Oakdale East Estate
SSD-37486043

Biodiversity Development Assessment Report

prepared for

Goodman Property Services (Aust.) Pty Ltd

écologique | environmental consulting

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Certification

I, Kat Duchatel (BAAS17054), certify that this biodiversity development assessment report has been prepared on the basis of the requirements of (and information provided under) the current biodiversity assessment method (OEH 2020).

Project team members:

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08/06/2022

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Revision Schedule

Rev No	Date	Description	Issued to
1	10/03/20221	DRAFT Biodiversity Development Assessment Report	Goodman
2	08/06/20221	Biodiversity Development Assessment Report for Submission	Goodman

Executive Summary

Background

SSD-37486043 seeks approval for a Concept Plan across Goodman's Oakdale East Industrial Estate ("Estate") and approval for Stage 2 of works at the Estate.

The site (subject land) is located within the Fairfield Local Government Area and is legally described as Lot 102 and Lot 103 in DP1268366.

Stage 1 of the works were completed in September 2021 and included Precinct 1 building and infrastructure works as indicated on the proposed Estate Masterplan.

The Concept Plan is proposed to set the development controls for the Estate which will override the Development Control Plan ("DCP") that is currently with Department of Planning and Environment (DPE) for consideration. This DCP has been lodged with DPE to support the Rehabilitation Development Application that is currently with Fairfield City Council for consideration.

The proposal is classified as a Part 4.1 State Significant Development (SSD-37486043) under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). This Biodiversity Development Assessment Report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs), which requires:

"*An assessment of the proposal's biodiversity impacts in accordance with the Biodiversity Conservation Act 2016, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted*."

This BDAR has followed the Biodiversity Assessment Method 2020 (BAM) established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act), which broadly requires an assessment of the following aspects:

- The type and condition of biodiversity values within the development footprint and wider subject land;
- Direct and indirect impacts on biodiversity values within the subject land;
- Any additional (prescribed) biodiversity impacts;
- Demonstration of how the hierarchy of 'avoid, minimise and mitigate' impacts has been applied;
- Quantification and description of the biodiversity credits needed to offset the residual impacts of a proposal on biodiversity values.

Subject land

The subject land assessed under this BDAR is located at 10 Old Wallgrove Road and is legally identified as Lot 102 and Lot 103 in DP1268366. Zoning of each lot is as follows:

- Lot 102: wholly zoned as IN1 – General Industrial; and
- Lot 103: predominantly zoned as IN1 but includes land zoned as E2 – Environmental Conservation along its eastern margin.

  Land zoned as E2 represents remnant native vegetation associated with riparian zone of Reedy Creek. Reedy Creek flows in a northerly direction from the south eastern corner to the north eastern corner of the subject land.

  Lot 103 also contains a future infrastructure corridor, oriented north-west to south-east, which is located to the north of Precincts 3 and 4 and south of Precinct 5.

The subject land has been operated as a plant and quarry by Austral Bricks (Plant 3) for brick production since 1973, consequently most of the site is highly modified and disturbed terrain. The eastern boundary of the subject land is defined by Reedy Creek and remnant native riparian zone.

Four plant community types (PCTs) are present within the subject land:

1. Cumberland river-flat forest (PCT 835)
2. Cumberland shale plains woodland (PCT 849).
3. Cumberland swamp oak forest (PCT 1800)
4. Phragmites australia and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071), which has been allocated to farm dam areas.

Fourteen ecosystem credits and ten species credits will be required to offset impacts from the clearing of 2.28h of native vegetation and habitat for the *Callocephalon fimbriatum* (Gang-gang Cockatoo), as summarised below:

ID	Plant community type (PCT)	Area (ha)	Ecosystem credits
PCT 835	Cumberland river-flat forest - moderate condition	0.49	10
PCT 849	Cumberland shale plains woodland - planted	0.05	0
PCT 1071	Phragmites australis/Typha orientalis coastal freshwater wetland - artifical basins	0.13	3
PCT 1800	Cumberland swamp oak floodplain forest -low condition	1.15	0
PCT 1800	Cumberland swamp oak floodplain forest - moderate condition	0.03	1
Landscaping	n/a	0.43	0
		2.28	**14**
ID	Species name	Area (ha)	Species credits
Species	Callocephalon fimbriatum (Gang-gang Cockatoo)	0.49	10

Minimisation and avoidance of impacts

Clearing is limited to highly degraded and/or scattered patches of native vegetation that are primarily located within an active quarry. Most native vegetation to be cleared is of planted origin or has colonised man-made bunds and dams.

Approximately 5 ha of native vegetation is being conserved along the eastern boundary of Precincts 2, 4, and 5 as part of and in addition to the Reedy Creek riparian corridor.

Additional matters considered

No prescribed impacts would result from the proposal.

No Serious and Irreversible Impact (SAII) entities would be impacted on from the proposal. PCT 849 is listed as an SAII entity but was not identified as an SAII entity within the development footprint.

A cumulative assessment of PCT 849 was undertaken across the subject land, which also concluded that the proposal will not significantly impact on an SAII entity.

Consideration of the Australian Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) has been undertaken.

Three TECs listed under the EPBC Act within the subject land include the following:

- PCT 849 (Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest equivalent)
- PCT 835 (Coastal floodplain eucalypt forest of eastern Australia equivalent)
- PCT 1800 (Coastal Swamp Oak (*Casuarina glauca*) Forest of NSW and South East Queensland ecological community equivalent)

To be considered as a MNES area, the TEC must meet both key diagnostic and minimum condition thresholds as prescribed by the Australian Government (DAWE, 2020). None of the PCTs impacted meet the thresholds to be considered a MNES, primarily due to a lack of native perennial understorey species.

Assessment of threatened and migratory species listed under the EPBC Act has also concluded that the subject land is unlikely to provide habitat important to any threatened or migratory species.

Indirect impacts

The proposal's potential indirect impacts on biodiversity values will be mitigated through a range of measures, including but not limited to the following:

- Consideration of noise and light spill into fauna habitat during the design phase;
- Management of on-site detention basins to achieve pre-development hydrological conditions in Reedy Creek;
- Preparation and adherence to an Erosion and Soil Control Plan to prevent and sedimentation of retained native vegetation and Reedy Creek;
- Pre-clearance and clearance processes that will be documented within a Flora and Fauna Management Plan (FFMP), which will include, but not be limited to:
    - Pre-clearance and clearance management of vegetation;
    - Fauna rescue and relocation protocol;
    - Euthanasia protocol;
    - Basin decommissioning;
    - Weed and pathogen control; and
    - Monitoring and reporting strategies.
- Preparation and implementation of a Vegetation Management Plan for riparian restoration of native vegetation areas protected within and in addition to the Reedy Creek riparian zone.
- Preparation of a Biosecurity Management Plan, which will detail, but not be limited to, the following:
    - General Biosecurity Duty required under the *Biosecurity Act 2015*;
    - Identification of priority weeds and other biosecurity risks (e.g., pathogens, disease, exotic fauna);
    - Recommended measures for prevention of introduction, spread and control of biosecurity risks

Contents

Tables

Figures

1. Introduction

1.1 Background

SSD-37486043 seeks approval for a Concept Plan across Goodman's Oakdale East Industrial Estate ("Estate") and approval for Stage 2 of works at the Estate.

The site (subject land) is located within the Fairfield Local Government Area and is legally described as Lot 102 and Lot 103 in DP1268366.

Stage 1 of the works were completed in September 2021 and included Precinct 1 building and infrastructure works as indicated on the proposed Estate Masterplan.

The Concept Plan is proposed to set the development controls for the Estate which will override the Development Control Plan ("DCP") that is currently with Department of Planning and Environment (DPE) for consideration. This DCP has been lodged with DPE to support the Rehabilitation Development Application that is currently with Fairfield City Council for consideration.

The Rehabilitation Development Application seeks approval for works only to Precinct 1 expansion, Precincts 2, 3 and 4 and includes the following (this application excludes works to Precinct 5):

- Cut and Fill works to provide bulk pad levels;
- Provision of Estate stormwater infrastructure including completion of detention basins and swales;
- Removal of 2.58 ha of vegetation;
- Demolition of the Brick Factory and rehabilitation of the surrounding land;
- Installation of 1 x retaining wall on the eastern portion of Precinct 3; and
- Consideration for Aboriginal Heritage and Geotech assessments.

1.2 The proposal

The proposed Concept Plan approval seeks approval for:

- The proposed Estate masterplan allowing development of 303,009 sqm of GLA;
- 24/7 hours of operation;
- Building Height of 43m for Precinct 3 (excluding roof-top plant and solar) and 15m (excluding roof-top plant and solar) to the remainder of the Estate;
- Estate subdivision;
- Estate wide planning controls as shown in the EIS;
- Construction hours 7 am to 6 pm Monday to Friday, 8 am to 1 pm Saturday; and
- Geotech and Aboriginal heritage considerations for Precinct 5.

The Stage 2 works considered under this application include the following:

- Cut and fill works to Precinct 5 only to provide bulk pad level;
- Completion of lead-in infrastructure works including intersection upgrades at Millner Ave / Old Wallgrove Road and Lenore Drive / Old Wallgrove Road;
- Clearing of 2.3 ha of native vegetation;
- Completion of the internal road network (excl. the proposed private driveway providing access to Precinct 5 but including all other roads shown on the proposed masterplan);
- Reticulation of services infrastructure to provide serviced development pads to all precincts;

- Completion of retaining walls across the entire Estate; and
- Completion of Building works to Precinct 1 expansion and Precinct 3 including any ancillary on lot infrastructure and detailed civil works required.

Precinct 1 expansion:

- Construction, operation, fit-out and use approval of a warehouse with ancillary office spanning 3,122 sqm of GLA;
- 24/7 hours of operation; and
- 15m building height (excluding solar and rooftop plant).

Precinct 3:

- Construction, operation, fit-out and use approval of a temperature controlled automated distribution centre;
- Total GLA of 96,810 sqm including 10,009 sqm of which is for future expansion;
- In addition to this, 38,050 sqm of mezzanines will be installed within the premises;
- 43m building height (excluding solar and rooftop plant);
- Storage of dangerous goods and flammable goods that exceed the SEPP33 threshold; and
- 24/7 hours of operation.

Figure 1-1 illustrates the proposed SSD Master Plan layout.

1.3 Secretary's Environmental Assessment Requirements

This Biodiversity Development Assessment Report has been prepared to support the Concept Plan and Stage 2 works proposed under SSD-37486043 and responds to the Planning Secretary's Environmental Assessment Requirements (SEARs).

Table 1-1 summarises the SEARs as relevant to biodiversity matters.

Table 1-1. Response to SEARs

SEARs requirement	Where addressed in this BDAR
An assessment of the proposal's biodiversity impacts in accordance with the *Biodiversity Conservation Act 2016* and the Biodiversity Assessment Method (BAM), including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted	Purpose of this BDAR. A BDAR waiver has not been sought
An assessment of long-term impacts of detention basins and spill into Reedy Creek	Table 8-4 in Section 8.2 and Section 9
Impacts from ancillary infrastructure and noise and lighting impacts on fauna during Operation	Table 8-4 in Section 8.2 and Section 9
A vegetation management plan for the Reedy Creek riparian corridor through the site	Addressed separately
A biosecurity management plan	Addressed separately

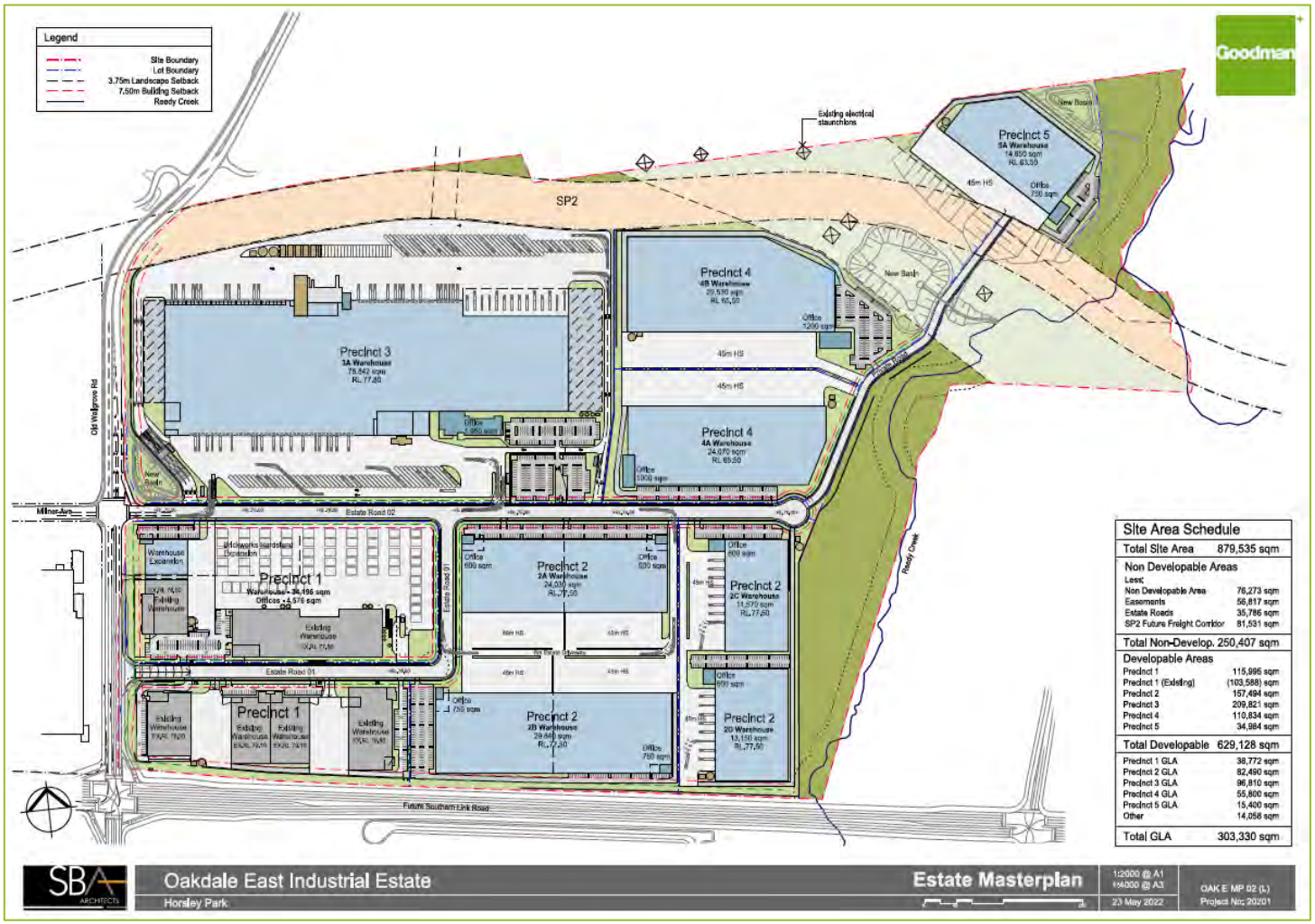


Figure 1-1. SSD-37486043 layout (SBA, May 2022)

1.4 Subject land

The subject land assessed under this BDAR is located at 10 Old Wallgrove Road and is legally identified as Lot 102 and Lot 103 in DP1268366. Zoning of each lot is as follows:

- Lot 102: wholly zoned as IN1 – General Industrial; and
- Lot 103: predominantly zoned as IN1 but includes land zoned as E2 – Environmental Conservation along its eastern margin.

  Land zoned as E2 represents remnant native vegetation associated with riparian zone of Reedy Creek. Reedy Creek flows in a northerly direction from the south eastern corner to the north eastern corner of the subject land.

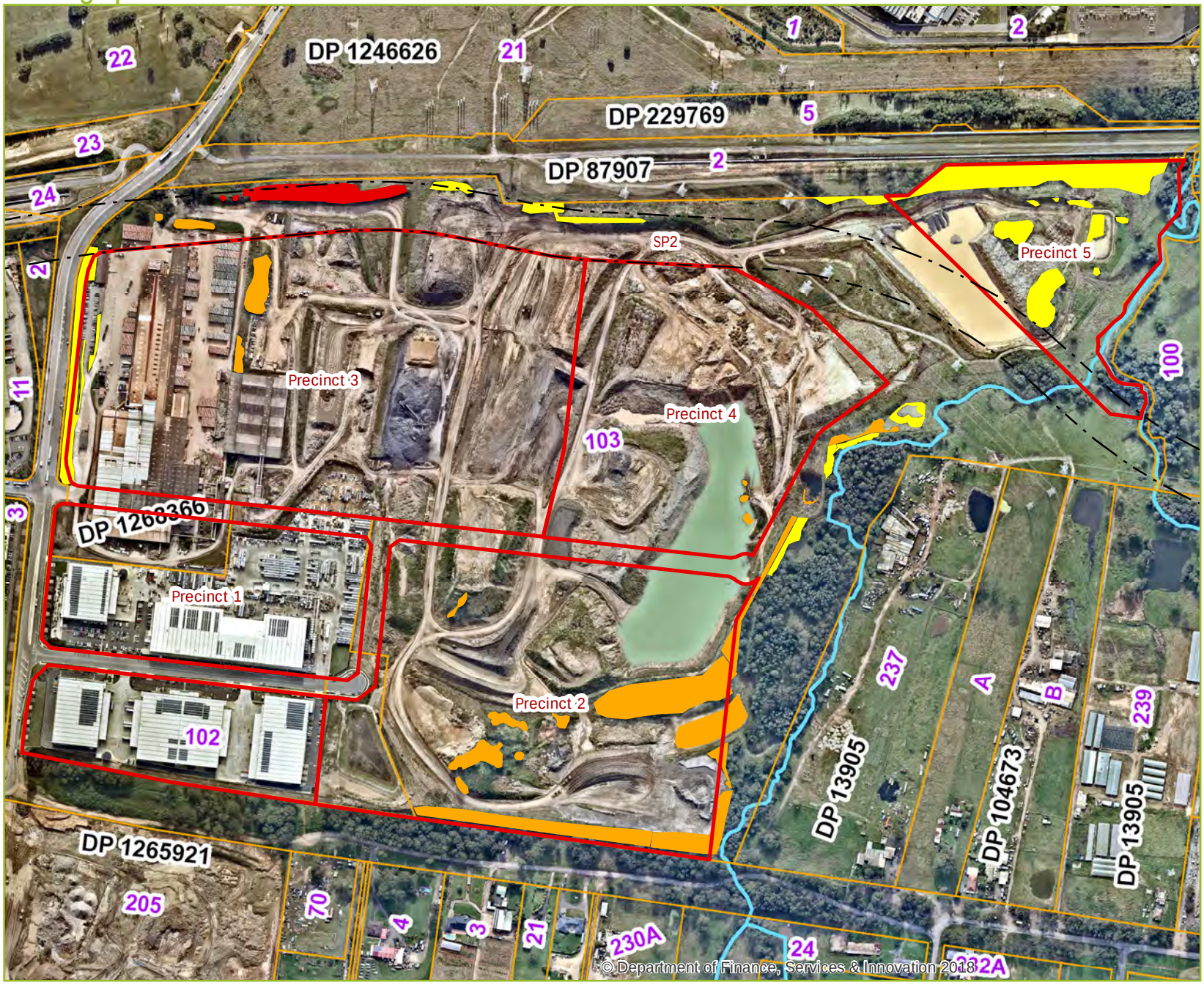
  Lot 103 also contains a future infrastructure corridor, oriented north-west to south-east, which is located to the north of Precincts 3 and 4 and south of Precinct 5 (see Figure 1-2).

The subject land has been operated as a plant and quarry by Austral Bricks (Plant 3) for brick production since 1973. Consequently, the subject land, excluding the Reedy Creek riparian zone, contains highly modified and disturbed terrain.

The subject land has been the subject of various biodiversity assessments over the past three years, summarised as follows:

- Lot 102 - an approved BDAR for the recently developed Stage 1 under DA approval (DA 133.2/2019);
- Lot 103 - an approved DA (DA85/2019) for the relocation of Plant 3's crusher, (to enable Stage 1 development to proceed); and
- Lot 103 - a supporting BDAR for DA/347.1/2021, which has been reviewed and amended to the satisfaction of Council.

Figure 1-2 illustrates the subject land in the context of vegetation approved for clearing under DA 133.2/2019, along with the proposed vegetation clearing associated with DA/347.1/2021 and SSD-37486043.



Oakdale East Estate
SSD-37486043

Figure 1.2. Site context

Legend

- Precincts
- Future freight corridor

Vegetation_clearing

- DA85/2019 approved to clear
- DA/347.1/2021 proposed to clear
- SSD-37486043 proposed to clear
- Reedy Creek

N

0 40 80 160 240 320
m

Coordinate System: MGA Zone 56 (GDA 2020)
Image sources: Nearmap 19 May 2022
Date prepared: 07 June 2022

1.5 Information sources

The following information sources were used in the preparation of this report:

1.5.1 Data and Imagery

- Imagery:
  - Aerial imagery: NearMap 7 June 2022
- Australian Government Department of the Environment and Energy
  - Protected Matters Search Tool http://www.environment.gov.au/epbc/pmst/index.html
  - Species Profiles and Threats Database (SPRAT) http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
  - Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (Department of the Environment, Water, Heritage, and the Arts, 2013 EPBC Act Policy Statement)
  - Interim Biogeographic Regionalisation for Australia (IBRA) version 7.0
- NSW Department of Planning, Industry and Environment (DPIE), Environment, Energy and Science (EES) Group, formerly the Office of Environment and Heritage (OEH)
  - NSW (Mitchell) Landscapes – version 3.1
  - BVMap_BV13_Web.gdb
  - Biodiversity Values Map and Threshold Tool
  - Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207
  - BioNet Vegetation Classification Database and Threatened Biodiversity Data Collection
  - Biodiversity Investment Opportunities Map: Mapping Priority Investment Areas for the Cumberland Subregion (2018)
  - Department of Environment and Climate Change, 2008, Soil and Land Resources of the Hawkesbury-Nepean Catchment, Department of Environment and Climate Change, Sydney.

1.5.2 Relevant surveys

Past biodiversity surveys relevant to the subject land assisted in assessing the known or likelihood of threatened species, populations, and ecological communities to occur within the subject land and the general locality. Relevant studies reviewed included the following and are shown in Figure 1-3:

- écologique (2022) Austral Brick Plant 3 Rehabilitation BDAR
- écologique (2020) Biodiversity Assessment Report – Oakdale East Industrial Estate Stages 2-5
- écologique (2019) Oakdale East Industrial Estate Stage 1 BDAR
- écologique (2019) Biodiversity Assessment Report – Austral
- Bricks Plant#3 Crusher Relocation (DA)
- écologique (2018) Biodiversity Assessment Report – Oakdale East Development Control Plan (DCP)
- Cumberland Ecology (2016a) Biodiversity Assessment Report – Oakdale West Estate (SSDA)
- Cumberland Ecology (2016b) Biodiversity Assessment Report – Oakdale South Estate (SSDA)
- Travers Bushfire and Ecology (2014) Ecology and Flora and Fauna Assessment CSR Brick Plant
- Cumberland Ecology (2007) Ecological Assessment – Oakdale Industrial Estate Concept Plan (Major Project)

Oakdale East Estate
SSD-37486043

Figure 1.3.
Relevant surveys

Coordinate System: MGA Zone 56 (GDA 2020)
Image sources: Nearmap 5 June 2021
Date prepared: 22 February 2022

1.6 Legislative context

Table 1-1 provides a summary of legislation relevant to biodiversity matters on the subject land.

Table 1-2. Legislative context

Legislative mechanism	Relevance to proposal
Federal	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places — defined in the EPBC Act as matters of national environmental significance (MNES). MNES within the subject land, comprise three threatened ecological communities (TECs) although the patches of each TEC do not meet the diagnostic and condition thresholds for consideration as a TEC under the EPBC Act (refer Section 5).
State	

Biodiversity Conservation Act 2016 (BC Act)	The BC Act together with the *Biodiversity Conservation Regulation 2017* (BC Reg.), outlines the framework for addressing impacts on biodiversity from development and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (the Scheme).
	
	Despite the highly modified nature of the subject land, several areas of remnant and planted native vegetation will be cleared for the works. Clearing of this vegetation triggers entry into the NSW Biodiversity Offsets Scheme (the Scheme), which requires proponents to provide the following:
	
	• An assessment the proposal's biodiversity impacts through application of the Biodiversity Assessment Method (BAM); and
	• A Biodiversity Assessment Development Report (BDAR) that documents how:
	  o Impacts on biodiversity will be avoided and minimised, and
	  o Remaining residual impacts that cannot be avoided will be offset (through the credit obligation generated from application of the BAM).
	
	This BDAR sets out how the proponent has applied steps to avoid and minimise impacts on biodiversity and sets out the number and type of ecosystem and species credits required to offset residual impacts of the activity on biodiversity values.

Fisheries Management Act 1994 (FM Act)	Reedy Creek along the eastern boundary of the subject area is not mapped as key fish habitat (KFH) and the proposal will not impact on any fishery resources as defined under the FM Act, nor involve any activities that require approval under the FM Act.
Water Management Act 2000 (WM Act)	The WM Act is administered by Natural Resources Access Regulator (NRAR) and establishes an approval regime for activities within waterfront land, defined as the land 40 m from the highest bank of a river, lake, or estuary. Development within Precincts 2, 4 and 5 within the subject land are partially located on waterfront land.

Legislative mechanism	Relevance to proposal
	Impacts on waterfront land within Precincts 2 and 4 have been referred to NRAR via DA/347.1/2021 (by Fairfield Council), which is being assessed under Part 4 of the EP&A Act Impacts on waterfront land within Precinct 5 will be addressed through a Vegetation Management Plan (VMP) that will be specify how the protection and restoration of a riparian corridor will be achieved. The VMP will be provided to NRAR for review and approval.

2. Landscape Context

2.1 General description

The subject land is mapped as overlying disturbed terrain, Blacktown and South Creek soil landscapes in the following locations:

- **Precinct 5:** Blacktown and South Creek soil landscapes, although predominantly disturbed terrain through quarrying activities.
- **Precinct 3:** disturbed terrain
- **Future freight corridor:** disturbed terrain and Blacktown soil landscape and South Creek soil landscapes, although areas overlying Blacktown soil landscapes are disturbed terrain through quarrying activities and construction of the adjacent Warragamba pipelines.

Soil landscape characteristics are summarised in Table 2-1 and shown in Figure 2-1.

Table 2-1. Subject land soil landscapes

BLACKTOWN Landscape	Low hills and rises on Wianamatta Group Shale (shale, sandstone-lithic and sandstone-quartz) in the Cumberland Plain, Hornsby Plateau and Picton Hills. Local relief 10-50 m; altitude 10-202 m; slopes 0-9%; rock outcrop nil. Extensively cleared woodland.
Soils	Red Kurosols (Red and Brown Podzolic Soils) Red and Yellow Sodosols (Soloths) and Yellow Chromosols (Yellow Podzolic Soils). Red Chromosols, Red Dermosols and Red Ferrosols (Krasnozems) on iron-rich parent material.
Vegetation	Extensively cleared. Two distinct vegetation units. Closer to the coast the vegetation is dominated by wet sclerophyll forest (tall open forest) with this grading into dry sclerophyll forest (open woodland) to the west as rainfall declines. The dry sclerophyll forest is dominated by Shale Plains Woodland with minor occurrences of Shale Hills Woodland.
Land degradation	Some saline scalds occur mainly at breaks in slope and in lower slope positions where drainage has been significantly altered. At many sites, the A1 horizon has been eroded (sheet erosion), leaving an organically influenced A2 horizon exposed as topsoil.
Hazards	Localised salinity, low fertility, foundation movement hazards and sheet and gully erosion hazards
SOUTH CREEK Landscape	Flood plain on Quaternary Alluvium (alluvium, shale, sand and silt) in the Cumberland Plain. Local relief 0-10 m; altitude 3-159 m; slopes 0-3%; rock outcrop nil. Extensively cleared open forest.
Soils	Grey, Yellow and Brown Chromosols (Grey, Red, Brown Podzolic Soils), Black and Brown Dermosols (Prairie Soils) and Tenosols (Alluvial Soils).
Vegetation	Original vegetation has been extensively cleared. Described as Alluvial Woodland and River-flat Forest. There is usually an upper tree stratum and a lower tree stratum and a sparse shrub stratum and dense ground cover.
Land degradation	Highly modified, active fluvial area with many areas of fluvial erosion (including streambank erosion) and deposition. Post-settlement alluvium often overlies buried soil horizons. Subsoils

Hazards	are sometimes saline, and this is evident in surface scalds where water tables are close to the surface.
	Localised seasonal waterlogging, salinity, fertility and foundation hazards, sheet and gully erosion and permanent waterlogging. Widespread flood hazard and streambank erosion.

2.2 Landscape features

Landscape features relevant to the proposal have been assessed from within a 1500m buffer zone (the BDAR assessment area) around the proposed development site (subject land).

In accordance with Sections 3.1 and 3.2 of the BAM (2020) assessment and mapping of the following landscape features are required:

- IBRA bioregions and subregions;
- NSW (Mitchell) landscapes;
- Rivers and streams classified according to stream order;
- Wetlands within, adjacent to and downstream of the site;
- Connectivity of different areas of habitat;
- Geological features such as karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features;
- Areas of outstanding biodiversity value occurring on the subject land and assessment area; and
- Percent native vegetation cover in the assessment area.

2.2.1 IBRA bioregions and IBRA subregions

The subject land and BDAR assessment area are wholly located within the Sydney Basin IBRA region and Cumberland IBRA subregion (see Figure 2-2)

2.2.2 NSW landscape regions (Mitchell Landscapes)

The subject land is located wholly within the Cumberland Plain landscape. The only other NSW landscape is a small area of Sydney Basin Diatreme occurs, which covers approximately 1.3% of the BDAR assessment area (see Figure 2-3).

2.2.3 Rivers / streams

Two creeks (Reedy Creek and Ropes Creek) occur within the BDAR assessment area as shown in Figure 2-4. Ropes Creek is located approximately 1.3 km to the west of the subject land and will not be disturbed as a result of the proposal.

The subject land's eastern boundary is contiguous with the riparian zone of Reedy Creek, where it is a third order Strahler stream (see Figure 2-4).

2.2.4 Wetlands

No wetlands of local, regional, national or international significance are located within the subject land or BDAR assessment area.

2.2.5 Connectivity

The subject land does not contain any regionally important biodiversity corridors but provides connectivity from south to north within the Reedy Creek riparian corridor. An area of mapped Cumberland subregional corridor occurs within the BDAR assessment area but will not be impacted by the proposal (see Figure 2-5).

2.2.6 Geological features

No karsts, caves, crevices, cliffs or areas of geological significance have been identified within the BDAR assessment area.

2.2.7 Outstanding biodiversity values

No outstanding biodiversity values occur within the BDAR assessment area. Figure 2-5 shows High Biodiversity Value mapping provided under the BC Reg.

2.3 Native vegetation in BDAR assessment area

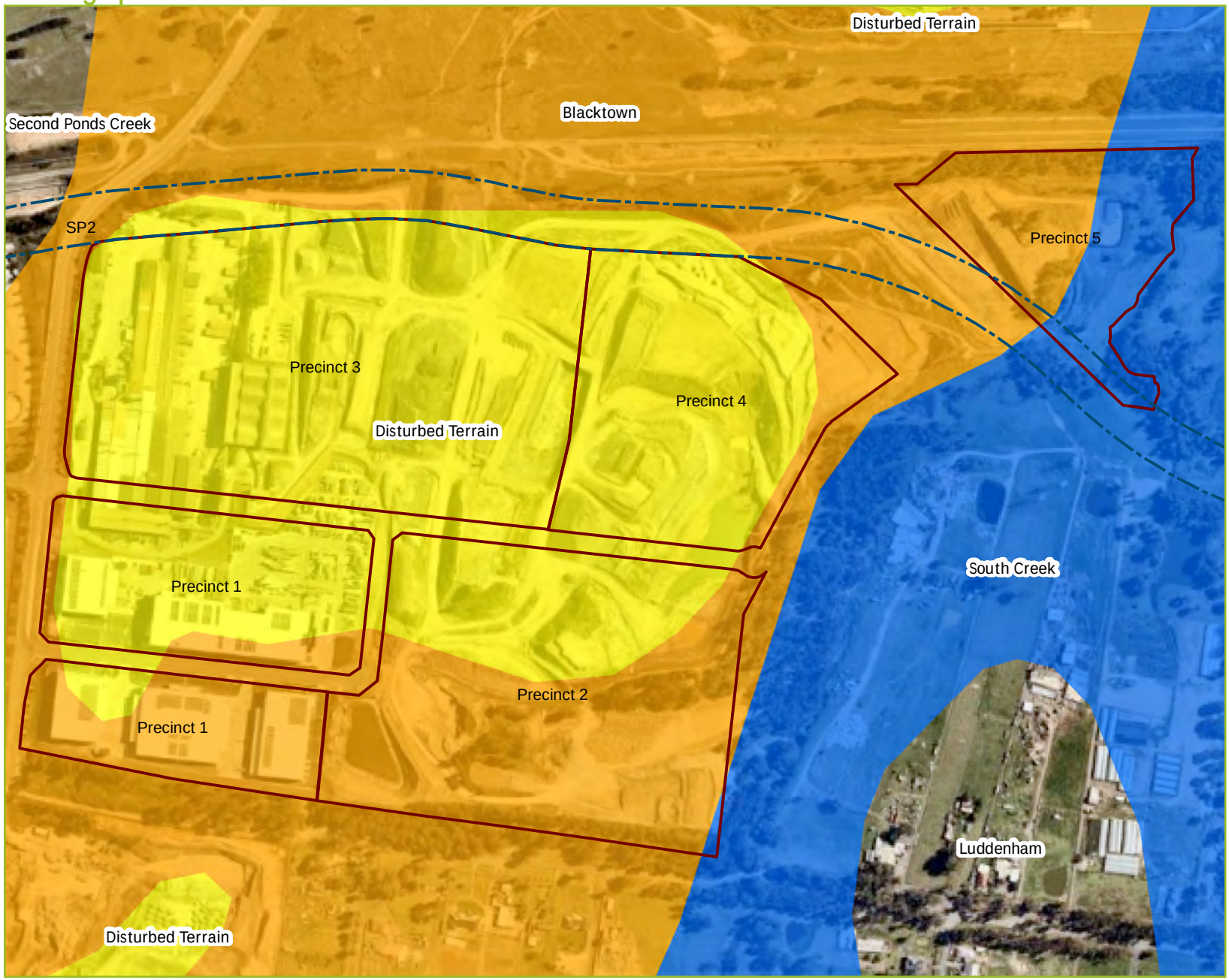
Native vegetation cover on the subject land must be assessed in relation to native vegetation cover across a broader area.

The cover of native vegetation within the BDAR assessment area is required to determine the context of the site. The cover of native vegetation in the BDAR assessment area, was assessed as follows:

- Clipping the extent of Cumberland Plain Vegetation Mapping (OEH 2013) within the BDAR assessment area using ArcMap v10.8.2;
- Editing the shapefile to remove areas of vegetation no longer evident and increase the extent of vegetation, along with the addition of polygons identifying areas of vegetation not represented in mapping.

Figure 2-6 illustrates the extent of native vegetation within the BDAR assessment area.

The BDAR assessment area including the subject land is 1,406.9 ha. The total of native vegetation cover within the BDAR assessment area is estimated at 156.4 ha, which equates to 11% and an assignment to the10-30% cover class (in accordance with the BAM Section 3.2).



Oakdale East Estate
SSD-37486043

Figure 2-1.
Subject land soils

Legend

- Precincts
- Future freight
- Blacktown
- South Creek
- Disturbed Terrain

N

0 40 80 160 240 320
m

Coordinate System: MGA Zone 56 (GDA 2020)

Image sources: Nearmap 17 October 2021

Data sources: HNP_SLR100K_v1_1_GDA94

Date drawn: 22 February 2022

Oakdale East Estate SSD-37486043

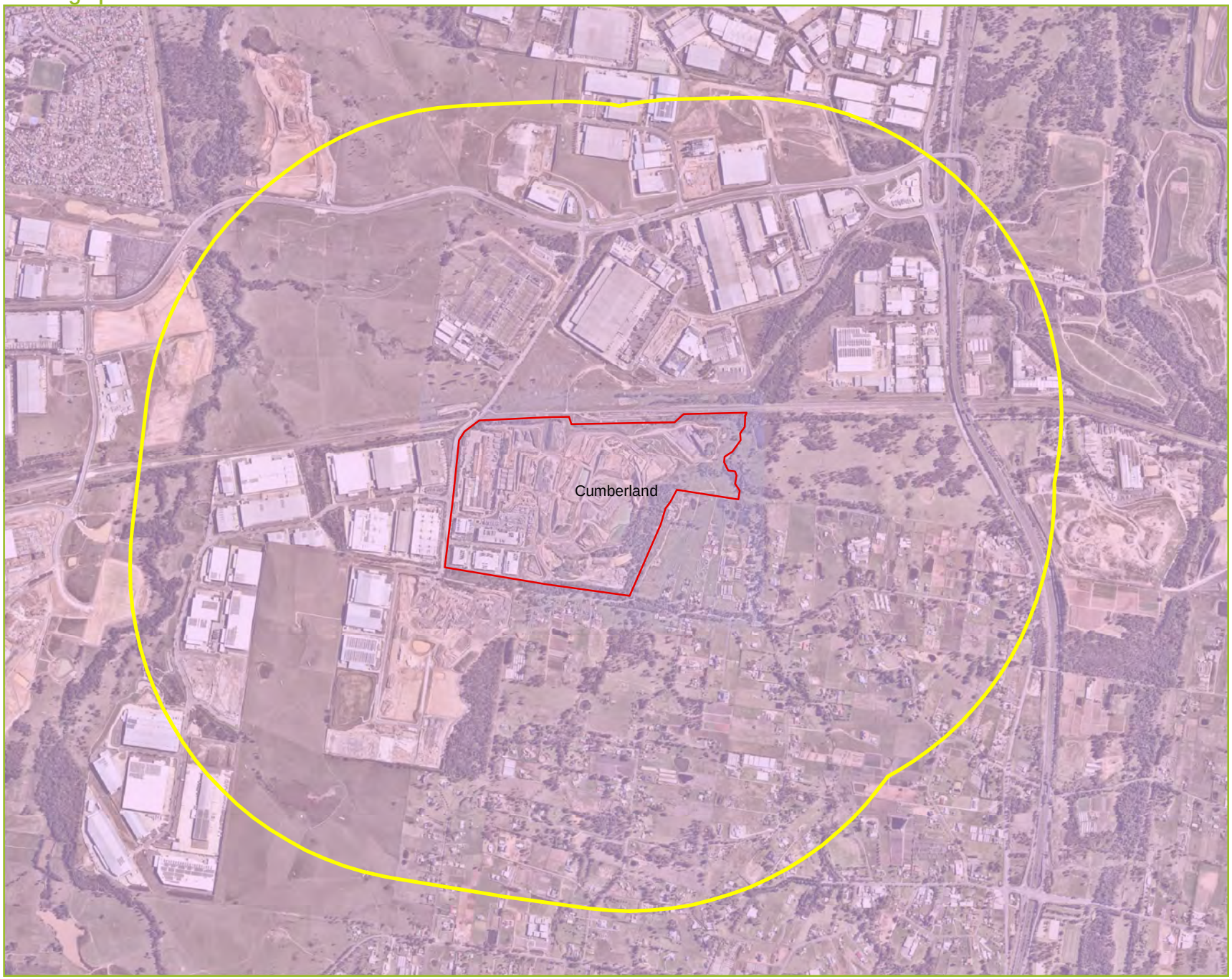


Figure 2-2.
IBRA subregion

Legend

- BDAR assessment area
- Subject land
- IBRA subregions

N

0 0.25 0.5 1

km

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 17 October 2022

Data source: IBRA v7_subregions

Date prepared: 22 February 2022

Oakdale East Estate SSD-37486043

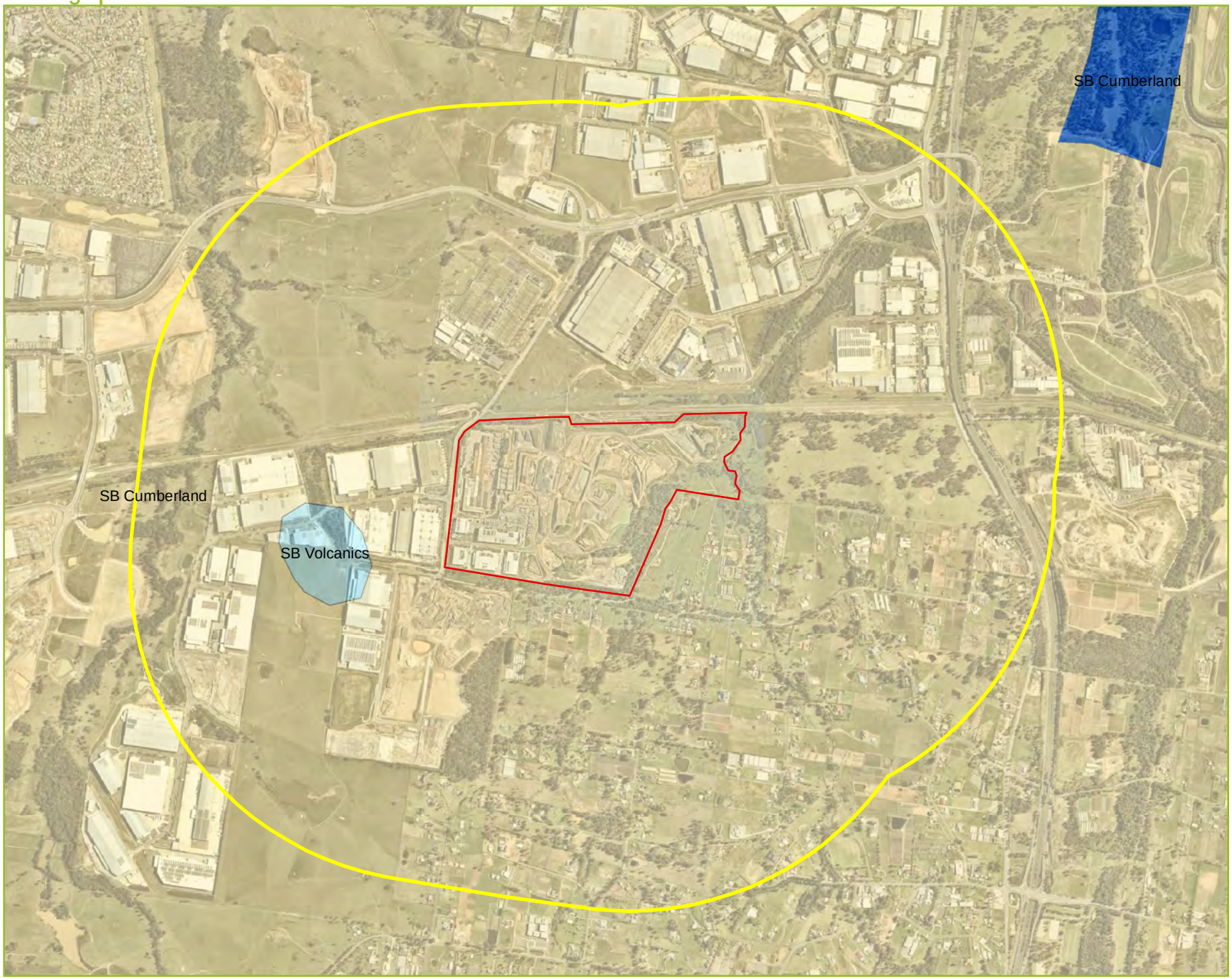


Figure 2-3.
Mitchell landscapes

Legend

- BDAR assessment area
- Subject land

Mitchell landscapes

- Cumberland Plain
- Sydney Basin Diatremes
- HN Channels/Floodplains

N

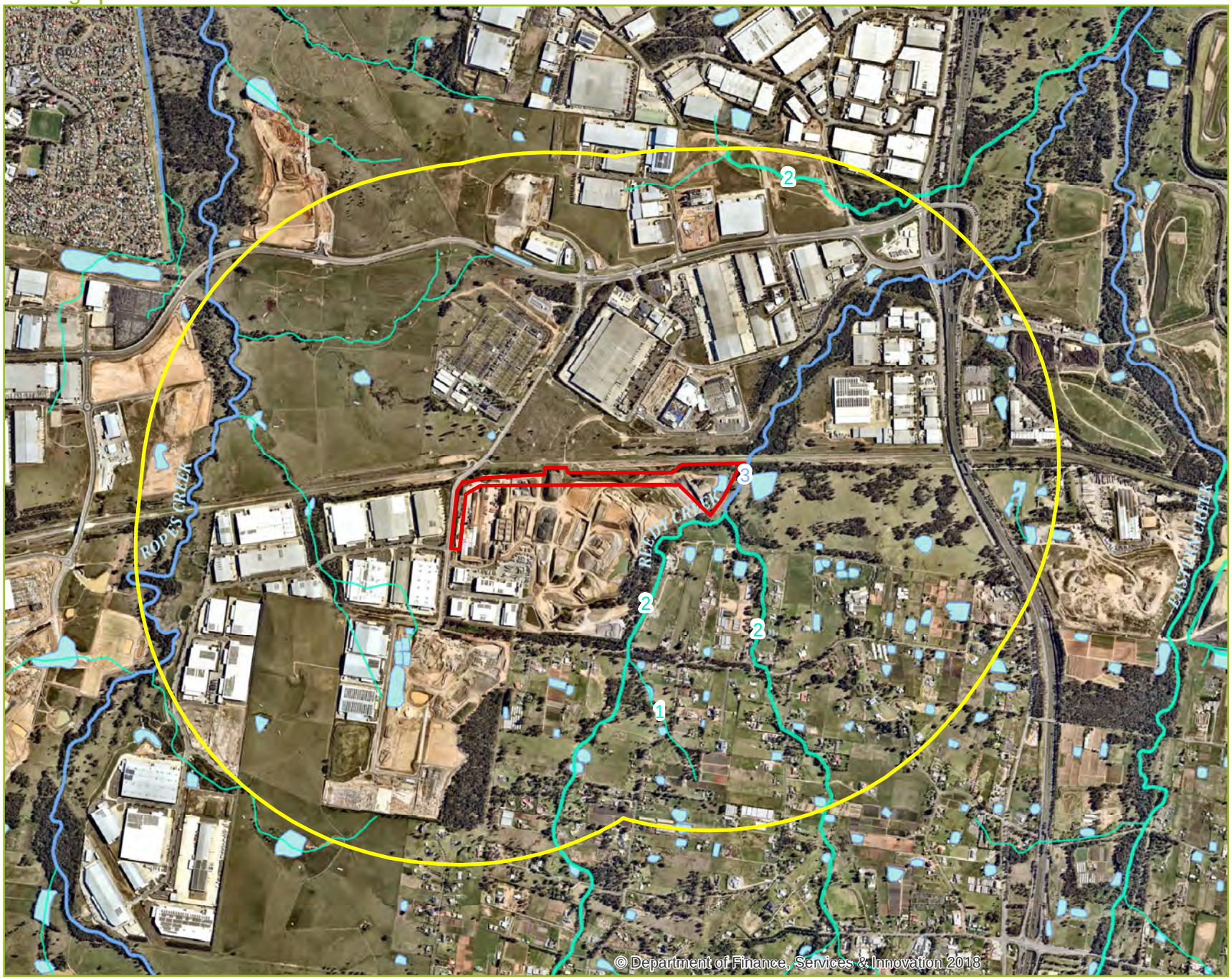
0 0.25 0.5 1
km

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 17 October 2022

Data source: Mitchell_Landscapes_v3

Date prepared: 22 February 2022



Oakdale East Estate SSDA

Figure 2-4.
Watercourses

Legend

- BDAR assessment area
- Subject land
- 3 Stream order

N

0 0.25 0.5 1
km

Coordinate System:
MGA Zone 56 (GDA 2020)

Image source:
Nearmap 17 October 2022

Date prepared: 22 February 2022

Oakdale East Estate SSDA

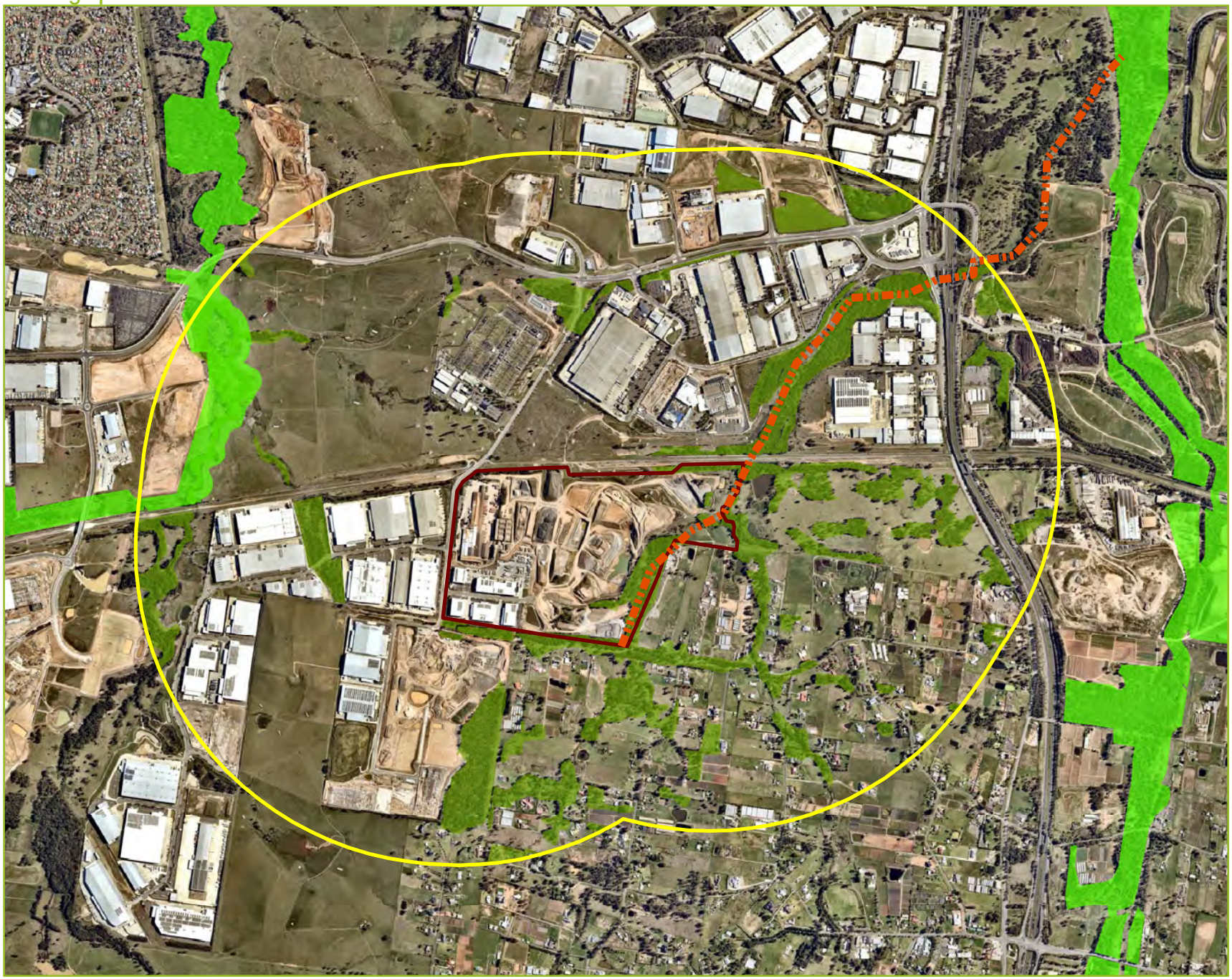


Figure 2-5.
Connectivity

Legend

- BDAR assessment area
- Subject land
- Subregional corridors
- Native vegetation
- Local corridor

N

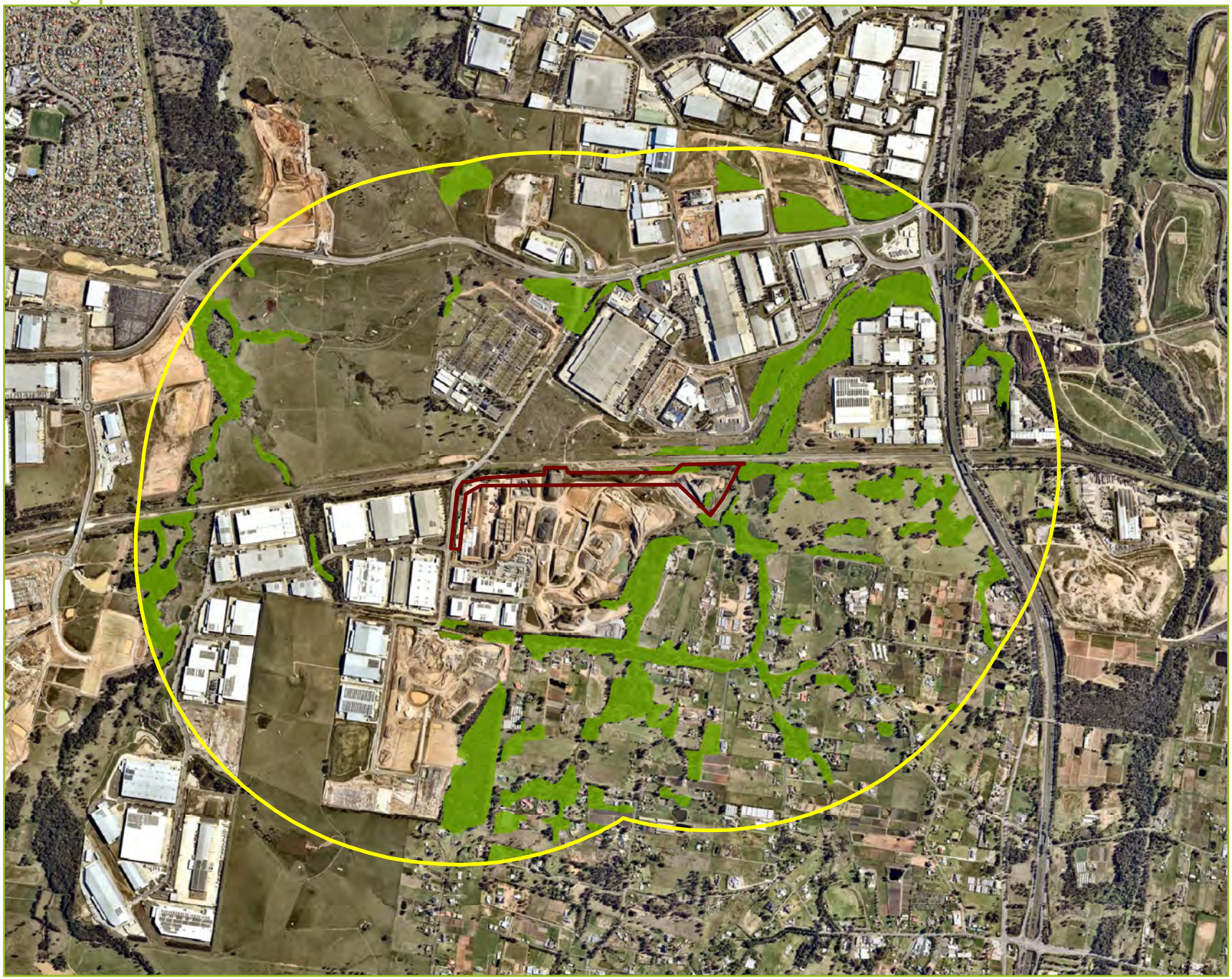
0 0.25 0.5 1
km

Coordinate System:
MGA Zone 56 (GDA 2020)

Image source:
Nearmap 17 October 2022

Data source:
BioMapCumberlandSubregionalCorridors

Date prepared: 22 February 2022



Oakdale East Estate SSDA

Figure 2-6.
Native Vegetation

Legend

- BDAR assessment area
- Subject land
- Native vegetation

N

0 0.25 0.5 1
km

Coordinate System:
MGA Zone 56 (GDA 2020)

Image source:
Nearmap 17 October 2022

Data source:
CumberlandPlainWest_2013_modified

Date prepared: 22 February 2022

3. Native Vegetation

3.1 Plant community types

Identification of plant community types (PCTs) within the subject land was confirmed during site surveys with reference to the BioNet Vegetation Classification database and data collected from floristic and site integrity plot/transects in accordance with Section 2 of the BAM (2020).

PCTs confidently identified with the subject land include:

1. Cumberland riverflat forest (PCT 835);
2. Cumberland shale plains woodland (PCT 849);
3. Cumberland swamp oak riparian forest (PCT 1800); and

A further PCT has been attributed to native emergent vegetation occurring within artificially constructed basins, as follows:

4. Phragmites australia and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071).

The location of floristic and site integrity plots and transects completed for this assessment are shown in Figure 3-1 and plot/transect data provided in Appendix A.

3.1.1 PCT 835: Cumberland riverflat forest

The total area of PCT 835 proposed for clearing is 0.50 ha.

PCT 835 occurs in two patches and five small groups or individual scattered trees in Precinct 5, and a larger patch associated with the Reedy Creek riparian corridor.

Table 3-1 summarises the areas of PCT 835 that will be cleared for SSD-37486043. All areas of PCT 835 have been assessed under the same condition state (Moderate).

Table 3-1. PCT 835 in the subject land

Precinct	Zone	Area (ha)	Condition state
4	1	0.111	Moderate – area of larger patch where clearing of outer degraded areas is likely
5	1	0.107	Moderate - patch
		0.216	Moderate - patch
		0.048	Scattered small groups or individual trees, included in Moderate
		0.007	Area along boundary in northeastern corner of subject area, which allows for approximately 72 m^2. This area may incur damage for installation of a security fence required by WaterNSW to protect the Warragamba pipelines.
Total area		**0.489**	

It should be noted that the required plot/transect data was collected from a larger patch of PCT 835 located outside of the subject land (see Figure 3-1), this due to the following factors:

- At the time of original BAM surveys:
  - 1,069 m^2 the smallest patch within the subject land was too small to adequately locate the plot/transect, without extending into man-made earthen bunds;
  - The larger patch at 2,156 m^2 was heavily infested with *Lycium ferocissimum* (African boxthorn) in the shrub layer;
  - All future vegetation clearing was assessed including the future freight corridor;

  - While it is now understood that this patch will not be cleared under the proposed SSDA, it best represents PCT 835 within the immediate location, in that:
    - it is more floristically diverse, and
    - does not contain the High Threat Weeds found within the impacted patches of PCT 835, thereby removing any bias that may have occurred from data collected from the larger patch within the subject land.
- The impacts of encroaching into the larger area of PCT 835 (associated with the Reedy Creek riparian corridor) was identified during the design process. This area was surveyed on identification of these impacts (May 2022), which found the following:
  - The PCT 835 vegetation occurs on artificially modified land as a result of basin construction and other earthworks associated with historical quarrying activities,
  - The BAM data initially collected is considered to conservatively represent the same condition state as this location, and
  - Adjacent areas of impact were assessed as more commensurate with PCT 1800, for which an additional PCT 1800 zone has been included in the BAM-C (with a responding offsetting obligation for PCT 1800 calculated).

Table 3-2 summarises the criteria used for allocation of native vegetation to PCT 835 and site photos are provided in photo plates 1 - 7 and the location of PCT 835 within the subject land shown in Figure 3-1.

Table 3-2. Selection process for PCT 835

Criteria	Description
IBRA Region/ Subregion	Sydney Basin / Cumberland Plain
Mitchell Landscape	Cumberland Plain
Keith Formation and Class	Forested Wetlands / Coastal Floodplain Wetlands
Confirmed in vegetation mapping	OEH (2013) mapping confirmed as PCT 835
Landscape position	An open eucalypt forest situated on broad alluvial flats of the Hawkesbury and Nepean River systems, also forming narrower ribbons alongside streams and creeks that drain the Cumberland Plain.
Percent cleared values	93%
Native species present	Canopy species dominated by *Angophora floribunda* and *Eucalyptus tereticornis* with *Melaleuca linearifolia* in the mid strata and groundlayer species including includes *Microlaeana stipoides, Echinopogon ovatus, Persicaria decipiens, Dichondra repens, Marsilea nutans.*
TEC	In NSW, PCT 835 is listed as the endangered ecological community (EEC) “River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions” under the BC Act. Nationally PCT 835 is commensurate with the critically endangered ecological community (CEEC) “River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria” under the EPBC Act.

Photo 1. PCT 835 plot location

Photo 2. PCT 835 plot location (on left)

Photo 3. PCT 835 in subject land

Photo 4. PCT 835 in subject land (PCT 835 plot location in background on left – behind ute)

Photo 5. PCT 835 in subject land

Photo 6. PCT 835 in subject land adjacent Precinct 4 where construction of the road connection Precinct 4 and 5 will required vegetation clearing.

Photo 7. PCT 835 in subject land adjacent Precinct 4 where construction of the road connection Precinct 4 and 5 will required vegetation clearing.

3.1.2 PCT 849 – Cumberland shale plains woodland

PCT 849 occurs as one small patch, covering 0.05 ha within the future freight corridor (see Figure 3-1). Native vegetation within this patch has been planted to screen a large stockpile within the quarry. Evidence of the planted origin is shown in photo plates 8 and 9.

Most of the understory is introduced, however small and scattered occurrences of Cumberland Plain groundcovers were evident.

Table 3-3. Selection process for PCT 849

Criteria	Description
IBRA Region/ Subregion	Sydney Basin / Cumberland Plain
Mitchell Landscape	Cumberland Plain
Keith Formation and Class	Grassy Woodland / Coastal Valley Grassy Woodlands
Confirmed in vegetation mapping	Non-confirmed mapped areas verified during site surveys.
Landscape position	Planted and colonising native species on earthen bund
Percent cleared values	93%
TEC Status	In NSW, PCT 849 is listed as the CEEC "Cumberland Plain Woodland in the Sydney Basin Bioregion" under the BC Act. Nationally PCT 849 is commensurate with the CEEC "Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest" under the EPBC Act. The patch of PCT 849 considered in this assessment is not considered to represent a TEC due the artificial nature of the earthen bund (on which it occurs) and the planted origin of the vegetation present.
Native species present	*Eucalyptus crebra, Corymbia maculata x citriodora, Glycine clandestina, Dichondra repens.*

Photo 8. PCT 849 showing planted origin

Photo 9. PCT 849 showing planted origin & weedy understorey

3.1.3 PCT 1800 - Cumberland swamp oak riparian forest

PCT 1800 occurs in two condition states within the subject land a summarised in Table 3-4. The total area of PCT 1800 proposed for clearing is 1.18 ha (0.03ha moderate and 1.15ha low condition).

Table 3-4. PCT 1800 in the subject land

Precinct	Zone	Area (ha)	Condition state
4	1	0.03	Moderate – area of larger patch where clearing of outer degraded areas is likely due to road construction
5	1	1.02	Low - poor condition, due to a lack of other native species in both shrub and ground layers. Both patches are located on excavated subsoils associated with quarrying operations and the construction of the Warragamba pipelines.
SP2	1	0.13	
Total area		**1.18**	

Table 3-5 summarises the criteria used for allocation of native vegetation to PCT 1800, site photos are provided in photo plate 9 to 12 and the location of PCT 1800 within the subject land shown in Figure 3-1.

Table 3-5. Selection process for PCT 1800

Criteria	Description
IBRA Region/ Subregion	Sydney Basin / Cumberland Plain
Mitchell Landscape	Cumberland Plain
Keith Formation and Class	Forested Wetlands / Coastal Floodplain Wetlands;
Confirmed in vegetation mapping	Not mapped within subject land
Landscape position	Not assessed
Percent cleared values	60
TEC Status	Associated with Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions (Equivalent); and Coastal Swamp Oak (*Casuarina glauca*) Forest of NSW and SE Queensland ecological community under the EPBC Act.
Native species present	*Casuarina glauca* dominant

Photo 10. PCT 1800 Zone 1 (poor condition) – location of plot / transect data collection

Photo 111. PCT 1800 Zone 1 (moderate condition) – location of plot / transect data collection

Photo 12. PCT 1800 Zone 1 (moderate condition) – location of plot / transect data collection

3.1.4 PCT 1071 Phragmites australia and Typha orientalis wetlands

The subject land contains one artificially constructed detention basin, which is located in Precinct 5. The dominance of *Typha orientalis* (broad leaf cumbungi) is most closely matched to Phragmites australia and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071).

The BioNet community profile report for PCT 1071 identifies its habitat as included man-made water bodies, drainage lines and depressions across a wide variety of environments. Therefore, the existing dam vegetation has been assessed within the BAM-C as PCT 1071.

PCT 1071 is a freshwater wetland formation, which under Section 4.3.3 of the BAM requires survey to obtain to obtain a quantitative measure of the composition and structure attributes but only the high threat weed cover functional attribute.

Aquatic vegetation is limited to *Typha orientalis* (broad-leaved cumbungi), the floating attached *Potomogeton ochreatus* (floating pond weed) and scattered occurrences of other commonly found native species such as: *Juncus usitatus* (common rush) and *Persicaria decipiens* (knotweed).

PCT 1800 within the subject land shown in Figure 3-1 and photo plates 13 to 14.

Photo 13. PCT 1071 location of plot data`

Photo 14. PCT 1071 adjacent Precinct 4

Legend

- PCT 835
- PCT 849
- PCT 1071
- PCT 1800
- Landscaping

N

0 55 110 220 330 440

m

Oakdale East Estate SSD-37486043

Figure 3.1. PCT clearing

Coordinate System: MGA Zone 56 (GDA 2020)
Image sources: Nearmap June 2022
Date prepared: 8 June 2022

3.1.5 Landscaping

Approximately 0.43 ha of landscaping will be cleared from alongside Old Wallgrove and surrounding the Plant 3 staff carpark.

Landscaping was undertaken as part of the Oakdale Central Estate and Old Wallgrove Road upgrade in 2015. Site photos of landscaping are shown in photo plates 15-20 and the planting schedule from civil drawings provided in Figure 3-2.

Photo 15. Car park adjacent landscaping (looking south)

Photo 16. Car park adjacent landscaping (looking north)

Photo 17. Landscaping (looking northwest)

Photo 18. Landscaping viewed from entrance to north

Photo 19. Landscaping viewed from Old Wallgrove Road

Photo 20. Landscaping viewed from Old Wallgrove Road

PLANT SCHEDULE

Symbol	Botanical Name	Common Name	Quantity	Mature	Mature	Spacing	Pot Size
			Total	Height (m.)	Spread (m.)		
Trees							
Af	*Angophora floribunda*	Rough Bark Apple	8	30m	10m	as shown	5L
Cm	*Corymbia maculata*	Spotted Gum	42	30m	8m	as shown	5L
Ec	*Eucalyptus crebra*	Narrow Leaved Ironbark	18	15m	6m	as shown	5L
Et	*Eucalyptus tereticornis*	Forest Red Gum	43	30m	8m	as shown	5L
Ms	*Melaleuca stypheliodes*	Prickly-leaved Paperbark	8	15m	8m	as shown	5L

Symbol	Botanical Name	Common Name	Quantity	Mature	Mature	Spacing	Pot Size
Street Tree Planting			Total	Height (m.)	Spread (m.)		
Trees							
Ml	*Melaleuca linariifolia*	Snow-in-Summer	208	8m	4m	as shown	45L

Symbol	Botanical Name	Common Name	Quantity	Mature	Density	Percentage of Mix	Pot Size
			Total	Height (m.)	(plants/m2)		
Native Shrubs and Grasses Mix							
Bs	*Bursaria spinosa*	Blackthorn	425	3m	0.5/m2	20.0%	Forestry-tube
Dv	*Dodonaea viscosa*	Hopbush	320	2.5m	0.5/m2	15.0%	Forestry-tube
Gj	*Grevillea junipera*	Juniper-leaved Grevillea	320	2m	0.5/m2	15.0%	Forestry-tube
Ar	*Austrodanthonia racemosa*	Wallaby Grass	2515	0.3m	6/m2	10.0%	Tube
Cp	*Capillipedium parviflorum*	Scented-top Grass	2515	1.5m	6/m2	10.0%	Tube
Lf	*Lomandra filiformis*	Wattle Mat-rush	2515	1m	6/m2	10.0%	Tube
Ta	*Themeda australis*	Kangaroo Grass	5030	1m	6/m2	20.0%	Tube

Turf							
	Zoysia macrantha 'Nara'	Prickly Couch	33370 m2				

Swale Planting							
	Paspalum vaginatum	Saltwater Couch	3720 m2				

Symbol	Botanical Name	Common Name	Quantity	Mature	Density		Pot Size
			Total	Height (m.)	(plants/m2)		
Low Native Grass Planting							
Dc	*Dianella caerulea* 'Little Jess'	Little Jess	6385	0.4m	6/m2		Tube
Lt	*Lomandra 'Tanika'*	Tanika	4605	0.3m	6/m2		Tube

Symbol	Botanical Name	Common Name	Quantity	Mature	Density	Percentage of Mix	Pot Size
			Total	Height (m.)	(plants/m2)		
Bio-retention Basin No.1 Planting - Filtered Media Planting							
Ca	*Carex appressa*	Tall Sedge	160	0.8m	10/m2	20.0%	Hiko cells
Fn	*Ficinia nodosa*	Knobby Club-rush	160	1m	10/m2	20.0%	Hiko cells
Ju	*Juncus usitatus*	Common Rush	160	1m	10/m2	20.0%	Hiko cells
Dt	*Danthonia tenuior*	Wallaby Grass	80	1m	10/m2	10.0%	Hiko cells
Es	*Entolasia stricta*	Wiry Panic Grass	80	1.2m	10/m2	10.0%	Hiko cells
Pl	*Poa labillardieri*	Tussock Grass	80	0.8m	10/m2	10.0%	Hiko cells
Ta	*Themeda australis*	Kangaroo Grass	80	0.8m	10/m2	10.0%	Hiko cells
Bio-retention Basin Bank Planting - Battered Bank Planting							
Dl	*Dianella longifolia*	Flax Lily	80	0.8m	10/m2	7.0%	Hiko cells
Fn	*Ficinia nodosa*	Knobby Club-rush	70	1m	10/m2	6.0%	Hiko cells
Ju	*Juncus usitatus*	Common Rush	80	1m	10/m2	7.0%	Hiko cells
Lf	*Lomandra filiformis*	Wattle Mat-rush	230	1m	10/m2	20.0%	Hiko cells
Ll	*Lomandra longifolia*	Spiny-headed Mat Rush	230	1.2m	10/m2	20.0%	Hiko cells
Lm	*Lomandra multiflora*	Matrush	230	0.8m	10/m2	20.0%	Hiko cells
Ta	*Themeda australis*	Kangaroo Grass	230	0.8m	10/m2	20.0%	Hiko cells

Symbol	Botanical Name	Common Name	Quantity	Mature	Density	Percentage of Mix	Pot Size
			Total	Height (m.)	(plants/m2)		
Bio-retention Basin No. 2 Planting - Filtered Media Planting							
Ca	*Carex appressa*	Tall Sedge	240	0.8m	10/m2	20.0%	Hiko cells
Fn	*Ficinia nodosa*	Knobby Club-rush	240	1m	10/m2	20.0%	Hiko cells
Ju	*Juncus usitatus*	Common Rush	240	1m	10/m2	20.0%	Hiko cells
Dt	*Danthonia tenuior*	Wallaby Grass	120	1m	10/m2	10.0%	Hiko cells
Es	*Entolasia stricta*	Wiry Panic Grass	120	1.2m	10/m2	10.0%	Hiko cells
Pl	*Poa labillardieri*	Tussock Grass	120	0.8m	10/m2	10.0%	Hiko cells
Ta	*Themeda australis*	Kangaroo Grass	120	0.8m	10/m2	10.0%	Hiko cells
Bio-retention Basin Bank Planting - Battered Bank Planting							
Dl	*Dianella longifolia*	Flax Lily	95	0.8m	10/m2	7.0%	Hiko cells
Fn	*Ficinia nodosa*	Knobby Club-rush	80	1m	10/m2	6.0%	Hiko cells
Ju	*Juncus usitatus*	Common Rush	95	1m	10/m2	7.0%	Hiko cells
Lf	*Lomandra filiformis*	Wattle Mat-rush	270	1m	10/m2	20.0%	Hiko cells
Ll	*Lomandra longifolia*	Spiny-headed Mat Rush	270	1.2m	10/m2	20.0%	Hiko cells
Lm	*Lomandra multiflora*	Matrush	270	0.8m	10/m2	20.0%	Hiko cells
Ta	*Themeda australis*	Kangaroo Grass	270	0.8m	10/m2	20.0%	Hiko cells

Figure 3-2. Landscaping plant schedule

The contractor shall check and verify all work on site (including work by others) before commencing the landscape installation. Any discrepancies are to be reported to the Project Manager or Landscape Architect prior to commencing work. Do not scale this drawing. Any required dimensions not shown shall be referred to the Landscape Architect for confirmation.

A3

Issue	Revision Description	Drawn	Check	Date
-	-	-	-	--.--.----
-	-	-	-	--.--.----
-	-	-	-	--.--.----
-	-	-	-	--.--.----
-	-	-	-	--.--.----
-	-	-	-	--.--.----
-	-	-	-	--.--.----
-	-	-	-	--.--.----
-	-	-	-	--.--.----
1	ISSUE FOR CONSTRUCTION	JN	RS	02.10.15
E	ISSUE FOR SECTION 138 APPROVAL	JN	RS	29.05.15
D	ISSUE FOR SECTION 138 APPROVAL	JN	RS	31.03.15
C	AMEND TREE Mn to Ml, Em to Cm	TC	RS	12.01.15
B	FOR COUNCIL REVIEW	JN	RS	28.11.14
A	FOR TENDER	JN	RS	10.11.14

LEGEND

Client:

Goodman

SITE IMAGE

Landscape Architects

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Project:

OAKDALE CENTRAL
OLD WALLGROVE ROAD
UPGRADE

Drawing Name:

Plant Schedule

ISSUE FOR CONSTRUCTION

Job Number:	Drawing Number:	Issue:
SS14-2930	LA-503	1

3.1.6 Exotic vegetation

The remaining area within the subject land comprises non-vegetated land surfaces (haul roads, buildings, car parks). Approximately 3.0 ha of SSD-37486043's footprint is covered by exotic groundcover species. Exotic groundcover is primarily temporary with variable extent due to ongoing quarrying (under an existing mining operation plan). Approximately 11.0 ha of Precincts 2 and 4 comprise exotic groundcover species, which have been considered in the BDAR prepared for DA/347.1/2021.

Photo plates 21 to 22 illustrate examples of the areas containing exotic vegetation and cleared stockpile areas.

Photo 21. Example of stock pile areas dominated by exotic grasses

Photo 22. Example of stockpile areas

3.2 Threatened ecological communities

All PCTs shown on Figure 3-3 are listed as threatened ecological communities (TECs) under the BC Act. Table 3-6 summarises whether or not each PCT has been maintained as a TEC in the BAM-C and Figure 3-4 illustrates the PCTs considered to represent TECs.

Table 3-6. TECs in the subject land

PCT / condition	BC Act listing	Maintained in BAM-C
PCT 835 / moderate	Endangered River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	YES
PCT 849 / low	Critically endangered Cumberland Plain Woodland in the Sydney Basin Bioregion	NO
PCT 1071 / low	Endangered Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	NO
PCT 1800 / moderate	Endangered Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions	YES
PCT 1800 / low		NO

3.2.1 PCT 849 – Cumberland shale plains woodland

PCT 849 in the subject land comprises native local and non-local tree species that have been planted as screening on constructed bunds. The planted origin of these species is demonstrated in photo plates provided in Section 3.1.2).

3.2.2 PCT 1071 - Phragmites australia and Typha orientalis wetlands

PCT 1071 in the subject land comprises native macrophytes that have colonised artificially constructed basins. The basins are not commensurate with coastal floodplain lagoon habitat as described in the NSW Scientific Committee's determination to list the community as an endangered ecological community (EEC).

3.2.3 PCT 1800 – Cumberland swamp oak riparian forest

Low condition state PCT 1800 in the subject land comprises juvenile to semi-mature *Casuarina glauca* growing on spoil between the Warragamba pipelines and quarry. The location is not commensurate with habitat for the community, which includes low-lying parts of floodplains, alluvial flats, drainage lines, lake margins and fringes of estuaries; habitats where flooding is periodic and soils show some influence of saline ground water. This latter habitat feature sets it apart from other floodplain communities as described by the NSW Scientific Committee.

Legend

- Subject_land
- Precincts
- TEC
- PCT 835
- PCT 849
- PCT 1071
- PCT 1800
- Landscaping

N

0 50 100 200 300 400

m

Oakdale East Estate SSD-37486043

Figure 3.3 TEC clearing

Coordinate System: MGA Zone 56 (GDA 2020)
Image sources: Nearmap June 2022
Date prepared: 8 June 2022

3.3 Patch size

Section 4.2.3 of the BAM a determination of the patch size in hectares and assign it to one of the following classes:

a. <5 ha, or
b. 5–<25 ha, or
c. 25–<100 ha, or
d. ≥100 ha.

The patch size class is used to assess habitat suitability on the subject land for threatened species. A patch size may be assigned to more than one class to the vegetation zone if both of the following apply:

a. a vegetation zone comprises two or more discontinuous areas of native vegetation, and

b. the areas of discontinuous native vegetation have more than one patch size class

The patch size for PCT 835, PCT 849 and PCT 1800 are proximal to larger patches adjacent to the subject land. The larger adjacent patches have not been validated to determine the PCTs present, so a broad patch size class of 61.5 ha (25-<100 ha) has been used.

PCT 1071 within the subject land is not proximal to larger patches of this PCT and the patch size class assigned is limited to the extent of this PCT (within the subject land), which is <5ha.

4. Threatened species

4.1 Assessing habitat suitability for threatened species

The Threatened Biodiversity Data Collection (TBDC) identifies the threatened species that are likely to occur on or use the subject land and thereby predicts the species that require assessment. This is automatically populated in the BAM-C based on the information collected from assessing the subject land.

Threatened species are categorised in the BAM-C as ecosystem, species, or dual, credit species.

4.1.1 Ecosystem credit species

Ecosystem credit species are those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection.

The TBDC identifies the threatened species assessed for ecosystem credits. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

4.1.2 Species credit species

Species credit species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. These species are identified in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the proponent may elect to assume the species is present.

4.1.3 Dual credit species

Dual credit species are threatened species that the TBDC identifies as both ecosystem credits and species credit species. Dual credit species are generally highly mobile species that rely on particular habitat components for breeding or require particular areas in the landscape important for their survival. For dual credit species, part of the habitat is assessed as a species credit. The remaining habitat components for the species are assessed as an ecosystem credit (e.g., foraging habitat).

4.2 Identify candidate species for further assessment

4.2.1 Ecosystem credit species

Table 4-1 provides a list of the ecosystem credit species derived from the BAM-C and identifies the PCTs in which each species is predicted to occur in; and the ecosystem credit type, i.e., ecosystem (foraging) indicates the species is a dual species and also considered in Section 4.2.2.

Table 4-1. Ecosystem credit species

Species Name	PCTs	Credit type
Bats		
Falsistrellus tasmaniensus[1]	835, 849, 1071, 1800	Ecosystem (foraging)
Miniopterus australis	835, 849, 1071, 1800	Ecosystem (foraging)
Miniopterus orianae oceanensis	835, 849, 1071, 1800	Ecosystem (foraging)
Micronomus norfolkensis	835, 849, 1071, 1800	Ecosystem (foraging)
Saccolaimus flaviventris	835, 849, 1800	Ecosystem
Pteropus poliocephalus	835, 849, 1800	Ecosystem (foraging)

Species Name	PCTs	Credit type
Birds		
Anthochaera phrygia	835, 849, 1800	Ecosystem (foraging)
Artamus cyanopterus cyanopterus	835, 849, 1071,1800	Ecosystem
Botaurus poiciloptilus	835, 1071	Ecosystem
Callocephalon fimbriatum	835, 849	Ecosystem
Chthonicola sagittata	835, 845, 1800	Ecosystem
Circus assimilis	849, 1071	Ecosystem
Climacteris picumnus victoriae	835, 849, 1800	Ecosystem
Daphoenositta chrysoptera	835, 849, 1800	Ecosystem
Ephippiorhynchus asiaticus	1071	Ecosystem
Epthianura albifrons	1071	Ecosystem
Glossopsitta pusilla	835, 849, 1800	Ecosystem
Haliaeetus leucogaster	835, 849, 1071, 1800	Ecosystem (foraging)
Hieraaetus morphnoides	835, 849, 1071, 1800	Ecosystem (foraging)
Hirundapus caudacutus	835, 849, 1071, 1800	Ecosystem
Iredippara gallinacea	1071	Ecosystem
Ixobrychus flavicollis	835, 1800,1071	Ecosystem
Lathamus discolor	835, 849, 1800	Ecosystem (foraging)
Lophoictinia isura	835, 849, 1071, 1800	Ecosystem
Melanodryas cucullata cucullata	835, 849, 800	Ecosystem
Melithreptus gularis gularis	835, 845, 1800	Ecosystem
Neophema pulchella	835, 845, 1800	Ecosystem
Ninox connivens	835, 845, 1800	Ecosystem (foraging)
Ninox strenua	835, 845, 1800	Ecosystem (foraging)
Pandion cristatus	835, 1071,1800	Ecosystem (foraging)
Petroica boodang	835, 845, 1800	Ecosystem
Petroica phoenicea	835, 849, 1800	Ecosystem
Rostralus australis	1071	Ecosystem
Stagonopleura guttata	835, 849, 1800	Ecosystem
Stictonetta naevosa	1071	Ecosystem
Tyto novaehollandiae	835, 845, 1800	Ecosystem (foraging)
Marsupials		
Dasyurus maculatus	835, 849, 1071, 1800	Ecosystem
Phascolarctos cinereus	835, 849, 1800	Ecosystem

[1] *Falsistrellus tasmaniensis* was added to the predicted species list as recorded within the area.

Four species returned in the predicted species list were discounted from the BAM calculator (see Table 4-2)

Table 4-2. Ecosystem species discounted from the BAM-C

Species name	PCT	Justification
Calidrus ferruginea	1071	Migratory shore birds that favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. These habitats are absent from the subject land.
Limicola falcinellus		
Limosa limosa		
Grantiella picta	835, 849, 1800	A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. These habitats are absent from the subject land.

4.2.2 Species credit species

Table 4-2 provides a list of the species credit species derived from the BAM-C, and identifies the following:

- The PCTs in which each species is predicted to occur in;
- The species credit type, i.e., species (breeding) indicates the species is a dual species and also considered in Section 4.2.1;
- Whether they have been retained within the assessment (yes or no); and
- Justification for the species not retained within the assessment (i.e., following consideration of any habitat constraints, absence of habitat, geographic limitations, and habitat quality.

Table 4-3. Species credit species

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
Amphibians				
Litoria aurea	1071	Species	No	Habitat degraded: i.e., the indicative habitat area available for the species is located within an operational quarry area. Subsequently, movement habitat and shelter habitat are highly disturbed. The species was the subject of targeted surveys within Precincts 2 and 4 and not detected. Nor has the species been detected within numerous studies conducting in areas surrounding the subject land.
Bats				
Chalinolobus dwyeri	835, 849	Species	Yes	
Miniopterus australis	835, 849	Species (breeding)	No	**Habitat constraint:** i.e., no caves, tunnels, mines, culverts or other known structures known or suspected to be used for breeding present.
Miniopterus orianae oceanensis	835, 849	Species (breeding)	No	**Habitat constraint:** i.e., no caves, tunnels, mines, culverts or other known structures known or suspected to be used for breeding present.
Myotis macropus	835, 849	Species	Yes	
Pteropus poliocephalus	835, 849	Species (breeding)	No	**Habitat constraint:** i.e., breeding camps absent.
Birds				
Anthochaera phrygia	835, 849	Species (breeding)	No	Geographic constraint: i.e., subject land not within a mapped breeding area for the species (which is only known to breed at three locations).
Burhinus grallarius	835, 849	Species	No	**Habitat constraint/degraded:** i.e., inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber and nests on the ground in a scrape or small bare patch. Remnant vegetation impacted by the proposal is isolated and located within operational quarry areas, lacks fallen timber and is subject to predation from the European red fox.
Calidrius ferruginea	1071	Species	No	**Geographic constraint:** the subject land is not an important habitat area for the species migration.
Callocephalon fimbriatum	835, 849	Species (breeding)	Yes	
Haliaeetus leucogaster	835, 849	Species (breeding)	No	**Habitat constraint:** no nests located, and no large trees present suitable for nesting by the species present.

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
Hieraaetus morphnoides		Species (breeding)	No	**Habitat constraint:** no nests located, and no large trees present suitable for nesting by the species present.
Lathamus discolor	835, 849	Species (breeding)	No	**Habitat constraint:** i.e., site is not within mapped breeding area
Limicola falcinellus	1071	Species	No	**Geographic constraint:** the subject land is not an important habitat area for the species migration
Limosa limosa	1071	Species	No	**Geographic constraint:** the subject land is not an important habitat area for the species migration
Lophoictinia isura	835, 849	Species (breeding)	No	**Habitat constraint:** no nests located, and no large trees present suitable for nesting by the species present.
Ninox connivens	835, 849, 1800	Species (breeding)	No	**Habitat constraint:** Requires hollows of large, old trees, which are absent from the subject land
Ninox strenua	835, 849, 1800	Species (breeding)	No	**Habitat constraint:** Nest 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, which are absent from the subject land**.**
Pandion cristatus	835, 849	Species (breeding)	No	**Habitat constraint:** i.e., no stick nests in living or dead trees or artificial structures within 100 m of a floodplain
Tyto novaehollandiae	835, 849, 1800	Species (breeding)	No	**Habitat constraint:** Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting, which are absent from the subject land
Invertebrates				
Meridolum corneovirens	835, 849	Species	Yes	
Pommerhelix duralensis	849	Species	No	Habitat absent: i.e., absence of forested habitats that have good native cover and woody debris, rocks and leaf litter.
Marsupials				
Cercartetus nanus	835, 849	Species	No	**Habitat absent/degraded:** species has a preference for heathy habitats, which is not present. Key food source absent and the species is not recorded from within the BioNet database locality search.
Petaurus norfolcensis	835, 849	Species	No	**Habitat degraded/absent:** species requires mature or old growth woodland or forest with abundant hollows for refuge and nest sites.
Phascolarctos cinereus	835, 849	Species (breeding)	No	**Habitat constraint:** species requires large areas of habitat which are not present within the subject land, which only contains small patches of canopy trees, which are substantially isolated from larger and more intact vegetation

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
				within the locality. Species is also not recorded from within the BioNet database locality search.
Flora				
Acacia bynoeana	849	Species	Yes	
Acacia pubescens	849	Species	Yes	
Caladenia tessellata	849	Species	No	**Habitat degraded/absent:** i.e., generally found in grassy sclerophyll woodland on clay loam or sandy soil. The subject land is highly modified due to quarrying operations and does not support the species habitat. The species is also known only from old records in the Sydney area and is considered unlikely to have subsisted pre-clearing and historical quarrying operations.
Callistemon linearifolius	835	Species	Yes	
Commersonsia prostrata	1071	Species	Yes	
Cynanchum elegans	835, 849	Species	Yes	
Deyeuxia appressa	849	Species	No	**Habitat degraded/absent:** i.e., the distribution of this species overlaps with Shale/Sandstone Transition Forest, Cumberland Plain Woodlands (CPW), and Turpentine-Ironbark Forest in the Sydney Basin Bioregion. None of these communities are present within the subject land (excluding a small area of planted CPW species). D.appressa is a highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. The species has not been collected since and may now be extinct in the wild. Prior to the operation as a plant and quarry for brick production since 1973, the subject land was substantially cleared for agricultural purposes. If the species had historically been present within the subject land, the likelihood of it subsisting throughout the past decades of quarrying earthworks is considered unlikely.
Dillwynia tenuifolia	849	Species	Yes	
Dillwynia tenuifolia population	849	Species	No	**Geographic limitation:** the population is bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA, which is outside of the subject land.
Eucalyptus benthamii	835, 849	Species	Yes	

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
Grevillea juniperina subsp. *juniperina*	849	Species	Yes	
Gyrostemon thesioides	849	Species	Yes	
Haloragia exalata subsp. *exalata*	1071	Species	Yes	
Hibbertia sp. Bankstown	849	Species	Yes	
Marsdenia viridiflora subsp. - endangered population	849	Species	Yes	
Maundia triglochinoides	835, 1071	Species	Yes	
Melaleuca biconvexa	835, 1071	Species	Yes	
Persicaria elatior	835, 1071	Species	Yes	
Persoonia bargoensis	849	Species	Yes	
Persoonia hirsuta	835	Species	Yes	
Pilularia novae-hollandiae	835, 849	Species	Yes	
Pimelea curviflora var. *curviflora*	849	Species	Yes	
Pimelea spicata	849	Species	Yes	
Pomaderris brunnea	835	Species	No	**Geographic limitation:** i.e., the species is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria.
Pterostylis saxicola	849	Species	No	**Habitat absent:** i.e., most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, which are absent from the subject land.
Pultenaea pedunculata	849	Species	Yes	
Thesium australe	849	Species	Yes	
Wahlenbergia multicaulis - endangered population	835, 849	Species	No	**Habitat absent:** i.e., in Western Sydney most sites are closely aligned with the Villawood Soil Series, which is a poorly drained, yellow podsolic extensively permeated with fine, concretionary ironstone (laterite).

Species name	PCTs	Credit type	Retained	Justification in BAM C if not retained
				The species is known from 13 known sites, two of which are in northern Sydney (Thornleigh and Mt Ku-Ring-Gai) with the remainder in western Sydney (Rookwood, Chullora, Bass Hill, Bankstown, Georges Hall, Campsie, South Granville and Greenacre).
Zannichellia palustris	1071	Species	Yes	

4.3 Targeted field surveys

4.3.1 Threatened flora species

Twenty-three threatened flora species were not discounted from having a marginal potential to occur within the subject land.

Survey effort consisted of a systematic search along parallel transects located 10 m apart although most habitat areas were relatively small and able to be searched comprehensively.

Survey results conducted for DA 85/2019, DA 133.2/2019, and DA 347.1/2021 have also been considered.

Surveys were conducted on the following dates:

- 10th and 11th November 2020 (Precincts 3, 4 and 5)
- 25th and 30th March 2021 (Precincts 4 and 5)
- 8th April 2021 (Precincts 4 and 5)
- 4th May 2022 (Precinct 4)

Table 4-4 lists the species surveyed, and Figure 4-1 illustrates the areas in which surveys were undertaken.

Table 4-4. Threatened flora species surveyed

Species name	PCT	Survey comment
Trees/shrubs		
Acacia bynoeana #, ##	849	Most species are distinctive in habitat, especially trees and larger shrub species. All areas surveyed lacked a shrub and subshrub layer (with the exception of occasional native blackthorn). # species habitat not found during surveys ## species not known to occur from locality
Acacia pubescens #	849	
Callistemon linearifolius	835	
Commersonsia prostrata #, ##	N/A	
Dillwynia tenuifolia #, ##	849	
Eucalyptus benthamii #, ##	835, 849	
Grevillea juniperina subsp. *juniperina*	849	
Gyrostemon thesioides #, ##	849	
Haloragia exalata subsp. *exalata* #, ##	1071	
Melaleuca biconvexa ##	835, 1071	
Persoonia bargoensis ##	849	
Persoonia hirsuta #	835	
Pimelea curviflora var. *curviflora* #, ##	849	
Pimelea spicata #	849	
Pultenaea pedunculata #	849	
Herbs/forbs		
Cynanchum elegans	835, 849	A distinct vine or twining species, not found during surveys
Hibbertia sp. Bankstown	849	Currently known to occur in only one population at Bankstown Airport in the Bankstown LGA. No Hibbertia species found during surveys.
Marsdenia viridiflora subsp. - endangered population	849	Grows in vine thickets and open shale woodland. Vine thickets not found during surveys.

Species name	PCT	Survey comment
Thesium australe	849	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. A root parasite that takes water and some nutrient from other plants, most often found in association with Kangaroo Grass. Habitat and species not found during surveys
Pilularia novae-hollandiae	1071	Species not evident in aquatic and semi-aquatic habitats
Maundia triglochinoides	835, 1071	
Persicaria elatior	1071	
Zannichellia palustris	1071	

4.3.2 Threatened fauna species

Threatened fauna surveys have been conducted within and external to the subject land by way of the following:

- Surveys undertaken in 2018 for the proposed Oakdale East DCP and approved Precinct 1 of the subject land;
- Surveys undertaken in 2020 as a component of a due diligence biodiversity assessment prepared to identify areas of biodiversity values in advance of designing future stages of development within the subject land;
- Targeted fauna and flora surveys undertaken in 2020 and 2021 for the Plant 3 Rehabilitation DA; and
- Targeted fauna and flora surveys undertaken in 2021 for the current proposal.

***Meridolum corneovirens* - Cumberland Plain land snail & *Pommerhelix duralensis* Dural land snail**

Methods employed entailed dedicated ground debris searches of 20-40 person minutes within each vegetated area in the subject land over the following dates:

- 10th and 11th November 2020 (Precincts 3, 4 and 5)
- 25th and 30th March 2021 (Precincts 4 and 5)
- 8th April 2021 (Precincts 4 and 5)
- 4th May 2022 (Precinct 4)

The Cumberland Plain land snail was found in Precinct 2

Avifauna

To determine those birds present, 20-minute dedicated surveys were conducted within each native vegetation patch and each water body on the following dates:

- 10th and 11th November 2020 (Precincts 3, 4 and 5)
- 30th March 2021 (Precinct 4 and 5)

These surveys employed the point count method (DEC 2004). During these surveys, any birds heard calling or observed were recorded. In addition, any evidence to suggest the presence of a bird (e.g., whitewash, crushed eucalypt fruit, nest site) were targeted and recorded if found.

Opportunistic sightings of birds were also recorded throughout field surveys on all days.

***Litoria aurea* green & golden bell frog**

The green and golden bell frog was discounted in the BAM-C based on very degraded marginal habitat present within Precinct 5 and previous surveys undertaken to determine amphibian species present conducted for BDARs prepared to support both DA 133.2/2019 and DA/347.1/2021.

Further consideration was paid to numerous targeted surveys for the species in the locality. Despite the recent history of surveys in the locality, the species has not been detected (see Figure 4-2).

Microchiroptera

Anabat ExpressTM echolocation detection was undertaken as follows:

- Four locations deployed within Precincts 2 and 4 on the 25th of March 2021 and collected on 30th March 2021 (4 units x 4 nights)
- Two locations deployed within Precinct 5 on 30th March 2021 and collected on 8th April 2021 (2 units x 10 nights)
- Each unit employed was placed on a tree at a height of between 3 m AGL. Being programmable, the unit was set to nocturnal only. Upon collection, each unit was noted to still be operating.
- Sites selected for the placement of the echolocation detector units were chosen as they corresponded to those habitats likely to be used by microchiropterans as a roosting site (i.e., proximity to hollow-bearing trees in adjacent riparian corridor) and/or during their foraging and dispersal periods (i.e., possible flyway).
- Any calls recorded were analysed in house using Anabat 6.3 computer software.
- By the completion of the study a total of 36 nights of echolocation detection had been accumulated.

Figure 4-1 shows the locations of Anabat deployment.

Three species listed under the BC Act were recorded during the course of the field surveys.

Table 4-5. Threatened species recorded during surveys

Species/Status	Easting	Northing	Records
Falsistrellus tasmaniensis (eastern false pipistrelle) / Vulnerable	299750	6255218	Confident calls recorded through use of Unit 4 (Precinct4)
	300029	6255362	Possible calls recorded through use of Unit 6 (Precinct 5)
Micronomus norfolkensis (eastern coastal free-tailed bat) / Vulnerable	299750	6255218	Confident calls recorded through use of Unit 4 (Precinct 4)
	300029	6255362	Confident calls recorded through use of Unit 6 (Precinct 5)
Miniopterus orianae oceanensis (large bent-winged bat) / Vulnerable	299670	6255077	Possible calls recorded through use of Unit 2 (Precinct 2)
	299750	6255218	Confident calls recorded through use of Unit 4 (Precinct 4)
	300001	6255523	Confident calls recorded through use of Unit 4 (Precinct 5)
	300029	6255362	Confident calls recorded through use of Unit 6 (Precinct 5)

Ecosystem credit species:

The three microchopteran species detected are all ecosystem credit species:

1. *Falsistrellus tasmaniensi* (eastern false pipistrelle)
2. *Micronomus norfolkensis* (eastern coastal free-tailed bat)
3. *Miniopterus orianae oceanensis* (large bent-winged bat)

The eastern coastal free-tailed bat and large bent-winged bat were returned in the list of predicted species list, Whereas the eastern false pipistrelle was added to the predicted species list for inclusion as ecosystem credit species within the BAM-C.

Species credit species:

Of the three microchopteran species detected, only the large bent-winged bat is a dual (ecosystem and species) credit species.

The large bent-winged bat is a cave dependent species for breeding and has been discounted from the BAM-C as breeding habitat is absent from the subject site (see Table 4-2). The location of Anabat Units, 2, 4 and 6 are shown in Figure 4-3.

Callocephalum fimbriatum (gang-gang cockatoo) has been assumed to be present within the subject land as appropriate surveys for this species were not undertaken.

Oakdale East
Estte SSDA

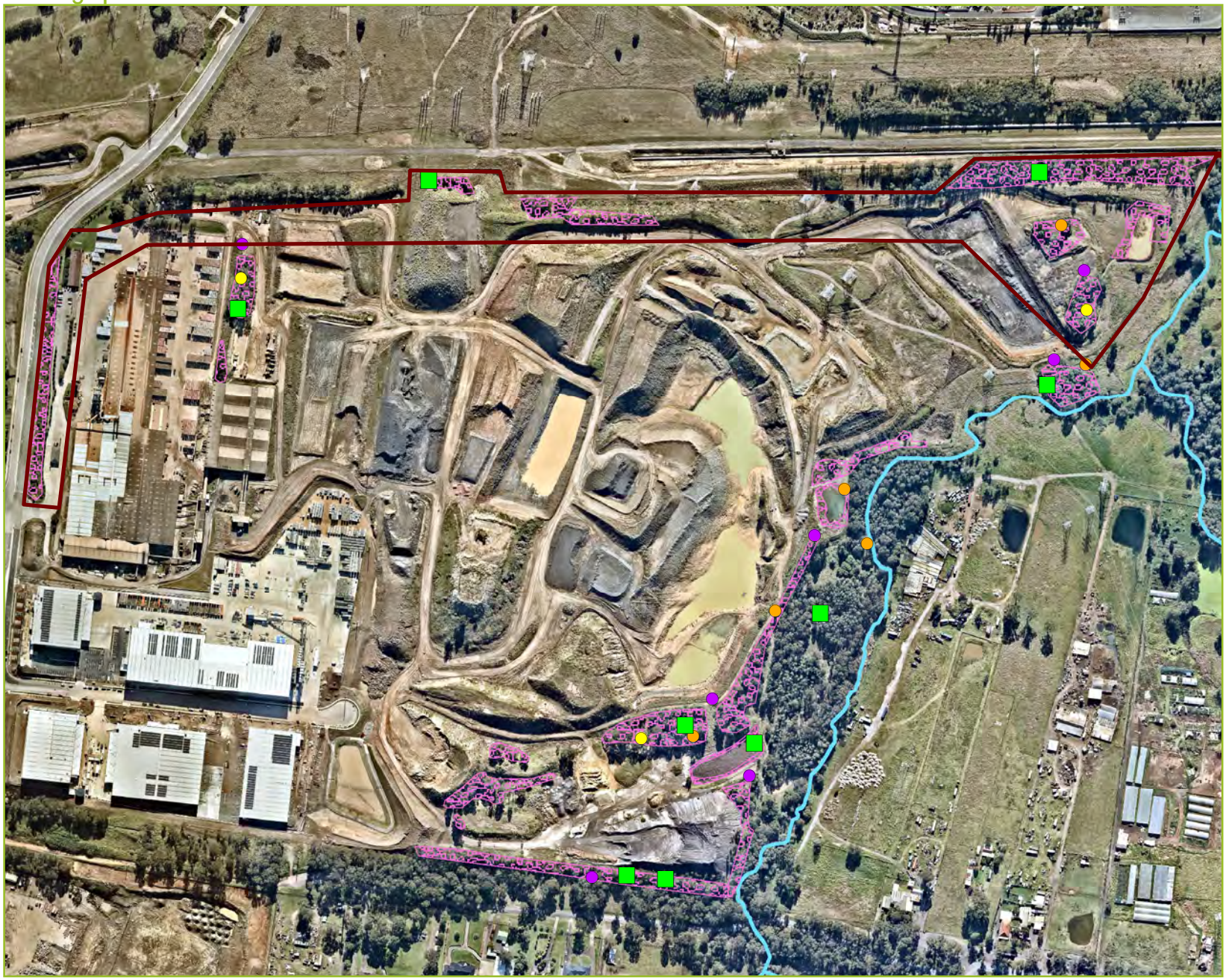
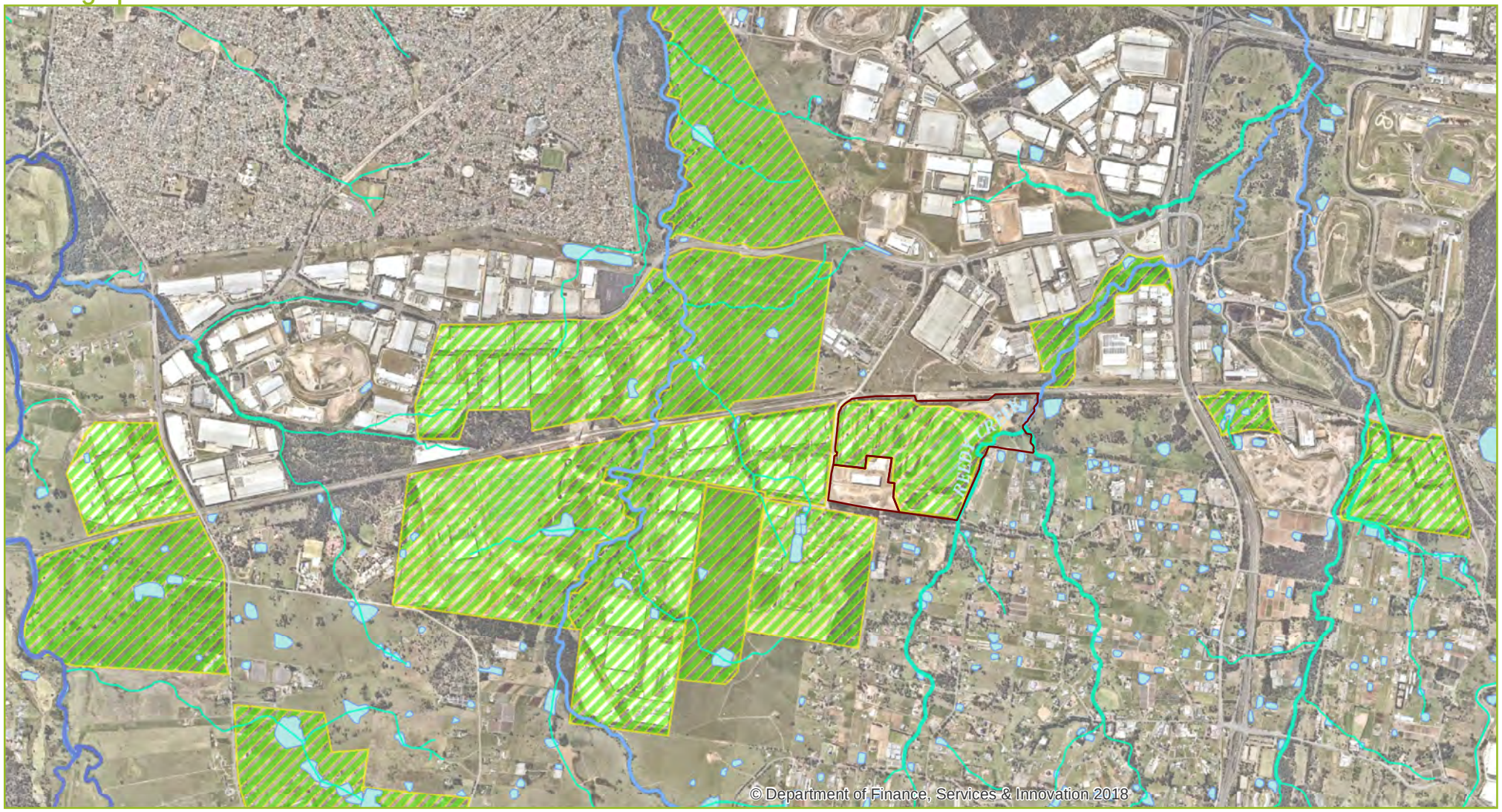


Figure 4.1. Threatened species surveys

Coordinate System: MGA Zone 56 (GDA 2020) | Image sources: Nearmap 17 October 2021 | Date drawn: 22 February 2022



Legend

Subject land

GGBF surveys

N

0 0.5 1 2 3 4

kms

Oakdale East Estate SSD-37486043

Figure 4.2. GGBF survey locations

Coordinate System: MGA Zone 56 (GDA 2020)
Image sources: Nearmap 15 April 2021

Legend

- Subject land
- Precincts
- Future freight corridor
- Gang gang cockatoo
- Anabat unit 2
- Anabat unit 4
- Anabat unit 6

N

0 15 30 60 90 120

m

Oakdale East Estate SSD-37486043

Figure 4.3. Threatened fauna recorded

Coordinate System: MGA Zone 56 (GDA 2020)
Image sources: Nearmap 17 February 2022
Date prepared: 4 March 2022

5. Matters of NES

5.1 Threatened ecological communities

In order to be protected as a MNES area the TEC must meet both key diagnostic and minimum condition thresholds as prescribed by the Australian Government (DAWE, 2020).

Three TECs listed under the EPBC Act within the subject land include the following:

- PCT 849 (Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest equivalent) does not contain a perennial understorey vegetative cover greater than 30% present - planted
- PCT 835 (Coastal floodplain eucalypt forest of eastern Australia equivalent); and
- PCT 1800 (Coastal Swamp Oak (*Casuarina glauca*) Forest of NSW and South East Queensland ecological community equivalent)

As shown in Figure 5-1, none of these PCTs meet the diagnostic threshold to be considered a MNES due to a lack of native perennial understorey species.

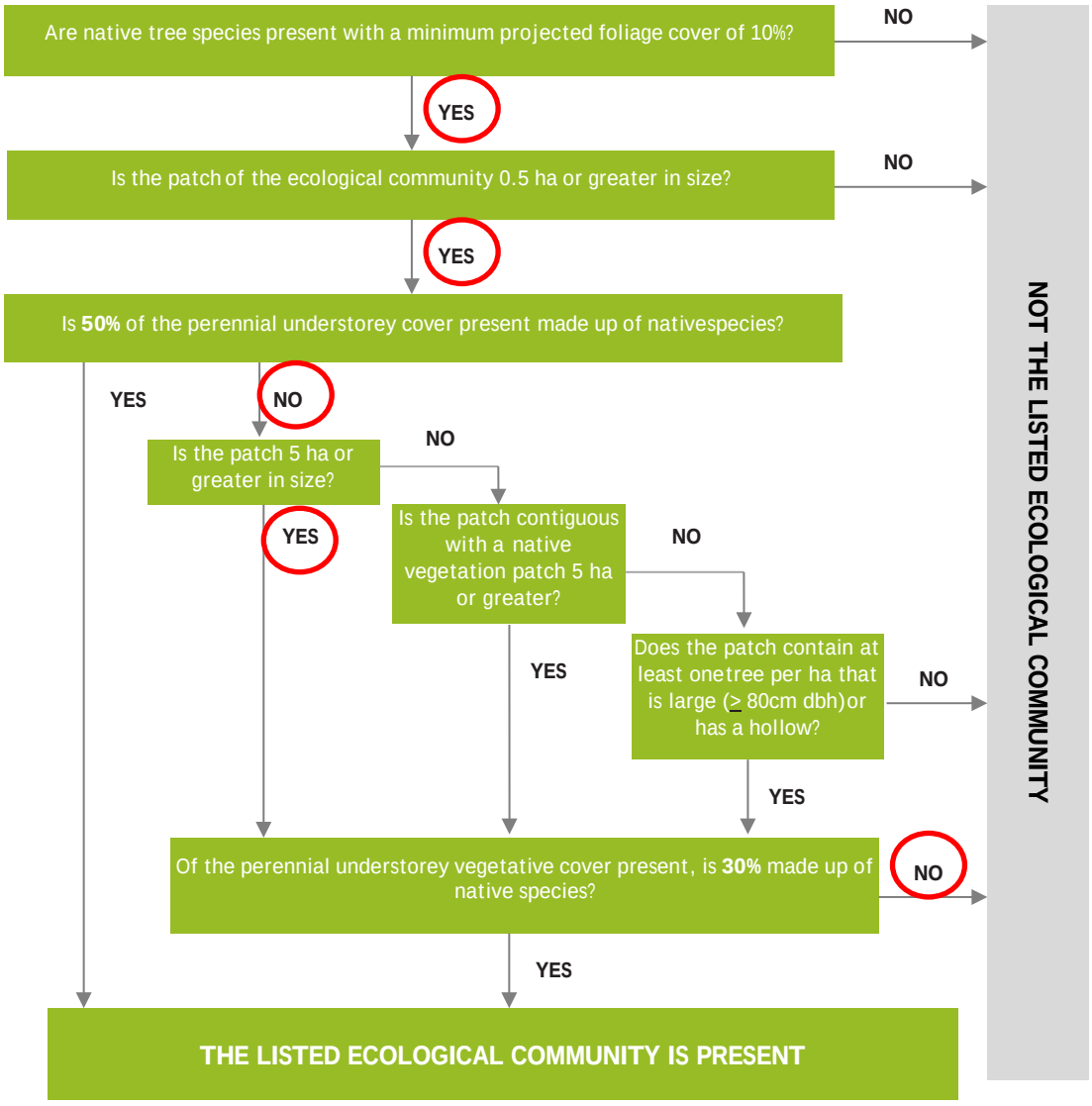


Figure 5-1. CPW diagnostic features and condition thresholds (adapted from DAWE guidelines, 2010)

5.2 Threatened species

Threatened and migratory species identified from the EPBC Act protected matters database search for the locality have been assessed for the likelihood of their occurrence within the subject land.

Table 5-1 summarises these species and whether discounted in the BAM-C, or found to be not present during surveys, or habitat important to the species is absent from the subject land.

Table 5-1. Threatened and migratory species returned from protected matters search report

Species name	Common name	Status	Justification
Flora			
Acacia bynoeana	Bynoes's wattle	V	Not found during surveys
Acacia pubescens	Downy wattle	V	Not found during surveys
Allocasuarina glareicola		E	Lack of suitable habitat and not found during surveys. Not recorded from locality
Cynanchum elegans	Whiteflowered wax plant		Not found during surveys
Grevillea parviflora subsp. parviflora	Small-flower grevillea	V	Not found during surveys
Genoplesium baueri	Bauer's midge orchid	E	Lack of suitable habitat and not recorded from locality
Haloragis exalata subsp. exalata	Square raspwort	V	Lack of suitable habitat and not found during surveys
Isotoma fluviatilis subsp. fluviatilis		X	Lack of suitable habitat and not recorded from locality
Macadamia integrifolia	Queensland nut, macadamia nut, bush nut	V	A medium sized tree that grows to 20 m in height, not present in subject land
Persicaria elatior	Tall knotweed	`	Lack of suitable habitat and not found during surveys
Persoonia hirsuta	Hairy geebung	E	Lack of suitable habitat and not found during surveys
Persoonia nutans	Nodding geebung	E	Lack of suitable habitat and not found during surveys
Pimelea curviflora var. curviflora		V	Lack of suitable habitat and not found during surveys
Pimelea spicata	Spiked rice-flower	E	Lack of suitable habitat and not found during surveys
Pomaderris brunnea	Brown pomaderris	V	Lack of suitable habitat and not found during surveys
Pterostylis gibbosa	Illawarra greenhood	E	Lack of suitable habitat and not recorded from locality
Pterostylis saxicola	Sydney Plains greenhood	E	Lack of suitable habitat and not found during surveys
Pultenea parviflora		V	Lack of suitable habitat and not found during surveys
Syzygium paniculatum	Magenta lilly pilly	E	Lack of suitable habitat and not found during surveys
Thesium australe	Austral toadflax	V	Lack of suitable habitat and not found during surveys

Species name	Common name	Status	Justification
Amphibians			
Heleioporus australiacus	Giant burrowing frog	V	Lack of suitable habitat and not recorded from locality
Litoria aurea	Green and golden bell frog	E	Not recorded during surveys and not recorded from locality
Litoria raniformis	Growling grass frog	V	Lack of suitable habitat and not recorded from locality
Aves			
Actitis hypoleucos	Common sandpiper	Mig	Lack of suitable habitat and not recorded from locality
Anthochaera phrygia	Regent honeyeater	CE	Habitat important to the species not present
Apus pacificus	Fork-tailed swift	Mig	Not observed during surveys, habitat absent
Botaurus poiciloptilus	Australasian bittern	E	Lack of suitable habitat and not recorded from locality
Calidris acuminata	Sharp-tailed sandpiper	Mig	Not observed during surveys, habitat absent
Calidris ferruginea	Curlew sandpiper	CE, Mig	Discounted in BAM-C
Calidris melanotos	Pectoral sandpiper	Mig	Habitat important to the species not present
Dasyornis brachypterus	Eastern bristlebird	E	Habitat important to the species not present
Gallinago hardwickii	Latham's snipe	Mig	Not observed during surveys, habitat absent
Grantiella picta	Painted honeyeater	V	Lack of suitable habitat and not recorded from locality
Haliaeetus leucogaster	White bellied sea-eagle	Mig	Habitat important to the species not present
Hirundapus caudacutus	White throated needletail	Mig	Habitat important to the species not present
Lathamus discolor	Swift parrot	Mig	Potential foraging habitat, but not important to the species
Monarcha melanopsis	Black-faced monarch	Mig	Habitat important to the species not present
Motacilla flava	Yellow wagtail	Mig	Habitat important to the species not present
Myiagra cyanoleuca	Satin flycatcher	Mig	Habitat important to the species not present
Numenius madagascariensis	Eastern curlew	CE, Mig	Habitat important to the species not present
Rostratula australis	Australian painted snipe	E	Not observed during surveys, habitat absent
Rjipidura rufifrons	Rufous fantail	Mig	Habitat important to the species not present
Tringa nebularia	Common greenshank	Mig	Habitat important to the species not present

Species name	Common name	Status	Justification
Insects			
Synemon plana	Golden sun moth	CE	Lack of suitable habitat and not recorded from locality
Mammals			
Chalinolobus dwyeri	Large-eared pied bat	V	Discounted in BAM-C
Dasyurus maculatus	Spotted-tailed quoll	E	Discounted in BAM-C
Petauroides volans	Greater glider	V	Lack of suitable habitat and not recorded from locality
Petrogale penicillata	Brush-tailed rock wallaby	V	Lack of suitable habitat and not recorded from locality
Phascolarctos cinereus	Koala	V	Discounted in BAM-C
Pseudomys novaehollandiae	New Holland mouse	V	Lack of suitable habitat and not recorded from locality
Pteropus poliocephalus	Grey-headed flying-fox	V	Potential foraging habitat, but not important to the species

5.3 EPBC Act referral process

A person must not take an action that has, will have or is likely to have a significant impact on any of the MNES without approval from the Australian Government Minister for the Environment (the Minister).

Section 5.1 has concluded that the vegetation communities in the subject land do not meet the criteria for consideration as a MNES and Section 5.2 has indicated that the subject land is unlikely to provide habitat important to any threatened or migratory species.

6. Prescribed Impact Identification

Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the BOS, as per clause 6.1 of the BC Regulation. Prescribed impacts include those impacts on the habitat of threatened species or ecological communities from development that is not directly caused as a result of vegetation clearing.

Table 6-1 lists the prescribed impacts, which are identified in Clause 6.1 of the *Biodiversity Conservation Regulation 2017* and the relevance of each prescribed impact in relation to the proposal.

Table 6-1. Prescribed and Uncertain Impacts

Will there be impacts on any of the following	Yes/No	If yes, address the assessment questions from section 9.2.1 of the BAM
(a) Development on the habitat of threatened species or ecological communities associated with: i. karst, caves, crevices, cliffs, rock outcrops and other geological features of significance; ii. human-made structures; iii. non-native vegetation;	NO	i. no karst, caves, crevices, cliffs and other features of geological significance occur on or near the subject land. ii. no human-made structures would be disturbed as a result of the proposal. iii. non-native vegetation within the subject land is unlikely to provide habitat for threatened species or ecological communities.
(b) on areas connecting threatened species habitat, such as movement corridors	NO	The subject land is not mapped within any connecting threatened species habitat of movement corridors.
(c) that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	NO	The proposal will not result in impacts to water quality, water bodies and hydrological processes that sustain threatened entities.
(d) on threatened and protected animals from turbine strikes from a wind farm	NO	No wind turbines are proposed
(e) on threatened species or fauna that are part of a TEC from vehicle strikes	NO	The proposal is not anticipated to impact on any threatened or other fauna as a result of vehicle strikes.

7. Avoid or Minimise Impacts

7.1 Avoiding or minimising impacts on biodiversity values

7.1.1 Direct impacts

The proposal will unavoidably impact on approximately 2 ha of native vegetation that has been assessed as in low to moderate condition. Areas of native vegetation unable to be avoided are located within the following environments:

- Isolated patches within the operational area of the quarry;
- Planted or recolonised patches within previously cleared and disturbed areas (due to both quarrying activities and the construction of the Warragamba pipeline); and
- Areas of planted native vegetation associated with landscaping.

Over six ha of native vegetation is being conserved along the eastern boundary of Precincts 2, 4 and 5, which comprises the following:

- 2.7 ha of riparian corridor, including:
    - 0.7 ha associated with NRAR's required 30 m vegetated riparian zone (VRZ) for the 3rd order reach of Reedy Creek - within Precinct 5,
    - 0.22 ha associated with NRAR's required 20 m vegetated riparian zone (VRZ) for the 2nd order reach of Reedy Creek - within Precinct 5, and
    - 1.8 ha associated with NRAR's required 20 m vegetated riparian zone (VRZ) for the 2nd order reach of Reedy Creek - within Precincts 2 and 4.
- 3.5 ha of additional retained native vegetation and habitat areas immediately adjacent to the above VRZ areas.

7.1.2 Indirect impacts

The proposal will ensure any indirect impacts are avoided, minimised and mitigated through the implementation of best management practices (refer Table 8-4). These measures will be detailed within the proposal's Construction and Environmental Management Plan (CEMP) and supporting sub-plans, including the following:

- Erosion and Sediment Control Plan;
- Flora and Fauna Management Plan (FFMP), which will document pre-clearance and clearance processes to achieve the following, but not limited to, objectives:
    - protection of retained native vegetation and habitat
    - prevention of injury/mortality to all fauna
    - prevention of the spread and/or introduction of weeds and pathogens
- Vegetation Management Plan (VMP - refer Appendix C); and
- Biosecurity Management Plan (BMP - refer Appendix D)

Refer Section 9 for further detail on the avoidance, minimisation and mitigation measures.

7.2 Avoiding and minimising prescribed impacts

Not applicable as no prescribed impacts would result from the proposal.

8. Assessing the impacts of the proposal on biodiversity values

8.1 Direct impacts

8.1.1 Native vegetation and habitat

The proposal will directly impact on approximately 2.05 ha of native vegetation (commensurate with three PCTs and attributed to a fourth PCT) as summarised in Table 8-1.

Table 8-1. Native vegetation clearing

PCT	Condition	Area (ha)
Cumberland river-flat forest (PCT 835)	Moderate	0.49
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion planted (PCT 849)	Low-planted-	0.05
Phragmites australia and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion (PCT 1071)	Low	0.13
Cumberland Swamp Oak riparian forest (PCT 1800)	Low	1.15
Cumberland Swamp Oak riparian forest (PCT 1800)	Moderate	0.03
Landscaping	Low	0.43
Total all native vegetation		**2.28**

8.1.2. Change in Vegetation Integrity Score

Table 8-2 provides a summary of the changes in vegetation integrity scores for each PCT management zone, as calculated in the BAM-C.

Table 8-2. Change in vegetation integrity scores

PCT ID	Zone	PCT zone name	Vegetation integrity score		
			Current	Future	Change
835	1	835_Moderate	40.8	0	-40.8
849	1	849_Low-planted	14.5	0	-14.5
1071	1	1071_Low	41.4	0	-41.4
1800	1	1800_Low	10.8	0	-10.8
1800	2	1800_Moderate	38.3	0	-38.3

8.1.3. Landscaping

The area of landscaping along Old Wallgrove Road frontage has been assessed under Appendix D: Streamlined assessment module –Planted native vegetation of the BAM.

Appendix D provides a decision-making for the assessment of planted native vegetation using the BAM. Where only part of the subject land contains planted native vegetation, this module may be used to assess that part of the development.

Evidence demonstrating the application of the decision-making key to the areas of planted native vegetation is provided in Table 8-3.

Table 8-3. D.1 Decision-making key

Key	If yes	If no
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	~~The planted native vegetation must be allocated to the best fit PCT, and the BAM must be applied.~~	Go to 2.
2. Is the planted native vegetation: a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	~~The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.~~	Go to 3.
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: a. a species recovery project b. Saving our Species project c. other types of government funded restoration project d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g., Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or g. approved vegetation management plan (e.g., as required as part of a Controlled Activity Approval for works on waterfront land under the NSW *Water Management Act 2000*)?	~~The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.~~	Go to 4.
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	~~Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).~~	Go to 5.
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in	~~Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters~~	Go to 6.

Key	If yes	If no
agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or tea tree farms?	~~4 and 5 of the BAM are not required to be applied).~~	
6. Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)?	Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).	An approved widely cultivated native species list is not yet available. This assessment has proceeded to D.2

D.2 Assessment of planted native vegetation for threatened species habitat

D.2 (assessment of planted native vegetation for threatened species habitat) requires an assessment of the suitability of the planted native vegetation for use by threatened species. Incidental sightings or evidence (e.g., scats, stick nests) of threatened species credit species (flora and fauna) using, inhabiting or being part of the planted native vegetation is to be recorded.

If there is evidence that threatened species are using the planted native vegetation as habitat, the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts on these species. Species credits are not required to offset the proposed impacts.

The steps taken to assess threatened species habitat and all reasonable measures proposed to be taken to mitigate or minimise impacts must be set out in the BDAR.

This assessment has concluded that the planted native vegetation does not provide habitat for threatened species, due to the following:

- Previous clearing of this location to facilitate the upgrade of Old Wallgrove Road in association with Oakdale Central Estate development in 2015;
- Evidence of the planted origin of species as shown in Figure 3-2;
- The relative immaturity of the planted native vegetation, i.e., approximately 7 years;
- The absence of habitat features that would support any threatened species; and
- The location of the vegetation, which is juxtaposed between the hardstand areas (i.e., Plant 3's operational area, staff car park, buildings and Old Wallgrove Road).

8.2 Indirect impacts

Indirect impacts are generally those that affect areas outside of the development footprint but occur due to the development, and which impact on native vegetation, threatened ecological communities, threatened species and their habitat. The BAM requires that the following aspects be assessed:

a. the nature, extent, frequency, duration and timing of indirect impacts of the proposal, inclusive of the following:
    i. during construction
    ii. during operation
    iii. arising from a change in land-use patterns
b. the consequences of indirect impacts on biodiversity values;
c. any limitations to data, assumptions and predictions about impacts on biodiversity; and
d. reduced viability of adjacent habitat due to noise, dust or light spill.

Table 8-3 provides a summary of indirect impacts identified in the BAM that must be considered:

Table 8-4. Assessment of indirect impacts

Indirect impact	Duration	Biodiversity values impacted	Consequence
Inadvertent impacts on adjacent habitat or vegetation, such as:			
• Increased sedimentation	Short term during construction	General environment	Vegetation clearing and earthworks can expose soils and subsoils, which following rainfall may erode and mobilise soils in runoff, potentially smothering ground layer vegetation (in turn affecting health through a decrease in photosynthesis) or impact on water quality in downstream aquatic ecosystems (in turn affecting aquatic organisms that may provide a food resource for native fauna). Providing that best practices in erosion and sedimentation management are implemented in accordance with the project's Erosion and Sediment Control Plan (ESCP) the consequence of this impact is considered to be a low risk.
• Introduction of weeds and pathogens	Short term during construction	General environment	Construction activities have the potential to both spread existing weed infestations, introduce new weed species, and introduce or spread soil borne pathogens on machinery and equipment. As a consequence, the condition (e.g., site integrity values) of retained and neighbouring vegetation could be decreased. Providing that the mitigation measures identified in Appendix D are implemented the consequence of this impact is considered to be a low risk.
• Trampling or other damage to remnant vegetation, including threatened species	Short term during construction	N/A	No remnant vegetation, including threatened species would be at risk of trampling or other damage. Retained native vegetation is isolated from the development by Estate roads and protected by fencing. Providing that the mitigation measures identified in Appendix D are implemented the consequence of this impact is considered to be a low risk.
• Fertiliser drift	N/A	N/A	Fertiliser will not be used
• Rubbish dumping, wood collection, removal and disturbance of rocks, including bush rock	N/A	N/A	The subject lands are not accessible by the public and the consequence of this impact is considered to be a low risk.

Indirect impact	Duration	Biodiversity values impacted	Consequence
Reduced viability of adjacent habitat due to:			
Dust	Short term during construction	Reedy Creek riparian corridor (PCTs 1800 and 835)	Dust generation during construction activities will be managed through the following measures: • Construction staging, • Minimising material stockpiles, • Cleaning (water suppression) of construction haul roads, • Speed restrictions, and • Implementation of the project's ESCP, and • Implementation of mitigations measures prescribed within the Construction Environmental Management Plan (CEMP). The proposal is considered unlikely to reduce viability of any native vegetation or habitat within the locality due to dust generation.
Light spill	Long term during operation	Reedy Creek riparian corridor (PCTs 1800 and 835)	SSD-37486043 seeks approval for 24hour operation of industrial lots. Therefore, the operational phase of the development has the potential to impact on adjacent bushland and fauna habitat. Lighting required for the Estate's roads and industrial lots where proximal to retained native vegetation will be designed in accordance with available standards and guidelines for mitigating impacts on fauna habitat, which include but may not be limited to the following: • Commonwealth of Australia (2020) National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds; and • AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting recognises the impact of artificial light on biota. T The above guidelines provide a range of measures to minimise light spill impacts on fauna and fauna habitat. Examples include: • The use of recent advances in smart control technology options for better controlled and targeted artificial light management; • Ensuring that lighting is shielded and directed only to the intended object or area;

Indirect impact	Duration	Biodiversity values impacted	Consequence
			• Ensuring that light intensity is appropriate for the target area using only the minimum number and intensity of lights needed to provide safe and secure illumination for the area at the time required to meet the lighting objectives; and • Consideration of the following lighting aspects: o high quality, low glare lighting, which enhances visibility for the user at night, reduces eye fatigue, improves night vision and delivers light where it is needed, o non-reflective, dark coloured surfaces, o reduced or filtered out blue, violet and ultraviolet wavelengths, which wildlife are sensitive to. Providing the design of the Estate's lighting installations incorporates the above and current best practice measures, the likelihood of light spill impacts on fauna and fauna habitat will be minimised as far as practical.
Noise	Short term during construction Long term during operation	Reedy Creek riparian corridor (PCTs 1800 and 835)	Short term construction noise is unlikely to be substantially different to noise emanating from quarrying operations that have presided over the site for several decades. Long term operational noise (in particular, that from potential 24-hour operations), has the potential to impact on habitat for resident fauna. Based on assessment findings, there is unlikely to be a significant impact on threatened species and/or habitat for threatened species. This is due to: • The proximity of the site to Old Wallgrove Road and existing operations with adjacent industrial areas; • A lack of optimal habitat for threatened species, and the degraded condition of native vegetation to be retained. The latter associated with the riparian corridor of Reedy Creek, which is subject to grazing by domestic and feral fauna from adjacent land use (noting that Reedy Creek meanders in and out of the subject land and cannot be fully protected from such as not within the Applicant's control).

Indirect impact	Duration	Biodiversity values impacted	Consequence
Increased risk of starvation, exposure, loss of shade or shelter	N/A	N/A	The proposal would not result in any significant changes to existing food resources, shade or shelter. Native vegetation clearing will impact highly degraded and isolated small patches, which do not provide optimal shade and shelter for fauna.
Loss of breeding habitat	N/A	N/A	Breeding habitat for threatened species is absent from subject land
Habitat connectivity			
Habitat connectivity	N/A	N/A	The subject land does not contain any regional corridors. Existing habitat connectivity provided by the Reedy Creek riparian corridor will be maintained and improved upon through the implementation of vegetation management plans for Precincts 2, 4 and 5.
Water bodies, water quality and hydrological processes			
Water bodies, water quality and hydrological processes	Short and long term	Reedy Creek riparian corridor (PCTs 1800 and 835)	Potential short term construction impacts are typically associated with earthworks and other activities that result in erosion and transport of sediments into native bushland and waterways. Water quality and hydrology processes within Reedy Creek have historically been managed under the quarry's operational system of capture, detention and recirculation of stormwater runoff. Avoidance and mitigation of water quality and hydrology processes due to the rehabilitation of the site (to facilitate the works proposed under this SSD) have been considered under DA/347.1/2021. On-site detention (OSD) capture of stormwater runoff associated with SSD-37486043 is required to be compliant with both DPE and Council's requirements (during construction) and bioretention basins (during the operational phase). Both require that the design of OSDs meet pre-development stormwater quantity and quality runoff conditions. Consequently, the potential impacts from OSD discharge into Reedy Creek is considered to be a low risk.

9. Mitigating and managing impacts

9.1 Flora and fauna management

Mitigation of construction impacts will be specified within a project specific Construction and Environmental Management Plan (CEMP). The following general areas are included in a CEMP but will vary depending on a site's environment and as required by consent conditions:

- Air quality;
- Construction noise and vibration;
- Fill importation;
- Waste management;
- Soil and water plan;
- Erosion and sediment control;
- Flora and fauna management;
- Vegetation management; and
- Biosecurity management

The proposal's potential indirect impacts on biodiversity values will be mitigated through a range of measures, which are to be specified in a fauna and flora management plan (FFMP).

As a subplan to the CEMP, the FFMP will specify biodiversity related procedures, which would include, but may not be limited to, the following:

- Pre-clearance and clearance management;
- Fauna rescue and relocation protocol;
- Euthanasia protocol;
- Dam decommissioning;
- General biosecurity duties;
- Unexpected finds protocol; and
- Monitoring and reporting strategies

9.1.1 Pre-clearance

The pre-clearing process provides a final check for the presence of flora and fauna species and habitat on a site immediately before clearing begins. Pre-clearing surveys are required to:

- Delineate the extent of clearing permitted and prepare site map(s) identifying exclusion zones;
- Identify and record the details of all habitat features (including where applicable: GPS location; species or type of habitat feature) for inclusion on site map(s);
- Mark habitat features that will be cleared, using suitable methods; and
- Locate nearby habitat suitable for the release of fauna that may be encountered during the pre-clearing or clearing stages;
- Locate suitable areas for relocation of habitat features if any (e.g., large woody debris).

9.1.2 Clearing

Where habitat features are identified in pre-clearing surveys, a two-staged clearance process shall be undertaken and an experienced ecologist present to supervise the process, act as a fauna spotter and relocate any fauna captured.

This shall include sufficient notification to proximal veterinarian surgeons and wildlife carers of the intent to commence clearance works and determining nearby locations where any injured or otherwise immature and susceptible fauna may be released.

9.1.3 Basin decommissioning

Basin decommissioning requires a range of management and mitigation measures to comply with the following legislation:

- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Fisheries Management Act 1994* (FM Act);
- *Prevention of Cruelty to Animals Act 1979* (PCA Act); and
- *Biosecurity Act 2015* (Biosecurity Act)

Table 9-1 provides a summary of management and mitigation measures that should be detailed within the FFMP for implementation pre-construction and during the decommissioning process.

Table 9-1. Dam decommissioning requirements

Item	Requirements
Proposed method	• It is envisioned that basin water disposal will be reused on-site for dust depression and soil conditioning with recirculation of water on site under current operations. As there is no watercourse within the subject land, it is most likely that dewatering would be staged in line with development progress and provide a source of water for initial dust suppression and soil conditioning.
Environmental protection measures	• Details including a plan of all sediment and erosion control measures that will be in place during the dewatering of each basin.
Water quality	• The quality of the basin water is to be assessed against ANZECC Guidelines, specifically freshwater 95% level of protection trigger values, but may also require additional values should any discharge to Reedy Creek be necessitated. • Water quality of potential receiving waters in which aquatic fauna will be relocated to, will also need to be assessed to ensure relocation sites provide suitable habitat for aquatic fauna.
Water quantity	• Should discharge to Reedy Creek be proposed, details of quantity and flow rate of discharge will be required. • Water levels in each dam will also need to be monitoring to ensure refuge habitat for aquatic fauna is maintained at all times up until the dam is ready for decommissioning and a program in place to capture and relocate aquatic fauna.
Sediment quality	• Prior to disturbing the sediment of the dam, the sediment within the dam walls and bed must be assessed against the National Environmental Protection Measure (NEPM) 2013.
Aquatic fauna	• Details on the methods that will be used to capture and rescue fauna residing in and around the dam. • Details on how fauna will be rescued from dam sediments or allowed to relocate from the dam. • Proposed relocation sites for native species including a permit under Section 37 of the FM Act for the relocation of fin fish (i.e., introduction of fin fish into watercourses).

Item	Requirements
	• Detailed description on the methods for fauna transportation and release. • Methods to prevent injury to fauna during pumping of water from the dam. • Protocols for dealing with any injured native fauna and euthanasia.
Biosecurity risks	• Protocols to prevent the spread of diseases and aquatic weed species (depending on the location of the release site). • Details of how exotic pest species will be humanely euthanased in a manner consistent with the PCA Act. • Methods for disposing of dam water and preventing the spread of carp eggs and juvenile pest species into natural waterways.
Reporting	• Details on reporting of actions undertaken with tallies of fauna removed from the dam with details of their relocation destination or euthanasia.

9.2. Adaptive management for uncertain impacts

Not applicable as the proposal is considered unlikely to result in any uncertain impacts that require adaptive management.

10. Thresholds for Assessment

Section 9 of the BAM sets out the impact thresholds that must be applied, which include:

1. Impacts on an entity that is at risk of a serious and irreversible impact;
2. Impacts for which the assessor is required to determine an offset requirement;
3. Impacts for which the assessor is not required to determine an offset requirement; and
4. Impacts that do not require further assessment by the assessor.

10.1. Impacts on serious and irreversible impacts

PCT 849 is identified in the TBDC as a serious and irreversible impact (SAII) entity. Although only a very small area of planted species constituent of PCT 849 would be impacted by SSD-37486043. The BAM-C credit reports do not indicate PCT 849 within the subject land to be a SAII entity.

Notwithstanding, cumulative impacts on PCT 849 have been considered in the context of the wider Estate area, which are summarised in Table 10-1 summarises and considered.

summarises past and proposed clearing of PCT 849 within the wider Estate area.

Table 10-1.Cumulative impacts on PCT 849

DA reference	DA title / PCT 849 Condition	Area impacted (ha)
DA 85/2019	Plant 3 Crusher relocation / low condition - planted	0.80
DA 133.2/2019	Stage 1 Oakdale East Estate – clearing of remnant PCT 849	0.10
DA 133.2/2019	Stage 1 Oakdale East Estate / low condition - planted	0.60
DA/347.1/2021	Plant 3 Rehabilitation DA / low-moderate condition - planted and recolonising vegetation	1.02
SSD-37486043	Stage 2 Oakdale East Estate / low condition - planted	0.05
	Cumulative total of PCT 849 cleared or proposed to be cleared	**2.57**

As highlighted in Table 10-1, only 0.10 ha of remnant PCT 849 has been cleared, with the remaining 2.45 ha comprising plant species constituent of PCT 849.

The clearing of 0.8 ha for the Plant 3 Crusher relocation DA did not trigger entry into the NSW Biodiversity Offset Scheme (the Scheme).

The clearing of 0.1 ha of remnant and a further 0.6 ha of planted PCT 849 associated with Stage 1 of the Estate has been offset compliantly under the Scheme.

Future proposed clearing of planted PCT 849 associated with DA/347.1/2021 and SSD-37486043 will also incur offsetting obligations under the Scheme.

Impacts on PCT 849 as a SAII is documented within DA/347.1/2021, which concluded the following:

- The impact on the geographic extent of PCT 849 equates to a minimum and maximum of 0.009% and 0.003% (respectively) of the minimum (11,200 ha) and maximum (29,813 ha) of the estimated geographic extent of PCT 849;
- PCT 849 within 500m of the subject land, extends over approximately 14.3 ha, which will not be impacted because of the past and future DAs within the subject land;

- There will be negligible if any impact on the distance between isolated areas of the PCT 849 or dispersal distance for native flora species (characteristic of the PCT 849), and any impact on connectivity, fragmentation, or perimeter ratio for the remaining areas of the PCT 849 as a result of the past and future DAs within the subject land.

10.2 Impacts that require an offset

Table 10-2 summarises the impacts that the proposal will incur ecosystem credit obligations. Figure 10-1 shows the locations where ecosystem credits are incurred, and BAM-C credit summary reports provided in Appendix B.

Table 10-2. Ecosystem credit offsetting requirements

ID	Plant community type (PCT)	Area (ha)	Ecosystem credits
PCT 835	Cumberland river-flat forest - moderate condition	0.49	10
PCT 1071	Phragmites australis/Typha orientalis coastal freshwater wetland - artifical basins	0.13	3
PCT 1800	Cumberland swamp oak floodplain forest - moderate condition	0.03	1
		2.28	**14**

The area of PCT 835 (0.49 ha) was not discounted for potentially providing habitat for the gang-gang cockatoo. This species was assumed to be present and incurs an offsetting obligation of 10 species credits (see Table 10-3, Figure 10-1 and BAM-C credit summary reports provided in Appendix B).

Table 10-3. Species credit offsetting requirements

Species	Habitat condition	Change in habitat condition	Area of impact (ha)	Credits required
Calliocephalon fimbriatum gang gang cockatoo (fauna)	40.8	-40.8	0.49	810

10.3. Impacts that do not require an offset

The areas within the SSD-37486043 footprint that do not require an offset are summarised below:

Credit obligations are not required for the following areas of native vegetation clearing:

- 0.05 ha of PCT 849: which returned a vegetation integrity score of 14.5 in the BAM-C, which is below the threshold value that triggers and offsetting obligation
- 1.15 ha of PCT 1800: which returned a vegetation integrity score of 10.8 in the BAM-C, which is below the threshold value that triggers and offsetting obligation
- 0.43 ha of landscaping: which in accordance with BAM's assessment for planted native vegetation (BAM Appendix D), does not incur a credit obligation

Approximately 3 ha of the subject land within the SSD-37486043 footprint contains exotic vegetation, which does not require an offset credit obligation.

Figure 10-1 shows the areas within the SSD-37486043 footprint that are summarised above.

Legend

- Subject_land
- Precincts
- Offset required
- Offset not required
- PCT 835
- PCT 849
- PCT 1071
- PCT 1800
- Landscaping

N

0 50 100 200 300 400

m

Oakdale East Estate SSD-37486043

Figure 10.1. Offset requirements

Coordinate System: MGA Zone 56 (GDA 2020)
Image sources: Nearmap 17 October 2021
Date prepared: 22 February 2022

11. References

Department of Agriculture, Water and Environment (DAWE) (2020) Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.

Department of Agriculture, Water and Environment (DAWE) (2010) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest. A guide to identifying and protecting the nationally threatened ecological community Environment Protection and Biodiversity Conservation Act 1999 Policy Statement 3.31

Department of Environment and Conservation (DEC) (2005) Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland. Department of Environment and Conservation (NSW), Sydney.

Department of Environment, Climate Change and Water (DECCW) (2011) Cumberland Plain Recovery Plan

Department of Planning, Industry and Environment (DPIE) (2008-2010) Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing.

Department of Planning, Industry and Environment (DPIE) (2020) DRAFT Cumberland Plain Conservation Plan – A Conservation Plan for Western Sydney to 2056. August 2020

Tozer (2003) The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities. *Cunninghamia* (2003) 8(1): 1–75

Tozer M.G, Turner K, Keith D.A, Tindall D, Pennay C, Simpson C, MacKenzie B, Beukers P and Cox S (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands *Cunninghamia* 11(3): 359-406

Appendix A. Transect/plot data

Survey Name: Oakdale East Estate SSDA 11.11.2020

Zone ID: PCT 835 - Zone 1 **Plot no:** 1

Location:	Zone	Easting	Northing	Bearing
	56H	299987	6255344	77

Vegetation formation:	Vegetation class:	PCT (if known)
Forested Wetlands	Coastal Floodplain Wetlands	835

CONDITION (400m^2 plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	2	0	3	7	0	1

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	34	0	16	23.5	0	0.1

High Threat Weed cover: 38.7

FUNCTION (1,000m^2 plot)

Tree regeneration (<5cm)		Stem classes	
~~Present~~		5-9	10
		10-19	31
Absent		20-29	17
		30-49	4

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
2	2	6

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	15	1	10	5	2	7

Survey Name: Oakdale East SSDA **Zone ID:** PCT 835 Zone 1 **Plot no:** 1

GF code	Scientific Name	Common Name	N, E or HTW	Cover	Abund	Stratum
TG	*Angophora floribunda*	Rough-barked apple	N	30	47	OS
TG	*Casuarina glauca*	Swamp oak	N	outside plot		OS
TG	*Eucalyptus tereticornis*	Forest red gum	N	4	3	OS
SG	*Melaleuca linearifolia*	Narrow-leaved paperbark	N	outside plot		OS
				34		
GG	*Echinopogon ovatus*	Forest hedgehog grass	N	2	20	US
GG	*Lachnagrostis filiformis*	Blown grass	N	2	25	US
GG	*Microlaeana stipoides*	Weeping meadow grass	N	12	50	US
				16		
FG	*Cotula coronopifolia*	Water ribbons	N	0.1	1	US
FG	*Dichondra repens*	Kidney weed	N	1.1	20	US
FG	*Einadia sp.*	seedlings	N	0.1	5	US
FG	*Marsilea nutans*	Nardoo	N	0.1	10	US
FG	*Oxalis perannens*	Native oxalis	N	0.1	10	US
FG	*Persicaria decipiens*	Knot grass	N	20	>1000	US
FG	*Plectranthus parviflorus*	Cockspur	N	2	25	US
				23.5		
OG	*Glycine sp.*		N	0.1	5	US
				0.1		
	WEEDS					
	Anagallis arvensis	Scarlet pimpernel	E	0.1	10	US
	Chenopodium album	Fat hen	E	0.1	5	US
	Conyza bonariensis	Fleabane	E	1	10	US
	Cirsium vulgare	Spear thistle	E	2	20	US
	Lolium perenne	Perennial ryegrass	E	5	100	US
	Phytolacca octandra	Inkweed	E	0.1	3	US
	Plantago lanceolatum	Lamb's tongue	E	2	50	US
	Polypogon monspeliensis	Annual beard grass	E	0.1	10	US
	Rumex crispus	Curly-leaf dock	E	2.5	50	US
	Sida rhombifolia	Paddys lucerne	E	15	>1000	US
	Solanum nigrum	Deadly nightshade	E	0.1	4	US
	Solanum pseudocapsicum	Apple of Sodom	E	1	20	US
	Tradescantia jubata	Trad	E	0.1	9	US
	Trifolium repens	White clover	E	3	100	US
	Rumex crispus	Curly-leaf dock	E	2.5	50	US
				34.6		
	Bidens pilosa	Cobblers pegs	HTW	0.1	5	US
	Cestrum parqui	Green cestrum	HTW	0.1	2	MS
	Cyperus eragrostis	Umbrella sedge	HTW	15	>100	US
	Ehrharta erecta	Panic veldt grass	HTW	20	>100	US
	Nassella trichotoma	Serrated tussock grass	HTW	2.5	20	US
	Senecio madagascariensis	Fireweed	HTW	1	100	US
				38.7		

11.11.2020

Survey Name: **Oakdale East Estate SSDA**

Zone ID: PCT 849 Zone 1 **Plot no:** 1

Location:	Zone	Easting	Northing	Bearing
	56H	299312	6255571	270

Vegetation formation:	Vegetation class:	PCT (if known)
Grassy woodlands	Coastal Valley Grassy Woodlands	849 - planted

CONDITION (400m^2 plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	2	0	0	2	0	1

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	38	0	0	0.1	0	0.1

High Threat Weed cover:	56.6

FUNCTION (1,000m^2 plot)

Tree regeneration (<5cm)		Stem classes	
~~Present~~		5-9	1
		10-19	10
Absent		20-29	9
		30-49	1

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
0	0	0

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	0	0	15	0	5	4

Survey Name: Oakdale East SSDA **Zone ID:** **PCT 849 Zone 1** **Plot no:** **1**

GF code	Scientific Name	Common Name	N, E or HTW	Cover	Abund	Stratum
TG	*Eucalyptus crebra*	Narrow-leaved ironbark	N	20	2	OS
TG	*Casuarina glauca*	swamp oak	N	18	6	OS
TG	*Corymbia maculata x citriodora*	Spotted - lemon gum	Hybrid	out of plot	4	OS
FG	*Oxalis perannens*	Native oxalis	N	0.1	5	US
FG	*Wahlenbergia gracilis*	Australian bluebell	N	0.1	3	US
OG	*Glycine tabacina*	Glycie	N	0.1	1	US
GG	*Pennesetum alopecuroides*	Nafray® Pennisetum	Hybrid	15	60m^2	US
SG	*Lycium ferocissimum*	African boxthorn	HTW	1	4m^2	MS
GG	*Cenchrus clandestinum*	African love grass	HTW	5	>50	US
GG	*Chloris gayana*	Rhodes grass	HTW	15	>500	US
GG	*Eragrostis curvula*	African love grass	HTW	35	>500	US
FG	*Senecio madagascariensis*	Fire weed	HTW	0.1	4	US
FG	*Verbena incompta*	Purpletop	E	0.1	2	US
FG	*Centaurium tenuiflorum*	Pink centarium	E	0.1	3	US
FG	*Plantago lanceolatum*	Lambs tongue	E	1	>50	US
FG	*Solanum linnaeanum*	Apple of sodom	E	1	12	US
FG	*Bidens pilosa*	Cobblers pegs	E	0.5	>100	US
FG	*Brassica rapa*	Field mustard	E	0.1	5	US
		Bare		20		

GF Code: Growth Form | N: native, E: exotic, HTE: high threat exotic

Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 10, 15, 20, 25, …100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, …, 10, 20, 30, … 100, 200, …, 1000, …

Survey Name: Oakdale East Estate SSDA 11.11.2020

Zone ID: PCT 1800 Zone 1 **Plot no:** 1

Location:	Zone	Easting	Northing	Bearing
	56H	299827	6255602.8	89

Vegetation formation:	Vegetation class:	PCT (if known)
Forested Wetlands	Coastal Floodplain Wetlands	1800

CONDITION (400m^2 plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	1	0	1	0	0	0

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	20	0	0.1	0	0	0

High Threat Weed cover: 22.75

FUNCTION (1,000m^2 plot)

Tree regeneration (<5cm)		Stem classes	
Present		5-9	22
		10-19	8
~~Absent~~		20-29	5
		30-49	5

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
0	0	0

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	3	0	0	0	0	1

Survey Name: Oakdale SSD Precinct 5 **Zone ID:** PCT 1800 Zone 1 **Plot no:** 1

GF code	Scientific Name	Common Name	N, E or HTW	Cover	Abund	Stratum
TG	*Casuarina glauca*	Swamp oak	N	20	13	OS
GG	*Themeda australis*	Kangaroo grass	N	0.1	2	US
	WEEDS					
	Anagallis arvensis	Scarlet pimpernel	E	0.1	10	
	Cirsium vulgare	Spear thistle	E	10	150	
	Lolium perenne	Perennial ryegrass	E	40	1000	
	Lotus corniculatus	Birds-foot trefoil	E	0.1	10	
	Phytolacca octandra	Inkweed	E	0.1	3	
	Plantago lanceolatum	Lamb's tongue	E	10	>200	
	Setaria sp.	Pigeon grass	E	1.5	40	
	Solanum pseudocapsicum	Apple of Sodom	E	10	80	
	Solanum nigrum	Deadly nightshade	E	0.1	3	
	Trifolium repens	White clover	E	2	100	
	Verbena incompta	Purpletop	E	1	25	
	Bidens pilosa	Cobblers pegs	HTW	2.5	50	
	Briza subaristata		HTW	2.5	30	
	Cenchrus clandestinum	Kikuyu	HTW	5	100	
	Cyperus eragrostis	Umbrella sedge	HTW	5	100	
	Chloris gayana	Rhodes grass	HTW	10	200	
	Senecio madagascariensis	Fireweed	HTW	0.25	10	
				25.25		

GF Code: Growth Form | **N:** native, **E:** exotic, **HTE:** high threat exotic

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Survey Name: Oakdale East Estate SSDA **Date:** 4/05/2022

Zone ID: PCT 1800 Zone 2 **Plot no:** 1

Location:	Zone	Easting	Northing	Bearing
	56H	299853	6255258	270°

Vegetation formation:	Vegetation class:	PCT (if known)
Forested Wetlands	Coastal Floodplain Wetlands	PCT1800

CONDITION (400m^2 plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	1	1	3	4	0	0

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	28	18.75	8.25	2.6	0	0

High Threat Weed cover: 63.85

FUNCTION (1,000m^2 plot)

Tree regeneration (<5cm)		Stem classes	
Present	YES	5-9	YES
		10-19	YES
Absent		20-29	YES
		30-49	NO

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
0	0	12

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	25	0	15	0	35	15

Survey Name: Oakdale East Estate **Zone ID:** PCT 1800 / 2 **Plot no:** 1 **Date:** 4/05/2022

GF code	Scientific Name	Common Name	N, E or HTW	Cover	Abund	Stratum
TG	*Casuarina glauca*	Swamp Oak	N	28	40	OS
			subtotal	**28**		
SG	*Plectranthus parviflorus*	Cockspur	N	18.75	75m^2	US
			subtotal	**12.5**		
GG	*Chloris ventricosa*	Windmill grass	N	1.25	5m^2	US
GG	*Microlaeana stipoides*	Weeping meadow grass	N	0.75	3m^2	
GG	*Phragmites australis*	Common reed	N	6.25	25m^2	US
			subtotal	**8.25**		
FG	*Dichondra repens*	Kidney weed	N	2.5	10m^2	US
FG	*Persicaria decipiens*	Slender knotweed	N	0.1	4	US
FG	*Potamogeton ochreatus*	Blunt pondweed	N	Outside plot		instream
FG	*Triglochin procerum*	Water ribbons	N	Outside plot		instream
			subtotal	**2.6**		
SG	*Lycium ferocissimum*	African boxthorn	HTW	12.5	50m^2	MS
SG	*Lantana camara*	Lantana	HTW	12.5	50m^2	MS
GG	*Chloris gayana*	Rhodes grass	HTW	12.5	50m^2	US
GG	*Cyperus eragrostis*	Umbrella sedge	HTW	Outside plot		instream
GG	*Eragrostis curvula*	African lovegrass	HTW	Outside plot		US
GG	*Juncus acutus*	Sharp rush	HTW	Outside plot		instream
FG	*Alternanthera philoxeroides*	Alligator weed	HTW	Outside plot		instream
FG	*Bidens pilosa*	Cobblers peg	HTW	1.25	5m^2	US
FG	*Senecio madagascariensis*	Fireweed	HTW	0.1	3	US
FG	*Tradescantia fluminensis*	Trad	HTW	25	100m^2	US
			subtotal	**63.85**		
SG	*Solanum pseudocapsicum*	Jerusalem cherry	E	0.1	1	US
GG	*Setaria sp.*	Pigeon grass	E	1.25	5m^2	US
FG	*Brassica sp.*		E	0.1	5	US
FG	*Conyza bonariensis*	Fleabane	E	0.1	7	US
FG	*Plantago lanceolata*	Lambs tongue	E	0.25	15	US
FG	*Rumex crispus*	Curled dock	E	Outside plot		instream
FG	*Sida rhombifolia*	Paddy's lucerne	E	0.25	20	US
OG	*Araujia sericifera*	Moth vine	E	Outside plot		Aerial
			subtotal	**2.05**		
			TOTAL	**117.25**		

GF Code: Growth Form | **N:** native, **E:** exotic, **HTE:** high threat exotic

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Survey Name: **Oakdale East SSD** 11.11.2020

Zone ID: PCT 1071 Zone 1 **Plot no: 1**

Location:	Zone	Easting	Northing	Bearing
	56H	299645	6254923	250

Vegetation formation:	Vegetation class:	PCT (if known)	
Freshwater Wetlands	Coastal Freshwater Lagoons	849	

CONDITION (400m^2 plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	0	0	1	2	0	0
Structure:	**Tree**	**Shrub**	**Grass grasslike**	**Forb**	**Fern**	**Other**
Cover of each group:	0	0	85	0.2	0	0

FUNCTION (1,000m^2 plot)

Tree regeneration (<5cm)		Stem classes	
~~Present~~		5-9	NO
		10-19	NO
Absent		20-29	NO
	YES	30-49	NO

No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
0	0	0

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	0	5	10	0	1	3.2

Scientific Name	Common Name	N, E or HTE	Cover (400m^2)		Stratum
			%	Abund	
Typha orientalis	Broadleaf Cumbungi	N	85	>1000	US
		TOTAL	**85**		

Appendix B. BAM summary reports

BAM Credit Summary Report

Proposal Details

Assessment Id
00031464/BAAS17054/22/00031465

Proposal Name
Oakdale East Estate SSD-37486043

BAM data last updated *
24/11/2021

Assessor Name
Kat Duchatel

Report Created
08/06/2022

BAM Data version *
50

Assessor Number
BAAS17054

BAM Case Status
Finalised

Date Finalised
08/06/2022

Assessment Revision
0

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Cumberland riverflat forest											
1	835_Moderate	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	40.8	40.8	0.49	PCT Cleared - 93%	High Sensitivity to Potential Gain	Endangered Ecological Community	Critically Endangered	2.00		10
											Subtotal	**10**
Cumberland shale plains woodland											
2	849_Low-planted	Not a TEC	14.5	14.5	0.05	PCT Cleared - 93%	High Sensitivity to Potential Gain			2.50		0
											Subtotal	**0**
Cumberland Swamp Oak riparian forest											
3	1800_Low 01	Not a TEC	10.8	10.8	1.2	PCT Cleared - 60%	High Sensitivity to Potential Gain			1.75		0
											Subtotal	**0**

Cumberland Swamp Oak riparian forest											
5	1800_Moderate	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	38.3	38.3	0.04	PCT Cleared - 60%	High Sensitivity to Potential Gain	Endangered Ecological Community	Endangered	2.00	1
										Subtotal	**1**
Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion											
4	1071_Low	Not a TEC	41.4	41.4	0.13	PCT Cleared - 75%	High Sensitivity to Potential Gain			2.00	3
										Subtotal	**3**
										Total	**14**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

Callocephalon fimbriatum / Gang-gang Cockatoo (Fauna)									
835_Moderate	40.8	40.8	0.49			Vulnerable	Not Listed	False	10
								Subtotal	**10**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00031464/BAAS17054/22/00031465

Proposal Name
Oakdale East Estate SSD-37486043

BAM data last updated *
24/11/2021

Assessor Name
Kat Duchatel

Assessor Number
BAAS17054

BAM Data version *
50

Proponent Names

Report Created
08/06/2022

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
08/06/2022

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calidris ferruginea / Curlew Sandpiper
Limicola falcinellus / Broad-billed Sandpiper
Limosa limosa / Black-tailed Godwit

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
835-Cumberland riverflat forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.5	10	0	10
849-Cumberland shale plains woodland	Not a TEC	0.1	0	0	0
1800-Cumberland Swamp Oak riparian forest	Not a TEC	1.2	0	0	0
1071-Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	Not a TEC	0.1	0	3	3
1800-Cumberland Swamp Oak riparian forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.0	0	1	1

835-Cumberland riverflat forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 941, 1108, 1109, 1212, 1228, 1293, 1318, 1326, 1386, 1504, 1556, 1594, 1618, 1720, 1794	-	835_Moderate	Yes	10	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

849-Cumberland shale plains woodland	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Coastal Valley Grassy Woodlands This includes PCT's: 116, 834, 849, 1326	Coastal Valley Grassy Woodlands >=90%	849_Low-planted	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

849-Cumberland shale plains woodland

1071-Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Coastal Freshwater Lagoons This includes PCT's: 781, 783, 1071, 1290, 1735, 1736, 1737, 1740, 1741, 1742	Coastal Freshwater Lagoons >=70% and <90%	1071_Low	No	3	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

1800-Cumberland Swamp Oak riparian forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Coastal Floodplain Wetlands This includes PCT's: 780, 828, 835, 926, 1234, 1235, 1386, 1651, 1720, 1727, 1728, 1800	Coastal Floodplain Wetlands >=50% and <70%	1800_Low01	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

1800-Cumberland Swamp Oak riparian forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800, 1808	-	1800_Moderate	No	1	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**835_Moderate**	0.5	10.00

Credit Retirement Options

Like-for-like credit retirement options

Callocephalon fimbriatum / Gang-gang Cockatoo	Spp	IBRA subregion
	Callocephalon fimbriatum / Gang-gang Cockatoo	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00031464/BAAS17054/22/00031465

Proposal Name
Oakdale East Estate SSD-37486043

BAM data last updated *
24/11/2021

Assessor Name
Kat Duchatel

Assessor Number
BAAS17054

BAM Data version *
50

Proponent Name(s)

Report Created
08/06/2022

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Major Projects

Date Finalised
08/06/2022

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Calidris ferruginea / Curlew Sandpiper
Limicola falcinellus / Broad-billed Sandpiper
Limosa limosa / Black-tailed Godwit

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
835-Cumberland riverflat forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.5	10	0	10.00
849-Cumberland shale plains woodland	Not a TEC	0.1	0	0	0.00
1800-Cumberland Swamp Oak riparian forest	Not a TEC	1.2	0	0	0.00
1071-Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	Not a TEC	0.1	0	3	3.00
1800-Cumberland Swamp Oak riparian forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.0	0	1	1.00

835-Cumberland riverflat forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 941, 1108, 1109, 1212, 1228, 1293, 1318, 1326, 1386, 1504, 1556, 1594, 1618, 1720, 1794	-	835_Moderate	Yes	10	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands	Tier 1	835_Moderate	Yes (including artificial)	10	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
849-Cumberland shale plains woodland	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Coastal Valley Grassy Woodlands This includes PCT's: 116, 834, 849, 1326	Coastal Valley Grassy Woodlands >=90%	849_Low-planted	No	0	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region

	Grassy Woodlands	Tier 1	849_Low-planted	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1071-Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Coastal Freshwater Lagoons This includes PCT's: 781, 783, 1071, 1290, 1735, 1736, 1737, 1740, 1741, 1742	Coastal Freshwater Lagoons >=70% and <90%	1071_Low	No	3	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Freshwater Wetlands	Tier 2 or higher threat status	1071_Low	No	3	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1800-Cumberland Swamp Oak riparian forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region

	Coastal Floodplain Wetlands This includes PCT's: 780, 828, 835, 926, 1234, 1235, 1386, 1651, 1720, 1727, 1728, 1800	Coastal Floodplain Wetlands >=50% and <70%	1800_Low01	No	0	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands	Tier 3 or higher threat status	1800_Low01	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1800-Cumberland Swamp Oak riparian forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800, 1808	-	1800_Moderate	No	1	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region

	Forested Wetlands	Tier 3 or higher threat status	1800_Moderate	No	1	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Callocephalon fimbriatum / Gang-gang Cockatoo	**835_Moderate**	0.5	10.00

Credit Retirement Options

Like-for-like options

Callocephalon fimbriatum/ Gang-gang Cockatoo	Spp	IBRA region	
	Callocephalon fimbriatum/Gang-gang Cockatoo	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.