Flora and Fauna Assessment

2115 Castlereagh Road, Penrith

AON Ari

30 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	Expansion
BAM	Biodiversity Assessment Method
BC Act	*NSW Biodiversity Conservation Act 2016*
Biosecurity Act	*NSW Biosecurity Act 2015*
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
DA	Development Application
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DoEE	former Commonwealth Department of Environment and Energy (now DAWE)
DPIE	NSW Department of Planning, Industry and Environment
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*
FFA	Flora and Fauna Assessment
FM Act	*NSW Fisheries Management Act 1994*
GIS	Geographic Information System
GPS	Global Positioning System
ha	hectares
LEP	City of Penrith Local Environment Plan 2010
LGA	Local Government Area
LLSA	*NSW Local Land Services Amendment Act 2016*
m	metres
MNES	Commonwealth Matters of National Environmental Significance
NSW	New South Wales
OEH	former NSW Office of Environment and Heritage (now DPIE)
Project	Construction of industrial and commercial buildings and associated landscaping and services within the Subject Site
SEPP	State Environmental Planning Policy
SREP 20	Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997) (1997 EPI 592)
Study Area	The entirety of Lot 2 787287 as shown in **Figure 1**.
Subject Site	The area subject to the proposed development as shown in **Figure 1**

1. Introduction

1.1. Purpose

Cumberland Ecology Pty Ltd (Cumberland Ecology) has been commissioned by AON Ari on to conduct a Flora and Fauna Assessment (FFA) to support a Development Application (DA) for the proposed upgrade of an industrial complex (the Project) located at 2115 Castlereagh Road, Penrith. The site comprises Lot 2 787287 (the 'Study Area', **Figure 1**). The Project will involve construction of new industrial and commercial buildings within the Study Area as well as renovations of existing buildings associated with a former copper processing facility and current aluminium distributor (the development areas subject to the DA are hereafter referred to as the 'Subject Site', **Figure 1**).

The purpose of this report is to describe the current biodiversity values of the Subject Site and to assess the potential impacts of the proposed works on flora and fauna, particularly threatened species, populations and communities that are listed under the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The specific objectives of this report are to:

- Describe the vegetation communities on the Subject Site;
- Describe fauna habitats and fauna usage of the Subject Site;
- Identify any threatened species, populations or ecological communities (as listed under the BC Act and/or EPBC Act) existing on the Subject Site;
- Assess the likelihood of occurrence of threatened species, populations or communities (as listed under the BC Act and/or EPBC Act) within the Subject Site;
- Assess the potential impact of the project on threatened species, populations or communities (as listed under the BC Act and/or EPBC Act), including the completion of Tests of Significance under Section 7.3 of the BC Act; and
- Where relevant, recommend mitigation measures to reduce the impacts of the proposed development on biodiversity values.

1.2. Background

1.2.1. Site Description

The Subject Site is located within a portion of the Study Area (**Figure 1**). The Study Area occurs within the City of Penrith Local Government Area (Penrith LGA) and is zoned as IN1 General Industrial under the Penrith Local Environment Plan 2010 (LEP). It is bound by Castlereagh Road to the west, other industrial properties to the north and south, and a large wetland to the east. It is approximately 12.07 ha in size, with 10.98 ha of this comprising the Subject Site.

The majority of the Study Area is developed and comprises hardstand surfaces and industrial buildings. In the west some vegetation is present around the Castlereagh Road frontage; comprising lawns, gardens, and planted native and exotic trees. Mown grassland areas are present in the northern half of the central areas of

the site, with a small number of planted native trees. The eastern extent of the site contains large areas which have recently been cleared back to bare earth, with some scattered planted native trees around the southern and south-eastern boundaries of the site. A drainage line is present in the east of the property along the south-eastern boundary, and this, and some areas to the east of the drainage line are currently vegetated with native wetland species.

1.2.2. Description of the Proposed Development

The current Project entails the redevelopment of the Subject Site to create a 'made in Australia' manufacturing hub.

The proposed development will consist of but not limited to the following:

- Installation of new landscaping features to front and rear of Subject Site;
- Renovation of existing manufacturing buildings;
- Construction of new manufacturing buildings and hardstand areas; and
- Installation of new stormwater management infrastructure including a new open basin.

The development will require complete removal of all vegetation within the Subject Site (subject to detailed architectural plans).

1.3. Relevant Legislation

1.3.1. Environmental Planning and Assessment Act 1979

The 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 the environment and biodiversity values, which is addressed in Section 1.7 and requires application of Part 7 of the *Biodiversity Conservation Act 2016*. This includes threatened species, communities, habitat and processes as listed under the BC Act and *Fisheries Management Act 1994* (FM Act).

1.3.2. Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's key piece of environmental legislation and is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) (formerly DoEE). It is designed to protect national environmental assets, known as Matters of National Environmental Significance (MNES), which include threatened species of flora and fauna, threatened ecological communities, migratory species as well as other protected matters. Among other things, it defines the categories of threat for threatened flora and fauna, identifies key threatening processes and provides for the preparation of recovery plans for threatened flora, fauna and communities.

Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES must be referred to the Commonwealth Minister for the Environment.

1.3.3. Biodiversity Conservation Act 2016

Under the NSW Land Management and Biodiversity Conservation (LMBC) reform, the NSW Parliament passed the following two Acts in November 2016:

- Biodiversity Conservation Act 2016 (BC Act), which replaces the Threatened Species Conservation Act 1995, the Nature Conservation Trust Act 2001 and parts of the National Parks and Wildlife Act 1974; and
- Local Land Services Amendment Act 2016 (LLSA Act), which replaces the Native Vegetation Act 2003 and the Native Vegetation Regulation 2005.

These reforms commenced on 25 August 2017 and are now in force.

A key part of the reforms is the introduction of the Biodiversity Offsets Scheme (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.

The BOS applies to local development (assessed under Part 4 of the EP&A Act) that is likely to significantly affect threatened species or communities or that triggers threshold levels for when assessment via the BOS is required. The triggers for entry into the BOS are if a Part 4 development:

- 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;
- Exceeds the biodiversity offsets scheme threshold according to Clause 7.1 of the NSW *Biodiversity Conservation Regulation 2019* (BC Regulation), with the thresholds being:
    - 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.
- Is carried out in a declared area of outstanding biodiversity value (AOBV).

If a project triggers any of the above thresholds, assessment according to the BOS is required, which involves the preparation of a Biodiversity Assessment Development Report (BDAR) in accordance with the Biodiversity Assessment Method (BAM). An assessment of whether the project will trigger the above thresholds is provided below.

A Test of Significance has been conducted for relevant entities (see **Appendix B**) to determine whether or not a significant impact to threatened species or communities is likely to occur. These Tests of Significance indicate a significant impact is not expected to occur to any threatened entities.

The Subject Site is zoned as IN1 – General Industrial under the LEP which has a minimum lot size of 1.25 ha. As such, any clearing of native vegetation of 0.50 ha or more would trigger entry into the BOS (see **Table 1**).

Approximately 0.31 ha of native vegetation is required to be cleared for the proposed development. As such the BOS is not triggered by exceeding this threshold.

Table 1 Native vegetation clearance thresholds for triggering entry into the BOS

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

We have reviewed the NSW Biodiversity Values Map and Threshold Tool, and note the Subject Site is not mapped on the Biodiversity Values Map. Therefore, entry into the BOS is not triggered via this mechanism.

For the aforementioned reasons the Project does not trigger entry in the BOS and a BDAR is not required. Subsequently, this FFA has been prepared to assess the impacts to biodiversity of the Project.

1.3.4. Biosecurity Act 2015

Problematic weeds in NSW are handled under the NSW *Biosecurity Act 2015* (Biosecurity Act). Under the Biosecurity Act all weeds are required to be controlled by all persons under a "General Biosecurity Duty". The General Biosecurity Duty means that all public and private land owners or managers and all other people who deal with weed species (biosecurity matters) must use the most appropriate approach to prevent, eliminate, or minimise the negative impact (biosecurity risk) of those weeds (DPI 2017).

Under the Biosecurity Act some weed species have been prioritised for management by specific regulations and controls under the act. These are known as State Level Priority Weeds. The state has been divided into 11 regions (each covering a number of LGAs) under the Act. Within each region, additional weed species known as Regional Priority Weeds have been prioritised for management. A further set of weeds are identified within the Regional Strategic Weed Management Plans as being "other weeds of regional concern".

All land within the Subject Site occurs within the Greater Sydney Local Land Services region, and weed management within the region is to be undertaken under the direction of the South East Regional Strategic Weed Management Plan (2017). Appendix 1 of the Weed Management Plan outlines the State Priority Weeds, Regional Priority Weeds, and other weeds of regional concern.

1.3.5. Water Management Act 2000

1.3.5.1. Legislation

The primary objective of the NSW *Water Management Act 2000* (WM Act) is to manage NSW water in a sustainable and integrated manner that will benefit current generations without compromising future generations' ability to meet their needs. Since 2018, the WM Act has been administered by Natural Resources Access Regulator (NRAR) and establishes an approval framework for activities within waterfront land which is defined as land 40 m from the highest bank of a river, lake, wetland or estuary.

The definition of a lake under the WM Act is:

a. a wetland, a lagoon, a saltmarsh and any collection of still water, whether perennial or intermittent and whether natural or artificial, and

b. any water declared by the regulations to be a lake,

whether or not it also forms part of a river or estuary, but does not include any water declared by the regulations not to be a lake.

The definition of a 'river' under the WM Act is:

a. any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved, and

b. any tributary, branch or other watercourse into or from which a watercourse referred to in paragraph (a) flows, and

c. anything declared by the regulations to be a river,

whether or not it also forms part of a lake or estuary, but does not include anything declared by the regulations not to be a river.

In relation to paragraph (c) of the definition of 'river' in the Dictionary to the Act, the following are declared to be a river as per the Water Management (General) Regulation 2018 (WM Regulation):

a. any watercourse, whether perennial or intermittent, comprising an artificial channel that has changed the course of the watercourse

b. any tributary, branch or other watercourse into or from which a watercourse referred to in paragraph(a) flows.

Under the WM Regulation the following activities related to the physical properties of a watercourse are exempt from requiring a controlled activities approval under clause 28 of Schedule 4:

- Activities on waterfront land if river is concrete lined or in pipe: Any activity carried out on waterfront land relating to a river where the channel of the river is fully concrete lined or is a fully enclosed pipe channel.

The Guidelines for Controlled Activities on waterfront land - Riparian corridors (NRAR 2018) provides guidance to establish Vegetated Riparian Zones (VRZ) along watercourses which are based on the Strahler stream ordering system. The VRZ is measured from the top of the creek bank. The minimum required VRZ width for a first order stream is 10 m either side of the creek (measured from top of bank). The maximum required VRZ is 40 m either side of the creek (measured from top of bank) and this is applied to fourth order and greater streams, wetlands, estuaries, and tidal influenced waters. The Riparian Corridor is defined as the VRZ width on both sides of the creek or waterbody plus the channel width. Development is able to be undertaken within the outer 50% of a VRZ assuming an equal area of land can be added to the VRZ, making the VRZ wider at another location. VRZ requirements are detailed in **Table 2** below.

Table 2 Recommended Riparian Corridor (RC) Widths

Watercourse Type	VRZ Width	Total RC Width
1st order	10 metres	20 metres + channel width
2nd order	20 metres	40 metres + channel width
3rd order	30 metres	60 metres + channel width
4th order and greater (includes estuaries, wetlands and parts of rivers influenced by tidal waters)	40 metres	80 metres + channel width

1.3.5.2. Waterbodies within and Adjacent to the Study Area

i. Locally Mapped Wetlands and Watercourses

No watercourses have been mapped within the Subject Site. The nearest mapped watercourse within the Water Management (General) Regulation 2018 Hydro Line spatial data (DPIE 2021), a first order stream, occurs approximately 75 m to the south and is a tributary of Boundary Creek, flowing south to meet that watercourse (**Figure 1**).

A large wetland is mapped as occurring to the east of the Subject Site in ancillary maps to the Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997) (1997 EPI 592) (hereafter referred to as SREP20) (**Figure 1**).

ii. Watercourses

Within the Study Area a drainage line is present in the south east (**Figure 2**). This drainage line flows from close to the southern boundary of the Study Area to the north in the direction of the SREP20 mapped wetland, located to the east of the Study Area. The upper limits of the drainage line within the Subject Site were dry at the time of the Cumberland Ecology survey comprising bare earth due to recent vegetation clearing. The drainage line at this location is ephemeral and likely only contains flowing water during weather events with an above average amount of rain, and had the appearance of a ditch/depression. To the east, the drainage line becomes more pronounced, and contains aquatic vegetation and shallow water. At the approximate centre of the drainage line a stormwater pipe discharges into the drainage line increasing water depth downstream to the east. At the eastern extent of the drainage line it terminates in a wider basin-like area within the Study Area. There is no visible overland flow/channel connecting the drainage line from the Study Area to the adjoining SREP20 mapped wetland.

The drainage line is considered to be artificial as there is "clear man made shaping of swales, piped drainage entry and separation between this basin and the wetland area" (Wilson, M. Email to Petrina Goh dated 04 March 2021). These features are evident in LIDAR imagery taken across the Study Area (**Figure 2)** which shows it is wholly contained within the Study Area and is not part of a natural watercourse. Although the definitions of a river under the WM Act and WM Regulation include artificial drainage lines where they redirect a natural watercourse, or where they improve a natural water course, the definition does not include wholly artificial watercourses in areas in which no watercourse historically occurred. A review of aerial photography from 1943 (**Figure 3**) shows this drainage line did not exist at that time and a large artificial channel evidently filled with

water was present further to the east near the property boundary which likely filled the same function of draining water from the Study Area. The drainage line is present in aerial photography from 1986 onwards (**Figure 4**).

For the aforementioned reasons the areas adjacent to the drainage line have not been considered to comprise an occurrence of waterfront land. The Subject Site does not occur within 10 m of the drainage line and is therefore outside of the area that would be considered a VRZ if the drainage line was considered to be a first order stream. Planting of suitable native vegetation is proposed in the Project landscape plan within 10 m of the drainage line.

iii. Wetlands

A large wetland which would fit the definition of a lake under the WM Act occurs to the east of the Subject Site in the location specified in the SREP 20 mapping covering the area. The boundary of the wetland was recorded by Cumberland Ecology (during the site survey on the 4 March 2021) using a handheld GPS device and is shown in **Figure 5**. The 40 m waterfront land buffer in which a controlled activities approval is required for the wetland overlaps with areas in the east of the Study Area. The Project has been designed to exclude the Subject Site impacting on waterfront land and as such a controlled activities approval is not expected to be required (**Figure 5**).

1.3.6. Sydney Regional Environmental Plan No 20—Hawkesbury-Nepean River (No 2—1997) (1997 EPI 592)

The aim of SREP 20 is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context. Ecological aspects of SREP 20 relevant to the proposed development include the following two policies:

- Environmentally sensitive areas: The environmental quality of environmentally sensitive areas must be protected and enhanced through careful control of future land use changes and through management and (where necessary) remediation of existing uses. Environmentally sensitive areas in the Hawkesbury-Nepean catchment are: the river, riparian land, escarpments and other scenic areas, conservation area sub-catchments, national parks and nature reserves, wetlands, other significant floral and faunal habitats and corridors, and known and potential acid sulphate soils; and

- Flora and fauna: Manage flora and fauna communities so that the diversity of species and genetics within the catchment is conserved and enhanced.

2. Methodology

2.1. Database Analysis and Literature Review

Database analysis was conducted for the locality using the NSW Department of Planning, Industry and Environment (DPIE) Threatened Species Data Collection (BioNet) (EES 2020). The locality is defined as the area within a 10 km radius of the Subject Site. The Atlas of NSW Wildlife Database search was used to generate records of threatened flora and fauna species listed under the BC Act within the locality of the Subject Site. For the purpose of this assessment fish were excluded, as no permanent waterbodies are present on the site. The lists generated from these databases were reviewed against available knowledge of the Subject Site, in conjunction with the abundance, distribution, and age of records to ascertain the likelihood of occurrence of threatened species within the Subject Site.

2.2. Flora Survey

Flora surveys were undertaken within the Study Area by Cumberland Ecology on 4 March 2021 by a botanist and ecologist over a 6 hour period. Surveys included vegetation mapping, plot-based vegetation survey, and targeted threatened flora searches. Further details of each of the survey methods are provided below.

All vascular plants recorded or collected were identified using keys and nomenclature provided in Harden (Harden 1990-1993). Where known, taxonomic and nomenclatural changes have been incorporated into the results, as derived from PlantNET (Botanic Gardens Trust 2020). The location of Flora and Fauna Surveys is shown in **Figure 6**.

2.2.1. Vegetation Mapping

Previous broad-scale mapping conducted for the Cumberland Plain vegetation mapping (OEH 2013) was utilised to determine potential vegetation communities likely to occur within the Study Area. Cumberland Ecology conducted additional vegetation surveys to revise and update the existing vegetation mapping. The vegetation within the Study Area was then ground-truthed to examine and verify the mapping of the condition and extent of the different vegetation communities. Where vegetation community boundaries were found to differ from the DPIE mapping, records were made of proposed new boundaries using a hand-held Global Positioning System (GPS) and mark-up of aerial photographs.

The resultant information was synthesised using a Geographic Information System (GIS) to create a spatial database that was used to interpret and interpolate the data to produce a vegetation map of the Study Area.

2.2.2. Random Meander Survey

Random meander surveys were undertaken to detect flora species present within the Study Area. These surveys consisted of traversing all vegetation communities present with the Subject Site.

2.2.3. Targeted Threatened Flora Surveys

Targeted threatened flora searches via random meanders were undertaken within suitable habitat of threatened flora species known from the locality.

2.2.4. BAM Plots

Two BAM plots were undertaken within the Study Area to document the condition and composition of planted and naturally occurring native vegetation.

The following data was collected within each of the plots:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 x 20 m floristic 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 x 20 m floristic plot;
- Cover of 'High Threat Exotic' weed species within a 20 x 20 m floristic plot;
- 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; and
    - 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.

2.3. Fauna Survey

Fauna surveys were undertaken within the Subject Site by Cumberland Ecology on 4 March 2021. Surveys included a fauna habitat assessment and incidental observations. Further details of each of the survey methods are provided below. The location of flora and fauna surveys is shown in **Figure 6**.

2.3.1. Habitat Assessments

A fauna habitat assessment was undertaken on 4 March 2021 over a 6 hour period. The assessment included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, bush rock and wetland areas such as creeks and soaks. Structural features considered included the nature and extent of the understorey and ground stratum and extent of canopy. The survey also included an assessment of the presence of habitat features suitable for use by threatened fauna species known from the locality.

2.3.2. Incidental Observations

Any incidental fauna species that were 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 Site.

2.4. Limitations

Vertebrate fauna and vascular flora of the locality are well known based upon a sizeable database of past records and various published reports. The surveys by Cumberland Ecology added to the existing database and helped to provide a clear indication of the likelihood that various species occur, or are likely to occur, within the Subject Site. The data obtained from database assessment and surveys of the Subject Site furnished an appropriate level of information to support this assessment.

The weather conditions at the time of the flora surveys were generally favourable for plant growth and production of features required for identification of most species. Shrubs, grasses, herbs and creepers were readily identifiable in most instances. It is expected that not all flora species present would have been recorded during surveys. Despite this, it is considered that sufficient information has been collected to assess issues including conservation significance of the flora, condition and viability of bushland and likely impact on native vegetation. An assessment of the likelihood of occurrence of threatened flora species recorded within the locality of the Subject Site in the database searches was undertaken to supplement the flora survey.

No targeted fauna surveys were undertaken for this assessment, which relied on database analysis, fauna habitat assessment and incidental observations. In general, opportunistic observations of fauna provide a "snapshot" of some of the fauna present on site that was active during 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 Site. Therefore, not all fauna utilising the Subject Site are likely to have been recorded during surveys. An assessment of the likelihood of occurrence of threatened and migratory fauna species listed for the locality in the database searches was undertaken to supplement the fauna surveys. 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

Broad-scale mapping of the Study Area undertaken by OEH (2013)does not map any native vegetation within the Study Area. The nearest native vegetation communities mapped are Cumberland Plain Woodland about 0.5 km to the east of the site along Hickeys Lane, and Alluvial Woodland which occurs approximately 0.5 km to the south-west of the site along Boundary Creek. Cumberland Plain Woodland is listed as a Critically Endangered Ecological Community (CEEC) under the BC Act and the EPBC Act. The Alluvial Woodland mapping unit is made up of two Threatened Ecological Communities (TECs), River-flat Eucalypt Forest, listed as an Endangered Ecological Community (EEC) under the BC Act and a CEEC under the EPBC Act, and Swamp Oak Floodplain Forest, listed as an EEC under the BC Act and the EPBC Act.

Surveys undertaken by Cumberland Ecology indicate that these communities are not present in the Study Area and vegetation within the site consists primarily of planted native and exotic vegetation, and aquatic vegetation which occurs along an artificial drainage line, but has likely naturally colonised the drainage line.

Historical aerial photography of the Subject Site shows the trees throughout the extent of the Study Area have been planted (Spatial Services NSW Goverment 2020). In 1943 no woody vegetation appeared to be present within the Study Area at all (**Figure 3**). In 1986 trees had been planted in landscaped areas in the west of the Study Area, but the eastern half of the property was devoid of woody vegetation (**Figure 4**). By 1998 it is evident trees have been planted as strips along the south-eastern boundary of the Study Area and to the east of the drainage line in the east of the Study Area (**Figure 7**).

The remainder of the Study Area outside of hardstand areas and buildings comprises a highly modified area that consists of exotic grassland areas in the central-northern area of the Study Area and in the east large areas have been recently cleared and stripped back to bare earth with the exception of piles of dirt and cleared vegetation. A complete list of species recorded in the Subject Site is provided in **Appendix A**. The vegetation communities on site have been categorised into the following units:

- Cleared Exotic Dominated Shrubland and Grassland;
- Freshwater Wetlands *Phragmites* Dominated Variant;
- Freshwater Wetlands - *Persicaria* and *Typha* Dominated Variant;
- Planted Native Vegetation; and
- Exotic Vegetation.

These communities are described below and **Figure 8** shows the vegetation mapping of the Subject Site.

The extent of these communities within the Study Area and Subject Site is detailed in **Table 3** below.

Table 3 Vegetation Communities within Study Area and Subject Site

Vegetation Community	Study area	Subject site
Cleared Exotic Dominated Shrubland and Grassland	2.82	2.51
Freshwater Wetlands - Persicaria and Typha Dominated Variant	0.11	0.00
Freshwater Wetlands Phragmites Dominated Variant	0.16	0.00
Planted Native Vegetation	0.38	0.31
Exotic Vegetation	2.17	1.84
Total	5.64	4.67

3.1.1. Cleared Exotic Dominated Shrubland and Grassland

BC Act Status: Not listed

EPBC Act Status: Not listed

NSW Plant Community Type: N/A

BC Act Status: Not listed

EPBC Act Status: Not listed

NSW Plant Community Type: N/A

Approximately 2.8 ha of Exotic Dominated Shrubland and Grassland in the east of the site had been cleared prior to the survey, and clearing was continuing concurrently to the survey. At the time of the survey this area was stripped back to bare earth with cleared vegetation pushed into piles along with soil (**Photograph 1**). Since the clearing, some seedling growth had occurred and vegetation within the piles was generally identifiable.

This area seemed to have been a wasteland area with small trees of exotic weed species present scattered through the area. Woody vegetation within piles indicates dominant species were weeds particularly *Celtis sinensis* (Chinese Hackberry), *Pyracantha angustifolia* (Orange Firethorn), and *Ligustrum lucidum* (Broad-leaved Privet). The only native woody vegetation observed comprised a single felled individual of the *Acacia decurrens* (Black Wattle), which was noted near the artificial drainage line in the far east (**Photograph 2**). The exotic shrubs *Rubus fruticosus* (Blackberry) and *Cestrum parqui* (Green Cestrum) were also noted in some vegetation piles.

The ground layer, based on inspections of small, uncleared areas adjacent to the drainage line in the east and at the western extent of the cleared area, vegetation in cleared piles, and regrowth individuals of seedlings in cleared areas, was likely to have been dominated by exotic grasses and forbs. Species recorded include grasses *Eragrostis curvula* (African Lovegrass), *Paspalum dilatatum* (Paspalum), *Cynodon dactylon* (Couch), *Chloris gayana* (Rhodes Grass), and *Cenchrus clandestinus* (Kikuyu). Forbs include the exotics *Verbena bonariensis*

(Purpletop), *Cirsium vulgare* (Spear Thistle), *Asparagus asparagoides* (Bridal Creeper), and the native *Commelina cyanea* (Scurvy Weed).

Some small areas at the southern extent of the drainage line which have also been cleared were also evidently dominated by the tall, native aquatic grass *Phragmites australis* (Common Reed) due to the presence of this species in piled vegetation in the south-eastern corner of the Study Area.

Photograph 1 Cleared Exotic Dominated Shrubland and Grassland in the east of Study Area

Photograph 2 Felled *Acacia decurrens* tree adjacent to drainage line

3.1.2. Freshwater Wetlands

BC Act Status: Not listed

EPBC Act Status: Not listed

NSW Plant Community Type: PCT 781 Coastal Freshwater Wetland

This community occurs in the drainage line in the east of the Study Area and the basin-like depression at the north-eastern extent, and some areas to the east of the drainage line. Floristically the community is similar to the *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* EEC, as listed under the BC Act, however the Final Determination (NSW Scientific Committee 2011) for the community states "Artificial wetlands created on previously dry land specifically for purposes such as sewerage treatment, stormwater management and farm production, are not regarded as part of this community, although they may provide habitat for threatened species". As the drainage line, as described in **Section 1.3.5.2.ii**, is considered to be wholly artificial and to occur on what was likely to be formerly dry land (**Figure 3**) for the purpose of channelling stormwater, the community is not considered to conform to the listed EEC. Two variants of the community are present within the Study Area as described below.

3.1.2.1. Freshwater Wetlands - *Phragmites* Dominated Variant

The southern half of the drainage line is located at higher elevations than the stormwater inlet, and is dominated by a dense monoculture of the tall aquatic grass *Phragmites australis* (Common Grass) (**Figure 8**). At some locations, the fern *Hypolepis muelleri* (Harsh Ground Fern) is also present beneath the *Phragmites* (**Photograph 3**).

Phragmites australis is also dominant at higher elevations to the east of the drainage line all the way to the property boundary in the understorey under some planted Eucalypts and exotic woody weeds, and in open areas (**Photograph 4**). Due to the higher elevation at this location (**Figure 2**) it is unlikely this area is ephemerally inundated. There appears to have been former earthworks in this location and the landform has an artificial appearance. The landscape is likely to have been sculpted during works for the adjoining sewerage treatment plant or the adjoining powerline. There is potential fill has been used and due to looser soils than the surrounding lands the occurrences of *Phragmites australis* may be accessing water sitting below the soil surface associated with the adjacent drainage line.

Photograph 3 *Phragmites australis* and *Hypolepis muelleri* in southern extent of drainage line

Photograph 4 *Phragmites australis* dominated area to the east of drainage line

3.1.2.2. Freshwater Wetlands - *Persicaria* and *Typha* Dominated Variant

The drainage line below the stormwater pipe, which discharges into the middle of the drainage line , including the basin-like northern extent, contains more water than the section to the south. In this location, the drainage line is dominated by the aquatic species *Persicaria decipiens* (Slender Knotweed) and *Typha orientalis* (Bulrush), with occasionally occurrences of *Carex appressa* (Tall Sedge) close to the edges (**Photograph 5**). These species generally require more permanent access to water than the *Phragmites australis* occurring to the south which tolerates ephemerally inundated areas.

Photograph 5 Basin-like northern extent of drainage line dominated by *Typha orientalis* and *Persicaria decipiens*

3.1.3. Planted Native Vegetation

BC Act Status: Not listed

EPBC Act Status: Not listed

NSW Plant Community Type: N/A

This vegetation consists of a number of planted species of trees and shrubs native to NSW, though many are not locally native to the Study Area.

Trees planted in the west of the Study Area in a landscaped setting (**Photograph 6**) include *Eucalyptus bicostata* (Southern Blue Gum), *Eucalyptus microcorys* (Tallowwood), *Eucalyptus elata* (River Peppermint), *Grevillea robusta* (Silky Oak), *Callistemon salignus* (Willow Bottlebrush), and *Syzygium paniculatum* (Brush Cherry).

In the far north-west of the landscaped areas fronting Castlereagh Road a strip of relatively young, planted trees is present, of the locally native species; *Eucalyptus tereticornis* (Forest Red Gum) and *Corymbia maculata* (Spotted Gum) (**Photograph 7**).

In the central area of the Study Area there is a small strip of planted trees of the native species including *Corymbia eximia* (Yellow Bloodwood), *Eucalyptus robusta* (Swamp Mahogany) and *Eucalyptus elata* (River Peppermint) (**Photograph 8**).

In strips along the south-eastern boundary and to the south of the drainage line in the east, native trees are present, which as described above in **Section 3.1** were evidently planted between 1986 and 1998. A number of these appear to have died since 1998. These trees predominately consist of the locally native species *Eucalyptus crebra* (Narrow-leaved Ironbark), although a single *Eucalyptus melliodora* (Yellow Box) is present, native to areas west of Sydney, and a single *Eucalyptus cladocalyx* is also present, which is native to South Australia. Some planted native shrub species are also present in gardens in the west such as *Callistemon viminalis* (Weeping Bottlebrush).

The ground layer underneath planted native trees within the Study Area generally consists of lawns as described below in the Exotic Vegetation community, although trees in the strip in the south-east of the Study Area currently have no ground layer due to clearing (**Photograph 9**).

Photograph 6 Planted native *Eucalyptus microcorys* (Tallowood) in the west

Photograph 7 Planted native *Corymbia maculata* and *Eucalyptus tereticornis* in north-west

Photograph 8 Planted native *Eucalyptus elata* and *Eucalyptus robusta* in Central Area

Photograph 9 Planted *Eucalyptus crebra* in the south-east

3.1.4. Exotic Vegetation

BC Act Status: Not listed

EPBC Act Status: Not listed

NSW Plant Community Type: N/A

Exotic Vegetation occurs across the Study Area and consists of planted trees and shrubs in gardens, mown and managed lawn areas, and unmanaged wasteland areas. Planted exotic vegetation occurs only in the west of the Study Area and consists of a number of planted tree and shrub species (**Photograph 10**). Native Australian species, that are not native to NSW, such as *Corymbia citriodora* (Lemon-scented Gum) and *Eucalyptus cladocalyx* (Manna Gum), have been included in this community. Other tree species include exotics; *Liquidambar styraciflua* (American Sweetgum), *Ailanthus altissima* (Tree of Heaven), *Harpephyllum caffrum* (Kaffir Plum), *Ulmus parviflora* (Chinese Elm), and *Jacaranda mimosifolia* (Jacaranda). Shrub species include exotics; *Murraya paniculata* (Orange Jessamine), *Nerium oleander* (Oleander), and *Abelia chinensis* (Chinese Abelia).

Mown lawn areas (**Photograph 11**) are dominated by exotic grass species including *Cenchrus clandestinus, Cynodon dactylon,* and *Stenotaphrum secundatum* (Buffalo Grass). Exotic forbs are common as lawn weeds and

include *Hypochaeris radicata* (Catsear), *Taraxacum officinale* (Dandelion), and *Modiola caroliniana* (Red-flowered Mallow). A small number of common native species are present in these areas, and occur rarely as scattered individuals. These include the sedge *Cyperus gracilis* (Slender Flat-sedge), the forb *Dichondra repens* (Kidney Weed), and the grass *Eriochloa pseudoacrotricha* (Early Spring Grass).

Wasteland areas remain to the north-east of the drainage line in the east of the site predominately, with a few small areas remaining on the western bank of the drainage line (**Photograph 12**). These areas are dominated generally by the bramble *Rubus fruticosus,* and tall, unmanaged herbaceous species including the grasses *Cenchrus clandestinus* and *Paspalum dilatatum,* and forbs such as *Foeniculum vulgare* (Fennel), *Sida rhombifolia* (Paddys Lucerne), and *Conyza sumatrensis* (Tall Fleabane). A small number of exotic shrubs are present and include juvenile individuals of *Celtis sinensis*, and *Cestrum parqui* (Green Cestrum). A single individual of the native small tree *Acacia decurrens* was also recorded in the community.

Photograph 10 Planted exotic trees and exotic lawn in west of Study Area

Photograph 11 Mown exotic lawn areas in central-north of Study Area

Photograph 12 Wasteland area dominated by exotic species in far east of Study Area

3.2. Threatened Ecological Communities

No threatened ecological communities were recorded as present in the Study Area. Some species associated with local TECs are present within the Study Area as described in the vegetation community descriptions in **Section 3.1**, however no occurrences of any naturally occurring TECs are present which would fit the descriptions of the relevant TECs in the final determinations.

3.3. Flora Species

3.3.1. General Species

A total of 106 plant species were recorded during the site survey, of which 72 were exotic or not native to NSW, and 34 native to NSW (including cultivars). Most vegetation has been planted, with the exception of exotic environmental weeds (**Appendix A**).

3.3.2. Threatened Species

No naturally occurring threatened flora species were found during the survey of the Subject Site by Cumberland Ecology. A single individual of *Syzygium paniculatum* is present in the west of the Subject Site as a planted tree. This species naturally occurs in littoral and gallery rainforests in coastal areas on sand and alluvium and would not naturally occur on the shale-clay soils of the site (DPIE 2021b). It is listed as Endangered under the BC Act and Vulnerable under the EPBC Act. The species is extensively cultivated and commonly planted in urban gardens, and therefore sometimes considered to be a weed (Botanic Gardens Trust 2021). The single planted individual does not represent a natural occurrence of the species and is likely genetically degraded (through inbreeding) nursery stock/a cultivar. As such for the purposes of this assessment it has not been considered to conform to the listed threatened species.

A total of an additional 10 threatened flora species listed under the BC Act and/or the EPBC Act have been recorded for the locality or identified as having the potential to occur in the locality. An assessment of the likelihood of occurrence of these species in the Subject Site has been conducted and is presented in **Appendix B**. This assessment indicates that these species are unlikely to occur in the Subject Site due to the high degree of disturbance and the lack of suitable habitat.

3.3.3. Priority Weeds

Three State Priority Weeds, all of which are also Weeds of National Significance, and one Regional Priority Weed, were recorded within the Study Area. The spread of these species must be minimised to the extent possible, and the sale or distribution of these species is prohibited.

A number of other weeds occurring within the Subject Site are listed as Other Weeds of Regional Concern in the Greater Sydney Regional Weed Management Plan 2017 – 2022. These are weeds that may be useful or widely spread as crops or garden plants, but that can become invasive and threaten assets in certain circumstances.

Priority Weeds and Other Weeds of Regional Concern located within the Study Area are detailed in **Table 4** below.

Table 4 Priority Weeds recorded within the Study Area

Scientific name	Common name	Priority status	WoNS
Acer negundo	Box elder	Other Weed of Regional Concern	No
Ailanthus altissima	Tree of heaven	Other Weed of Regional Concern	No
Asparagus asparagoides	Bridal creeper	State Priority - Asset Protection	Yes
Celtis sinensis	Chinese Celtis	Other Weed of Regional Concern	No
Cenchrus clandestinus	Kikuyu	Other Weed of Regional Concern	No
Cestrum parqui	Green cestrum	Regional Priority	No
Chloris gayana	Rhodes grass	Other Weed of Regional Concern	No
Cinnamomum camphora	Camphor laurel	Other Weed of Regional Concern	No
Dolichandra unguis-cati	Cat's Claw Creeper	State Priority - Asset Protection	Yes
Eragrostis curvula	African lovegrass	Other Weed of Regional Concern	No
Ligustrum lucidum	Large-leaved Privet	Other Weed of Regional Concern	No
Ludwigia longifolia	Long-leaf willow primrose	Other Weed of Regional Concern	No
Murraya paniculata	Orange jessamine	Other Weed of Regional Concern	No
Pinus patula	Patula pine	Other Weed of Regional Concern	No
Pyracantha angustifolia	Firethorn	Other Weed of Regional Concern	No
Rubus fruticosus	Blackberry	State Priority - Asset Protection	Yes
Schinus terebinthifolius	Broad leaf pepper	Other Weed of Regional Concern	No
Solanum mauritianum	Wild tobacco bush	Other Weed of Regional Concern	No
Ulmus parvifolia	Golden elm	Other Weed of Regional Concern	No

3.4. Fauna Species

3.4.1. Fauna Habitat

The vegetation within the Subject Site has limited habitat potential for fauna due to its disturbed condition and lack of microhabitats such as fallen logs, hollow-bearing trees and bush rock. The native vegetation present within the Subject Site is mostly planted and degraded such that it would likely only provide occasional forging habitat for urban-adapted fauna. Fauna habitat present is limited to buildings, potentially suitable for roosting by some microchiropteran bat (microbat) species and flowering and fruiting trees and shrubs, suitable for foraging by nectar and fruit foraging species.

Nevertheless, many of the plants, including exotics, can provide some limited potential foraging resources for nectivorous mammals and mobile avian species that may use the Subject Site from time to time as part of a larger foraging range.

3.4.2. General Species

A small number of fauna species were recorded from the Study Area during the field survey. These are detailed in **Table 5** below.

Table 5 Fauna species observed within the Study Area

Observation Type	Scientific Name	Common name
Incidental	*Threskiornis molucca*	Australian White Ibis
Incidental	*Grallina cyanoleuca*	Magpie-lark
Incidental	*Cracticus tibicen*	Australian Magpie
Incidental	*Manorina melanocephala*	Noisy miner
Shell of species	*Cicada sp.*	Cicada

3.4.3. Threatened Species

No threatened fauna species have been recorded within the Subject Site.

A total of 28 threatened native fauna species listed under the BC Act and/or EPBC Act, as well as one migratory bird species listed under the EPBC Act, have been recorded in the locality. The likelihood of these species occurring within the Subject Site has been assessed and the results presented in **Appendix B**.

Based on the results of the site inspection and the habitat requirements of each threatened fauna species, the only three threatened species considered as having the potential to utilise the Subject Site are:

- Grey-headed Flying-fox (*Pteropus poliocephalus*) - Vulnerable under the BC Act and EPBC Act;
- Southern Myotis (*Myotis macropus*) – Vulnerable under the BC Act; and
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) – Vulnerable under the BC Act.

While the Grey-headed Flying Fox and Yellow-bellied Sheathtail-bat have foraging habitat within the Subject Site which will be removed under the Project, the only habitat present for the Southern Myotis is roosting habitat within buildings on the site, which are to be retained. As such this species has not been assessed further within this report to the assessment in **Appendix B**.

Although some habitat is available for threatened species in the wider locality, the Subject Site is too small and disturbed for the remaining species to utilise it for foraging purposes regularly or for breeding purposes. The lack of an adequate midstorey and understorey, poor habitat connectivity and minimal available resources on the Subject Site prohibits most fauna from nesting, roosting or foraging there. The only roosting/nesting habitat available on site is in the form of the branches of the exposed, planted mature trees that are scattered throughout the Subject Site, and buildings which have potential to be utilised by the aforementioned microchiropteran bat species.

4. Impact Assessment

4.1. Impacts on Vegetation Communities

The primary impact resulting from the Project is the removal of Planted Native Vegetation and Exotic Vegetation within the Subject Site that contains planted native and exotic species in a landscaped setting.

Past and current use of the Subject Site has entailed clearing and modification of the vegetation within the Subject Site, which is now dominated by planted native and exotic tree species that lack a significant understorey or midstorey due to their occurrence in isolated garden beds and lawns, or in areas lacking understorey, or comprising infestations of exotic weed species. This vegetation does not conform to the description of any native vegetation community. The extent of vegetation of removal of vegetation communities for the Project is detailed in **Table 6** below:

Table 6 Area of vegetation communities to be removed and retained

Vegetation Community	Study area	Subject site	Remaining
Cleared Exotic Dominated Shrubland and Grassland	2.82	2.51	0.31
Freshwater Wetlands - Persicaria and Typha Dominated Variant	0.11	0.00	0.11
Freshwater Wetlands Phragmites Dominated Variant	0.16	0.00	0.16
Planted Native Vegetation	0.38	0.31	0.07
Exotic Vegetation	2.17	1.84	0.33
Total	5.64	4.67	0.97

Avoidance, minimisation and mitigation measures will be addressed in **Chapter 5**.

4.2. Impacts on Flora Species

No threatened flora species listed under the BC Act or EPBC Act were recorded or are considered to have the potential to occur within the Subject Site, with the exception of a planted *Syzygium paniculatum* which as described in **Section 3.3.2** is not considered to comprise an individual of the listed species due to not occurring in its natural habitat and likely provenance from highly genetically degraded nursery stock. The proposed development, therefore, is unlikely to have a significant impact upon any threatened flora species.

4.3. Impacts on Fauna Species

4.3.1.1. Threatened and Migratory Species

The Subject Site is considered to have the potential to provide habitat which will be removed for two threatened fauna species that have been recorded from the locality; the Grey-headed Flying-fox, and the Yellow-bellied Sheathtail-bat.

The Subject Site potentially provides marginal foraging opportunities for these threatened and migratory fauna species but is unlikely to exclusively support a local population of any species.

The threatened and migratory species recorded from the locality that have potential foraging habitat in the Subject Site are considered below in more detail.

The Grey-headed Flying-fox is a nectivorous species and may forage periodically on trees present in the Subject Site and adjoining vegetation occasionally as part of a wider foraging area although the extent of foraging resources in the Subject Site is relatively low due to the predominantly cleared state of the site and the low abundance of trees. No breeding camps are present in the Subject Site for the Grey-headed Flying-fox, and the closest is recorded approximately 13 km to the south-west of the Study Area in a forested area west of the Nepean River in Emu Plains (DAWE 2021).

The Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) is listed as Vulnerable under the BC Act. It is found in a range of habitats including forest, agricultural and urban areas. It requires tree hollows, buildings, abandoned mammal dens or burrows for roosting (DPIE 2021c). Buildings within the Subject Site may provide some roosting habitat, but these are to be retained. The Yellow-bellied Sheathtail-bat forage on insects from 2m to 25m above the ground, depending on the environment. Similar foraging habitats are present throughout the locality and will persist within the Subject Site following completion of new landscape plantings.

For the reasons presented above, the proposed works are not considered likely to have a significant impact on any threatened or migratory fauna species. Nonetheless, as a precautionary measure, Tests of Significance have been conducted for the Grey-headed Flying Fox and the Yellow-bellied Sheathtail-bat which have the potential to occur in the area (**Appendix C**). These assessments indicate that the proposed works will not have any significant impacts on these threatened fauna species.

5. Mitigation Measurements

Although no significant habitat is being removed, being restricted mainly to planted trees with limited understorey vegetation, and open lawn areas, a number of mitigation measures are recommended. These measures should be implemented to minimise biodiversity impacts to the Subject Site and adjoining habitats, particularly the wetland vegetation within the drainage line within the Study Area and the large wetland to the east of the Study Area.

5.1. Vegetation Protection

To avoid unnecessary removal or damage to the nearby vegetation, the clearing area should be clearly demarcated and signed, where appropriate, to ensure no vegetation beyond these boundaries is removed, particularly aquatic vegetation within the drainage line, and any trees to be retained. Clearing works and equipment should be excluded from areas outside the clearing area. Site inductions are to be given by the civil contractor to ensure all site workers and visitors are aware of any no-access areas.

All tree protection measures, as detailed in the Project Arboricultural Impact Assessment, should be implemented where trees are to be retained in close proximity to the proposed development.

5.2. Erosion, Sedimentation and Pollution Control

Potential impacts to flora and fauna occurring in the construction phase that can be managed include: run-off, sedimentation, erosion and pollution. To reduce sedimentation on the construction site, erosion control measures should be implemented in accordance with the "Blue Block" (Landcom 2004). 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 from heavy rainfall. Sediment fences should be established around the perimeter of the development area to prevent the impacts of sedimentation on the adjoining vegetation. 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.

These erosion control measures are particularly important to comply with the SREP 20 requirements to protect the mapped wetland to the east of the Study Area and water quality of the Hawkesbury-Nepean River system.

5.3. Pre-clearing Surveys and Clearing Supervision

5.3.1. Pre-clearing Surveys

An ecologist should conduct a pre-clearing survey of all buildings and vegetation within one week of commencing demolition works in order to identify the occurrence of fauna and/or fauna habitat present. Any fauna species recorded during the pre-clearance survey will be captured (where possible) and relocated to adjacent habitat to be retained.

5.3.2. Clearing Supervision

Any habitat features identified during the pre-clearing surveys should be removed under the supervision of an ecologist or qualified animal carer. Details regarding the appropriate methodology to be implemented during habitat removal should be provided following the results of the pre-clearing survey. Any fauna captured during

clearing supervision works should be relocated into adjacent areas of habitat to be retained, taken to a veterinarian or wildlife carer, or humanely euthanised at the discretion of the attending ecologist.

5.4. Weed Control Measures

Priority weed species occurring within the Subject Site should be managed in order to prevent further spread. Prior to any vegetation clearance, Priority Weeds in the canopy and shrub layers should be demarcated in order for these to be disposed of separately from native material. All groundcover should be disposed of as exotic as these cover a large portion of the Subject Site.

5.5. Replanting

Replanting of native species representative of the vegetation community Cumberland Plain Woodland should occur where possible as part of the landscaping for the Subject Site, as this is the ecological community which would historically have occurred within the majority of the Study Area.

Proposed planting of native species within the 10 m buffer area of the drainage line in the east of the Study Area should comprise species representative of the River-flat Eucalypt Forest vegetation community as this is the ecological community which naturally occurs along the banks of watercourses in the locality.

Utilisation of flora species consistent with these two locally occurring vegetation communities will assist the Project meeting the policy objectives of SREP 20 and improve the fauna habitat values of the site by providing habitat more similar to the habitat local fauna species are naturally adapted to utilise than the random plantings of exotic species and non-locally native species currently planted within the Subject Site.

6. Conclusion

Past and current use of the Subject Site and surrounds has entailed clearing and modification of most of the pre-existing native vegetation. The proposed development will remove 0.31 ha of Planted Native Vegetation and 1.84 ha of Exotic Vegetation.

No naturally occurring threatened flora species listed under the BC Act or EPBC Act were recorded within the Subject Site. Numerous threatened flora species have been recorded from the wider locality, however due to the high degree of disturbance none are considered likely to occur in the Subject Site.

A range of threatened fauna species have been recorded from the locality and it is considered that the Subject Site has potential to provide habitat which will be removed for two of these species. The available habitats for the Grey-headed Flying-fox and the Yellow-bellied Sheathtail-bat in the Subject Site is highly limited however, and although these species have the potential to periodically utilise habitats in the Subject Site, they would not comprise important habitat for this species. Large areas of similar vegetation will remain in the locality that these species would be able to utilise. Tests of significance has been conducted which indicate that the proposed development will not have any significant impact on the Grey-headed Flying-fox or the Yellow-bellied Sheathtail-bat.

A range of mitigation measures are proposed to prevent further degradation of the ecological values in the vegetation of surrounding areas, including vegetation protection measures, pre-clearing surveys and erosion and sedimentation controls. Furthermore, if additional plantings of local native trees and shrubs are made, and weed species are removed within the Subject Site, there is potential to improve the habitat available for native flora and fauna species.

No significant impact is predicted to occur to any threatened species or endangered ecological communities as a result of the proposed works, and the preparation of a Biodiversity Development Assessment Report is not warranted. A referral to the Commonwealth Department of the Environment, under the EPBC Act is also not required.

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APPENDIX A :
Flora Species Recorded

Table 7 Flora Species Recorded within the Study Area

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
Tree (TG)	Fabaceae (Mimosoideae)	*Acacia decurrens*	Black Wattle	YES							X	X		
Tree (TG)	Meliaceae	*Melia azedarach*	White Cedar	YES			0.5	1						
Tree (TG)	Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush	YES									X	
Tree (TG)	Myrtaceae	*Corymbia eximia*	Yellow Bloodwood	YES										X
Tree (TG)	Myrtaceae	*Corymbia maculata*	Spotted Gum	YES									X	
Tree (TG)	Myrtaceae	*Eucalyptus bicostata*	Eurabbie	YES									X	
Tree (TG)	Myrtaceae	*Eucalyptus camaldulensis*	River Red Gum	YES									X	
Tree (TG)	Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark	YES			10.0	1						
Tree (TG)	Myrtaceae	*Eucalyptus elata*	River Peppermint	YES					10.0	1			X	
Tree (TG)	Myrtaceae	*Eucalyptus melliodora*	Yellow Box	YES										X

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
Tree (TG)	Myrtaceae	*Eucalyptus microcorys*	Tallowwood	YES									X	
Tree (TG)	Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany	YES										X
Tree (TG)	Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum	YES									X	
Tree (TG)	Myrtaceae	*Lophostemon confertus*	Brush Box	YES									X	
Tree (TG)	Podocarpaceae	*Podocarpus elatus*	Plum Pine	YES									X	
Tree (TG)	Proteaceae	*Grevillea robusta*	Silky Oak	YES					15.0	2			X	
Shrub (SG)	Myrtaceae	*Callistemon salignus*	Willow Bottlebrush	YES									X	
Shrub (SG)	Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	YES									X	
Grass & grasslike (GG)	Cyperaceae	*Carex appressa*	Tall Sedge	YES										X
Grass & grasslike (GG)	Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge	YES					0.1	10			X	
Grass & grasslike (GG)	Juncaceae	*Juncus usitatus*		YES										X

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
Grass & grasslike (GG)	Poaceae	*Cynodon dactylon*	Common Couch	YES					15.0	1,500		X	X	
Grass & grasslike (GG)	Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass	YES					0.1	5				
Grass & grasslike (GG)	Poaceae	*Eriochloa pseudoacrotricha*	Early Spring Grass	YES								X		
Grass & grasslike (GG)	Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Grass	YES					0.1	10				
Grass & grasslike (GG)	Poaceae	*Phragmites australis*	Common Reed	YES			70.0	5,000						
Grass & grasslike (GG)	Typhaceae	*Typha orientalis*	Broad-leaved Cumbungi	YES										X
Forb (FG)	Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell	YES					0.1	10				
Forb (FG)	Commelinaceae	*Commelina cyanea*	Native Wandering Jew	YES								X		
Forb (FG)	Convolvulaceae	*Dichondra repens*	Kidney Weed	YES					0.1	5			X	

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
Forb (FG)	Onagraceae	*Ludwigia peploides* subsp. *montevidensis*	Water Primrose	YES										X
Forb (FG)	Polygonaceae	*Persicaria decipiens*	Slender Knotweed	YES										X
Forb (FG)	Portulacaceae	*Portulaca oleracea*	Pigweed	YES								X		
Fern (EG)	Dennstaedtiaceae	*Hypolepis muelleri*	Harsh Ground Fern	YES										X
	Amaranthaceae	*Amaranthus retroflexus*	Redroot Amaranth		YES								X	
	Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed		YES				0.1	1			X	
	Anacardiaceae	*Harpephyllum caffrum*			YES								X	
	Anacardiaceae	*Schinus molle* var. *areira*	Pepper Tree		YES								X	
	Anacardiaceae	*Schinus terebinthifolius*	Brazilian Pepper Tree		YES								X	
	Apiaceae	*Foeniculum vulgare*	Fennel		YES						X			

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
	Apocynaceae	*Araujia sericifera*	Moth Vine		YES		2.0	40			X			
	Apocynaceae	*Nerium oleander*	Oleander		YES								X	
	Asparagaceae	*Asparagus asparagoides*	Bridal Creeper		YES	YES			0.2	5		X		
	Asteraceae	*Bidens pilosa*	Cobbler's Pegs		YES	YES						X	X	
	Asteraceae	*Cirsium vulgare*	Spear Thistle		YES							X		
	Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane		YES				0.1	20				
	Asteraceae	*Conyza sumatrensis*	Tall fleabane		YES				0.1	10	X	X		
	Asteraceae	*Hypochaeris microcephala*	White Flatweed		YES				0.1	2		X		
	Asteraceae	*Hypochaeris radicata*	Catsear		YES				0.1	10			X	
	Asteraceae	*Lactuca serriola*	Prickly Lettuce		YES								X	
	Asteraceae	*Sonchus oleraceus*	Common Sowthistle		YES								X	
	Asteraceae	*Taraxacum officinale*	Dandelion		YES				0.1	20			X	

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
	Bignoniaceae	*Dolichandra unguis-cati*			YES	YES			0.3	2				
	Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda		YES								X	
	Caprifoliaceae	*Abelia chinensis*			YES								X	
	Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow		YES				0.1	50				
	Cupressaceae	*Cupressus arizonica*	Arizona Cypress		YES								X	
	Cyperaceae	*Cyperus aggregatus*			YES				0.1	5		X		
	Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge		YES	YES								X
	Cyperaceae	*Cyperus sesquiflorus*			YES							X		
	Euphorbiaceae	*Ricinus communis*	Castor Oil Plant		YES							X		

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
	Fabaceae (Caesalpinioideae)	*Gleditsia triacanthos*	Honey Locust		YES	YES						X		
	Fabaceae (Faboideae)	*Medicago minima*	Woolly Burr Medic		YES				0.1	2				
	Fabaceae (Faboideae)	*Wisteria sinensis*	Chinese wisteria		YES								X	
	Fagaceae	*Quercus palustris*	Pin Oak		YES								X	
	Hamamelidaceae	*Liquidambar styraciflua*	Sweetgum		YES				25.0	2			X	
	Lauraceae	*Cinnamomum camphora*	Camphor Laurel		YES								X	
	Lythraceae	*Lagerstroemia indica*			YES								X	
	Malaceae	*Pyracantha angustifolia*	Orange Firethorn		YES							X		
	Malaceae	*Spiraea cantoniensis*	Reeves' meadowsweet		YES								X	
	Malvaceae	*Modiola caroliniana*	Red-flowered Mallow		YES				0.1	20		X	X	

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
	Malvaceae	*Sida rhombifolia*	Paddy's Lucerne		YES		20.0	1,000	0.1	5	X	X		
	Myrtaceae	*Corymbia citriodora*	Lemon-scented Gum		YES								X	
	Myrtaceae	*Eucalyptus cladocalyx*	Sugar Gum		YES									X
	Oleaceae	*Fraxinus griffithii*			YES								X	
	Oleaceae	*Ligustrum lucidum*	Large-leaved Privet		YES	YES						X	X	
	Onagraceae	*Ludwigia longifolia*			YES									X
	Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis		YES				0.1	5		X		
	Pinaceae	*Cedrus deodara*	Deodar Cedar		YES								X	
	Pinaceae	*Pinus patula*	Patula Pine		YES								X	
	Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues		YES				0.1	10		X		
	Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass		YES	YES						X		

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
	Poaceae	*Cenchrus clandestinus*	Kikuyu Grass		YES		5.0	500			X	X		
	Poaceae	*Chloris gayana*	Rhodes Grass		YES	YES						X		
	Poaceae	*Digitaria sanguinalis*	Crab Grass		YES				1.0	100		X		
	Poaceae	*Ehrharta erecta*	Panic Veldtgrass		YES	YES			0.5	100				
	Poaceae	*Eleusine indica*	Crowsfoot Grass		YES								X	
	Poaceae	*Eragrostis curvula*	African Lovegrass		YES	YES			5.0	500		X	X	
	Poaceae	*Paspalum dilatatum*	Paspalum		YES	YES			0.1	10		X		
	Poaceae	*Setaria parviflora*			YES				1.0	100		X		
	Polygonaceae	*Rumex crispus*	Curled Dock		YES							X		
	Rosaceae	*Rubus fruticosus*	Blackberry complex		YES						X			
	Rubiaceae	*Richardia brasiliensis*	Mexican Clover		YES				0.1	20				
	Rutaceae	*Murraya paniculata*			YES								X	

BAM Growth Form Group	Family	Scientific Name	Common Name	Nat	Exo	HTE	P1	P1	P2	P2	RMS1	RMS2	RMS3	Add. Spp.
							C	A	C	A	P	P	P	P
	Sapindaceae	*Acer negundo*	Box Elder		YES								X	
	Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein		YES							X		
	Simaroubaceae	*Ailanthus altissima*	Tree of Heaven		YES	YES							X	
	Solanaceae	*Cestrum parqui*	Green Cestrum		YES	YES					X	X	X	
	Solanaceae	*Solanum mauritianum*	Wild Tobacco Bush		YES		1.0	2						
	Solanaceae	*Solanum nigrum*	Black-berry Nightshade		YES		1.0	20	0.1	1		X		
	Solanaceae	*Solanum sisymbriifolium*			YES		1.0	10				X		
	Ulmaceae	*Celtis sinensis*	Japanese Hackberry		YES		1.0	2			X		X	
	Ulmaceae	*Ulmus glabra*			YES								X	
	Ulmaceae	*Ulmus parvifolia*	Chinese Elm		YES								X	
	Verbenaceae	*Verbena bonariensis*	Purpletop		YES							X		
	Verbenaceae	*Verbena quadrangularis*			YES							X		

Table Key: Nat = Native, Exo = Exotic, THE = High Threat Weed as detailed in the BAM Calculator, P = Plot, RMS = Random Meander Survey, RMS1 = Exotic Wasteland Area to east of the northern extent of the drainage basin, RMS2 = Cleared Exotic Dominated Shrubland and Grassland areas and exotic grassland areas in the centre of the Study Area, RMS3 = Landscaped lawns and gardens in the west of the Study Area, C = Coverage, A = Abundance, P = Presence, X denotes presence of species in Random Meander Survey.

APPENDIX B :
Likelihood of Occurrence Tables

Table 8 Likelihood of Occurrence – Threatened Flora Species

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Apocynaceae	*Marsdenia viridiflora* subsp. *viridiflora*	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	E2	-	1090	Grows in vine thickets and open shale woodlands.	Unlikely to occur. Vegetation of Subject Site is highly degraded. No vine thickets are likely to have historically occurred on the site due to flat topography, and open shale woodlands are not present. Ground layer is either cleared or managed lawns.
Fabaceae (Faboideae)	*Dillwynia tenuifolia*		V	-	435	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	Unlikely to occur. Species is conspicuous shrub that was not located during surveys.

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						Castlereagh Scribbly Gum Woodland.	
Fabaceae (Faboideae)	*Pultenaea parviflora*		E1	V	273	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 to occur. Species is conspicuous shrub that was not located during surveys.
Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E1	V	8	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 to occur. Soils of the site are shale derived and not sandy.
Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V	V	1	Occurs on alluviums, shales and at the intergrade between shales and sandstones. Occur in open	Unlikely to occur. Species is conspicuous shrub that was not located during surveys.

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	
Myrtaceae	*Micromyrtus minutiflora*		E1	V	105	Found in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	Unlikely to occur. Species is conspicuous shrub that was not located during surveys.
Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	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 to occur. No rainforest on sandy soils or sand dunes are likely to have historically occurred in the Study Area. The species is extensively cultivated. A single planted individual is present in the west of the Subject Site, but does not represent a natural occurrence of the species and is likely genetically degraded (through inbreeding) nursery stock/cultivar.

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Proteaceae	*Grevillea juniperina subsp. juniperina*	Juniper-leaved Grevillea	V	-	277	Endemic to western Sydney. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	Unlikely to occur. Species is conspicuous shrub that was not located during surveys.
Proteaceae	*Persoonia nutans*	Nodding Geebung	E1	E	66	Occurs on aeolian and alluvial sediments in woodland to dry sclerophyll forest, below 60 m above sea level.	Unlikely to occur. Species is conspicuous shrub that was not located during surveys.
Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E1	E	380	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. Flowers all year round, though most often in Summer, probably in response to rainfall.	Unlikely to occur. Vegetation of Subject Site is highly degraded. Cumberland Plain Woodland is not present. Ground layer is either cleared or managed lawns. Species is readily identifiable when flowering and flowers in response to rain. Cumberland Ecology has checked reference sites in mid-March and species was flowering.

Table Key: E = Endangered, E1 = Critically Endangered, E2 = Endangered Population, E4A = Critically Endangered, V = Vulnerable

Table 9 Likelihood of Occurrence – Threatened Fauna Species

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Aves							
Acanthizidae	*Chthonicola sagittata*	Speckled Warbler	V,P	-	7	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 to occur. No woodlands with grassy understorey present.
Accipitridae	*Circus assimilis*	Spotted Harrier	V	-	1	Occurs throughout mainland Australia except in densely forested or wooded habitats of the coast, escarpment, and	Unlikely to occur. Species is primarily an inland species and no open grassy woodlands,

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						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.	shrubland, or native grasslands are present.
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle		M	2	Found in coastal habitats and around terrestrial wetlands, including rivers, swamps, lakes and the sea.	Unlikely to occur. Some artificial aquatic wetland habitat is present, however this is outside of the Subject Site and is to be retained. No nests were noted in any trees.
Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V	-	2	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.	Unlikely to occur. No open eucalypt forest, woodland, or open woodland present within the Subject Site.
Accipitridae	*Lophoictinia isura*	Square-tailed Kite	V	-	3	Found in a variety of timbered habitats including dry	Unlikely to occur. No woodland or forest

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						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.	present within the Subject Site.
Anatidae	*Stictonetta naevosa*	Freckled Duck	V	-	2	This species occurs primarily in south-eastern and south-western Australia and occurs as a vagrant elsewhere. It breeds in large, temporary swamps created during flood events in the Bulloo and Lake Eyre's basins and along the Murray-Darling river system. During inland droughts the species disperses to wetlands in the Murray River basin, and occasionally to coastal areas. The species prefers permanent freshwater swamps and creeks heavy with shrub, sedge, and rush growth. It rests in dense	Unlikely to occur. Wetland habitat in the Study Area is outside of the Subject Site and is to be retained.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						cover during the day, usually in deep water and feeds at dusk and sawn on algae, seeds, and vegetative parts of aquatic sedges and grasses. It nests generally during October to December in dense vegetation near to the water level.	
Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V	-	4	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	Unlikely to occur. No suitable native vegetation within the Subject Site.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						occasionally consume nectar, fruit and seed.	
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black Cockatoo	V	-	3	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m ASL in which stands of She-Oak species, particularly Black She-oak (Allocasuarina littoralis), Forest She-oak (A. torulosa) or Drooping She-oak (A. verticillata) occur.	Unlikely to occur. No forest or woodland is present in the Subject Site and no Casuarinaceae species are present.
Estrildidae	*Stagonopleura guttata*	Diamond Firetail	V,P		1	Distributed through central and eastern NSW and mainly occurs west of the Great Dividing range, however populations are known from drier coastal areas such as the Cumberland Plain and Hunter, Clarence, Richmond, and Snowy River Valleys. It is found predominately in grassy eucalypt woodlands including Box-Gum Woodlands, but also occurs in open forest and grasslands, including those derived from clearing of	Unlikely to occur. No grassy eucalypt woodlands present.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						woodland communities. It is often associated with riparian areas. It feeds exclusively on the ground on grass and herb seeds and leaves, and on insects. It builds nests and in the shrubby understorey, or sometimes higher in trees underneath other larger bird's nests. It roosts in dense shrubs, or smaller nests built exclusively for nesting.	
Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V	-	14	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Unlikely to occur. No eucalypt forests or woodlands present.
Petroicidae	*Petroica phoenicea*	Flame Robin	V	-	1	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. Ground layer of the breeding habitat is dominated by native grasses with shrub layer either sparse or	Unlikely to occur. No upland tall moist eucalypt forests and woodlands or clearings areas dominated by native grasses.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						dense. Often nests near the ground and are built in sheltered sites e.g. shallow cavities in trees, stumps or banks.	
Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V	-	4	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	Unlikely to occur. Open woodland and forest not present. Three small hollows are present however these are in the east in planted trees and not in riparian areas - two of these hollows were below chest height and observed to be empty.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						trees of species like Allocasuarina spp.	
Psittacidae	*Lathamus discolor*	Swift Parrot	E1	E	12	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 to occur. Eucalypts within the site are scattered and not likely to attract any migrating birds which would utilise larger remnant vegetation patches within the locality. Species does not nest in NSW.
Strigidae	*Ninox strenua*	Powerful Owl	V	-	4	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 daytime occurs in dense vegetation of Eucalypts and species such as Syncarpia glomulifera (Turpentine), Angophora floribunda (Rough-barked Apple), and other	Unlikely to occur. No dense vegetation for daytime roosting and no large hollows suitable for breeding.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						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.	
Tytonidae	*Tyto novaehollandiae*	Masked Owl	V	-	2	Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and	Unlikely to occur. No dry eucalypt forest or woodland, and no moist eucalypt forested gullies for breeding.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						ground mammals, especially rats.	
Tytonidae	*Tyto tenebricosa*	Sooty Owl	V	-	1	Occurs in coastal rainforest, including dry, subtropical, and temperate rainforests, and moist eucalypt forests. Utilises tall trees in heavily vegetated areas for daytime resting. It hunts during the night for small ground or tree dwelling mammals such as the Common Ringtail Possum or Sugar Glider. The species requires very large tree hollows for nesting.	Unlikely to occur. No coastal rainforest or moist eucalypt forests.
Gastropoda							
Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1	-	51	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 to occur. No Cumberland Plain Woodland within the Subject Site.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
Camaenidae	*Pommerhelix duralensis*	Dural Land Snail	-	E	1	Inhabits areas that are between shale-derived and sandstone-derived soils with forested vegetation that have good native cover and woody debris. Species prefers sheltering under rocks, inside curled-up bark and underneath leaf litter and light woody debris.	Unlikely to occur. Species occurs in shale/sandstone transitional areas not present within the Subject Site and specimens from City of Penrith LGA are not confidently assigned to the species, which is thought to primarily occur between Rouse Hill, Cattai, and Wiseman's Ferry.
Mammalia							
Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E	3	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. Females have a large home range of 200-500 hectares and males a larger range of 500-4000 hectares.	Unlikely to occur. No forested or heath habitats and no tree hollows, natural logs, or rock crevasses suitable for den sites.
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	1	Roosts singly or in groups of up to six, in tree hollows and	Some potential to occur. Potential roosting

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						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.	habitat present in buildings and tanks within Subject Site. Species known to forage in varied habitats.
Molossidae	*Micronomus norfolkensis*	Eastern Freetail-bat	V	-	18	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.	Unlikely to occur. No forest or woodland habitat present.
Petauridae	*Petaurus norfolcensis*	Squirrel Glider	V	-	4	Occurs widely in eastern Australia from northern Queensland to Victoria. Inhabits old growth Box-Ironbark Woodlands west of the Great Dividing Range and Blackbutt-Bloodwood forest with heathy understorey in coastal areas. Prefers mixed species stands with a shrub or *Acacia* midstorey. Requires abundant	Unlikely to occur. No old growth woodland or heathy forest present and abundant tree hollows not present.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						tree hollows for refuge and nest sites. Diet varies seasonally and includes *Acacia* gum, eucalypt sap, nectar, honeydew and manna, and protein from pollen and invertebrates.	
Phascolarctidae	*Phascolarctos cinereus*	Koala	V	V	1	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 to occur. No woodland or forest present within the Subject Site. Only one record from the locality.
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V	V	240	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.	Potential to occur. Species is known to forage across urban areas on garden vegetation. No breeding camp is present within the Subject Site.
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	6	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	Unlikely to occur. No well-timbered areas containing gullies within the Subject Site.

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
						in well-timbered areas containing gullies.	
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V	-	8	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	Unlikely to occur. No moist habitat with tall trees.
Vespertilionidae	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V	-	33	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.	Unlikely to occur. No forested areas suitable for foraging within the Subject Site.
Vespertilionidae	*Myotis macropus*	Southern Myotis	V	-	21	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	Potential to occur. Buildings present with potential roosting habitat and wetland outside of the Study Area is likely to have open water at time suitable for foraging. However buildings are being retained and

Family	Scientific Name	Common Name	BC Act	EPBC Act	Records	Habitat Requirements	Likelihood of Occurrence
							renovated so no habitat is being removed.
Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V	-	20	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.	Unlikely to occur. No gullies and river systems present draining the Great Dividing Range.

Table Key: E = Endangered, E1 = Critically Endangered, E2 = Endangered Population, E4A = Critically Endangered, V = Vulnerable

APPENDIX C :
Tests of Significance

C.1. Grey-headed Flying-fox

C.1.1. Background

The Grey-headed Flying-fox is distributed along the east coast of Australia from Bundaberg in Queensland to Melbourne, Victoria. It occurs as far west as the western slopes of the Great Dividing Range in northern NSW. It occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Grey-headed Flying-foxes migrate according to the availability of native fruits, nectar and pollen. They roost in large "camps" which are generally within 20 km of a food source (NSW Scientific Committee 2004). No camps are present within the Subject Site and the nearest camp occurs approximately 13 km to the south-west of the Study Area in a forested area west of the Nepean River in Emu Plains (DAWE 2021). The Grey-headed Flying-fox is listed as Vulnerable under the BC Act and the EPBC Act.

This species is assessed as having foraging habitat within the Subject Site as the species is known to commonly forage on planted native and exotic tree and shrub species in urban areas throughout Sydney (DPIE 2021a)

C.1.2. Test of Significance

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(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 Grey-headed Flying-fox is a highly mobile species that has vast foraging ranges and the species is unlikely to rely on the small area of potential foraging habitat to be removed as a result of the proposed development. No breeding camps are present within the Subject Site or will be affected. Any local population of the species that may access the vegetation of the Subject Site would also have access to the much larger, higher quality foraging areas available within the nearby Wianamatta Regional Park, Wianamatta Nature Reserve, and substantial forested areas of the lower Blue Mountains. The habitat to be removed as part of the proposal represents a very small portion of potential foraging habitat available in the locality. As such, the proposal is not considered to affect the life cycle of the Grey-headed Flying-fox such that a viable local population is 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,

Approximately 0.31 ha of Planted Native and 1.84 ha of Exotic vegetation (including exotic grassland areas which would not be foraging habitat) will be removed which comprises areas of planted trees and shrub the Grey-headed Flying-fox has potential to use as foraging habitat.

The habitat occurs in a highly urban environment that has connectivity only to areas of similar isolated patches of degraded remnant vegetation and urban vegetation, with the exception of the wetland to the east and some woodland patches on the eastern shore outside of the Study Area – this connectivity will remain as the Subject Site following completion of the Project will similarly comprise areas of buildings, hardstand areas, and landscaping. As such, while the development will encroach slightly into the area of existing foraging habitat, it will not isolate it and will only marginally fragment it further. The potential habitat on the Subject Site represents only a very small area available to the species in the locality and as the species is highly mobile and accesses resources from across a vast foraging range, the proposal is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality or within or between local populations. Accordingly, the proposed development will not remove, modify, fragment or isolate important habitat.

(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 areas of outstanding biodiversity value (AOBV) are within the Subject Site or immediate surrounds and therefore no AOBVs will be directly or indirectly impacted by the proposed development.

(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 key threatening process of 'loss of roosting and foraging sites' could potentially impact habitat for this species further than current conditions. However, the vegetation on the Subject Site is not considered to constitute significant habitat for the Grey-headed Flying-fox. As potential habitat will remain in the vicinity of the Subject Site, the loss of a small area of degraded foraging habitat is not likely to significantly impact habitat for the potentially occurring threatened species.

C.1.3. Conclusion

Very marginal foraging habitat will be removed within the Subject Site; however more optimum habitat exists in the wider locality including within Wianamatta Regional Park, Wianamatta, Nature Reserve, and substantial forested areas of the lower Blue Mountains. Any local population of this species is unlikely to depend on the

limited resources contained on the Subject Site for its survival and large areas of suitable habitat remain in the locality with much of that being in conservation areas.

Such reserves will remain in perpetuity and contain far higher habitat value than the marginal habitat proposed to be removed from the Subject Site. No breeding habitat exists on the Subject Site and the proposal is not likely to place a viable local population of this species at risk of extinction. The Grey-headed Flying-fox is highly mobile and is expected to move between areas of remaining habitat within the immediate vicinity of the Subject Site and wider area.

The project is not likely to have a significant detrimental impact upon the Grey-headed Flying-fox and subsequently no Biodiversity Development Assessment Report or referral to the Commonwealth is required.

C.2. Yellow-bellied Sheathtail-bat

C.2.1. Background

The Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) is listed as Vulnerable under the BC Act. It is found in a range of habitats including forest, agricultural and urban areas. It requires tree hollows, buildings, abandoned mammal dens or burrows for roosting (DPIE 2021c). The Yellow-bellied Sheathtail-bat forage on insects from 2m to 25m above the ground, depending on the environment.

C.2.2. Test of Significance

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(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 Yellow-bellied Sheathtail-bat is a highly mobile species that has a substantial foraging range and the species is unlikely to rely on the small area of potential foraging habitat in the Subject Site to be removed as a result of the proposed development. Any local population of the species that may access the vegetation of the Subject Site would also have access to the much larger, higher quality foraging areas available within the nearby Wianamatta Regional Park, Wianamatta Nature Reserve, and substantial forested areas of the lower Blue Mountains. The foraging habitat to be removed as part of the proposal represents a very small portion of potential foraging habitat available in the locality. As such, the proposal is not considered to affect the life cycle of the Yellow-bellied Sheathtail-bat such that a viable local population is placed at risk of extinction. Roosting habitat present in the form of buildings will remain as existing buildings are to be retained and renovated rather than removed.

(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,

Approximately 4.67 ha of foraging habitat in the Subject Site will be removed comprising 0.31 ha of Planted Native Vegetation, 1.84 ha of Exotic Vegetation, and 2.51 ha of Cleared Exotic Dominated Shrubland and Grassland areas which could provide very marginal, degraded potential foraging habitat for this species will be removed as part of the proposed development.

The habitat occurs in a highly urban environment that generally has connectivity only to areas of similar isolated patches of degraded vegetation and urban vegetation, with the exception of the wetland to the east and some woodland patches on the eastern shore outside of the Study Area – this connectivity will remain as the Subject Site following completion of the Project will similarly comprise areas of buildings, hardstand areas, and landscaping. As such, while the development will encroach slightly into the area of existing foraging habitat, it will not isolate it and will only marginally fragment it further. The potential habitat on the Subject Site represents only a very small area available to the species in the locality and as the species is highly mobile and accesses resources from across a substantial foraging range, the proposal is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality or within or between local populations. Accordingly, the proposed development will not remove, modify, fragment or isolate important habitat.

(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 areas of outstanding biodiversity value (AOBV) are within the Subject Site or immediate surrounds and therefore no AOBVs will be directly or indirectly impacted by the proposed development.

(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 key threatening process of 'loss of roosting and foraging sites' could potentially impact habitat for this species further than current conditions. However, the vegetation on the Subject Site is not considered to constitute significant habitat for the Yellow-bellied Sheathtail-bat. As potential habitat will remain in the vicinity of the Subject Site, and similar landscaped vegetation will remain following the completion of the Project, the

loss of a small area of degraded foraging habitat is not likely to significantly impact habitat for the potentially occurring threatened species.

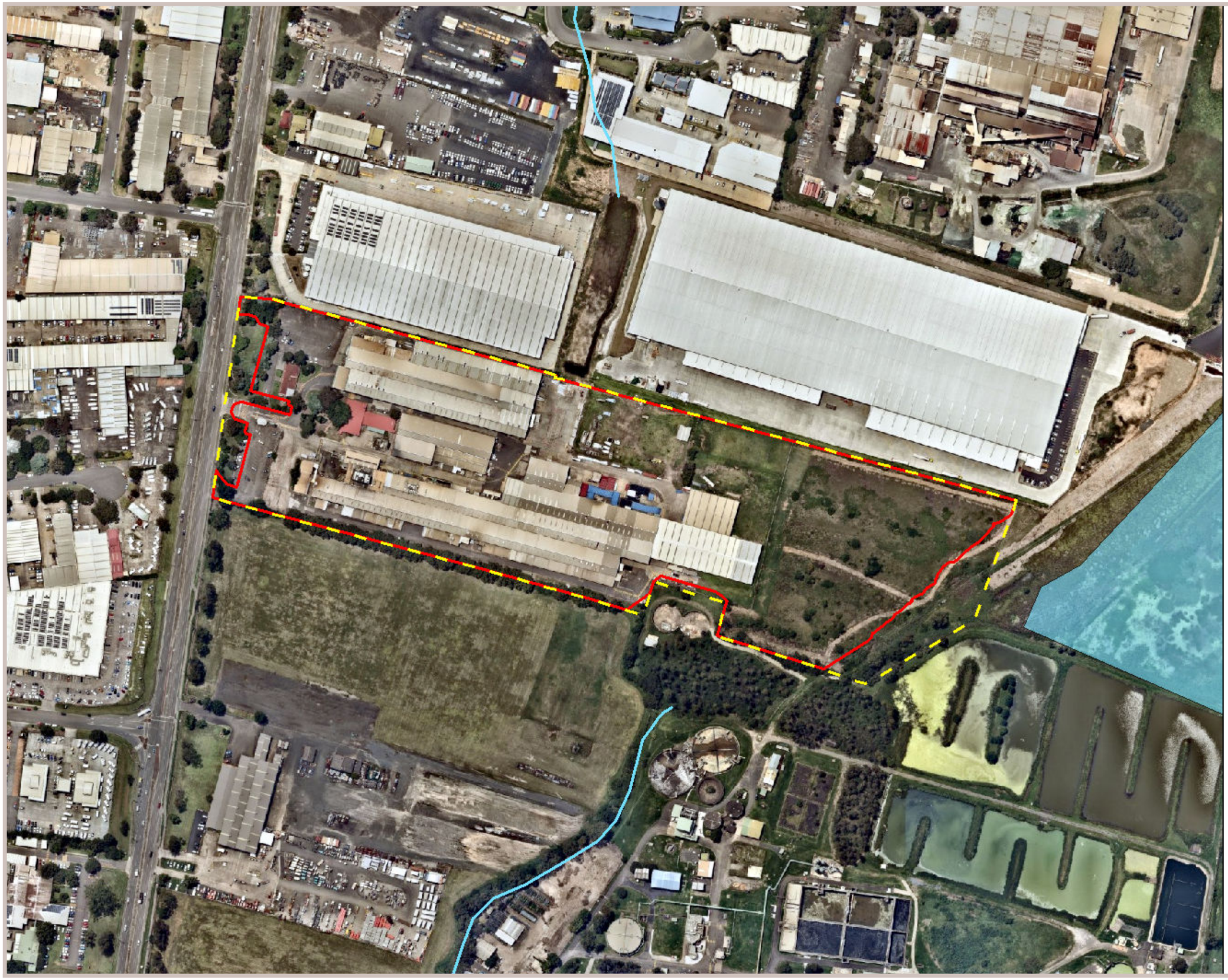
C.2.3. Conclusion

Marginal foraging habitat will be removed within the Subject Site; however more optimum habitat exists in the wider locality including within Wianamatta Regional Park, Wianamatta Nature Reserve, and substantial forested areas of the lower Blue Mountains. Any local population of this species is unlikely to depend on the limited resources contained on the Subject Site for its survival and similar occurrences of marginal habitat will remain through the locality.

Furthermore, large areas of suitable habitat remain in the locality with much of that being in conservation areas, along with. Such reserves will remain in perpetuity and contain far higher habitat value than the marginal habitat proposed to be removed from the Subject Site. No breeding habitat exists on the Subject Site and the proposal is not likely to place a viable local population of this species at risk of extinction. The Yellow-bellied Sheathtail-bat is highly mobile and is expected to move between areas of remaining habitat within the immediate vicinity of the Subject Site and wider area.

The project is not likely to have a significant detrimental impact upon the Yellow-bellied Sheathtail-bat and subsequently no Biodiversity Development Assessment Report or referral to the Commonwealth is required.

FIGURES



Legend

- Subject Site
- Study Area
- SREP 20 Wetland
- SIX Maps Topographic Map Watercourse

Image Source:
Image © Nearmap (2021)
Dated: 12/01/2021

Data Source:
Sixmaps Clip and Ship (2021)
Spatial Services, NSW
Department of Finance and Services

Sydney Regional Environmental Plan
No 20-Hawkesbury-Nepean River
(No 2-1997) © State Government of
NSW and Department of Planning,
Industry and Environment 1997

Coordinate System: MGA Zone 56 (GDA 94)

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0 50 100 m

I:\...\21040\Figures\RP1\20210324\Figure 1. Location_Subject Site_Mapped Wetlands

Figure 1. Location of the Study Area, Subject Site, and Locally Mapped Wetlands and Watercourses

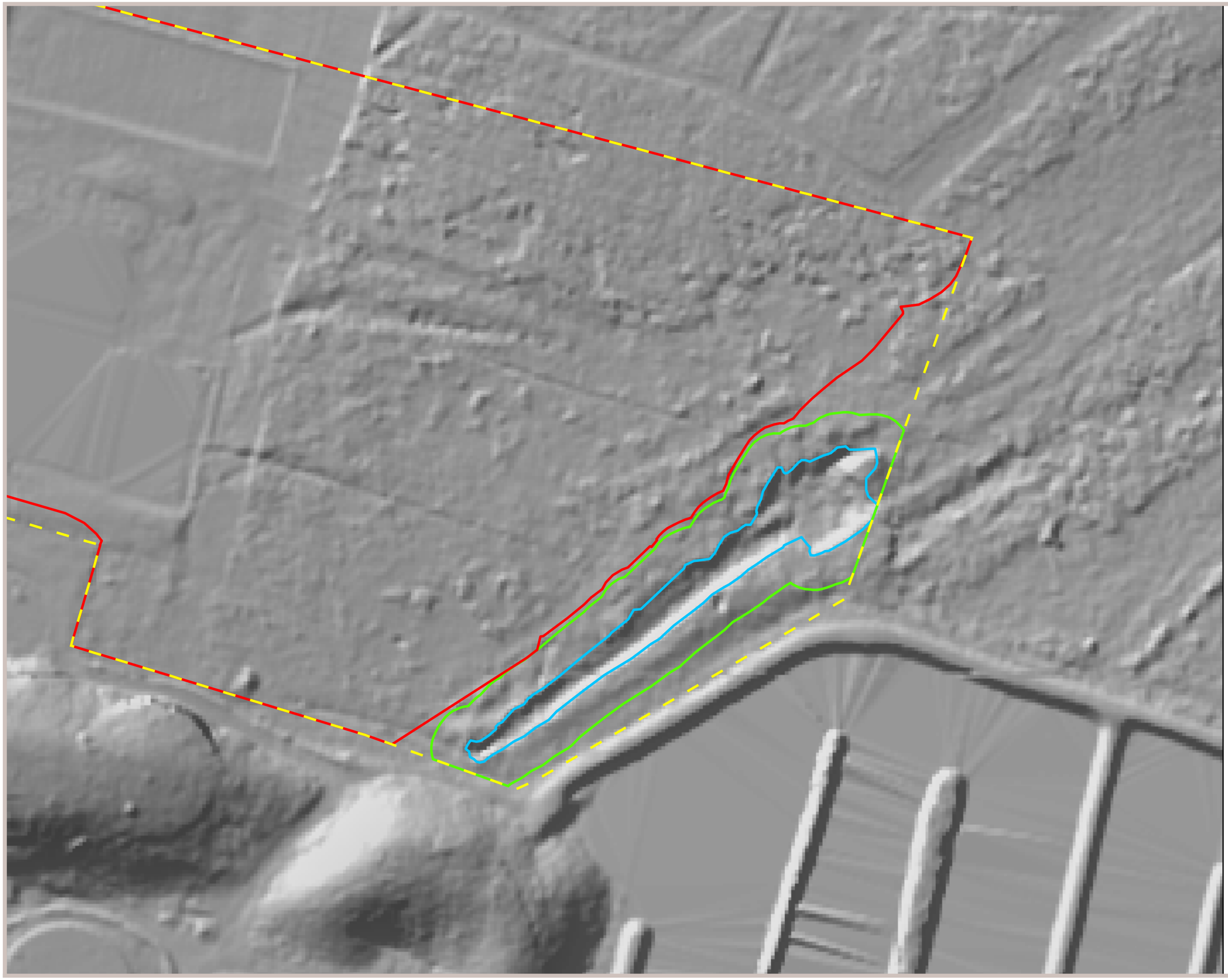
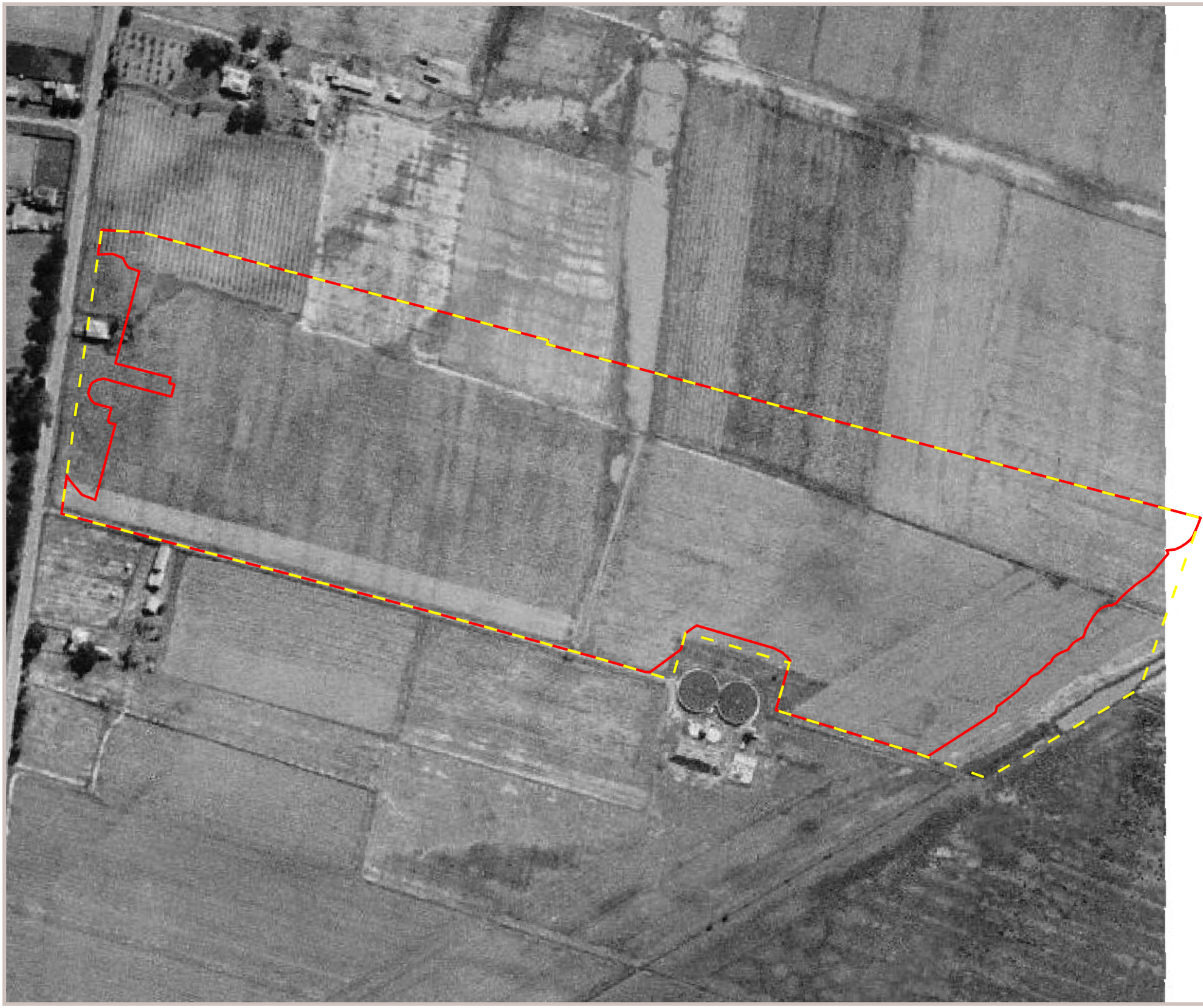


Figure 2. Location of the Drainage Line and 10 m Buffer



Legend

Subject Site

Study Area

Image Source:
Image © Historical Imagery (2021)
Dated:1943
Spatial Services, NSW
Department of Finance and Services

Data Source:
Sixmaps Clip and Ship (2021)
Spatial Services, NSW
Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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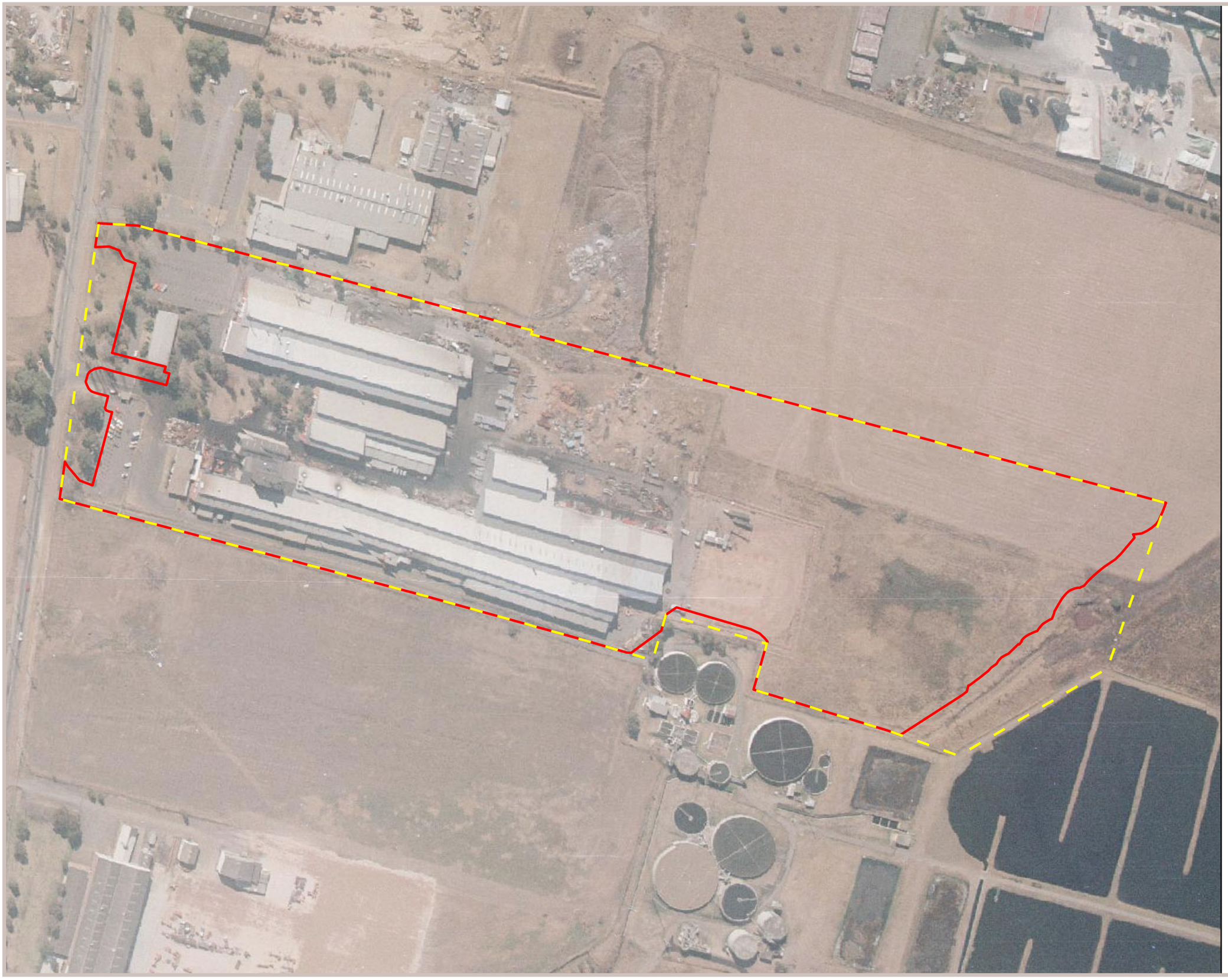
0 20 40 60 80 m

I:\...\21040\Figures\RP1\20210324\Figure 3. Historical Aerial_1943

Figure 3. Historical Aerial Photograph of the Study Area – 1943



Legend

Subject Site

Study Area

Image Source:
Image © Historical Imagery (2021)
Dated:1986
Spatial Services, NSW
Department of Finance and Services

Data Source:
Sixmaps Clip and Ship (2021)
Spatial Services, NSW
Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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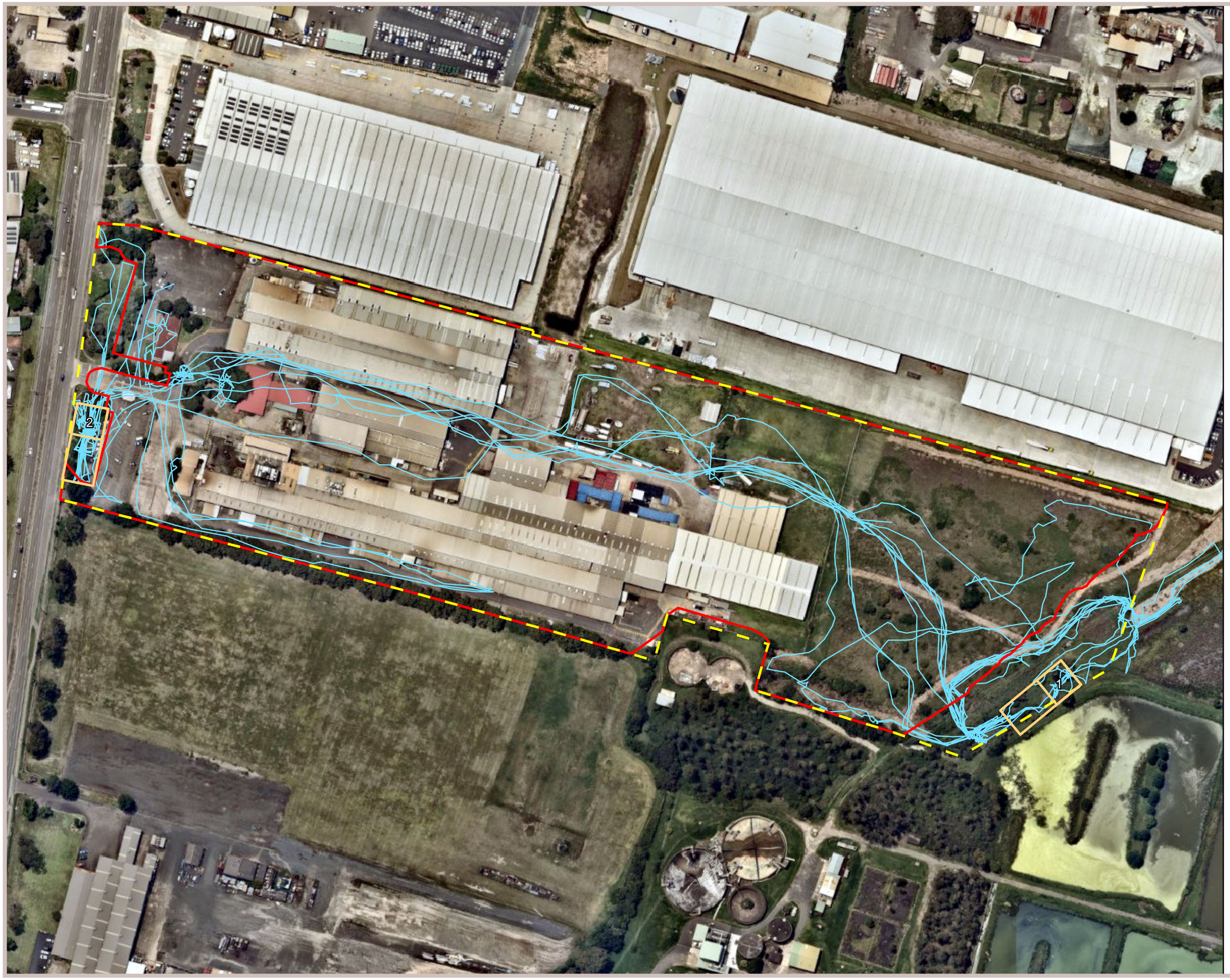
0 20 40 60 80 m

I:\...\21040\Figures\RP1\20210324\Figure 4. Historical Aerial_1986

Figure 4. Historical Aerial Photograph of the Study Area – 1986

Figure 5. Controlled Activities Approval Buffer and Required Vegetated Riparian Zone for Offsite Wetland



Legend

- Subject Site
- Study Area
- BAM Plot Location
- Survey Tracks

Image Source:
Image © Nearmap (2021)
Dated: 12/01/2021

Data Source:
Sixmaps Clip and Ship (2021)
Spatial Services, NSW
Department of Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)

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0 20 40 60 80 m

I:\...\21040\Figures\RP1\20210324\Figure 6. Location of Flora and Fauna Surveys

Figure 6. Location of Flora and Fauna Surveys

Document Set ID: 9577416
Version: 1, Version Date: 06/05/2021

Figure 7. Historical Aerial Photograph of the Study Area – 1998

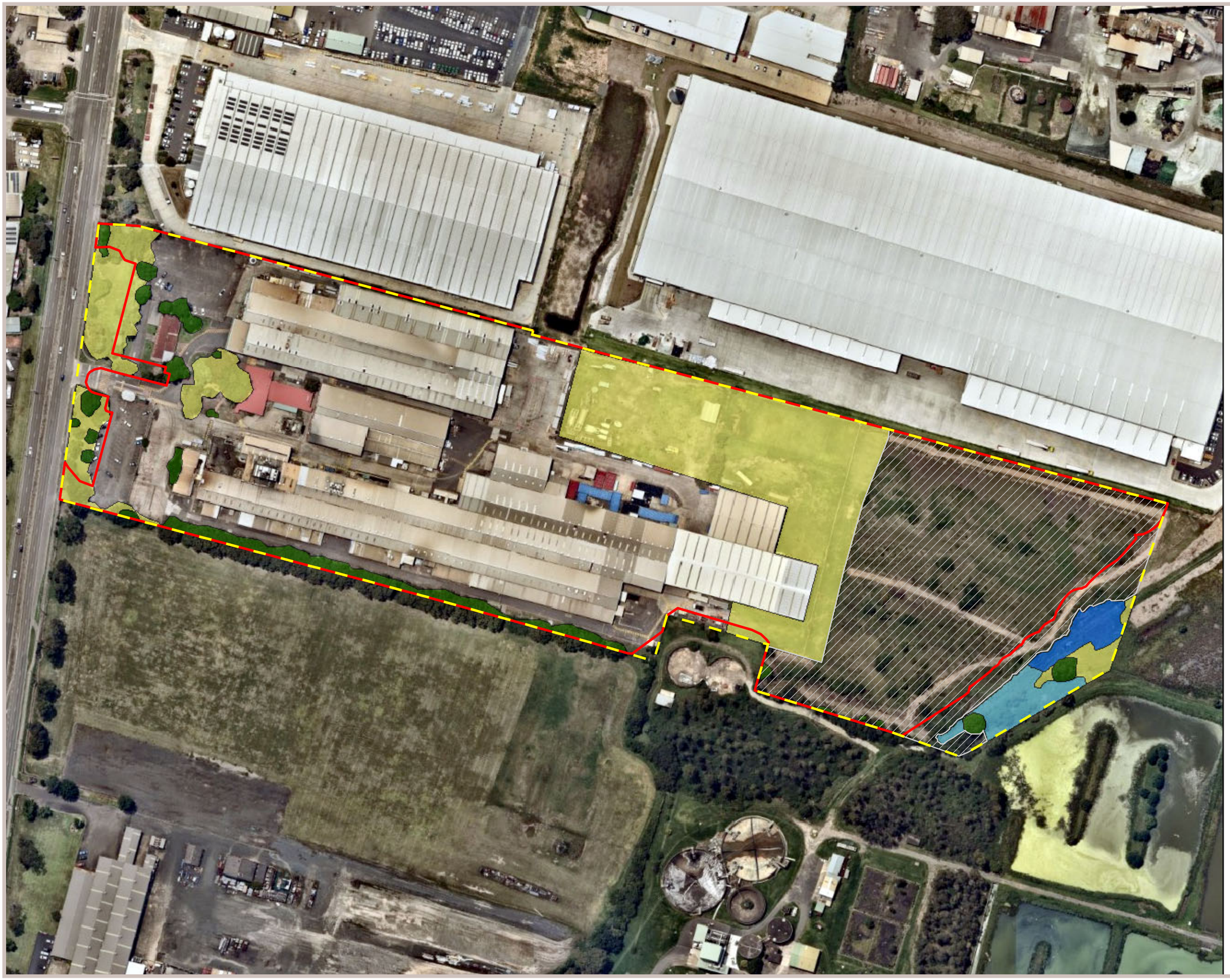

Figure 8. Vegetation Mapping of the Study Area and Subject Site