part 4 local developments, projects that significantly affect threatened species trigger the BOS. The BOS is intended to simplify biodiversity assessment and improve biodiversity outcomes by creating consistent assessment requirements to measure the likely biodiversity loss of development proposals and gains in biodiversity value achieved at offset sites through active management. Projects that trigger the BOS require an assessment following the Biodiversity Assessment Methodology (BAM) by an accredited BAM assessor and the preparation of a Biodiversity Development Assessment Report (BDAR).

1.4.4. State Environmental Policy (Sydney Region Growth Centres) 2006

The majority of the subject site lies within Biocertified Land (**Figure 2**). Item 5 of the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 ('Growth Centre SEPP') states that:

"Pursuant to section 126H of the Act, the biodiversity certification of the SEPP is limited to the certified areas.

Note: Pursuant to section 126I of the Act, developments or activities proposed to be undertaken within the certified areas do not need to undertake assessment of impacts on threatened species, populations and ecological communities, or their habitats, that would normally be required by Part 4 or 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act)."

As part of the biocertification process, the impacts of vegetation removal and offsets have already been considered as part of the assessment for the Growth Centre SEPP. Consequently, no further ecological assessments of the biocertified portions of the subject site are required. However, a portion of Lot 1 DP 781987 comprises non-biocertified land and is therefore subject to the usual ecological assessment pathway for Part 4 developments under the EP&A Act. This assessment pathway is further detailed in ***Section A.3.2***.

Additionally, the non-biocertified areas in Lot 1 DP 781987 within the subject site also corresponds to areas of vegetation mapped as Existing Native Vegetation under the Growth Centre SEPP (**Figure 2**). Any impact to these areas must be assessed accordingly.

1.4.5. Water Management Act 2000

The objectives of the *Water Management Act 2000* (WM Act) are to provide for the sustainable and integrated management of the water systems of NSW and to protect, enhance and restore water sources, associated ecosystems and ecological processes.

Under the WM Act, approval is required for carrying out a 'controlled activity' that takes place on 'waterfront land' to ensure that the activity to ensure negative impacts upon waterfront land and other water users are avoided or minimised. In this instance, the relevant definition of waterfront land per the WM Act is: *"the bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river…where the prescribed distance is 40m or (if the regulations prescribe a lesser distance…) that lesser distance*".

Controlled activity means:

- Erection of a building;
- Carrying out a work;
- Removing material from waterfront land, such as vegetation or extractive material;
- Depositing material on waterfront land, such as extractive material; and
- Carrying out an activity which affects the quantity or flow of water in a water source.

An application for a 'controlled activity approval' will be refused if the Minister is not satisfied that adequate arrangements are in force to ensure that no more than minimal harm will be done to any waterfront land as a consequence of the carrying out of the proposed controlled activity.

1.5. Assessment of Entry into the Biodiversity Offsets Scheme

To determine the type of assessment required for the Project it is necessary to determine whether the Project triggers the BOS. The criteria for entry into the BOS are outlined below:

- It is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test of significance in Section 7.3 of the BC Act; or
- If clearing exceeds the biodiversity offsets scheme threshold;
- It is carried out in a declared Area of Outstanding Biodiversity Value (AOBV).

These three criteria as they apply to the Project are assessed in detail below. The results indicate that the Project does not trigger the BOS and therefore an FFA is appropriate to assess the impacts to biodiversity associated with the Project.

1.5.1. Test of Significance

A test of significance in accordance with Section 7.3 of the BC Act was undertaken for all threatened communities and species known, or considered likely, to occur within the subject site (see **Appendix D**). This assessment indicates that none of these communities or species are considered likely to be significantly affected by the Project and therefore the BOS is not triggered by this mechanism.

1.5.2. Biodiversity Offsets Scheme Threshold

A development can exceed the BOS threshold if it is or involves:

- The clearing of native vegetation of an area above a prescribed threshold based on the minimum lot size; or
- The clearing of native vegetation, or other prescribed action, on land included on the Biodiversity Values Map.

These thresholds are assessed in detail below..

1.5.2.1. Clearing of Native Threshold

Any development being assessed under Part 4 of the EP&A Act that clears native vegetation above a threshold specified based on minimum lot size would automatically enter into the BOS and may require offsetting. The threshold levels of clearing for each minimum lot size are shown in **Table 1**. The area zoned as E3 – Environmental Management under the Growth Centre SEPP on which the subject site is located has a minimum lot size of 1 ha, therefore the clearing of 0.5 ha or more would trigger entry into the BOS. Since no native vegetation within the subject site is proposed to be removed, entry into the BOS is not triggered by this mechanism.

Table 1 Area of clearing thresholds

Minimum Lot Size of Land	Area of Clearing
Less than 1 hectare	0.25 hectares or more
Less than 40 hectares but not less than 1 hectare	0.5 hectares or more
Less than 1,000 hectares but not less than 40 hectares	1 hectare or more
1,000 hectares or more	2 hectares or more

1.5.2.2. Biodiversity Values Map

The area of vegetation mapped as Existing Native Vegetation under the Growth Centre SEPP is also included on the Biodiversity Values Map **(Figure 4**). Any impact to this area will automatically trigger entry into the BOS and require the preparation of a BDAR. Since no clearing of native vegetation is proposed in the area and the Project does not include other prescribed impacts prescribed under Clause 6.1 of the Biodiversity Regulation 2017, entry into the BOS is not triggered by this mechanism.

1.5.3. Declared Area of Outstanding Biodiversity Value

The BC Act currently lists the following AOBVs:

- Gould's Petrel habitat;
- Little Penguin population in Sydney's North Harbour habitat;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve; and
- Wollemi Pine habitat.

The Project is not located within the above AOBVs and therefore the BOS is not triggered by this mechanism.

2. Methodology

2.1. Literature Review

A review of relevant ecological literature was undertaken as part of this FFA to evaluate the flora and fauna values associated with the subject land. The information collected during the literature review guided the field surveys undertaken for the FFA. Information within the literature reviewed was also utilised in determining the likelihood of threatened species occurring within the subject site and assessing the potential impacts of the Project.

As part of the desktop assessment, a literature review of the following documents was also undertaken:

- Arboricultural Impact Assessment – 205-209 Grange Avenue, Marsden Park prepared by Redgum Horticultural dated 22 January 2020;
- Architectural Plans – 205-209 Grange Avenue, Marsden Park prepared by Design Cubicle Architectural Solutions dated 20 December 2019;
- Stormwater Management Plan and Concept Design – 205-209 Grange Avenue, Marsden Park prepared by S&G Consultants dated 18 February 2020;
- Civil Works Concept Design – 205 209 Grange Avenue, Marsden Park prepared by S&G Consultants dated 18 February 2020; and
- Landscape Concept Plan – 205-209 Grange Avenue, Marsden Park prepared by Vision Dynamics dated 5 February 2020.

2.2. Database Analysis

A number of databases were utilised during the preparation of this FFA. Key databases reviewed included:

- NSW Office of Environment and Heritage (OEH) BioNet Atlas (OEH 2019a);
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (DAWE 2021),
- OEH Threatened Species Profile Database; and
- DoEE Species Profile and Threat Database.

Database analysis was conducted for the locality using the OEH BioNet Atlas (OEH 2019a) and the DAWE Protected Matters Search Tool (DAWE 2021). The locality is defined as the area within a 5 km radius of the subject land. The BioNet Atlas search facility was used to generate records of threatened flora and fauna species and populations listed under the BC Act and/or EPBC Act within the locality. The abundance, distribution and age of records generated within the search areas provided supplementary information for the assessment of likelihood of occurrence of those threatened species within the subject site. The Protected Matters Search Tool generated a list of potentially occurring MNES listed under the EPBC Act within the locality of the subject land.

Previous broad-scale mapping of the Sydney Metropolitan area by the NSW National Parks and Wildlife Service (OEH 2016) and Blacktown Council (OEH 2013) was accessed in order to determine vegetation communities that could occur within the subject land.

2.3. Flora Surveys

Flora surveys were undertaken by Cumberland Ecology on 3 February 2021. Surveys included vegetation mapping, plot-based vegetation survey and threatened flora surveys. The survey design consisted of random meander searches as well as plot-based surveys and was guided by the following:

- NSW Government (2017): Biodiversity Assessment Method; and
- NSW Government (2016): NSW Guide to Surveying Threatened Plants.

The locations of all surveys are shown in **Figure 5**.

2.3.1. Vegetation Mapping

The vegetation within the subject land was ground-truthed by Cumberland Ecology to examine and verify the existing mapping including the condition and extent of the different vegetation communities. Where vegetation community boundaries were found to differ from the existing mapping, records were made of new boundaries using a hand-held Global Positioning System (GPS) and mark-up of aerial photographs. The data collected was analysed and the resultant information was synthesised using a Geographic Information System (GIS) to create a spatial database to produce a vegetation map of the subject land.

2.3.2. Plot-based Floristic Survey

A plot-based floristic survey was undertaken within the subject land. The survey was conducted in accordance with the BAM and included establishment of a 20 m x 50 m plot within which the following data was collected:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 m x 20 m plot;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 m x 20m plot;
- Cover of 'High Threat Exotic' weed species;
- Assessment of function attributes within a 20 m x 50 m plot, including:
    - Count of number of large trees;
    - Tree stem size classes, measured as 'diameter at breast height over bark' (DBH);
    - Regeneration based on the presence of living trees with stems <5 cm DBH;
    - The total length in metres of fallen logs over 10 cm in diameter;
- Assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 m x 50 m plot; and

- Number of trees with hollows that are visible from the ground within the 20 m x 50 m plot.

All vascular plants recorded or collected were identified using keys and nomenclature provided in *PlantNET* (Botanic Gardens Trust 2019).

2.3.3. Threatened Flora Species Searches

Targeted threatened flora surveys were undertaken in conjunction with collection of floristic plot data. Surveys were targeted towards threatened species known to occur in the locality of the study area and were conducted in areas considered to provide potential habitat for these species. Surveys involved foot traverses, and where threatened flora species were observed, the location was recorded with a handheld GPS.

2.3.4. Data Analysis

2.3.4.1. Plant Community Types

The primary nomenclature used within this report is locally defined map units that were determined following field investigations within the subject land. Where relevant, the locally defined map units were matched with the equivalent Plant Community Types (PCTs).

Identification of the PCTs occurring within the subject land was guided by the findings of the floristic survey. The data collected during surveys of the subject land was analysed in conjunction with a review of the PCTs held within the VIS Classification Database. Consideration was given to the following:

Occurrence within the Sydney Basin Interim Biogeographic Regionalisation for Australia subregion and Hawkesbury Nepean management area;

- Vegetation formation;
- Alignment with TECs;
- Landscape position;
- Associated upper stratum species; and
- Upper, mid and ground strata species.

Where locally defined map units were not readily able to be matched to PCTs, best-fit communities were selected, or noted as unassigned if comprised of planted or exotic vegetation.

2.3.4.2. Classification of Threatened Ecological Communities

Following review of potentially occurring TECs, the vegetation communities identified within the subject land were examined against the listings of TECs under the BC Act and EPBC Act.

For TECs listed under the BC Act, vegetation communities were examined against the final determinations for potentially occurring TECs. A component of this analysis was to compare the species recorded during the field surveys with the species lists provided in the final determinations. Additional information such as location and geology and landform aspects of each final determination were also considered in the assessment.

For TECs listed under the EPBC Act, vegetation communities were examined against the DoEE Species Profile and Threats Database and any associated documentation, such as listing advice and policy statements.

2.4. Fauna Surveys

Fauna surveys were undertaken by Cumberland Ecology on 3 February 2021. Surveys included general habitat assessment, hollow-bearing tree assessment, bird census, and incidental observations.

2.4.1. General Habitat Assessment

A general fauna habitat assessment was undertaken within the subject land during field surveys. This assessment included consideration of important indicators of habitat conditions and complexity as well as the occurrence of micro-habitats such as tree hollows, fallen logs and riparian areas. An assessment of the structural complexity of the vegetation, the age structure of the remnant vegetation and the nature and extent of human disturbance was also undertaken. Notes were taken on specific habitat features that may be utilised by threatened fauna species known to occur in the locality.

2.4.2. Hollow-bearing Tree Assessment

Remnant native vegetation and some areas of planted vegetation were surveyed to determine the presence of hollows. All trees that were observed to contain a hollow visible from the ground were recorded with a hand-held GPS, including both living and dead trees.

2.4.3. Incidental Observations

Visual observation and call identification of diurnal birds was carried out throughout the subject land during the survey period. Diurnal birds were also identified and recorded as they were encountered throughout the subject land.

Any incidental vertebrate fauna species that was observed, heard calling, or otherwise detected on the basis of tracks or signs were recorded and listed in the total species list for the subject land.

2.5. Limitations

Weather conditions during flora and fauna surveys were generally appropriate for detection of a variety of flora and fauna. The survey was undertaken during fine weather, with a maximum temperature of 31ºC, and a minimum of 16ºC.

The fauna of the locality is well known based upon a sizeable database of past records and various published reports. The field survey undertaken by Cumberland Ecology added to this existing database and has helped to provide an indication of the likelihood that various species occur or are likely to occur within the subject land. The data obtained from database assessment and surveys of the subject land furnished an appropriate level of information to support this assessment.

Data obtained from the fauna surveys are a "snapshot" in time and illustrate the fauna that were active during the time of the surveys. The data produced by the surveys is intended to be indicative of the types of species that could occur and not an absolute census of all vertebrate fauna species occurring within the subject land.

It is likely that if continued field sampling was undertaken within the subject land, additional species could be identified.

The field surveys were supplemented by literature review, database analysis and a fauna habitat assessment. The combination of these techniques is considered appropriate for assessing the habitat values of the site for threatened fauna within the subject site.

3. Results

3.1. Vegetation Communities

Previous broad-scale vegetation mapping conducted by the former Office of Environment and Heritage (OEH) identifies two vegetation communities within the subject land; Cumberland Shale Plains Woodland and Alluvial Forest in the Sydney Basin Bioregion, the former is a CEEC under the BC Act and EPBC Act, and, the latter is an EEC listed under the BC Act and CEEC under the EPBC Act. The surveys by Cumberland Ecology for this assessment refined the existing vegetation mapping of the subject land and identified nine vegetation communities (four native and five exotic), which includes two condition states for River-flat Eucalypt Forest. The vegetation communities recorded by Cumberland Ecology within the subject site are provided within **Table 2**, as well as their associated plant community type (PCT), listing status and extent. The distribution of vegetation communities within the subject land is provided in **Figure 6**.

Table 2 - Area of each vegetation community found within the subject land

Vegetation Community	Subject Land (ha)	Subject Site (ha)
River-flat Eucalypt Forest (Degraded)	0.12	0.02
River-flat Eucalypt Forest (Scattered Trees)	0.04	0.00
Cumberland Plain Woodland (Scattered Trees)	0.08	0.00
Non-endemic Native	0.07	0.00
Typha orientalis	0.04	0.00
Exotic Vegetation	0.25	0.00
Exotic Grassland	2.16	0.05
Coral Tree (*Erythrina crista-galli*)	0.03	0.01
Blackberry (*Rubus fruticosus spp. agg.*)	0.01	0.00
Dam	0.02	0.00
Cleared Land	0.46	0.00
TOTAL	**3.28**	**0.08**

Key: EEC = endangered ecological community, CEEC = critically endangered ecological community

3.1.1. River-flat Eucalypt Forest

Statewide Class: Coastal Valley Grassy Woodlands

NSW PCT: 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin

River-flat Eucalypt Forest (RFEF) is an open eucalypt forest situated on broad alluvial flats of the Hawkesbury and Nepean river systems and is a TEC listed under the BC Act. It also forms narrower ribbons alongside streams and creeks that drain the Cumberland Plain. Typically, the canopy includes *Angophora floribunda* (Rough-barked Apple), *Eucalyptus tereticornis* (Forest Red Gum) and/or *Eucalyptus amplifolia* (Cabbage Gum). The understorey within RFEF is characterised by an occasional sparse to open small tree stratum of *Melaleuca* spp. (Paperbark) and *Acacia* spp. (Wattles). A sparse lower shrub layer features *Bursaria spinosa* (Native Blackthorn). The ground layer is characterised by an abundant cover of grasses with small herbs and ferns. River-flat

Eucalypt Forest occurs at altitudes between one and 160 metres above sea level and with a mean annual rainfall of 750-1000 millimetres.

Within the subject land RFEF occurs at lower elevations in the south- and north-western corner of the site adjacent to the dam. It is characterised by the occurrence of *Eucalyptus tereticornis* (Forest Red Gum) and/or *Eucalyptus amplifolia* (Cabbage Gum). The understorey is disturbed and is dominated by exotic grasses.

The RFEF occurs in two condition classes within the subject land; native canopy with exotic dominated understorey and scattered endemic trees.

3.1.1.1. River-flat Eucalypt Forest - native canopy with exotic dominated understorey

BC Act Status: EEC

EPBC Act Status: CEEC but does not conform to listing – the perennial understorey vegetative cover present is not made up of 30% or more of native species and thus does not meet the condition classes and thresholds for the ecological community located in Table 4 of the EPBC Act Listing Advice (DoEE 2019).

This variant of RFEF occurs in the lower reaches of the subject land in the south-eastern corner and has previously been under-scrubbed and grazed. The canopy includes *Eucalyptus amplifolia* (Cabbage Gum) and *Eucalyptus tereticornis* (Forest Red Gum). The sub-canopy stratum includes canopy species as well as *Casuarina glauca* (Swamp Oak). There is no intact native shrub layer. The understorey is dominated by *Paspalum dilatatum* (Paspalum) and to lesser extent *Cynodon dactylon* (Couch Grass). Other exotic grasses present include *Bromus catharticus* (Brome Grass) and *Setaria parviflora* (Pigeon Grass). The native species present include *Juncus usitatus* (Common Rush), *Paspalum distichum* (Water Couch) and *Centella asiatica* (Indian Pennywort).

An example of this vegetation community is shown in **Photograph 1**.

Photograph 1 RFEF - native canopy with an exotic dominated understorey

3.1.1.2. River-flat Eucalypt Forest - endemic trees (scattered)

BC Act Status: EEC

EPBC Act Status: EPBC Act Status: CEEC but does not conform to listing– the perennial understorey vegetative cover present is not made up of 30% or more of native species and thus does not meet the condition classes and thresholds for the ecological community located in Table 4 of the EPBC Act Listing Advice (DoEE 2019).

This variant of the RFEF occurs as scattered canopy trees in the north-eastern corner of the subject land. It occurs as a canopy of *Eucalyptus tereticornis* (Forest Red Gum) and the ground cover is maintained as a lawn dominated by *Stenotaphrum secundatum* (Buffalo Grass), *Cenchrus clandestinus* (Kikuyu) and *Cynodon dactylon* (Couch Grass).

An example of this vegetation community is shown in **Photograph 2**.

Photograph 2 RFEF – scattered endemic trees (showing lawn underneath trees behind buildings in the south western corner of the subject land).

3.1.2. Cumberland Plains Woodland – endemic trees (scattered)

Statewide Class: Coastal Valley Grassy Woodlands

NSW PCT: 849 Grey Box – Forest Red Gum Grassy Woodland on Flats of the Cumberland Plain, Sydney Basin.

BC Act Status: CEEC

EPBC Act Status: CEEC, but does not conform to listing –the patch size of the ecological community is less than 0.5ha in area and thus does not meet any of the Condition Thresholds for Patches located in Table 1 of the EPBC Act Listing Advice (DEWHA 2010).

Cumberland Plains Woodland (CPW) is a threatened ecological community (TEC) found throughout the Cumberland Plain. It is one of the plant communities associated with clay-rich shale soil. Tozer *et al.* (2010) define the primary habitat for the community as occurring at elevations less than 150 meters above sea level with some sites occurring at higher elevations where the landscape remains gently inclined. The main canopy species include *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus fibrosa* (Red Ironbark) and *Eucalyptus crebra* (Narrow-leaved Ironbark).

This variant of the CPW occurs as scattered trees within the centre of the subject land and along the western edge where trees from the neighbouring lot overhang the site. It occurs as a canopy of *Eucalyptus tereticornis*

(Forest Red Gum) above a shrub stratum consisting of *Solanum sisymbriifolium* and the ground cover is dominated by *Cenchrus clandestinus* (Kikuyu), *Paspalum dilatatum* (Paspalum) and *Cynodon dactylon* (Couch Grass).

An example of this vegetation community is shown in **Photograph 3**.

Photograph 3 Cumberland Plain Woodland in the form of scattered endemic trees

3.1.3. Exotic Vegetation

BC Act Status: Not listed

EPBC Act Status: Not Listed

Exotic vegetation occurs throughout the subject land primarily around the dwellings located on the subject site.

It consists of planted garden beds and exotic trees such as *Platanus* × *acerifolia* (London Plane), *Fraxinus angustifolia*, *Phoenix canariensis* (Canary Island Date Palm), *Schinus Molle* (Pepper Tree) and *Jacaranda mimosifolia* (Jacaranda). These exotic trees include established fruit trees such as *Prunus persica* (Peach) and *Citrus sinensis* (Orange Tree). Other exotic species present include *Solanum sisymbriifolium*, *Senecio madagascariensis* (Fireweed), *Stenotaphrum secundatum* (Buffalo Grass), *Cenchrus clandestinus* (Kikuyu) and *Hypochaeris radicata* (Cats-ear).

This community does not comprise a defined native vegetation unit and does not conform to a listing under either the BC Act or EPBC Act. An example of this vegetation community is shown in **Photograph 4**.

Photograph 4 Exotic Vegetation

3.1.4. Exotic Grassland

BC Act Status: Not listed

EPBC Act Status: Not Listed

Exotic grassland is the dominant vegetation type and is found throughout the entire land. It is dominated by the grass species *Paspalum dilatatum* (Paspalum), *Cenchrus clandestinus* (Kikuyu Grass), *Cynodon dactylon* (Couch) and *Eragrostis curvula* (African Lovegrass). Other grass species present to a lesser extent include *Stenotaphrum secundatum* (Buffalo Grass) and *Lolium perenne* (Perennial Ryegrass). Other exotic species present include and *Rumex crispus* (Curly Dock).

This community does not comprise a defined native vegetation unit and does not conform to a listing under the BC Act or EPBC Act. An example of this vegetation community is shown in **Photograph 5.**

Photograph 5 Exotic Grassland

3.1.5. Cultivated Non-endemic Trees and Shrubs

BC Act Status: Not listed

EPBC Act Status: Not Listed

Non-endemic native trees and shrubs have been planted primarily within garden beds and around the dwellings in the west of the subject land. The species include *Lophostemon confertus* (Brush Box), *Grevillea robusta* (Silky Oak), *Callistemon viminalis* (Weeping Bottlebrush), *Callistemon citrinus* (Crimson Bottlebrush) and *Eucalyptus robusta* (Swamp Mahogany).

An example of this vegetation community is shown in **Photograph 6**.

Photograph 6 Cultivated Non-endemic Trees and Shrubs

3.1.6. *Typha orientalis* (Bulrush) dominated

BC Act Status: Not listed

EPBC Act Status: Not Listed

The native *Typha orientalis* (Bulrush) is associated with the dam acting as a retention basin in the south of the subject land. This vegetation does not conform to the BC Act listed Freshwater Wetlands as it is within an artificially created area specifically excluded from the community's final determination (NSW Scientific Committee 2010). This vegetation type surrounds the dam and extends northeast along the northern edge of the drainage line adjacent to the exotic grassland. The vegetation is dominated by *Typha orientalis* (Bulrush) and to a much lesser extent by *Juncus usitatus* (Common Rush). Other species present include *Persicaria decipiens* (Slender Knotweed), *Rubus fruticosus* spp. agg. (Blackberry Complex) and *Rumex crispus* (Curly Dock).

An example of this vegetation community is shown in **Photograph 7**.

Photograph 7 *Typha orientalis* (Bulrush) dominated vegetation within dam

3.1.7. *Rubus fruticosus* (Blackberry Complex)

BC Act Status: Not listed

EPBC Act Status: Not Listed

Rubus fruticosus spp. agg. (Blackberry Complex) is present as a large patch infestation along the eastern boundary of the subject site. Its presence is associated with the drainage line adjacent to the boundary. The dominant species is *Rubus fruticosus* spp. agg. (Blackberry Complex). No other species were recorded associated with this vegetation type.

This community does not comprise a defined native vegetation unit and does not conform to a listing under the BC Act or EPBC Act *Rubus fruticosus* spp. agg. is classified as a Priority Weed under the NSW *Biosecurity Act 2015* and a Weed of National Significance (WoNS).

An example of this vegetation community is shown in **Photograph 8**.

Photograph 8 *Rubus fruticosus* (Blackberry Complex)

3.1.8. Erythrina crista-galli (Cockspur Coral Tree)

Erythrina crista-galli (Cockspur Coral Tree) is associated with a drainage line that traverses the subject site from the dam in the south to the eastern boundary of the subject land. The vegetation type is bounded by *Typha orientalis* and the species propagules are dispersed by water. Other species associated with this vegetation type include *Typha orientalis* (Bulrush), *Rubus fruticosus* (Blackberry Complex) and *Rumex crispus* (Curly Dock).

This community does not comprise a defined native vegetation unit and does not conform to a listing under the BC Act or EPBC Act.

3.2. Flora

3.2.1. General Species

One hundred and sixty-nine (169) flora species were recorded within the subject land during field surveys, including 41 native species and 128 exotic species. Of the native species recorded in the subject land, the most frequently recorded plant families include the Poaceae (9), Myrtaceae (7) and Chenopodiaceae (4) families. Of the exotic species recorded in the subject land, the most frequently recorded plant families include the Asteraceae (18), Poaceae (17) and Fabaceae (Faboideae) (5).

The floral assemblage across the subject land is a reflection of previous clearing for urban development and current land uses which have resulted in the subject site being dominated by exotic ground cover and

understorey, combined with native canopy species. A total species list for the subject land is provided in **Appendix A**.

3.2.2. Priority Weeds and Weeds of National Significance

A total of 19 weeds recorded within the subject land are listed as State Priority (SP) weeds, Regional Priority (RP) weeds, Other Weeds of Regional Concern (OWRC) or Weeds of National Significance (WoNS) under the *Biosecurity Act 2015* and the Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022 (LLS: Greater Sydney 2017). These are identified in **Table 3**.

Table 3 Priority Weeds and WoNS recorded within the subject site

Family	Scientific Name	Common Name	Weed Status
Alliaceae	*Agapanthus praecox*	Agapanthus	OWRC
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	OWRC
Arecaceae	*Syagrus romanzoffiana*	Cocos Palm	OWRC
Asteraceae	*Senecio madagascariensis*	Fireweed	SP, WoNS
Cactaceae	*Opuntia stricta*	Common Prickly Pear	SP, WoNS
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle	OWRC
Convolvulaceae	*Ipomoea indica*	Morning Glory	OWRC
Fabaceae (Caesalpinioideae)	*Senna pendula*	Winter Cassia	OWRC
Fabaceae (Faboideae)	*Erythrina crista-galli*	Cockspur Coral Tree	OWRC
Fabaceae (Faboideae)	*Robinia pseudoacacia*	Black Locust	OWRC
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	OWRC
Oleaceae	*Olea europaea* subsp. *cuspidata*	African Olive	RP
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	OWRC
Poaceae	*Chloris gayana*	Rhodes Grass	OWRC
Poaceae	*Eragrostis curvula*	African Lovegrass	OWRC
Rosaceae	*Rubus fruticosus* spp. agg.	Blackberry Complex	SP, WoNS
Rutaceae	*Murraya paniculata*	Mock Orange	OWRC
Salviniaceae	*Salvinia spp.*	Salvinia	SP, WoNS
Verbenaceae	*Lantana camara*	Lantana	SP, WoNS

Key: RP = Regional Priority, SP = State Priority, WoNS = Weed of National Significance, OWRC = Other Weed of Regional Concern.

3.2.3. Threatened Species

No threatened flora species have been recorded within the subject site or are likely to occur. The understorey vegetation in the subject site is too disturbed and is comprised mostly of previously cleared areas and exotic

grasses and other weeds. An analysis of the likelihood of occurrence within the subject site for all threatened flora species recorded within the locality or that have the potential to occur due to the presence of suitable habitat is provided in **Appendix B**. Of the 25 threatened flora species known or predicted to occur within the locality, none are considered likely to occur within the subject site.

3.3. Fauna

3.3.1. Fauna Habitat

The majority of the subject land, especially the understorey and ground cover, is comprised of a mixture of exotic and native vegetation which has limited value for native fauna. The canopy consists of mature RFEF and CPW which may provide foraging habitat for microchiropteran bats and native birds. Some these trees are being retained in the subject land all trees within the subject site are being retained as part of the Project.

Habitat features recorded on the subject land include:

- Log piles/wood debris – providing shelter for reptiles and amphibians. This feature is scattered throughout the subject land but located mostly in the southern half of the subject land;
- Rock/metal piles – providing shelter for reptiles, amphibians and small mammals. This feature is scattered throughout the subject land;
- Palm trees with fronds – providing shelter for birds and amphibians. This feature is restricted to the planted trees around the dwellings in the north-western portion of the subject land.;
- Tree hollows – providing roosting and shelter for birds, arboreal mammals and microchiropteran bats. This feature was restricted to two trees located along the boundary between 207 and 209 Grange Avenue;
- Small artificial pond - providing shelter for amphibians and reptiles. This feature is restricted to the area located in the middle of the subject land, between the shed and the chicken coop;
- Dam and drainage line – providing shelter for amphibians and reptiles. This feature is restricted to the area located in the south-eastern corner of the subject land; and
- Nectar-producing trees - foraging habitat for insects, blossom-dependant birds, arboreal mammals and megachiropteran bats (flying-foxes). These features were confined to forested areas and areas where remnant canopy trees occur above an exotic dominated ground layer.

The location of each habitat feature is shown in **Figure 5**.

3.3.2. General Species

Nineteen (19) vertebrate fauna species have been recorded from the subject site during surveys. A total species list for the subject land is provided in **Table 4**. None of these species are listed under the BC Act or EPBC Act.

A number of introduced species were recorded during field surveys, including common farm animals such as chickens, goats and sheep as well as introduced feral birds including the Common Myna (*Acridotheres tristis*).

Table 4 Fauna Species List

Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	Observation Type
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		-	-	O/W
Acanthiza pusilla	Brown Thornbill		-	-	O/W
Acridotheres tristis	Common Myna	*	-	-	O/W
Anas superciliosa	Pacific Black Duck		-	-	O
Capra aegagrus hircus	Domestic Goat	*	-	-	O/W
Corvus coronoides	Australian Raven		-	-	O
Cracticus tibicen	Australian Magpie		-	-	O/W
Cryptoblepharus pulcher	Elegant Snake-eyes Skink		-	-	O
Gallus gallus domesticus	Chicken	*	-	-	O/W
Grallina cyanoleuca	Magpie-Lark		-	-	O/W
Hirundo neoxena	Welcome Swallow		-	-	O
Lampropholis guichenoti	Common Garden Skink		-	-	O
Lymnodynastes peronii	Striped Marsh Frog		-	-	W
Malurus cyaneus	Superb Fairywren		-	-	O/W
Manorina melanocephala	Noisy Miner		-	-	O/W
Ocyphaps lophotes	Crested Pigeon		-	-	O/W
Ovies aries	Sheep	*	-	-	O/W
Rhipidura leucophrys	Willie Wagtail		-	-	O/W
Trichoglossus moluccanus	Rainbow Lorikeet		-	-	O/W

Key: O = Observed, W = heard

3.3.3. Threatened Species

No threatened fauna species were recorded within the subject site during surveys. An analysis of the likelihood of occurrence within the subject site for all threatened fauna species recorded within the locality or that have the potential to occur due to the presence of suitable habitat is provided in **Appendix B**. Of the 54 threatened and migratory species known or predicted to occur within the locality, a total of 14 have been assessed as having potential to occur within the subject site. These are considered in more detail in subheadings below.

3.3.3.1. Green and Golden Bell Frog

The Green and Golden Bell Frog (*Litoria aurea*) is listed as Endangered under the BC Act and Vulnerable under the EPBC Act. This species was once widespread along the eastern coast of Australia, it now occurs as small, scattered populations around Sydney, Shoalhaven and mid-north coast of New South Wales. This species inhabits unshaded waterbodies such dams and streams with emergent aquatic vegetation (e.g. *Typha* and *Eleocharis* spp) that have a grassy area nearby and often includes disturbed areas. The Green and Golden Bell Frog feeds primarily on insects but can also eat other frogs, whilst tadpoles feed on algae and other plant matter (OEH 2017).

The BioNet Atlas holds four records of the Green and Golden Bell Frog within the locality. It is expected that this species has the potential to utilise the drainage line within the subject site and adjacent dam has habitat. This habitat may form part of a greater range which expands along the drainage line from the dam to Bells Creek in the adjacent lot to the east.

3.3.3.2. White-bellied Sea-eagle

The White-bellied Sea-eagle (*Haliaeetus leucogaster*) is listed as Vulnerable under the BC Act. This species is widely distributed around the coast of Australia and is also found along inland rivers and waterways in New South Wales. This species inhabits a wide range of habitats characterised by the presence of open water such as rivers, dams, lakes and the sea. The White-bellied Sea-Eagle forages primarily on fish and freshwater turtles, but will also eat waterbirds, reptiles, mammals and carrion. This species creates large stick nests in large emergent eucalypts often containing dead branches (OEH 2019h).

The BioNet Atlas holds three records of the White-bellied Sea-eagle within the locality. It is expected that this species has potential to forage within the canopy trees found along the drainage line within the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the east. It is unlikely that the species utilises the subject site for nesting purposes as no large stick nests were observed during surveys.

3.3.3.3. Little Eagle

The Little Eagle (*Hieraaetus morphnoides*) is listed as Vulnerable under the BC Act. This species is distributed throughout the Australian mainland except densely forested escarpments. This species is found in open eucalypt forests or woodlands, as well as *Acacia* and riparian woodlands. The Little Eagle preys on birds, reptiles and mammals, occasionally foraging on large insects and carrion. This species builds like stick nests in a tall living, remnant tree (DPIE 2019a).

The BioNet Atlas holds 11 records of the Little Eagle within the locality. It is expected that this species has potential to forage within the canopy trees found along the drainage line within the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the east. It is unlikely that the species currently utilises the subject site for nesting purposes as no large stick nests were observed during surveys.

3.3.3.4. Square-tailed Kite

The Square-tailed Kite (*Lophoictinia isura*) is listed as Vulnerable under the BC Act. This species is distributed along the coastal and subcoastal areas of northern Australia, Queensland, New South Wales and Victoria. In New South Wales, this species is mostly found along river systems. This species is found in a variety of habitats, including woodlands and open forest and prefers a timbered watercourse. The Square-tailed Kite occupies a wide foraging range of more than 100 km^2. It forages on prey items such as passerine birds and insects in the tree canopy. This species nests in tree forks or on large horizontal tree limbs located along or in the vicinity of watercourses (DPIE 2019b).

The BioNet Atlas holds one record of the Square-tailed Kite within the locality. It is expected that this species has potential to forage within the canopy trees found along the drainage line within the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species

which encompasses the adjacent vegetation along Bells Creek to the east. Although not sighted during surveys, this species also has the potential to nest in the woody vegetation within the subject site.

3.3.3.5. Dusky Woodswallow

The Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) is listed as Vulnerable under the BC Act. This species is widespread in eastern and southern Australia and occurs throughout New South Wales. This species primarily inhabits dry, open eucalypt forest with open understorey ground cover and sedges and woody debris, and is also found in farmland on the edges of forests or woodlands. The Dusky Woodswallow primarily forages on invertebrates such as insects which are captured above the canopy or over water. This species also occasionally forages on seeds, nectar and fruit (OEH 2018a).

The BioNet Atlas holds 37 records of the Dusky Woodswallow within the locality. It is expected that this species has potential to forage within the canopy trees found within the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the east. Although not sighted during surveys, this species also has the potential to nest in the woody vegetation within the subject site.

3.3.3.6. Powerful Owl

The Powerful Owl (*Ninox strenua)* is listed as Vulnerable under the BC Act. The species inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest (OEH 2019f). Optimal habitat includes a tall shrub layer and abundant hollows supporting high densities of arboreal marsupials (DEC (NSW) 2006). The main prey items of this species are medium-sized arboreal marsupials, particularly the Greater Glider, Common Ringtail Possum and Sugar Glider, with birds and flying foxes occasionally being consumed (OEH 2019f). Roosting occurs in groves of dense mid-canopy trees or tall shrubs in sheltered gullies, typically on wide creek flats and at the heads of minor drainage lines, but also adjacent to cliff faces and below dry waterfalls (DEC (NSW) 2006). This species nests in old hollow eucalypts in unlogged, unburnt gullies and lower slopes within 100 m of streams or minor drainage lines, with hollows greater than 45 cm diameter and greater than 100 cm deep; surrounded by canopy trees and sub-canopy or understorey trees or tall shrubs (DEC (NSW) 2006). In NSW, the Powerful Owl is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains (OEH 2019f).

The BioNet Atlas holds two records of the Powerful Owl within the locality. It is expected that this species has potential to forage within the canopy trees found within the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the east. The species would be unlikely to nest within the subject site as no suitably large tree hollows were observed.

3.3.3.7. Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable under the BC Act and the EPBC Act. The Grey-headed Flying-fox inhabits subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH 2019e). The primary food source is blossom from eucalypts (genera *Eucalyptus*, *Corymbia* and *Angophora*), melaleucas and banksias,

and in some areas it also utilises a wide range of rainforest fruits (DoE 2019). As none of the vegetation communities used by this species produces continuous foraging resources throughout the year, it has adopted complex migration traits in response to ephemeral and patchy food resources (DoE 2019). Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy (OEH 2019e). The Grey-headed Flying-fox is generally found within 200 km of the eastern coast of Australia, from Bundaberg in Queensland to Melbourne in Victoria (OEH 2019e).

The BioNet Atlas holds 70 records of the Grey-headed Flying-fox within the locality. It is expected that this species has potential to forage within the Eucalyptus canopy vegetation of the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the west. This species is not likely to roost or breed in the subject site as no camps are present within the subject site.

3.3.3.8. Yellow-bellied Sheathtail-bat

The Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) is listed as Vulnerable under the BC Act. The species occurs across northern and eastern Australia. It is found in various habitats both with and without trees. The species predominantly roosts in tree hollows but also roosts in buildings. The Yellow-bellied Sheathtail-bat forages for insects over the forest canopy (OEH 2019i).

The BioNet Atlas holds six records of the Yellow-bellied Sheathtail-bat within the locality. It is expected that this species has potential to forage within RFEF canopy vegetation of the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species, encompassing the adjacent vegetation along Bells Creek to the east.

3.3.3.9. Little Bent-wing Bat

The Little Bent-wing Bat (*Miniopterus australis*) is listed as Vulnerable under the BC Act. The Little Bent-wing Bat has a large distribution which extends from along the east coast of Australia, from Cape York in Queensland to Wollongong in New South Wales. The species is known to roost in tree hollows, caves and man-made structures such as drains, culverts and bridges. The Little Bent-wing Bat generally forages for insects in well-vegetated areas (EES 2020b).

The BioNet Atlas holds four records of the Little Bent-wing Bat within the locality. It is expected that the species has potential to forage within the RFEF vegetation in the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species, encompassing the adjacent vegetation along Bells Creek to the east.

3.3.3.10. Large Bent-wing Bat

The Large Bent-wing Bat (*Miniopterus oriane oceanensis)* is listed as Vulnerable under the BC Act. The Large Bent-wing Bat has a large distribution throughout the east and north-west coasts of Australia. The species is known to roost primarily in caves but may also utilise storm-water tunnels, buildings and other urban habitats. Populations are typically centred on maternity caves during the breeding season (spring to summer) with dispersal of up to 300 km at other times of the year. The species forages for insects above the canopy in wooded areas (OEH 2019b).

The BioNet Atlas holds 22 records of the Large Bent-wing Bat within the locality. It is expected that this species has potential to forage within the RFEF canopy vegetation of the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species, encompassing the adjacent vegetation along Bells Creek to the east.

3.3.3.11. Eastern Freetail-bat

The Eastern Coastal Free-tailed Bat (*Micronomuss norfolkensis*) is listed as Vulnerable under the BC Act. The Eastern Coastal Free-tailed Bat is distributed along the east coast from southern QLD to southern NSW. The species inhabits dry sclerophyll forest and woodland east of the Great Dividing Range. It roosts singly and communally, mainly in tree hollows but will also roost under decorticating bark or in man-made structures (OEH 2019d).

The BioNet Atlas holds 17 records of the Eastern Coastal Free-tailed Bat within the locality. It is expected that this species could forage within the RFEF canopy vegetation of the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the east.

3.3.3.12. Eastern False Pipistrelle

The Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) is listed as Vulnerable under the BC Act. The Eastern False Pipistrelle is distributed along the south-east coast and ranges of Australia. It inhabits moist habitats with trees taller than 20 m. The species generally roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings. It preys on insects above or just below tree canopy and forages up to 12 km from roost sites (OEH 2019c).

The BioNet Atlas holds six records of the Eastern False Pipistrelle within the locality. It is expected that this species has potential to forage within the RFEF canopy vegetation of the subject site. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species, encompassing the adjacent vegetation along Bells Creek to the east.

3.3.3.13. Southern Myotis

The Southern Myotis (*Myotis macropus*) is listed as Vulnerable under the BC Act. The species is found from the north-west through to western Victoria along the coast. It forages over pools and streams. The Southern Myotis roosts in groups of 10-15 close to water in caves, but can also roost in mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage (OEH 2019g).

The BioNet Atlas holds 14 records of the Southern Myotis within the locality. It is expected that this species has the potential to forage over the drainage line located within the subject site as well as the adjacent dam. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the east.

3.3.3.14. Greater Broad-nosed Bat

The Greater Broad-nosed Bat (*Scoteanax rueppellii*) is listed as Vulnerable under the BC Act. The species is found mainly in gullies and river systems of the Great Dividing Range. It usually roosts in tree hollows but is

also occasionally found in buildings. It forages for beetles and insects in open woodlands and dry forests, flying along creeks and rivers (EES 2020a).

The BioNet Atlas holds seven records of the Greater Broad-nosed Bat within the locality. It is expected that this species has the potential to forage over the drainage line located within the subject site as well as the adjacent dam. The foraging habitat within the subject site is considered likely to form part of a wider foraging range for the species which encompasses the adjacent vegetation along Bells Creek to the east.

4. Impact Assessment

4.1. Introduction

This chapter considers the ecological impacts of the Project on the biodiversity values within the subject site only as the rest of the subject land is biocertified land. The consolidation, earthworks and construction of the three dwellings and road will result in localised soil disturbance and the removal of vegetation within and directly surrounding the proposed development within the subject land.

The Project is not anticipated to any direct impacts on the subject site as the Project footprint is predominantly located within the northern section of the subject land, away from the subject site. A temporary flood basin is proposed to be installed in the eastern area adjacent to the subject site. However no removal of vegetation is proposed within the subject site. The flood basin will require the removal of 0.138 ha of vegetation, including 0.015 ha of degraded RFEF, 0.118 ha of exotic grassland, 0.003 ha of Blackberry and 0.002 ha of Coral Tree, all of which is located outside of the subject site. Secondary impacts due to potential indirect impacts are also relevant to the Project and are discussed below.

4.2. Direct Impacts

The direct impacts of the Project include clearing within the Project footprint, and removal of associated habitat, which is predominantly located in the northern section of the subject land and does not include the subject site. A temporary flood basin is proposed to be installed in the area adjacent to the subject site, however will not have a direct impact on the subject site. The extent of impacts from the proposed development on vegetation communities within the subject land is shown in **Table 5** and **Figure 7**.

Table 5 Extent of impacts from the Project

Vegetation Community	Subject Land (ha)	Project Footprint (ha)	Subject Site (ha)
River-flat Eucalypt Forest (Degraded)	0.12	0.01	0.00
River-flat Eucalypt Forest (Scattered Trees)	0.04	0.04	0.00
Cumberland Plain Woodland (Scattered Trees)	0.08	0.001	0.00
Non-endemic Native	0.07	0.07	0.00
Typha orientalis	0.04	0.00	0.00
Exotic Vegetation	0.25	0.19	0.00
Exotic Grassland	2.16	0.84	0.00
Coral Tree (*Erythrina crista-galli*)	0.03	0.002	0.00
Blackberry (*Rubus fruticosus* spp. Agg.)	0.01	0.003	0.00
Dam	0.02	0.00	0.00
Cleared Land	0.46	0.37	0.00
TOTAL	**3.28**	**1.53**	**0.00**

4.3. Indirect Impacts

4.3.1. Edge Effects

Edge effects are impacts that occur at the interface between natural habitats, especially forests and disturbed or developed land (Yahner 1988). When an edge is created between woodland and a cleared area, changes to ecological processes within the vegetation can extend between 10 m and 100 m from the edge (Yahner 1988). These include microclimatic changes in light, temperature, humidity and wind, which can favour a suite of different species and therefore cause significant changes to the ecology of the patch (Lindenmayer and Fischer 2006). Edge effects can also result from the increase in noise and artificial light from a project.

The Project is not considered likely to result in significant edge effects to vegetation within the subject site. The Project footprint is predominantly located in the opposite corner of the lot from the subject site and a buffer of exotic grassland already exists between the subject site and the current extent of the dwelling which will remain between the boundary of the Project footprint and the subject site. The proposed temporary flood basin in the south-eastern corner of the subject land will be located at a distance of 5 m from the edge of the subject site, well outside the canopy and root zone of existing trees. The Project is therefore not anticipated to have an adverse indirect impact to either the short-term and long-term health of the trees within the subject site. The removal of a small area of vegetation within the subject land proposed as part of the Project is unlikely to result in edge effects on the subject site.

4.3.2. Construction Impacts

A number of indirect impacts relevant to the construction phase of the Project have the potential to impact the remaining ecological values of the subject site, such as those relating to dust, noise, light and erosion.

4.3.2.1. Noise

Noise can affect animal physiology and behaviour, and if it becomes an ongoing stress, it can be injurious to an animal's energy budget, reproductive success and long-term survival. There are other potential impacts that include habitat loss through avoidance, reduced reproductive success and a retreat away from favourable habitats (AMEC 2005).

It is likely that most animal species will habituate to the periodic noise disturbance (AMEC 2005), and the construction phases of the Project are likely to cause temporary disturbance only to fauna. In the long term, the levels of noise are likely to only be marginally higher than existing levels in a semi-rural environment to which resident fauna will habituate over time and are not expected to have a significant, long-term, impact on any wildlife populations.

4.3.2.2. Light

The Project has the potential to increase the level of artificial light in the natural environment. Increased light levels may adversely impact wildlife by direct glare, chronic or periodic increased illumination and temporary unexpected fluctuations in light levels (Saleh 2007, Longcore and Rich 2010).

While the Project will have some effect on the surrounding environment, the impacts from light pollution are likely to be minimal. The subject site is located in a semi-rural environment that is already subject to levels of artificial light from surrounding dwellings and traffic. Although the Project will include the installation of street lighting along the proposed road surrounding the dwellings, this type of lighting will be directed downwards and will only result in a potential marginal increase in light spill on the subject site located on the opposite side of the lot to which fauna will habituate over time. Therefore light pollution from the Project is unlikely to have a significant or long-term impact on any fauna species.

4.3.2.3. Erosion

During the construction of the proposed project the retained vegetation can be impacted by sedimentation and erosion. Cutting and filling of the subject site for foundations is likely to increase potential erosion. Eroded sediment can smother retained vegetation if appropriate control measures are not implemented. Smothering can reduce regeneration of groundcover species and enter drainage lines. Sediment and eroded material can also contain weed matter and nutrients, and movement of this material into the retained vegetation can facilitate the spread of weeds. Increased weed invasion can result in changes to community composition.

With the implementation of appropriate sediment control methods, the risk of sedimentation is considered to be minor and temporary.

4.4. Impacts to Threatened Ecological Communities

4.4.1. River Flat Eucalypt Forest

The RFEF found within the subject site consists primarily of a native canopy over a degraded and exotic-dominated understorey. Since the subject site is located outside of the development footprint for the Project, all the RFEF vegetation is being retained. The installation of the temporary flood basin will require the removal of 0.015 ha of RFEF, located outside of the subject site. Consequently, no fragmentation of this ecological community within the subject site, subject land, or locality will occur as a consequence of the Project.

Indirect impacts in this community will be managed through the implementation of suitable management techniques such as erosion and sediment controls. The installation of the temporary flood basin is not expected to result in an increase in groundwater. Nevertheless, the existing RFEF within the subject site is already subject to periodic flooding and this vegetation community is characterised by its occurrence in wet soils with poor drainage. Any unexpected increase in groundwater as a consequence of the flood basin is therefore not anticipated to have an adverse impact on RFEF within the subject site, subject land, or locality.

Additionally, the subject site will encompass an area that will be subject to regeneration and management under an associated Vegetation Management Plan (VMP) prepared for the Project (ref. 21008RP2). The vegetation within the subject site will be protected and managed for a period of five years under the VMP requirements.

A Test of Significance has been conducted for RFEF and is presented in **Appendix D**. This assessment indicates that no significant impact to RFEF is expected to occur as a result of the Project.

4.5. Impact to Threatened Flora Species

No threatened flora species are considered to have the potential to occur naturally within the subject site due to the subject site's highly modified nature. Therefore, the proposed development is unlikely to impact on any threatened flora species listed under the BC Act or EPBC Act, or suitable habitat for threatened species.

4.6. Impacts to Threatened Fauna Species

No threatened fauna species were observed within the subject site during the time of field surveys. A total of eight threatened fauna species listed under the BC Act, two of which are also listed under the EPBC Act, are considered to have the potential to occur within the subject site due to the presence of suitable habitat. These include the Green and Golden Bell Frog, raptors, the Dusky Woodswallow, the Powerful Owl, the Grey-headed Flying-fox and microchiropteran bats.

Tests of Significance were undertaken for all species considered to have the potential to occur within the subject site (see **Appendix D**). Groups of species that share similar habitat requirements were assessed collectively and are summarised below. The assessed species are not considered to be significantly impacted by the project and subsequently, assessment under the BAM is not required.

4.6.1. Green and Golden Bell Frog

The Green and Golden Bell Frog is considered to have the potential to occur within the subject site due to the presence of the drainage line as well as proximity to the adjacent dam. The habitat within the subject site as well as the adjacent dam do not form part of the development footprint for the Project and will therefore remain with no direct impacts and very limited indirect impacts which will be managed through appropriate controls (e.g. erosion and sediment control and revegetation works specified in the VMP). Additionally, the proposed flood basin located adjacent to the subject site will be revegetated with aquatic and fringing vegetation which will provide additional habitat for the Green and Golden Bell Frog. This species may use the subject site as part of a broader range which includes the drainage line and vegetation along Bells Creeks located in the adjacent lot to the east.

A Test of Significance has been prepared for this species and is presented in **Appendix D**. This assessment indicates that the proposed development is unlikely to have a significant impact on this species.

4.6.2. Raptors

- White-bellies Sea-Eagle (*Haliaeetus leucogaster*);
- Little Eagle (*Hieraaetus morphnoides*); and
- Square-tailed Kite (*Lophoictinia isura*).

The above raptor species all have the potential to occur within the subject site as potential foraging habitat is present. However, these species is highly mobile and would likely utilise the subject site on occasion as part of a much broader foraging range. These species are unlikely to utilise the subject site for roosting purposes as no large stick nests were observed. It is more likely that these species roosts in the adjacent vegetation along

Bells Creek and may forage within the subject site. All trees within the subject site are being retained, therefore the Project is not expected to have a significant impact on these species.

A Test of Significance has been prepared for this group of species and is presented in **Appendix D**. This assessment indicates that the proposed development is unlikely to have a significant impact on these species.

4.6.3. Dusky Woodswallow

The Dusky Woodswallow is considered to have the potential to occur within the subject site as potential foraging and nesting habitat is present. This species is highly mobile and would likely utilise the subject site on occasion as part of a much broader foraging range. Additionally, all trees within the subject site are being retained, therefore the Project is not expected to have a significant impact on this species.

A Test of Significance has been prepared for this species and is presented in **Appendix D**. This assessment indicates that the proposed development is unlikely to have a significant impact on this species.

4.6.4. Powerful Owl

The Powerful Owl is considered to have the potential to occur within the subject site as potential foraging habitat is present. However, this species is highly mobile and would likely only utilise the subject site on occasion as part of a much broader foraging range. This species is unlikely to utilise the subject site for roosting purposes as no suitably large hollows for roosting are present. It is more likely that the species roosts in the adjacent vegetation along Bells Creek and may forage within the subject site. All trees within the subject site are being retained, therefore the Project is not expected to have a significant impact on this species.

A Test of Significance has been prepared for this species and is presented in **Appendix D**. This assessment indicates that the proposed development is unlikely to have a significant impact on this species.

4.6.5. Grey-headed Flying Fox

The Grey-headed Flying-fox is considered to have the potential to utilise the subject land for foraging purposes as part of a much broader foraging range. All trees within the subject site are being retained, therefore the Project is not expected to have a significant impact on this species. They roost/breed in camps which do not occur within the subject land.

A Test of Significance has been prepared for this species and is presented in **Appendix D**. This assessment indicates that the proposed development is unlikely to have a significant impact on this species.

4.6.6. Microchiropteran Bats

- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*);
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*);
- Little Bent-winged Bat (*Miniopterus australis*);
- Greater Broad-nosed Bat
- Southern Myotis (*Myotis macropus*);

- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*); and
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).

The above listed seven microchiropteran bat species are considered to have the potential to utilise the subject land for foraging purposes. These species are highly mobile and would likely utilise the subject site as part of a much broader foraging range encompassing the vegetation surrounding Bells Creek to the east. All trees within the subject site are being retained, therefore the Project is not expected to have a significant impact on these species.

A Test of Significance has been prepared for these species and is presented in **Appendix D**. This assessment indicates that the proposed development is unlikely to have a significant impact on these species.

4.7. Impacts to Riparian Corridors

The subject site contains a riparian corridor represented by the unnamed drainage line which runs from the dam in the adjacent lot, north-east across the subject site into Bells Creek in the adjacent lot to the east. This unnamed water courses has been classified as a first order stream under the WM Act. Bells Creek, which is located outside of the subject land on the adjacent lot to the east has been classified as a second order stream under the WM Act.

Riparian corridors consist of the following components (DPI 2018):

- The channel which comprises the bed and banks of the watercourse (to the highest bank); and
- The vegetated riparian zone (VRZ) adjoining the channel.

The width of the VRZ is required to be measured from the top of the highest bank on both sides of the watercourse (DPI 2018). The NSW Office of Water's guidelines state that the following VRZ buffers should apply as 'prescribed distances', and are based on the watercourse order as classified under the Strahler System of ordering watercourses:

- 1st order watercourse: 10 m each side of watercourse (20 m + channel width);
- 2nd order watercourse: 20 m each side of watercourse (40 m + channel width);
- 3rd order watercourse: 30 m each side of watercourse (60 m + channel width); and
- 4th order watercourse and greater (including estuaries, wetlands, and any parts of rivers influenced by tidal waters): 40 m (80 m + channel width).

As such, riparian buffers of 10 m along the unnamed watercourse within the subject site as well as a 20 m buffer along Bells Creek are be required to be established. The currently proposed design for the development footprint of the Project is located outside of the VRZ zone of the unnamed watercourse present within the subject site, except for the temporary flood basin which is located within the outer 50% of the VRZ zone (i.e. 5 m from the edge of the basin walls to the creek line). This is however not expected to have a significant

impact on the mapped unnamed watercourse present within the subject site provided appropriate erosion and sediment control measures are implemented.

4.7.1. Impacts to Bells Creek from Stormwater Outlet

Although Bells Creek is not located within the subject land, the Stormwater Management Plan design for the Project includes a stormwater discharge outlet which will carry stormwater runoff from the proposed road and residential buildings along Grange Avenue via a proposed drainage line and discharge downstream into Bells Creek via a headwall (S&G Consultants 2020). As detailed in the Civil Works Concept Design for the Project prepared by S&G Consultants in February 2020, all stormwater runoff will be treated so that it does not exceed a total suspended solid concentration greater than 50 mg/L in accordance with environmental guidelines. Additionally, the headwall outlet into Bells Creek will include river gravel, geotextile fabric as well as planting of sedges and rushes which will further filter the stormwater runoff as it enters the creek. Rock boulders of approximately 600 mm will also be installed at the outlet in order to dissipate energy from the stormwater runoff. Furthermore, the RFEF community that is currently found around Bells Creek is characterised by wet soils. The potential increase in water volume entering the creek is therefore not expected to have a significant impact on the existing vegetation around Bells Creek.

5. Mitigation Measures

5.1. Introduction

The purpose of this chapter is to outline the mitigation measures proposed to ameliorate the impacts of the Project on biodiversity values. As demonstrated in previous chapters, despite the subject site being highly modified, it contains a TEC and provides some habitat for threatened species. As a result, there is a need to implement measures to minimise impacts to these entities. Note that these mitigation measures apply not only to the subject site but to the entirety of the subject land and are further detailed in the accompanying Biodiversity Management Plan for the Project.

5.2. Mitigation Measures

5.2.1. Inductions

Site inductions are to be given by the civil contractor to ensure all site workers and visitors are aware of ecological issues associated with the subject site and the locations of any no access areas.

5.2.2. Access Restrictions

To avoid unnecessary removal or damage to vegetation within the subject land, the clearing area should be clearly demarcated and signed to ensure no vegetation beyond these boundaries is removed. Clearing works and equipment should be excluded from areas outside the clearing area.

5.2.3. Erosion, Sedimentation and Pollution Control

To reduce sedimentation on the construction site, erosion control measures should be implemented. This includes minimising the amount of exposed soils on the site at any given time. All soil stockpiles should be adequately covered when not in use to prevent erosion through heavy rainfall.

Sediment fences should be established around the perimeter of the development area to prevent the impacts of sedimentation on retained vegetation within the subject land, including the drainage line. During development, precautions should be taken to ensure that no pollution, such as petrochemical substances or water containing suspended solids, escapes the construction site. Pollution traps and efficient removal of pollution to an off-site location would help to minimise pollution impacts. Where practicable, the edges of the temporary flood basin should also be revegetated with semi-aquatic and fringing species in order to stabilise the basin walls and minimise erosion.

5.2.4. Pre-clearing and Clearing Surveys

Pre-clearing surveys are to be undertaken by a suitably qualified ecologist. Pre-clearing surveys will include the provision of a report following the completion of a pre-clearing survey, detailing the location and type of each habitat feature.

It is recommended that targeted searches for the Cumberland Plain Land Snail be conducted as part of the pre-clearing surveys to ascertain the presence of this species on the subject land.

To minimise impacts to native fauna species, clearing is to be undertaken in the following two-stage process under the supervision of a suitably qualified ecologist:

- The initial phase of clearing will involve clearing around identified habitat features and leaving the features overnight; and
- The second stage will involve clearing of the habitat features left overnight followed by an inspection.

Provisions will be made to protect any immobile native fauna during clearing activities by the following means:

- All persons working on the vegetation clearing will be briefed about the possible fauna present and should avoid injuring any present;
- Animals disturbed or dislodged during the clearance but not injured should be assisted to move to the adjacent bushland; and
- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal.

5.2.5. Landscaping

For any landscaping works to be undertaken within the subject land, where possible, it is recommended that native plant species endemic to the area and characteristic of RFEF be incorporated into the landscape plan for the subject site. All native re-plantings should be sourced from local nurseries where possible. Further information regarding planting requirements are detailed in the associated VMP for the Project.

5.2.6. Weed Control Measures

Priority weed species occurring within the subject land should be managed in order to prevent further spread. As such, it is recommended that all vegetation removed from the subject land should be disposed of appropriately as identified in the Regional Strategic Weed Management Plan. Weed control measures are outlined in Appendix B of the accompanying VMP for the Project.

6. Conclusion

The Project involves the subdivision and construction of three residential flat buildings and associated works, including roads, demolition of structures, tree removal, access driveways to basement car parking, stormwater drainage and landscaping works. An assessment was undertaken to determine the potential impacts of the Project on the biodiversity values of the subject site, which comprises non-biocertified areas of land as well as land mapped as Existing Native Vegetation located within the subject land. The Project does not trigger the BOS under the BC Act and therefore this FFA has been prepared to document the findings of the ecological assessment undertaken within the subject site.

The subject site comprises approximately 0.02 ha of RFEF, none of which will be impacted by the Project as it is located outside of the development footprint. No trees are being removed and so will not result in the fragmentation of the RFEF community within the subject land or locality. The vegetation present will continue to provide habitat for resident native species. Furthermore, the degraded vegetation within the subject site will be regenerated and managed under the VMP for the Project and will therefore result in the improvement of the biodiversity value of the subject site over time.

The vegetation on the subject site comprises potential foraging habitat for a number of threatened fauna species including the Green and Golden Bell Frog, Raptors, Dusky Woodswallow, Powerful Owl, Grey-headed Flying-Fox and microchiropteran bats. All of these species access resources from a wide area and are unlikely to be entirely dependent on the resources present in the subject site. Nevertheless, since the subject site will not be impacted by the Project, these threatened species will be able to continue using the vegetation within the subject site as foraging and potential roosting/breeding habitat.

The ecological investigation undertaken for this assessment indicates that the anticipated impacts to threatened ecological communities and threatened species habitat are minimal and will not result in significant impacts. Notwithstanding this, a suite of mitigation measures are proposed to minimise the impacts on biodiversity values within the subject site. The subject site is also subject to a separate VMP and Biodiversity Management Plan (BMP).

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APPENDIX A :
Flora Species List

Table 6 Flora species list for the subject land

Family	Scientific Name	Common Name	Exotic	Weed Status
Acanthaceae	*Justicia brandegeeana*		*	
Adoxaceae	*Viburnum odoratissimum* var. *awabuki*		*	
Agavaceae	*Yucca* spp.			
Alliaceae	*Agapanthus praecox*	Agapanthus	*	OWRC
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed		
Amaranthaceae	*Alternanthera pungens*	Khaki Weed	*	
Amaranthaceae	*Amaranthus retroflexus*	Redroot Amaranth	*	
Anacardiaceae	*Pistacia chinensis*	Chinese Pistachio	*	
Anacardiaceae	*Schinus molle*	Pepper Tree	*	
Apiaceae	*Centella asiatica*	Indian Pennywort		
Apiaceae	*Cyclospermum leptophyllum*	Slender Celery	*	
Apiaceae	*Petroselinum crispum*	Parsley	*	
Apocynaceae	*Catharanthus roseus*	Madagascar Periwinkle	*	
Apocynaceae	*Nerium oleander*	Oleander	*	
Araceae	*Colocasia* spp.		*	
Araceae	*Monstera deliciosa*	Fruit Salad Plant	*	
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	*	OWRC
Arecaceae	*Syagrus romanzoffiana*	Cocos Palm	*	OWRC
Aspleniaceae	*Asplenium australasicum*	Bird's Nest Fern		
Asteraceae	*Artemisia arborescens*	Tree Wormwood	*	
Asteraceae	*Aster subulatus*	Wild Aster	*	
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	*	
Asteraceae	*Cirsium vulgare*	Spear Thistle	*	
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	*	
Asteraceae	*Conyza sumatrensis*	Tall fleabane	*	
Asteraceae	*Dimorphotheca ecklonis*	Cape Daisy	*	
Asteraceae	*Eclipta platyglossa*	Yellow Twin-heads		
Asteraceae	*Gamochaeta americana*	Purple Cudweed	*	
Asteraceae	*Gamochaeta pensylvanica*	Cudweed	*	
Asteraceae	*Gazania linearis*		*	
Asteraceae	*Gazania rigens*		*	
Asteraceae	*Hypochaeris albiflora*	White Flatweed	*	
Asteraceae	*Hypochoeris radicata*	Catsear	*	

Family	Scientific Name	Common Name	Exotic	Weed Status
Asteraceae	*Lactuca serriola*	Prickly Lettuce	*	
Asteraceae	*Senecio madagascariensis*	Fireweed	*	SP, WoNS
Asteraceae	*Sonchus asper*	Prickly Sowthistle	*	
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	*	
Asteraceae	*Tagetes erecta*		*	
Betulaceae	*Betula pendula*	European White Birch	*	
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*	
Brassicaceae	*Brassica fruticulosa*	Twiggy Turnip	*	
Brassicaceae	*Brassica oleracea*	Collards	*	
Buxaceae	*Buxus microphylla*		*	
Cactaceae	*Opuntia stricta*	Common Prickly Pear	*	SP, WoNS
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle	*	OWRC
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	*	
Casuarinaceae	*Casuarina glauca*	Swamp Oak		
Celastraceae	*Euonymus japonicus*	Japanese Spindletree	*	
Chenopodiaceae	*Atriplex prostrata*		*	
Chenopodiaceae	*Beta vulgaris*	Wild Beet	*	
Chenopodiaceae	*Chenopodium album*	Fat Hen	*	
Chenopodiaceae	*Dysphania pumilio*	Small Crumbweed		
Chenopodiaceae	*Einadia hastata*	Berry Saltbush		
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush		
Chenopodiaceae	*Einadia nutans* subsp. *linifolia*	Climbing Saltbush		
Commelinaceae	*Commelina cyanea*	Native Wandering Jew		
Convolvulaceae	*Dichondra repens*	Kidney Weed		
Convolvulaceae	*Ipomoea indica*	Morning Glory	*	OWRC
Cucurbitaceae	*Cucurbita* spp.		*	
Cucurbitaceae	*Momordica charantia*	Bitter Melon	*	
Cupressaceae	*Cupressus sempervirens*	Italian Cypress	*	
Cupressaceae	*Juniperus communis*		*	
Cyperaceae	*Cyperus brevifolius*		*	
Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge	*	
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge		
Cyperaceae	*Cyperus polystachyos*			
Cyperaceae	*Cyperus* spp.			

Family	Scientific Name	Common Name	Exotic	Weed Status
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge	*	
Euphorbiaceae	*Euphorbia prostrata*	Red Caustic Weed	*	
Fabaceae (Caesalpinioideae)	*Bauhinia galpini*	African Plume	*	
Fabaceae (Caesalpinioideae)	*Ceratonia siliqua*	Carob	*	
Fabaceae (Caesalpinioideae)	*Senna pendula*	Winter Cassia	*	OWRC
Fabaceae (Faboideae)	*Erythrina crista-galli*	Cockspur Coral Tree	*	OWRC
Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine		
Fabaceae (Faboideae)	*Medicago polymorpha*	Burr Medic	*	
Fabaceae (Faboideae)	*Phaseolus vulgaris*		*	
Fabaceae (Faboideae)	*Robinia pseudoacacia*	Black Locust	*	OWRC
Fabaceae (Faboideae)	*Trifolium repens*	White Clover	*	
Gentianaceae	*Centaurium tenuiflorum*	Branched Centaury, Slender centaury	*	
Geraniaceae	*Pelargonium* x *hortorum*		*	
Haloragaceae	*Haloragis aspera*	Rough Raspwort		
Iridaceae	*Dietes grandiflora*		*	
Iridaceae	*Sisyrinchium micranthum*	Scourweed	*	
Juncaceae	*Juncus usitatus*	Common Rush		
Lamiaceae	*Stachys arvensis*	Stagger Weed	*	
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	*	OWRC
Lythraceae	*Lagerstroemia indica*	Crepe Myrtle	*	
Malaceae	*Cotoneaster glaucophyllus*		*	
Malvaceae	*Malva parviflora*	Small-flowered Mallow	*	
Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	*	
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*	
Melastomataceae	*Tibouchina urvilleana*	Lasiandra	*	
Moraceae	*Ficus benjamina*	Weeping Fig	*	
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush		

Family	Scientific Name	Common Name	Exotic	Weed Status
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush		
Myrtaceae	*Eucalyptus amplifolia*	Cabbage Gum		
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany		
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum		
Myrtaceae	*Lophostemon confertus*	Brush Box		
Myrtaceae	*Metrosideros excelsa*	New Zealand Christmas Bush	*	
Myrtaceae	*Syzygium australe*	Brush Cherry		
Nandinaceae	*Nandina domestica*	Japanese Sacred Bamboo	*	
Oleaceae	*Fraxinus angustifolia*	Desert Ash	*	
Oleaceae	*Olea europaea*	Common Olive	*	
Oleaceae	*Olea europaea* subsp. *cuspidata*	African Olive	*	RP
Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	*	
Oxalidaceae	*Oxalis latifolia*		*	
Oxalidaceae	*Oxalis perennans*			
Phyllanthaceae	*Phyllanthus tenellus*	Hen and Chicken	*	
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	*	
Platanaceae	*Platanus orientalis*		*	
Platanaceae	*Platanus x acerifolia*	Hybrid Plane	*	
Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass	*	
Poaceae	*Bothriochloa macra*	Red Grass		
Poaceae	*Bromus catharticus*	Praire Grass	*	
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	*	OWRC
Poaceae	*Chloris gayana*	Rhodes Grass	*	OWRC
Poaceae	*Chloris truncata*	Windmill Grass		
Poaceae	*Cynodon dactylon*	Common Couch		
Poaceae	*Echinochloa crus-galli*	Barnyard Grass	*	
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*	
Poaceae	*Eleusine indica*	Crowsfoot Grass	*	
Poaceae	*Eragrostis cilianensis*	Stinkgrass	*	
Poaceae	*Eragrostis curvula*	African Lovegrass	*	OWRC
Poaceae	*Lachnagrostis filiformis*	Blown Grass		
Poaceae	*Microlaena stipoides*	Weeping Grass		

Family	Scientific Name	Common Name	Exotic	Weed Status
Poaceae	*Panicum effusum*	Hairy Panic		
Poaceae	*Panicum simile*	Two-colour Panic		
Poaceae	*Paspalum dilatatum*	Paspalum	*	
Poaceae	*Paspalum distichum*	Water Couch		
Poaceae	*Paspalum urvillei*	Vasey Grass	*	
Poaceae	*Poa annua*	Winter Grass	*	
Poaceae	*Saccharum officinarum*	Sugarcane	*	
Poaceae	*Setaria parviflora*		*	
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass		
Poaceae	*Stenotaphrum secundatum*	Buffalo Grass	*	
Poaceae	*Zea mays*	Maize	*	
Polygonaceae	*Persicaria decipiens*	Slender Knotweed		
Polygonaceae	*Rumex brownii*	Swamp Dock		
Polygonaceae	*Rumex crispus*	Curled Dock	*	
Portulacaceae	*Portulaca oleracea*	Pigweed		
Portulacaceae	*Portulacaria afra*		*	
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	*	
Proteaceae	*Grevillea robusta*	Silky Oak		
Rosaceae	*Prunus persica*	Peach	*	
Rosaceae	*Prunus* spp.		*	
Rosaceae	*Rosa* spp.	Rose	*	
Rosaceae	*Rubus fruticosus* spp. agg.	Blackberry Complex	*	SP, OWRC
Rubiaceae	*Galium aparine*	Goosegrass	*	
Rubiaceae	*Gardenia jasminoides*	Gardenia	*	
Rutaceae	*Citrus x sinensis*	Orange	*	
Rutaceae	*Murraya paniculata*	Mock Orange	*	OWRC
Salicaceae	*Populus alba*	White Poplar	*	
Salicaceae	*Salix babylonica*	Weeping Willow	*	
Salviniaceae	*Salvinia* spp.	Salvinia	*	SP, WoNS
Solanaceae	*Solanum lycopersicum*	Tomato	*	
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*	
Solanaceae	*Solanum pseudocapsicum*	Madeira Winter Cherry	*	
Solanaceae	*Solanum sisymbriifolium*		*	
Stackhousiaceae	*Stackhousia viminea*	Slender Stackhousia		
Strelitziaceae	*Strelitzia reginae*		*	

Family	Scientific Name	Common Name	Exotic	Weed Status
Urticaceae	*Urtica dioica*	Giant Nettle	*	
Verbenaceae	*Duranta erecta*	Sky Flower	*	
Verbenaceae	*Lantana camara*	Lantana	*	SP, WoNS
Verbenaceae	*Verbena bonariensis*	Purpletop	*	
Verbenaceae	*Verbena officinalis*	Common Verbena	*	
Vitaceae	*Vitis vinifera*	Grape Vine	*	

Key: SP = State Priority, RP = Regional Priority, WoNS = Weed of National Significance, OWRC = Other Weed of Regional Concern

APPENDIX B :

Threatened Flora Likelihood of Occurrence

Table 7 Threatened flora species likelihood of occurrence

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant	E	E	Species or species habitat likely to occur	Usually associated with dry rainforest vegetation and in coastal communities. Can occur in clay influenced woodland associated with *Eucalyptus tereticornis* and *Corymbia maculata*.	Unlikely. Subject site does not contain associated rainforest community. Species not recorded during Cumberland Ecology surveys.
Campanulaceae	*Isotoma fluviatilis* subsp. *fluviatilis*	-	-	M	1	Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone.	Unlikely. No Cumberland Plain present within the subject site. No recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Casuarinaceae	*Allocasuarina glareicola*	-	E	E	Species or species habitat likely to occur within area	Grows in Castlereagh woodland on lateritic soil with *Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla* and *Melaleuca decora*. Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool.	Unlikely. Associated soil and species not present within the subject site. Not recorded during Cumberland Ecology surveys.
Dilleniaceae	*Hibbertia puberula*	-	E	-	1	Habitat is sandy soils on sandstone. Previous records for the species are from the Hawkesbury River area, Frenchs Forest, South Coogee, and the Blue Mountains.	Unlikely. Subject site does not contain sandy soil on sandstone. Limited number of records within the locality and not recorded during Cumberland Ecology surveys.
Fabaceae (Faboideae)	*Dillwynia tenuifolia*	-	V	-	195	Locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Unlikely. Subject site does not contain associated communities. Subject site groundcover is degraded and exotic-dominated. Not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Fabaceae (Faboideae)	*Pultenaea parviflora*	-	E	V	297	Endemic to the Cumberland Plain. Core distribution is from Windsor to Penrith and east to Dean Park. Found in scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays and in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Unlikely. Although a high number of records are present within the locality, the subject site understorey/groundcover is degraded. Additionally, the species was not recorded during Cumberland Ecology surveys.
Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E	V	Species or species habitat likely to occur within area	Found in heath and woodland on sandy soils. Prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Unlikely. Subject site does not contain a heath or sandy soils. No records within the locality and not recorded during Cumberland Ecology surveys.
Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V	V	Species or species habitat likely to occur within area	Occurs on alluviums, shales and at the intergrade between shales and sandstones. Occur in open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	Unlikely. Limited available habitat sue to the degraded nature of understorey within the subject site. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Haloragaceae	*Haloragis exalata* subsp. *exalata*	Wingless Raspwort	V	V	Species or species habitat may occur within area	Species requires protected and shaded damp situations in riparian habitats.	Unlikely. Limited habitat within the subject site due to the open vegetation and degraded understorey. No records within the locality and not recorded during Cumberland Ecology surveys.
Myrtaceae	*Micromyrtus minutiflora*	-	E	V	8	Found in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	Unlikely. Associated communities not present within the subject site. Limited records within the locality and not recorded during Cumberland Ecology surveys.
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E	V	1	Species occurs naturally from Forster in the north to Jervis Bay in the south. It is found in rainforest on sandy soils or on sand dunes at low altitude in coastal areas. It is most commonly associated with littoral and gallery rainforest types. The species is extensively cultivated as an ornamental plant.	Unlikely. Subject site does not contain rainforest on sandy soils. Limited number of records within the locality and not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Myrtaceae	*Melaleuca deanei*	Deane's Melaleuca	V	V	Species or species habitat may occur within area	Grows in wet heath on sandstone, sandy soils and woodlands. The majority of populations occur in clefts within granite outcrops on skeletal soils, though also occurs at lower altitudes in damp situation.	Unlikely. No suitable habitat present within the subject site due to lack of sandy soil and granite outcrop. No records within the locality and not recorded during Cumberland Ecology survey.
Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	CE	-	Species or species habitat may occur within area	Occurs in coastal districts from Batemans Bay in NSW to Bundaberg in Qld. It is found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest, usually on volcanic and sedimentary soil.	Unlikely. Subject site is not located in coastal area. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Orchidaceae	*Cryptostylis hunteriana*	Leafless Tongue Orchid	V	V	Species or species habitat may occur within area	Occur in a wide variety of habitats including heathlands, heathy woodlands, sedgelands, *Xanthorrhoea* spp. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests. Soils are generally considered to be moist and sandy, however, this species is also known to grow in dry or peaty soils. Is associated with the community Bloodwood / Scribbly Gum / Silver-top Ash Forest on the South Coast. Species is known to have occurrence associated with other *Cryptostylis* species. Flowering occurs generally from November to February.	Unlikely. Limited habitat present within the subject site due to degraded understorey. No records within the locality and not recorded during Cumberland Ecology surveys conducted during flowering period.
Orchidaceae	*Genoplesium baueri*	Bauer's Midge Orchid	E	E	Species or species habitat may occur within area	Grows in dry sclerophyll forest and in moss gardens over sandstone and flowers February to March.	Unlikely. No suitable habitat present within the subject site. No records within the locality and not recorded during Cumberland Ecolgy survey conducted during flowring period.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Orchidaceae	*Pterostylis gibbosa*	Illawarra Greenhood	E	E	Species or species habitat may occur within area	All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by *Eucalyptus tereticornis* (Forest Red Gum), *E. longifolia* (Woollybutt), and *Melaleuca decora* (White Feather Honey-myrtle). Near Nowra, the species grows in open forest of *Corymbia maculata* (Spotted Gum), *E. tereticornis,* and *E. paniculata* (Grey Ironbark). It is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The species is currently only known to occur at five sites three in the Illawarra, one near Nowra, and one at Milbrodale in the Hunter Valley.	Unlikely. Subject site located outside of known populations. Limited habitat present due to degrated understorey. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Orchidaceae	*Pterostylis saxicola*	Sydney Plains Greenhood	E	E	Species or species habitat may occur within area	The species occurs in small pockets of shallow soil in flat areas on top of sandstone rock shelves above cliff lines, or on mossy rocks in gullies. Sclerophyll forest/woodland often occurs growing above where the species occurs, on shale or shale/sandstone transition soils. Flowering occurs between October and December. It is currently only known to occur at five locations within western Sydney: Georges River National Park, close to Yeramba Lagoon, Peter Meadows Creek, and St Marys Towers.	Unlikely. Subject site located outside of known populations. No suitable habitat present due to lack of sandstone rock shelf. No records within the locality and not recorded during Cumberland Ecology survey.
Orchidaceae	*Rhizanthella slateri*	Eastern Underground Orchid	V	E	Species or species habitat may occur within area	Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. The species is highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Flowers September to November.	Unlikely. Limited suitable habitat present within the subject site due to degraded understorey. No records within the locality.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Polygonaceae	*Persicaria elatior*	Tall Knotweed	V	V	Species or species habitat may occur within area	Has been recorded in South-eastern and northern NSW. Usually grows in damp places, especially besides streams and lakes. Occasionally found in swamp forest or associated with disturbance.	Unlikely. No records within the locality and not recorded during Cumberland Ecology survey.
Proteaceae	*Grevillea juniperina* subsp. *juniperina*	Juniper-leaved Grevillea	V	-	966	Endemic to western Sydney. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	Unlikely. Although a high number of records are present within the locality, the subject site does not contain the associated communities. Additionally, it was not recorded during Cumberland Ecology surveys.
Proteaceae	*Persoonia hirsuta*	Hairy Persoonia	E	E	Species or species habitat likely to occur within area	Has a scattered distribution along the east coast from Singleton in the north to Bargo in the south, and the Blue Mountains to the west. It is found in mostly small populations on sandy soils in dry sclerophyll forest , woodland, and heath.	Unlikely. No suitable habitat found within the subject site due to lack of associated communities and degraded understorey. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Proteaceae	*Persoonia nutans*	Nodding Geebung	E	E	Species or species habitat likely to occur within area	Occurs on aeolian and alluvial sediments in woodland to dry sclerophyll forest, below 60 m above sea level.	Unlikely. Limited suitable habitat present within the subject site due to degraded understorey. No records within the locality and not recorded during Cumberland Ecology survey.
Santalaceae	*Thesium australe*	Austral Toadflax	V	V	Species or species habitat may occur within area	Found in very small populations scattered across eastern NSW. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*).	Unlikely. Subject site does not contain associated species or communities. No records within the locality and not recorded during Cumberland Ecology surveys.
Thymelaeaceae	*Pimelea curviflora* var. *curviflora*	-	V	V	1	Occurs on ridge tops and upper slopes in open forest and woodland on sandy soils derived from sandstone, on shale/lateritic soils, and on shale/sandstone transition soils.	Unlikely. No suitable habitat present within the subject site due to lack of ridge tops and slopes. Limited number of records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E	E	5	Found on well-structured clay soils in Cumberland Plain and Illawarra environments. In the inland Cumberland Plain sites it is associated with Grey Box and Ironbark. In the coastal Illawarra it occurs commonly in Coast Banksia open woodland with a better developed shrub and grass understorey.	Unlikely. No suitable habitat present within the subject site due to lack of clay soils. Limited number of records within the locality and not recorded during Cumberland Ecology survey.

Key: CE = Critically Endangered, E = Endangered, V = Vulnerable

APPENDIX C :

Threatened Fauna Likelihood of Occurrence

Table 8 Threatened fauna species likelihood of occurrence

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Amphibia							
Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E	V	4	Marshes, dams, stream sides, particularly those containing bulrushes or spikerushes; unshaded water bodies free of Gambusia form optimum habitat; vegetation and/or rocks are needed for sheltering.	Possible. Potential habitat such as dam fringed with rushes found within the subject site.
Myobatrachidae	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	1	Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Breeding habitat is generally soaks or pools within first or second order streams and are commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water. Largely confined to sandstone in the Sydney Basin.	Unlikely. No suitable sandstone habitat found within the subject site. Limited records within the locality and not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Aves							
Acanthizidae	*Chthonicola sagittata*	Speckled Warbler	V	-	4	The species is distributed from south-eastern Queensland through central and eastern NSW to Victoria. In NSW it occurs in eucalypt and cypress woodlands, generally to the west of the great diving range, though populations extend into drier coastal areas such as the Cumberland Plain and the Hunter and Snowy River valleys. Woodlands inhabited have a grassy understorey, and are often on ridges or in in gullies. It forages in the ground layer and in the understorey for insects and seeds. Large, relatively undisturbed woodland remnants are required for the species to persist in an area.	Unlikely. No suitable habitat found within the subject site due to degraded undertstorey and lack of undisturbed woodland remnants Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Accipitridae	*Circus assimilis*	Spotted Harrier	V	-	3	Occurs throughout mainland Australia except in densely forested or wooded habitats of the coast, escarpment, and ranges. It inhabits open grassy woodland, shrubland, and grassland. It nests in trees and preys on terrestrial mammals, birds, and reptiles, and will occasionally consume carrion.	Unlikely. No suitable habitat due to the lack of grassy woodland and shrubland, within the subject site. Limited number of records within the locality and no nests or individuals recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V	-	3	Found in coastal habitats and around terrestrial wetlands, including rivers, swamps, lakes and the sea.	Possible. Although limited number of records exist within the locality, the subject site pay contain suitable foraging habitat due to proximity to dam and presence of drainage line. No suitable breeding habitat as no nests were recorded during Cumberland Ecology survey.
Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V	-	11	Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Possible. Although limited number of records exist within the locality, the subject site pay contaain suitable foraging habitat due to proximity to dam and presence of drainage line. No suitable breeding habitat as no nests were recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Accipitridae	*Lophoictinia isura*	Square-tailed Kite	V	-	1	Found in a variety of timbered habitats including dry woodlands and open forests. It is a specialist hunter preying on passerine birds, especially honeyeaters and targets predominately nestlings and insects occurring in the tree canopy. It nests in tree forks or on large horizontal tree limbs located mostly along or near watercourses.	Possible. Although limited number of records exist within the locality, the subject site pay contaain suitable foraging habitat due to proximity to dam and presence of drainage line. No suitable breeding habitat as no nests were recorded during Cumberland Ecology survey.
Anatidae	*Oxyura australis*	Blue-billed Duck	V	-	2	Completely aquatic, prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.	Unlikely. Limited suitable habita due to lack of deep water and dnse aquaric vegetation. Limited number of rercords within the locality ad not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Apodidae	*Apus pacificus*	Fork-tailed Swift	-	Mig.	1	Species has been recorded throughout NSW, but mostly east of the Great Divide. The species is almost exclusively aerial in Australia and breeds overseas. It forages from a metre above the ground, up to hundreds of metres in altitude, and mostly occur over inland plains, though sometimes over foothills, and coastal areas.	Unlikely. Limited foraging habitat found within the subject site. Limited records within the locality and not recorded during Cumberland Ecology surveys.
Apodidae	*Hirundapus caudacutus*	White-throated Needletail	-	V, Mig.	2	Species is almost exclusively aerial, and is found commonly overhead of wooded areas and heathland. Is less commonly found overhead of grassland and swamps.	Unlikely. Limited foraging habitat found within the subject site. Limited records within the locality and not recorded during Cumberland Ecology surveys.
Ardeidae	*Botaurus poiciloptilus*	Australasian Bittern	E	E	Species or species habitat likely to occur within area	Occurs in freshwater wetlands, and more rarely, estuarine wetlands. It favours wetlands with tall, dense vegetation, and forages in shallow water up to a depth of 0.3m. It nests in deep vegetative cover over shallow pools.	Unlikely. Limited suitable habitat found within the subject site due to lack of tall, dense vegetation. Limited records within the locality and not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-	37	Occurs from Atherton Tableland in Queensland, down to Tasmania and west to the Eyre Peninsula in South Australia. In NSW it occurs from the coast to the western slopes of the Great Dividing Range and farther west. It breeds primarily on the western slopes of the Great Dividing Range in woodland and open dry forest. The species often occurs in eucalypt woodland and forest, though is also found in shrubland and heathland. It forages both above and below the canopy primarily for invertebrates, though will occasionally consume nectar, fruit and seed.	Possible. Potential foraging habitat found within the subject site.
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	-	Mig.	8	The Pacific Golden Plover is found on muddy, rocky and sandy wetlands, shores, paddocks, saltmarsh, coastal golf courses, estuaries and lagoons.	Unlikely. No suitable habitat found within the subject site. Limited records within the locality and not recorded during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Cuculidae	*Cuculus optatus*	Oriental Cuckoo	-	Mig.	Species or species habitat known to occur within area	Inhabits a large area during breeding season stretching from the Himalayas to Southern China. During winter, this species migrates further south including areas of northern and eastern Australia. Has been recorded in a large variety of habitats including all levels of the forest canopy.	Unlikely. No large hollows were found within the subject site. Furthermore, no individuals were sighted or heard during the field surveys conducted by Cumberland Ecology.
Falconidae	*Falco subniger*	Black Falcon	V	-	1	This species is widely distributed across Australia and is associated with a number of different vegetation communities. It is not found in heavily forested areas. The species commonly utilises wooded watercourses, and it is usually associated with wetlands and streams. The species generally nests in intact, riparian woodland remnants with a diverse array of avian prey.	Unlikely. No preferred foraging or breeding habitat found within the subject site due to degraded nature of vegetation. Limited records within the locality and not observed during Cumberland Ecology surveys.
Falconidae	*Falco hypoleucos*	Grey Falcon	E	V	Species or species habitat likely to occur	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	Unlikely. Limited habitat found within the subject land. No records within the locality and not observed during Cumberland Ecology surveys.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
					within area		
Meliphagidae	*Anthochaera phrygia*	Regent Honeyeater	CE	CE	1	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises : *E. microcarpa, E. punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, Corymbia maculata, E. mckieana, E. macrorhyncha, E. laevopinea,* and *Angophora*	Unlikely. Subject site is not located within mapped species habitat. Limited number of records within the locality and limited habitat present due lack of mistletoes. Additionally, species not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
						floribunda. Nectar and fruit from the mistletoes *Ameyma miquelii, A. pendula* and *A. cambagei* are also eaten during the breeding season.	
Meliphagidae	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	V	-	2	Occupies mostly upper levels of drier open forests or woodlands. Feeding territories are large making the species locally nomadic. tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares.	Unlikely. Limited habitat present due to the degraded nature of the subject site. Limited number of records within the locality and no individuals were heard or sighted during field surveys.
Meliphagidae	*Grantiella picta*	Painted Honeyeater	V	V	Species or species habitat likely to occur within area	Sparsely distributed from south-eastern Australia to north-western Queensland and eastern North Territory. Most records and all breeding records are from the inland slopes of the Great Dividing Range between the Grampians in Victoria, to Roma in Queensland. It moves north-south following the fruiting of mistletoe species. It feeds predominately on mistletoe fruits, but occasionally nectar of eucalypts, mistletoes, and potentially banksias, and arthropods. The species prefers woodlands with large numbers of mature trees which host mistletoes. The species nests in mistletoes.	Unlikely. No suitable habitat within the subject site due to the lack of mistletoes. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Monarchidae	*Myiagra cyanoleuca*	Satin Flycatcher	-	Mig.	Species or species habitat known to occur within area	Found along the east coast of Australia in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Unlikely. Subject site is not heavily forested. No records within the locality and not recorded during Cumberland Ecology survey.
Motacillidae	*Motacilla flava*	Yellow Wagtail	-	Mig.	Species or species habitat likely to occur within area	Found mainly in wet areas around grasslands or around the edges of freshwater lakes and marshes. It can only be found in large clearing forest areas where it feeds on insects.	Unlikely. Limited foraging habitat present due to degraded vegetation. No records within the locality and not recorded during Cumberland Ecology survey.
Muscicapidae	*Monarcha melanopsis*	Black-faced Monarch	-	Mig.	Species or species habitat known to occur within area	Found along the coast of eastern Australia, becoming less common further south. The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Unlikely, vegetation on the subject site identified as closed forest. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Muscicapidae	*Rhipidura rufifrons*	Rufous Fantail	-	Mig.	Species or species habitat known to occur within area	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground.	Unlikely. No suitable habitat found within the subject site due to lack of dense vegetation. No records within the locality and not recorded during Cumberland Ecology survey.
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V	-	27	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Unlikely. Limited habitat present within the subject site due to lack of dead branches. No individuals were sighted during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Petroicidae	*Petroica boodang*	Scarlet Robin	V	-	4	Lives in mature and regrowth dry eucalypt forests and woodlands. Occasionally found in mallee, or wetter forests, or in wetlands and tea-tree swamps. The understorey is usually open and grassy with few scattered shrubs. Habitat usually contains abundant logs and fallen timber. It breeds on ridges, hills and foothills of the Great Dividing Range, Western Slopes, and in eastern coastal regions. The species predominately inhabits forests and woodlands though some individuals may disperse to more open habitats following breeding. In Autumn and Winter the predominate habitat is open grassy woodlands, grasslands, or grazed paddocks with scattered trees. Birds pounce on insects and other invertebrates from low perches, though occasionally forage in the shrub and canopy layer.	Unlikely. Due to the modified nature of the subject site, it contains very little natural logs and fallen timber. Limited number of records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V	-	5	Forages mostly in the canopy of open Eucalyptus forest and woodland, on Eucalypt species, and species of *Angophora, Melaleuca*, and other trees. Riparian habitats are ideal for the species due to higher productivity of flowering feed species. Isolated trees in paddocks and roadside remnants, along with urban trees can help sustain populations of the species. The species roosts in tree tops, often some distance from food trees, though prefers to nest in close proximity to feed areas. The species nests in hollows with a small entrance (3 cm) and at a height of between two and fifteen metres. Often nest trees are in riparian areas, and include trees of species like *Allocasuarina* spp.	Unlikely. Limited suitable habitat due to lack of hollows and Allocasuarina spp. Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Psittacidae	*Lathamus discolor*	Swift Parrot	E	CE	9	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	Unlikely. Subject site is not located within mapped species habitat. Limited number of records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Rostratulidae	*Rostratula australis*	Australian Painted Snipe	E	E	5	Inhabits fringes of shallow inland wetlands, swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	Unlikely. No suitable habitat found within the subject site due to the lack of low scrub and presence of degraded understorey. Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	-	Mig.	48	The species does not breed in Australia. It spends the non-breeding season in Australia, mostly in the south-east, and occurs in widespread areas in both inland and coastal locations. It inhabits both freshwater and saline habitats. It prefers muddy edges of shallow fresh or brackish wetlands with inundated or emergent sedges, grass, saltmarsh, or other low vegetation. It forages for seeds, worms, molluscs, crustaceans, and insects, and is known to feed in and surrounding lagoons, swamps, lakes, dams, waterholes, soaks, bore drains, salt pans, and hypersaline inland lakes.	Unlikely. No suitable habitat present within the subject site due to lack of saline waterbody. No recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	E	CE	4	Occurs around coastal areas and is widespread inland. The species occupies mainly intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and around non-tidal swamps. They forage for invertebrates at the edges of shallow waters. The species generally roosts in dunes and sandy areas.	Unlikely. No suitable habitat found within the subject site since this species is found in coastal, intertidal areas. Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	-	Mig.	10	Breeds in the Northern Hemisphere and migrates south. Occurs around lagoons, estuaries, swamps, lakes, floodplains, saltmarshes and wetlands, preferring fresh water to saline. Forages on algae, seeds, crustaceans and insects.	Unlikely. No suitable habitat found within the subject site due to the lack of floodplains and wetlands. Limited number of records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	-	Mig.	11	found on the coast, in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. They may also be seen in saltworks, sewage farms, saltmarsh, shallow wetlands including lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats, flooded paddocks or damp grasslands. They are often in dense flocks, feeding or roosting.	Unlikely. No suitable habitat found within the subject site due to the lack of floodplains and wetlands. Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Scolopacidae	*Gallinago hardwickii*	Latham's Snipe	-	Mig.	12	Usually inhabit open, freshwater wetlands with low, dense vegetation. Will utilise artificial habitats including pasture and ploughed paddocks.	Unlikely. No suitable habitat found within the subject site due to the lack of floodplains, pastures, ploughed paddocks and wetlands. Limitted number of records within the subject site and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	*Tringa glareola*	Wood Sandpiper	-	Mig.	6	Wood Sandpipers are seen in small flocks or singly on inland shallow freshwater wetlands, often with other waders. They prefer ponds and pools with emergent reeds and grass, surrounded by tall plants or dead trees and fallen timber.	Unlikely. Limited suitable habitat found within the subject site due to the lack of dead trees and fallen timber. Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Scolopacidae	*Tringa nebularia*	Common Greenshank	-	Mig.	1	Does not breed in Australia. Occurs in all types of wetlands, both inland, and coastal. Utilises both permanent and ephemeral terrestrial wetlands., and utilises artificial wetlands including dams. It forages around the edge of wetland in shallow water and soft mud and feeds on mollucs, crustaceans, insects, and occasionally fish and frogs.	Unlikely. Limited suitable habitat found within the subject site due to the lack of soft mud. Limited number of records witthin the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	-	Mig.	3	Marsh Sandpipers are commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	Unlikely. No suitable habitat found within the subject site due to the lack of wetlands, rivers, water meadows, sewage farms, drains, lagoons and swamps. Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	P	CE, Mig.	Species or species habitat may occur within area	Breeds in the Northern Hemisphere and spends the non-breeding season in all states of Australia in coastal areas and rarely inland. In NSW it is distributed along all coastal areas but it mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River and Richmond River. It occupies lakes, inlets, bays and estuarine habitat. It is mainly found in intertidal mudflats and sometimes saltmarsh. It forages at the edge of shallow water and roosts on sandy spits and islets especially on dry beach sand.	Unlikely. No suitable habitat found within the subject site due to the lack of mudflats and estuaries. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Strigidae	*Ninox strenua*	Powerful Owl	V	-	2	The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. It breeds and hunts in open or closed sclerophyll forests or woodlands and occasionally hunts in open habitats. Roosting during the day time occurs in dense vegetation of Eucalypts and species such as *Syncarpia glomulifera* (Turpentine), *Angophora floribunda* (Rough-barked Apple), and other species. Prey species are medium-sized arboreal mammals such as the Greater Glider, Common Ringtail Possum, and Sugar Glider. As most prey species require hollows and a shrub layer these are important habitat components also of the Powerful Owl. Nests are in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old.	Possible. Although no large hollows were sighted within the subject site, it is possible that the large eucalypts found on site are used for foraging purposes on occasion as part of a broader foraging range.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Gastropoda							
Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E	-	99	Primarily inhabits Cumberland Plain Woodland (an endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Unlikely. Although high numbers of records exist within the locality, they a re restricted to areas of CPW which is not present within the subject site. Species not recorded during Cumberland Ecology survey.
Mammalia							
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	Species or species habitat likely to occur within area	Occurs in wide variety of habitats; rainforest, open forest, woodland, coastal heath and riparian forest. Uses hollows in trees, logs and rock crevasses as den sites.	Unlikely. No suitable habiat present within the subject site due to lack of hollows, rock crevasses or suitable logs. No records within the locality and no evidence of species recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	6	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Possible. Although no suitable roosting habitat is present due lack of man-made structures, the species may utilise the subject site as part of a broader foraging range.
Macropodidae	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V	Species or species habitat may occur within area	Occupies rock outcrops, escarpments and cliffs with features such as caves, fissures and ledges. Browses on adjacent vegetation. Has a home range of about 15 ha and shelters in caves.	Unlikely. No suitable habitat present within the subject site due to lack of rocky outcrops, escarpments and proximity to caves. No records within the locality and not recorded during Cumberland Ecology survey.
Miniopteridae	*Miniopterus australis*	Little Bent-winged Bat	V	-	4	Inhabits moist eucalypt forest, rainforest, wet and dry sclerophyll forest, melaleuca swamps, dense coastal forests and banksia scrub, preferring well timbered areas. Species roosts in caves, tunnels, tree hollows, stormwater drains, culverts, bridges and sometimes in buildings.	Possible. Although no suitable roosting habitat is present due lack of man-made structures, the species may utilise the subject site as part of a broader foraging range.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Miniopteridae	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V	-	22	Roosts mainly in caves but also in tunnels, mines or buildings. Non-breeding populations disperse within a 300 km range of maternity caves. Hunting for moths and other insects takes place in forested areas above the canopy.	Possible. Although no suitable roosting habitat is present due lack of man-made structures, the species may utilise the subject site as part of a broader foraging range.
Molossidae	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V	-	17	Occur in dry sclerophyll forest and woodland east of the Great Dividing Range. Roosts in tree hollows but will also roost under bark or in man-made structures.	Possible. Although no suitable roosting habitat is present due lack of man-made structures, the species may utilise the subject site as part of a broader foraging range.
Muridae	*Pseudomys novaehollandiae*	New Holland mouse	-	V	Species or species habitat may occur within area	Occurs in open habitats (heathland, woodland and forest) with a heath understorey and vegetated sand dunes. The species prefers deep soft top soils in order to burrow.	Unlikely. No suitable habitat present within the subject site due to lack of heath understorey and sand dunes. No records within the locality and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Petauridae	*Petaurus norfolcensis*	Squirrel Glider	V	-	1	Found throughout eastern Australia, from northern Queensland to western Victoria. Inhabits mature Box, Box-Ironbark woodlands and River Red Gum forests west of the Great Diving Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Requires abundant tree hollows for refuge and nest sites.	Unlikely. No suitable habitat present within the subject site due to lack of abundant tree hollows. No records within the subject site and not recorded during Cumberland Ecology survey.
Phascolarctidae	*Phascolarctos cinereus*	Koala	V	V	2	Inhabits eucalypt woodlands and forests, feeding on the leaves of Eucalyptus species. They feed on the foliage of more than 70 Eucalypt species and 30 non-eucalypt species.	Unlikely. Limited suitable habitat present within the subject site due to degraded vegetation. Limited number of records within the locality and not recorded during Cumberland Ecology survey.
Pseudocheiridae	*Petauroides volans*	Greater Glider	-	V	Species or species habitat likely to occur within area	Restricted to eastern Australia, and occurring from the Windsor Tableland in Queensland south to Wombat State Forest in central Victoria. Largely restricted to eucalypt forests and woodlands. The diet is predominately comprised of eucalypt leaves, and more rarely flowers. Highest abundances occur in tall montane forests with old trees and abundant hollows.	Unlikely. No suitable habitat present within the subject site due to lack of abundant tree hollows. No records within the subject site and not recorded during Cumberland Ecology survey.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	70	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Commonly found in gullies, close to water, in vegetation with a dense canopy.	Possible. No camp is present, however the species may use the subject site as potential foraging habitat as part of a broader foraging range.
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	4	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin. Found in well-timbered areas containing gullies.	Unlikely. No suitable habitat present due to lack of gullies, caves and Fairy Martin nests. Limited number of records within the locality.
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	6	Occurs in moist habitat with trees over 20m in height, hunting insects above or just below the tree canopy. Roosts in eucalypt hollows, under bark and in buildings.	Possible. Although no suitable roosting habitat is present due lack of man-made structures and tree hollows, the species may utilise the subject site as part of a broader foraging range.

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Locality Count	Habitat Requirements	Likelihood of Occurrence
Vespertilionidae	*Myotis macropus*	Southern Myotis	V	-	14	Roosts close to water in caves, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish. Known from a range of habitats close to water from lakes, small creeks to large lakes and mangrove lined estuaries.	Possible. Although no suitable roosting habitat is present due lack of man-made structures and tree hollows, the species may utilise the subject site as part of a broader foraging range.
Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V	-	7	Found mainly in the gullies and river systems that drain the Great Dividing Range. Usually roosts in tree hollows and buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects. Species is not known to occur in areas of high urban density.	Possible. Although no suitable roosting habitat is present due lack of man-made structures and tree hollows, the species may utilise the subject site as part of a broader foraging range.

Key: CE = Critically Endangered, E = Endangered, V = Vulnerable, Migr. = Migratory, P = Protected

APPENDIX D :
Tests of Significance

D.1. Introduction

This appendix contains the formal Tests of Significance required under Section 7.3 of the BC Act that have been prepared in accordance with the Threatened Species Test of Significance Guidelines (OEH 2018b). The Test of Significance is used for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats.

Tests of Significance have been provided for communities and species listed as vulnerable, endangered or critically endangered under the BC Act. Each Test of Significance is a series of factors (shown as italicised text below) for which a response has been supplied beneath in plain text.

D.2. River Flat Eucalypt Forest

a. *In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*

Not applicable.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

The local occurrence of RFEF occurs within the subject site, subject land and in the locality, including the vegetation surrounding Bells Creek in the adjacent lot to the east. All of the RFEF vegetation is proposed for retention as the Project footprint does not extend into the subject site. The removal of a small amount of degraded RFEF vegetation (0.015 ha) in the area adjacent to the subject site in order to allow for the installation of the flood basin will have a minimal impact on RFEF within the subject land. Accordingly, the Project is not considered to adversely affect the extent of RFEF such that its local occurrence is likely to be placed at risk of extinction. On the contrary, the regeneration measures outlined in the associated VMP, which include weed management and replanting, are likely to improve the overall nature of the RFEF community within the subject site.

c. In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

d. *whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)*

No area of outstanding biodiversity value for the assessed threatened ecological community has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the subject site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

No key threatening processes will result as a consequence of the Project as the subject site is located outside of the development area and therefore will not be directly impacted. The Project will adhere to strict hygiene protocols during construction and remedial works which will prevent the introduction of *Phytophthora cinnamomi* and rust into the subject site. The VMP will include weed management measures which will reduce threatening processes associated with the invasion of exotic weed species. The drainage line located within the subject site will not be altered or otherwise impacted by the Project.

Conclusion

RFEF exists within the subject site in the form of remnant and regrowth canopy trees with a degraded and exotic-dominated understorey. All of the RFEF within the subject site will be retained as the Project is located outside of the subject site. The Project is therefore not expected to create either direct and indirect impacts which will risk the survival or result in the fragmentation of this community. Accordingly, no significant impact is predicted to occur to RFEF as a result of the Project.

D.3. Fauna

D.3.1. Green and Golden Bell Frog

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The Green and Golden Bell Frog has not been recorded within the subject site, however is considered to have the potential to occur in the aquatic vegetation within the drainage line and adjacent dam. The Green and Golden Bell Frog is not expected to be impacted by the Project as the subject site is located outside of the proposed development and no impacts (both direct and indirect) are expected to the drainage line. Additionally, the proposed installation of the flood basin directly adjacent to the subject site will provide additional habitat for the species. Accordingly, the Project is not expected to have an adverse effect on the life cycle of this species such that a viable population is likely to be placed at risk of extinction.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

No vegetation within the subject site is proposed to be removed and the drainage line, surrounding vegetation and adjacent dam are also proposed to be maintained as part of the project. Additionally, the proposed flood basin will provide additional habitat for the species. Consequently, the vegetation corridor which includes the riparian area surrounding the drainage line which drains into Bells Creek will remain, and as such no habitat for the Green and Golden Bell Frog will be removed, modified or fragmented as a result of the Project.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No area of outstanding biodiversity value for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the subject site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project will not result in any key threatened processes as no native vegetation is proposed to be cleared as the subject site is located outside of the development area and therefore will not be impacted by the Project. The Project will adhere to strict hygiene protocols during construction and remedial works which will prevent the introduction of Chytrid fungus into the subject site. Furthermore, The drainage line located within the subject site will not be altered or otherwise impacted by the Project.

Conclusion

The drainage line, surrounding riparian vegetation and adjacent dam all form potential breeding and foraging habitat for the Green and Golden Bell Frog. All of this habitat will be retained as the subject site is located outside of the development area of the Project. The Project is therefore not expected to create either direct and indirect impacts which will risk the survival or result in the fragmentation of this species population.

Accordingly, no significant impact is predicted to occur to the Green and Golden Bell Frog as a result of the Project.

D.3.2. Raptors

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Several threatened raptor species have been recorded in the locality and have the potential to occur within the subject site due to the presence of suitable habitat. The local populations of these potentially occurring species are considered to extend beyond the subject site. This group of species are highly mobile and would be expected to occasionally utilise the foraging resources within the subject site as part of a larger foraging range which includes the vegetation along Bells Creek to the east. These species are not expected to roost on the subject site as no large stick nests were observed.

Nevertheless, all suitable habitat within the subject site will remain as no vegetation is proposed to be removed since the subject site is located outside the Project footprint. Accordingly, the Project is not considered to have an adverse effect on the life-cycle of these species such that a viable local population is likely to be placed at risk.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

No vegetation within the subject site is proposed to be removed as the subject site is located outside of the development area of the Project. Consequently, the vegetation within the subject site will continue to form a corridor to the vegetation surrounding Bells Creek to the east and on adjacent lots. As such no habitat for the threatened raptors will be removed, modified, fragmented or isolated as a result of the Project.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No area of outstanding biodiversity value for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the subject site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project will not result in any key threatened processes as no native vegetation is proposed to be cleared as the subject site is located outside of the development area and therefore will not be impacted by the Project. Furthermore, The drainage line located within the subject site will not be altered or otherwise impacted by the Project and will continue to provide potential foraging habitat.

Conclusion

The treed vegetation and riparian area located within the subject site all form potential foraging habitat for threatened raptor species. All of this habitat will be retained as the subject site is located outside the Project footprint. The Project is therefore not expected to create either direct and indirect impacts which will risk the survival or result in the fragmentation of these species population. Accordingly, no significant impact is predicted to occur to threatened raptors as a result of the Project.

D.3.3. Dusky Woodswallow

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Although not recorded within the subject site, the Dusky Woodswallow has been recorded within the locality and has the potential to occur due to the presence of suitable habitat. The local population is considered to extend beyond the subject site. This species is highly mobile and would be expected to occasionally utilise the resources within the subject site as part of a larger foraging range which includes the vegetation along Bells Creek to the east.

Nevertheless, all suitable habitat within the subject site will remain as no vegetation is proposed to be removed since the subject site is located outside of the Project footprint. Accordingly, the Project is not considered to have an adverse effect on the life-cycle of these species such that a viable local population is likely to be placed at risk.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

No vegetation within the subject site is proposed to be removed as the subject site is located outside of the the Project footprint. Consequently, the vegetation within the subject site will continue to form a corridor to the vegetation surrounding Bells Creek to the east and on adjacent lots. As such no habitat for the Dusky Woodswallow will be removed, modified, fragmented or isolated as a result of the Project.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No area of outstanding biodiversity value for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the subject site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Project will not result in any key threatened processes as no native vegetation is proposed to be cleared as the subject site is located outside of the development area and therefore will not be impacted by the Project.

Conclusion

The treed vegetation and riparian area located within the subject site all form potential foraging habitat and breeding habitat for the Dusky Woodswallow. All of this habitat will be retained as the subject site is located outside of the development area of the Project. The Project is therefore not expected to create either direct and indirect impacts which will risk the survival or result in the fragmentation of these species population. Accordingly, no significant impact is predicted to occur to the Dusky Woodswallow as a result of the Project.

D.3.4. Powerful Owl

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Although not recorded within the subject site, the Powerful Owl has been recorded within the locality and has the potential to occur due to the presence of suitable habitat. The local population is considered to extend beyond the subject site. This species is highly mobile and would be expected to occasionally utilise the resources within the subject site as part of a larger foraging range which includes the vegetation along Bells Creek to the east. This species is not expected to roost on the subject site as no suitably large hollows were observed.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

No vegetation within the subject site is proposed to be removed as the subject site is located outside of the Project footprint. Consequently, the vegetation within the subject site will continue to form a corridor to the vegetation surrounding Bells Creek to the east and on adjacent lots. As such no habitat for the Powerful Owl will be removed, modified, fragmented or isolated as a result of the Project.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No area of outstanding biodiversity value for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the subject site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

No key threatening processes will result as a consequence of the Project as the subject site is located outside of the development area and therefore will not be directly impacted. The Project will adhere to strict hygiene protocols during construction and remedial works which will prevent the introduction of *Phytophthora*

cinnamomi into the subject site. The drainage line located within the subject site will not be altered or otherwise impacted by the Project.

Conclusion

The treed vegetation and riparian area located within the subject site all form potential foraging habitat for the Powerful Owl. All of this habitat will be retained as the subject site is located outside of the Project footprint. The Project is therefore not expected to create either direct and indirect impacts which will risk the survival or result in the fragmentation of these species population. Accordingly, no significant impact is predicted to occur to the Powerful Owl as a result of the Project.

D.3.5. Grey-headed Flying-Fox

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Although not recorded within the subject site, the Grey-headed Flying-fox has been recorded within the locality and has the potential to occur due to the presence of suitable habitat. The subject site does not contain a roosting camp of the species and therefore would not breed within the subject site. The local population is considered to extend beyond the subject site. This species is highly mobile and would be expected to occasionally utilise the resources within the subject site as part of a larger foraging range which includes the vegetation along Bells Creek to the east.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

No vegetation within the subject site is proposed to be removed as the subject site is located outside of the the Project footprint. Consequently, the vegetation within the subject site will continue to form a corridor to

the vegetation surrounding Bells Creek to the east and on adjacent lots. As such no habitat for the Grey-headed Flying-fox will be removed, modified, fragmented or isolated as a result of the Project.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No area of outstanding biodiversity value for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the subject site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

No key threatening processes will result as a consequence of the Project as the subject site is located outside of the development area and therefore will not be directly impacted. The Project will adhere to strict hygiene protocols during construction and remedial works which will prevent the introduction of *Phytophthora cinnamomi* into the subject site. The drainage line located within the subject site will not be altered or otherwise impacted by the Project.

Conclusion

The treed vegetation and riparian area located within the subject site all form potential foraging habitat for the Grey-headed Flying-fox. All of this habitat will be retained as the subject site is located outside of the Project footprint. The Project is therefore not expected to create either direct and indirect impacts which will risk the survival or result in the fragmentation of this species population. Accordingly, no significant impact is predicted to occur to the Grey-headed Flying-fox as a result of the Project.

D.3.6. Microchiropteran Bats

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Several threatened microchiropteran bat species have been recorded in the locality and have the potential to occur within the subject site due to the presence of suitable habitat. The local populations of these potentially occurring species are considered to extend beyond the subject site. This group of species are highly mobile and would be expected to occasionally utilise the foraging resources within the subject site as part of a larger foraging range which includes the vegetation along Bells Creek to the east. These species are not expected to roost on the subject site as no hollows were observed.

Nevertheless, all suitable habitat within the subject site will remain as no vegetation is proposed to be removed since the subject site is located outside of the Project footprint. Accordingly, the Project is not considered to have an adverse effect on the life-cycle of these species such that a viable local population is likely to be placed at risk.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not applicable.

c. In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

No vegetation within the subject site is proposed to be removed as the subject site is located outside of the Project footprint. Consequently, the vegetation within the subject site will continue to form a corridor to the vegetation surrounding Bells Creek to the east and on adjacent lots. As such no habitat for the threatened raptors will be removed, modified, fragmented or isolated as a result of the Project.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No area of outstanding biodiversity value for the assessed threatened fauna species has currently been identified under the BC Act. No area of outstanding biodiversity value is located in the locality of the subject site. Therefore, the Project is not likely to have an adverse effect on an area of outstanding biodiversity value (directly or indirectly).

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

No key threatening processes will result as a consequence of the Project as the subject site is located outside of the development area and therefore will not be directly impacted. The Project will adhere to strict hygiene protocols during construction and remedial works which will prevent the introduction of *Phytophthora cinnamomi* into the subject site. The drainage line located within the subject site will not be altered or otherwise impacted by the Project.

Conclusion

The treed vegetation and riparian area located within the subject site all form potential foraging habitat for microchiropteran bat species. All of this habitat will be retained as the subject site is located outside of the the Project footprint. The Project is therefore not expected to create either direct and indirect impacts which will

risk the survival or result in the fragmentation of these species population. Accordingly, no significant impact is predicted to occur to microchiropteran bats species as a result of the Project.

FIGURES

Legend

- Project Footprint
- Subject Land
- Watercourse

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021

Coordinate System: MGA Zone 56 (GDA 94)

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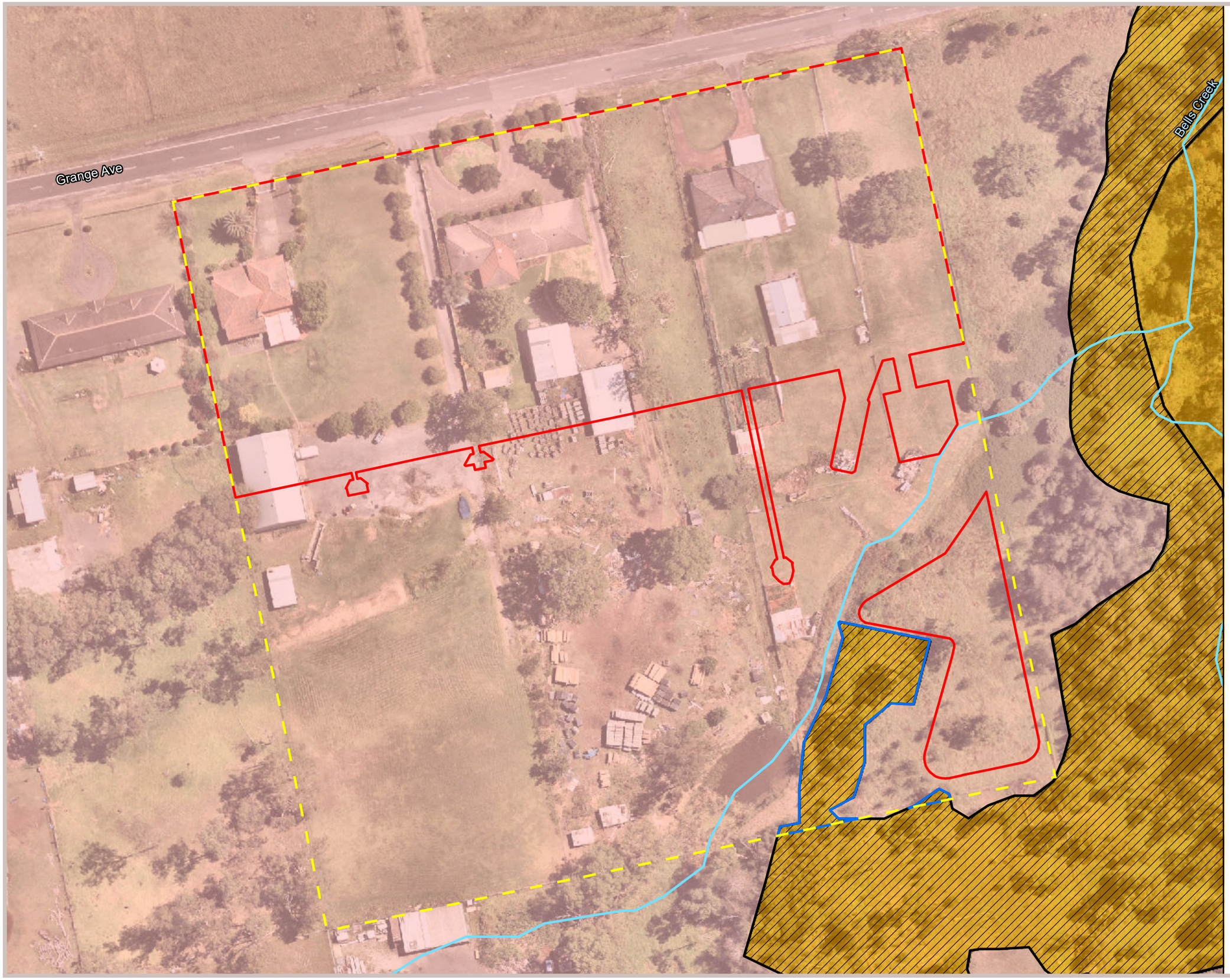
0 25 50 75 100 m

I:\...\21008\Figures\RP1\20210317\Figure 1. Location_Subject Land

Figure 1. Location of the subject land, proposed development and locality



Legend

- Project Footprint
- Subject Site
- Subject Land
- Watercourse

North West Growth Centre

- Certified
- Non Certified

Protected Vegetation

- Existing Native Vegetation Area

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021
Data Source:
OEH, 2015. Subject Lands for the Biocertification of Sydney Region Growth Centrese SEPP and related EPIs.
North West Growth Centre Native Vegetation Protection Map Sheet NVP_005

Coordinate System: MGA Zone 56 (GDA 94)

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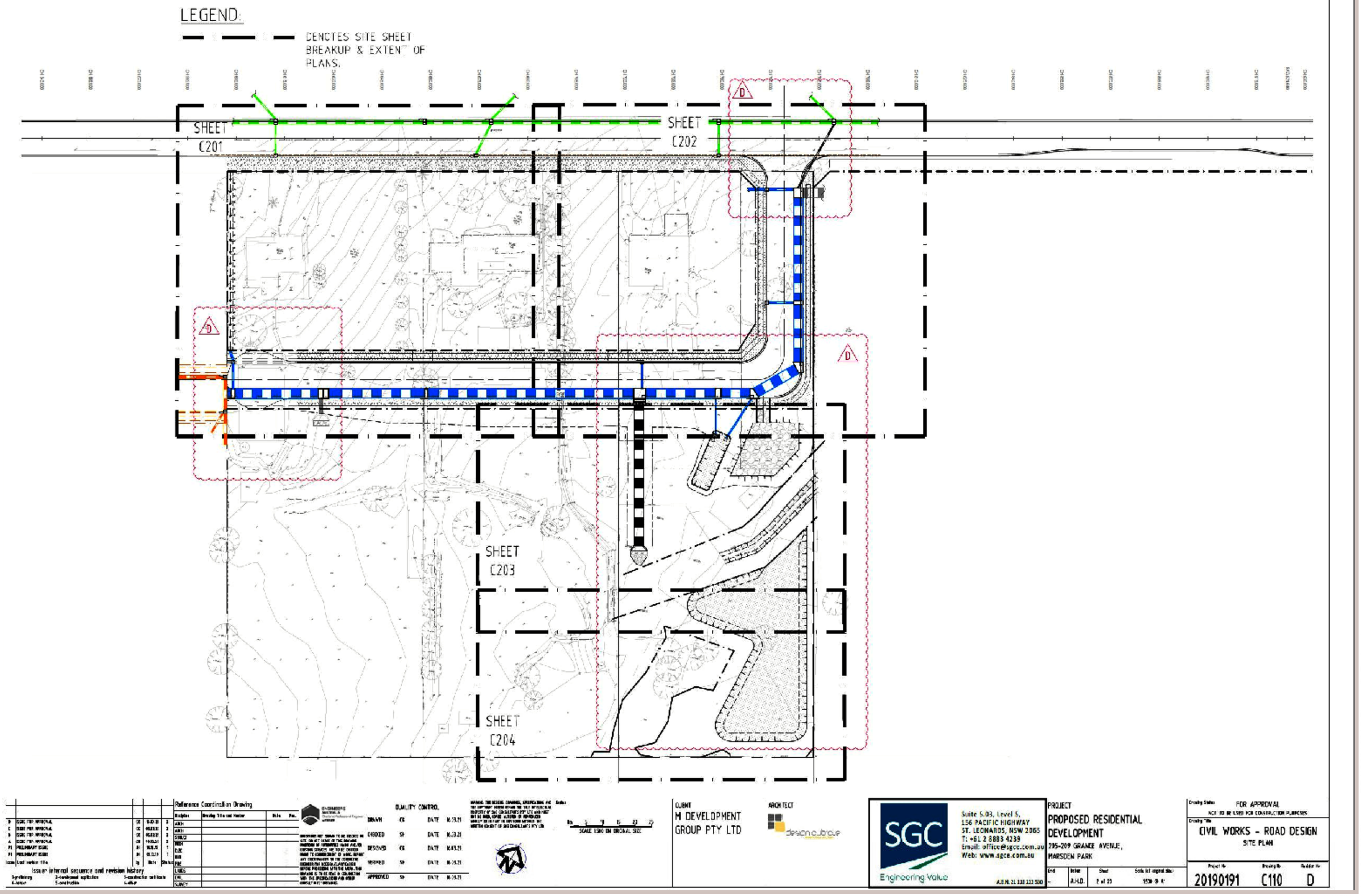
I:\...\21008\Figures\RP1\20210317\Figure 2. Location_Biocertified Land

0 10 20 30 40 m

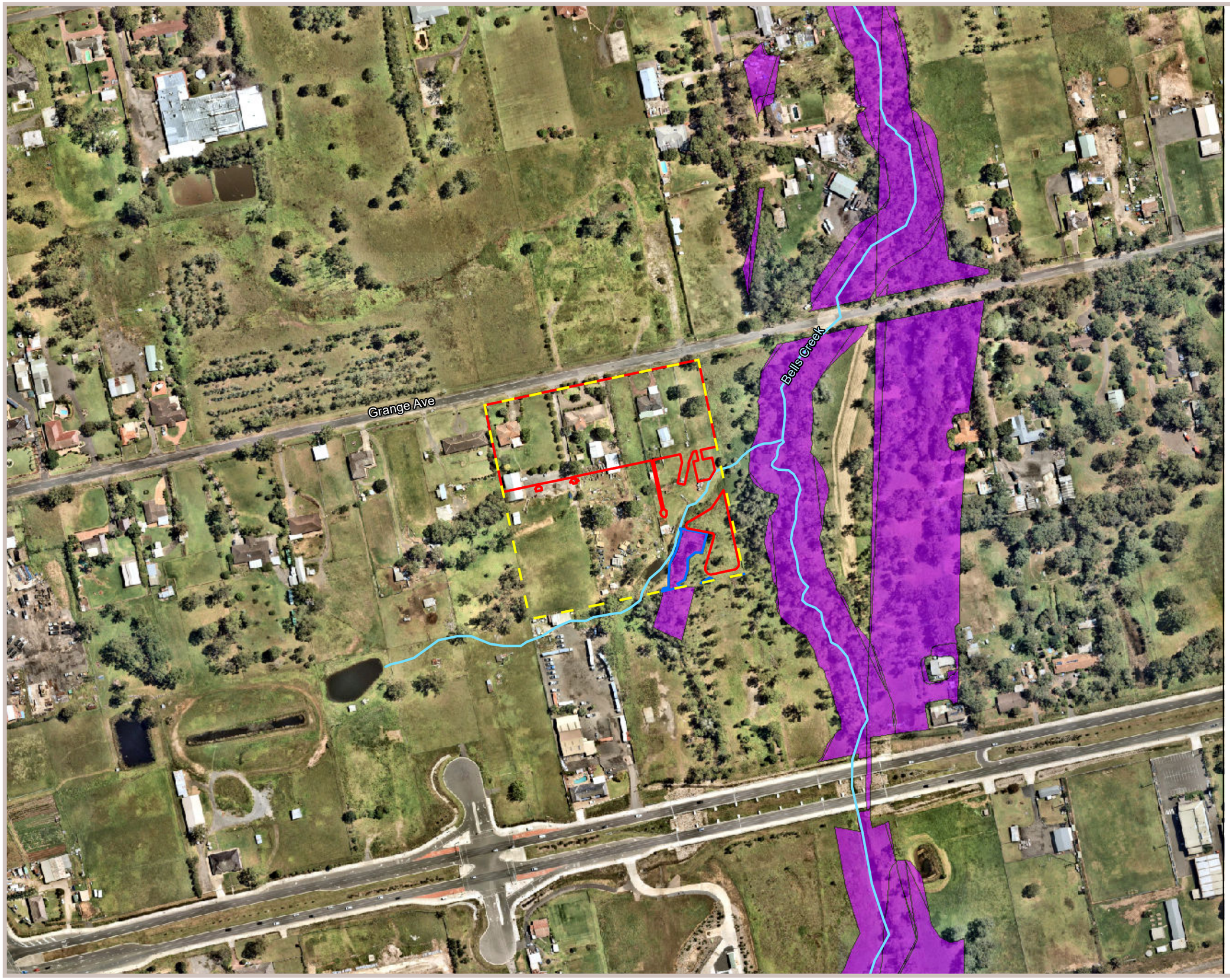
Figure 2. Location of the subject site, including non-biocertified land and Existing Native Vegetation



I:\...\21008\Figures\RP1\20210317\Figure 3. Project layout

Figure 3. Project layout

Image Source: SGC (2021)



Legend

- Project Footprint
- Subject Site
- Subject Land
- Biodiversity Values
- Watercourse

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021
Data Source:
Biodiversity Values Map (2021)
Dated: 05/02/2021
© State Government of NSW and Department of Planning, Industry and Environment 2018
Coordinate System: MGA Zone 56 (GDA 94)

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0 25 50 75 100 m

I:\...\21008\Figures\RP1\20210317\Figure 4. BVM

Figure 4. The subject site and Biodiversity Values Map

Figure 5. Survey effort and habitat features

Legend

- Subject Site
- Subject Land
- Watercourse

Vegetation Community

- Cumberland Plain Woodland (Scattered Trees)
- River-flat Eucalypt Forest (Scattered Trees)
- River-flat Eucalypt Forest (Degraded)
- Non-endemic Native
- Typha orientalis
- Exotic Vegetation
- Coral Tree
- Blackberry
- Exotic Grassland
- Cleared Land
- Dam

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021

Coordinate System: MGA Zone 56 (GDA 94)

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0 10 20 30 40 m

I:\...\21008\Figures\RP1\20210209\Figure 6. Vegetation Communities_Subject Land

Figure 6. Vegetation communities within the subject land

Bells Creek

Legend

- Project Footprint
- Subject Site
- Subject Land
- Watercourse

Vegetation Community

- Cumberland Plain Woodland (Scattered Trees)
- River-flat Eucalypt Forest (Scattered Trees)
- River-flat Eucalypt Forest (Degraded)
- Non-endemic Native
- Typha orientalis
- Exotic Vegetation
- Coral Tree
- Blackberry
- Exotic Grassland
- Cleared Land
- Dam

Habitat Feature

- Dam
- Log/wooden pile
- Palm tree
- Rock/metal pile
- Small pond
- Tree hollows

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021

Coordinate System: MGA Zone 56 (GDA 94)

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0 10 20 30 40 m

I:\...\21008\Figures\RP1\20210317\Figure 7. Project Impacts

Figure 7. Extent of Project impact