

The background of the page features several abstract, flowing green lines of varying thicknesses that originate from the left side and sweep upwards and to the right, creating a sense of movement and organic growth.

Oakdale East Industrial Estate

Biobanking Development Assessment Report

prepared for

Goodman

Oakdale East Industrial Estate - Biobanking Development Assessment Report

prepared for

Goodman

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Revision Schedule

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Executive Summary

This Biodiversity Development Assessment Report has been undertaken to accompany a Development Application relating to the proposed development of the southern portion of Lot 20 DP 1246626, Old Wallgrove Road, Kemps Creek.

Despite the highly modified nature of the development site, it is mapped as containing high biodiversity values on the NSW Biodiversity Values Map as defined by the *Biodiversity Conservation Regulation 2017*. This is due to remnant Cumberland Plain Woodland vegetation that crosses over the southern boundary into the development site from the vegetated Burley Road easement.

As the proposed development would require clearing of this vegetation, entry into the NSW Biodiversity Offsets Scheme is automatically triggered. This Biodiversity Development Assessment Report has been prepared consistent with the BioBanking Assessment Methodology.

A total of 0.1 ha of Cumberland Plain Woodland (PCT 849) would be cleared by the proposal. A further 0.64 ha derived woodland, and 9 ha of exotic grassland and existing plant (quarries, buildings, roads) would also be cleared.

PCT 849 is a critically endangered ecological community in NSW and nationally and is listed as an identified serious and irreversible impact, which requires additional impact assessment provisions in accordance with Section 10.2 of the BioBanking Assessment Methodology.

PCT 849 within the study area does not meet the threshold requirements of the nationally endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community. Therefore a referral under the *Environment Protection and Biodiversity Conservation Act 1999* is not required.

Due to the relatively small area and degraded condition of PCT 849, the proposal is considered not to cause a serious and irreversible impact on this community.

Derived woodland predominantly comprises trees planted for the purpose of stabilising steeply sloping man made berms and providing aesthetic screening, and with temporary intent (i.e. as quarries are depleted they are decommissioned, which involves the removal of man-made embankments on which plantings have been undertaken).

Despite the planted origin of this vegetation, it must be allocated to a PCT for assessment under the Biodiversity Offset Scheme and in accordance with the BioNet Vegetation Classification

Based on the geographical location and species planted, the closest classification is PCT 849.

Ten (10) ecosystem credits are required to offset the proposed clearing of native vegetation using the BioBanking Assessment Methodology calculator. Eight (8) of the ten ecosystem credits are required to offset the derived (planted) woodland.

Consequently the offsetting obligation calculated under BAM for clearing of vegetation predominantly planted by the proponent is justifiably considered to be at a premium.

The native vegetation to be removed from the development site is highly degraded and does not contain habitat features (e.g. structural diversity, large woody debris, hollows) important for listed threatened species. No candidate threatened species were detected during surveys and therefore no species credits are required to be offset.

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1. Introduction

1.1 Background

This Biodiversity Development Assessment Report has been undertaken to accompany a Development Application (DA) relating to the proposed development of the southern portion of Lot 20 DP 1246626, Old Wallgrove Road, Kemps Creek.

The development site is located within Western Sydney Employment Area in Precinct 8 (south of the Warragamba pipelines) and is zoned as General Industrial (IN1) under the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (SEPP WSEA).

Lot 20 DP 1246626 is owned by Austral Bricks (Austral) and has operated as a plant and quarry for brick production since 1973. Prior to quarrying and brick production the land was cleared for agricultural purposes.

Despite the highly modified nature of the development site, it is mapped as containing high biodiversity values on the NSW Biodiversity Values Map as defined by the *Biodiversity Conservation Regulation 2017* (BC Reg). This is due to remnant Cumberland Plain Woodland vegetation that crosses over the southern boundary into the development site from the vegetated Burley Road easement.

As the proposed development would require clearing of this vegetation, entry into the NSW Biodiversity Offsets Scheme (the Scheme) is automatically triggered and the applicant must engage an accredited assessor to apply the BioBanking Assessment Methodology (OEH 2017).

This Biodiversity Development Assessment Report (BDAR) has been prepared by Kathryn Duchatel, BAM Accreditation No.BAAS17054 under the BC Reg, and is consistent with the BioBanking Assessment Methodology (BAM).

1.2 The Proposal

The proposed development comprises several industrial warehouses, a masonry plant, storage hardstand a new estate road along, a stormwater bioretention basin (in addition to those already within the Lot), and associated earthworks, utilities and landscaping (see Figure 1.1).

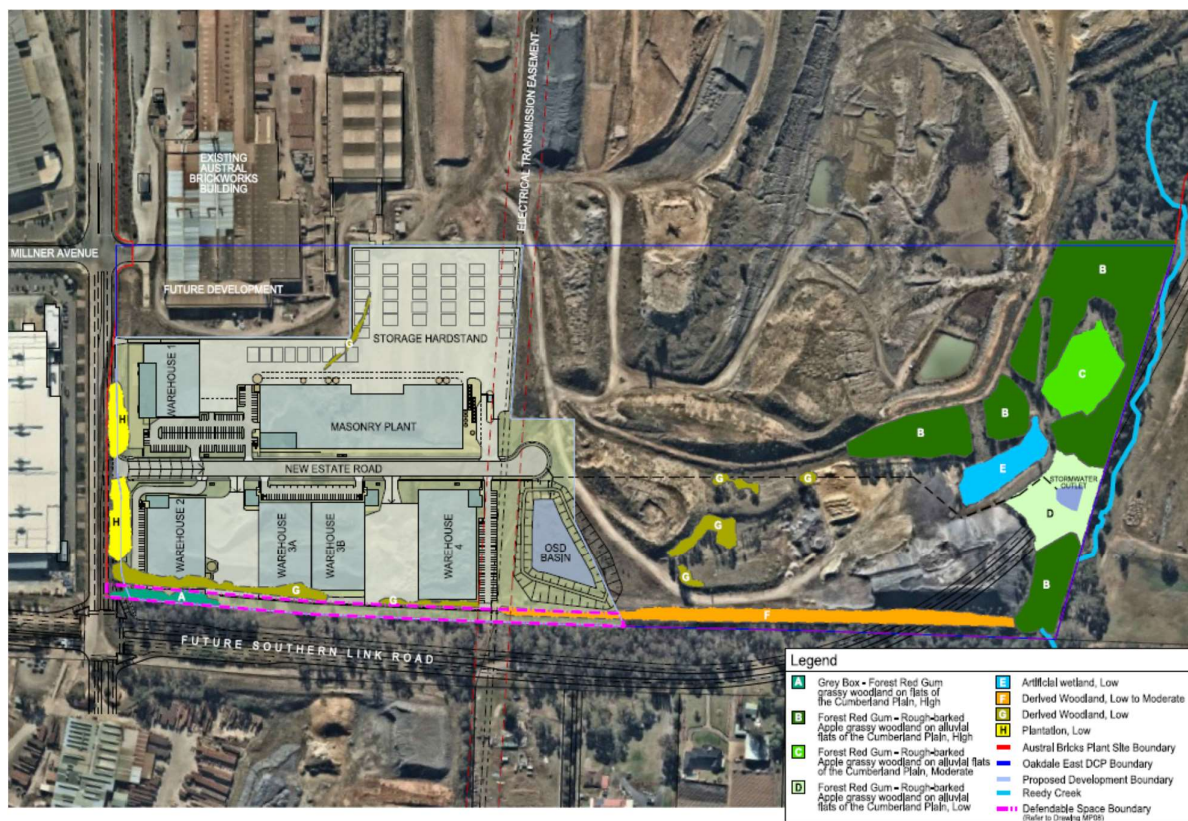


Figure 1-1. Development Masterplan

1.4 Information sources

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

- Imagery:
 - Aerial imagery: NearMap December 2018
- 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 Office of Environment and Heritage (OEH)
 - Biodiversity Values Map and Threshold Tool (updated OEH 2018)
 - BioNet - the database for the Atlas of NSW Wildlife, Threatened species database <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>
 - Threatened biota profiles for descriptions of the distribution and habitat requirements of threatened biota
 - BioNet Vegetation Classification
 - NSW (Mitchell) Landscapes - version 3.1
 - Remnant Vegetation of the western Cumberland subregion, 2013 Update VIS_ID 4207
- NSW Department of Industry (2018) Hydro Line spatial data

1.5 Literature reviewed

Past flora and fauna surveys relevant to the subject site assisted in assessing the known or likelihood of threatened flora and fauna species, populations and threatened ecological communities to occur within the site and the general locality.

Relevant studies are listed below and study areas shown in Figure 2-1:

- 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)



Figure 1-2. Relevant biodiversity study areas.

2. Landscape Context

2.1 Landscape features

Landscape features relevant to the proposal have been assessed in accordance with Chapter 4 of the BAM (2017). Landscape features assessed in this section include: IBRA region and subregions; NSW landscape regions (Mitchell Landscapes); rivers and streams; habitat connectivity; areas of outstanding biodiversity value; and other features as relevant. A site and location map showing the development site, the BDAR assessment area and landscape features assessed in this section is provided in Figure 2-2.

2.1.1 IBRA bioregions and IBRA subregions

The development site is located entirely within the Sydney Basin IBRA region and Cumberland IBRA subregion.

2.1.2 NSW landscape regions (Mitchell Landscapes)

The development site and BDAR assessment area occurs wholly within the 'Cumberland Plain' landscape, with localised areas of 'Sydney Diatreme' landscape occurring in the BDAR assessment area (Figure 2-2).

2.1.3 Rivers / streams

The development site does not contain any rivers or streams. Two creeks (Reedy Creek and Ropes Creek) occur within the 1,500 m assessment buffer area as shown in Figure 2.2.

Reedy Creek is approximately 6 kilometres from its headwaters to its confluence with Eastern Creek. Reedy Creek (the creek) enters the Lot 20 DP 1246626 at its southeastern boundary after being piped under Burley Road and flows for approximately 100 metres before crossing over into the neighbouring lot. Thereafter the creek is located within the adjacent property, re-entering Lot 20 DP 1246626 to the north of the proposed DCP boundary (refer Figure 2-2). Relative to the development site, Reedy Creek is located approximately 500 m to the east and will not be disturbed as a result of the proposal.

Ropes Creek is located approximately 1.3 km to the west of the development site and will not be disturbed as a result of the proposal.

Figure 2-2 shows the location of both creeks and their respective Strahler stream orders, as identified by the NSW Water Management (General) Regulation 2018 hydro line spatial data¹.

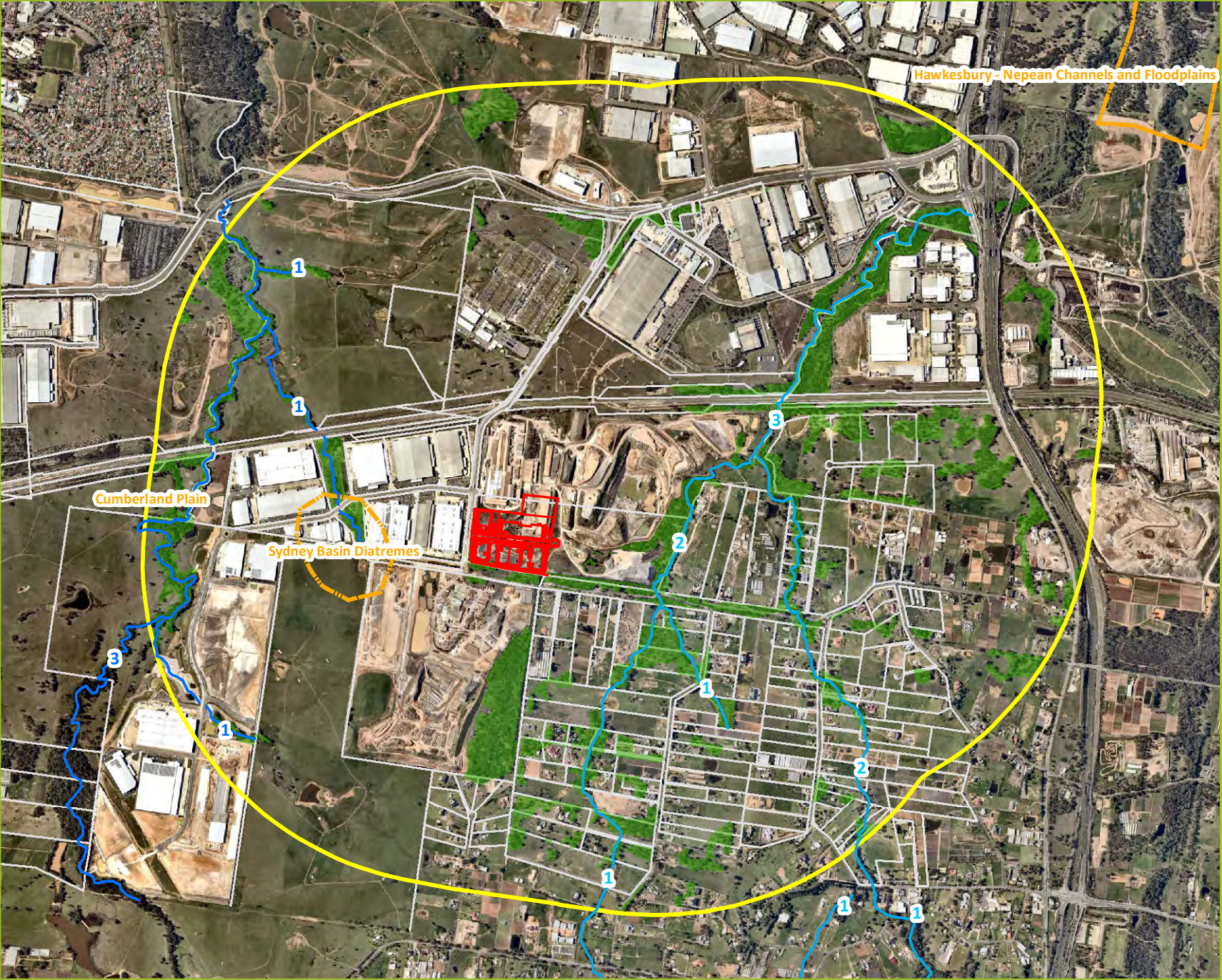
2.1.4 Other features

No wetlands of local, regional, national or international significance are located within the development site or BDAR assessment area, nor are any known soil hazard features, karsts, caves or other geological features of significance.

2.1.4 Outstanding biodiversity values

Figure 2-1 and 2-2 show the areas containing high biodiversity values as defined by the *Biodiversity Conservation Regulation 2017*.

¹ The Hydro Line spatial data is a dataset of mapped watercourses and waterbodies in NSW used to determine the Strahler stream order of a stream



Oakdale East Estate

Biodiversity Development Assessment Report

- Development_footprint
- 1500m Buffer Zone
- Native Vegetation
- Mitchell Landscapes
- Reedy Creek
- Ropes Creek
- 2 Stream Order

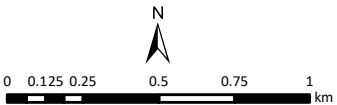
Figure 2-2.
Location Plan

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 30 October 2018

Date sources:
CumberlandPlainWest_2013, OEH
Mitchell (NSW) Landscapes V3

Plan date:
8 November 2018



2.2 Determining site context

2.2.1 Assessing native vegetation cover

The cover of native vegetation within a 1,500 m buffer around the development site is required to determine the context of the site. This was done using ArcMap v10.5, Nearmap aerial photography (dated October 2018) and Cumberland Plain Woodland vegetation mapping (OEH 2013). Vegetation mapping was edited to remove areas that have since been cleared as a result of development.

The total area of the 1,500 m buffer from the boundary of, and including, the development site is 1406.4 ha.

The total of native vegetation cover within the 1,500m buffer area is estimated at 149.9 ha, which equates to 10.7% or within the >10-30% class.

2.2.2 Assessing patch size

Patch size as defined by the BAM as ‘an area of native vegetation that’:

- a) occurs on the development site, and
- b) includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤ 30 m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site.

In assessing patch size, stands of native vegetation within 100 m (where in a moderate to good condition) but which are separated by hard barriers including permanent artificial structures, wide roads or other barriers have been treated as separate patches. These highly modified breaks in vegetation connectivity would significantly alter ecological function of these areas of native vegetation such that these areas warrant recognition as separate patches.

Patch size was calculated for the vegetation on the development site using the field validated map of vegetation types identified and the updated native vegetation extent data layer prepared for the 1,500 m buffer (based on OEH 2013). Patch size is required to be assessed as one of four classes per vegetation zone mapped, being <5 ha, 5-24 ha, 25-100 ha or >100 ha.

One native vegetation zone occurs within the development site, this being vegetation associated with Cumberland Plain Woodland (PCT 849) with its relevant patch size estimated as 10.2 ha which falls within the 5-24 ha class.

3. Native Vegetation

3.1 Site Description

The subject site is highly modified and disturbed as a result of historical land clearing, agricultural use, quarrying operations, in combination with adjacent land use practices. Remnant native vegetation is predominantly associated with the riparian zone of Reedy Creek, which is located to the east of the development site.

Substantial native canopy tree species have been planted over the past 20-30 years on berms constructed around quarrying operations, along access roads and drainage lines.

The boundary between the Lot 20 DP 1246626 and the neighbouring lot to the east is not fenced. As a result cattle, horses and goats have continued access and consequently there is negligible native shrub and ground cover.

3.2 Assessment Methods

3.2.1 Desktop Assessment

Desktop assessment included aerial photographic interpretation and review / editing of Cumberland Plain Woodland vegetation mapping (OEH 2013) to determine the current extent and type of vegetation within the development site.

An assessment of historical and contemporary aerial photography was also undertaken to gain a better understanding of native vegetation that has established on man-made berms and other artificially created environments.

3.2.2 Site History

Assessment of historical and contemporary aerial photography shows Lot 20 DP 1246626 was extensively cleared for farming purposes earlier than 1947 (more than 70 years ago) with development of the site as a quarry in 1973.

The land has remained predominantly cleared with substantial alterations made to the land form through quarrying activities and the construction of steeply sloping berms and basins.

Only scattered and small clusters of trees, and riparian vegetation associated with Reedy Creek is evident in aerial photography taken from 1947 up until 1986. Constructed berms were evident by 1986 with vegetation establishing on the southeastern berm by 1994 and on the southwestern berm by 2005). It is not clear to what extent tree species were planted to provide screening and stabilise embankments that surround the quarry areas. However a number of empty forestry tubes were evident scattered around the southernmost berm (which runs parallel to Burley Road).

3.2.3 Field surveys

A preliminary site inspection was undertaken on the 4th July 2018 to provide an overview of site constraints for future development of the site. This involved a qualitative survey of vegetation located along the southern boundary of the current proposed development site.

An additional site inspection was undertaken on the 12th September 2018 to assess biodiversity constraints and planning for the site's Development Control Plan (DCP). This site inspection focused on vegetation located within the riparian corridor of Reedy Creek and other areas of vegetation within the quarry site.

Both surveys in July and September 2018 were preceded by desktop assessment of aerial photography, vegetation mapping and searches of the Atlas of NSW Wildlife (OEH 2018) to assess records of threatened species within a 10km search area from the proposed DCP boundary.

Both surveys involved walking the site extensively with qualitative data collected (species present recorded, observations and photographic records) to determine the boundaries of vegetation mapping, plant community types present and general habitat assessment for threatened species.

The outcomes of site inspections undertaken in July and September 2018 informed the DCP application and set out areas of biodiversity conservation significance and recommendations for future development application requirements.

Floristic surveys including the detailed vegetation integrity assessment (plot/transect) in accordance with Section 5.3 of the BAM was carried out over October and November 2018² as relevant to the proposed DA boundary.

Limitations:

The location of floristic vegetation plots were limited in capacity for random sampling and avoidance of edge effects due to the limited area of vegetation within the development site and the highly modified state of the development site and its surrounds.

The area of Cumberland Plain Woodland (high biodiversity value) on site is part of a larger polygon with most of the vegetation located offsite within a road easement. The condition of the vegetation within the road easement is very different and not representative of that onsite, which precluded use of this area of vegetation for plot/transect surveys.

In some instances (i.e. canopy trees, both been planted and colonised on man-made berms, quarry embankments and drainage lines) a quantitative analysis was not able to be undertaken or considered likely to provide accurate analysis of the PCTs present. These areas of vegetation are constrained in width to only a few metres in most cases, and growing on artificially created surfaces (in all cases).

The boundary between the subject site and neighbouring lot to the east is not fenced. As a result cattle, horses and goats have continued access and consequently there is negligible native shrub and ground cover.

The embankments and drainage lines throughout the development site are also evidently well trampled and in frequent use by goats and eastern grey kangaroos as south to north and east to west corridors surrounding the quarries and internal access roads.

Both grazing and trampling resulted in difficulties in identification of potential native ground cover species.

3.3 Assessment of PCTs

3.3.1 Vegetation mapping

Native vegetation within the development site has been partially mapped by the NSW Office of Environment and Heritage (OEH) in the “Remnant Vegetation of the western Cumberland subregion, 2013 Update VIS_ID 4207”.

Two plant community types (PCT) are identified, as follows:

- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion; and
- PCT 849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion.

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

PCT 835 is listed under the BC Act as the endangered ecological community (EEC) “River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions” (River-Flat Eucalypt Forest).

² Initial October survey was interrupted by heavy rain with only set out of plot/transect completed data collection completed in November.

River-Flat Eucalypt Forest was identified within the Oakdale East DCP (écologique, 2018) in three separate areas:

- Along the entire eastern boundary of the DCP and follows closely to the outline of Reedy Creek. This community also extends west away from Reedy Creek along a small drainage line (that stormwater flows from a man-made basin to dams within a larger quarry area) and continues around the north of the basin as shown in Figure 3-1.

This community is dominated by *Casuarina glauca* (Swamp Oak) with *Melaleuca stypheloides* (Prickly-leaved Paperbark) subdominant and scattered *Eucalyptus tereticornis* (Forest Red Gum). The understorey is heavily impacted by grazing and weed infestations with negligible native shrub or ground cover species.

Further away from the creek line the community supports higher numbers of Forest Red Gum but a decreased canopy density with a similarly degraded shrub and ground layer.

- Two smaller patches of the community located to the north and west of the manmade basin. Both patches of this community are located within an artificially created detention area including a raised berm that separates the two patches.

These patches are dominated by Swamp Oak and *Angophora floribunda* (Rough-barked Apple), with River Red Gum subdominant and a small number of *Eucalyptus moluccana* (Grey Gum).

As a consequence of the frequent wet conditions the ground layer, while also predominantly weed infested, contains widespread *Juncus usitatus* (Common Rush) and occasional patches of *Typha orientalis* (Cumbungi).

This community contains a small area mapped as containing Cumberland Plain Woodland (see section 3.3.3).

No clearing of River-Flat Eucalypt Forest would occur as a result of the proposal.

3.3.3 PCT 849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion

PCT 849 is listed under the BC Act as the critically endangered ecological community (CEEC) "Cumberland Plain Woodland in the Sydney Basin Bioregion" (Cumberland Plain Woodland).

Cumberland Plain Woodland in NSW is commensurate with the national critically endangered community "Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest" listed under the EPBC Act.

OEH (2013) has mapped Cumberland Plain Woodland as occurring in four different locations within the subject site as follows:

- A small area at the northeastern corner of the subject site, which lies immediately adjacent Reedy Creek and has been identified as a combination of cleared land and remnant River-Flat Eucalypt Forest;
- Two separate locations along the southern boundary of the subject site, both of which are part of larger vegetated areas along the Burley Road easement. One (mostly canopy cover) extends into the subject site while the other location has been, or always was cleared; and
- A wedge shaped patch, which is located within and identified as an extension of River-Flat Eucalypt Forest.

Ground truthing identified approximately 0.1 ha of PCT 849 within the development site, which is located at the southwestern edge where the boundary fence line along Burley Road meets Old Wallgrove Road (see photographic plates below). This area has been impacted over time through construction of an adjacent quarry (no longer in use) a steeply sloping embankment, fence line and maintenance access track, all of which encroach into the OEH (2013) mapped area of PCT 849.

Editing of this polygon was undertaken following floristic surveys to remove canopies of weed and non PCT 849 (planted/derived woodland) vegetation previously included in the OEH (2013)

mapping. Dominant species present include a canopy of Forest Red Gum, sparse shrub layer of *Bursaria spinosa* (Native Blackthorn) and native ground layer species comprising *Brunoniella pumila* (Dwarf Blue Trumpet), *Microlaena stipoides* (Weeping Meadow Grass), *Dichondra repens* (Kidney Weed) and *Lomandra filiformis* (Wattle Mat-rush).

	PCT 849 viewed to the east along base of man-made embankment to quarry
	PCT 849 viewed from northeast, Old Wallgrove Road in background

3.3.4 Derived woodland vegetation

Other native vegetation within the proposed development site predominantly comprise trees planted for the purpose of stabilising steeply sloping man made berms and providing aesthetic screening, and with temporary intent (i.e. as quarries are depleted they are decommissioned, which involves the removal of man-made embankments on which plantings have been undertaken).

Plantings are in various ages and condition and have no native shrub and no or negligible ground cover species. The most dominant species are *Corymbia maculata* (Spotted Gum), Forest Red Gum and Swamp Oak, with lesser occurrences of Rough Barked Apple and Grey Gum.

Up to 0.64 ha of derived woodland is located within the development site is summarised in Table 3-1 and shown in photographic plates below.

Table 3-1. Derived woodland within the development site

Derived woodland vegetation	Area (ha)
Planted on man-made berms parallel to southern boundary and adjacent to PCT 849	0.33
Planted on man-made berms parallel to Old Wallgrove Road and continuous with PCT 849	0.23
Smaller patches (>3 trees) on man-made berms more centrally located but isolated within the operational area of the quarry	0.08
	0.64



Southern boundary viewed to the west (PCT 849 in far distance)



Planted screen trees along man-made berm parallel to southern boundary



Planted screen trees along Old Wallgrove Road



Derived woodland
mid quarry
(isolated trees)



Derived woodland
mid quarry
(isolated trees)

Despite the planted origin of this vegetation, it must be allocated to a PCT for assessment under the Biodiversity Offset Scheme and in accordance with the BioNet Vegetation Classification

Based on the IBRA subregion and species planted, the closest classification is PCT 849.

As already discussed in Section 3.3.3, PCT 849 is a critically endangered ecological community, both in NSW and nationally.

Consequently the offsetting obligation calculated under BAM for clearing of this vegetation is justifiably considered to be at a premium.

3.3.5 Exotic grassland

Most of the remaining proposed development area comprises cleared areas, which includes quarries, quarry embankments, stock pile areas, access roads and exotic grassland.

Exotic grassland comprises introduced pastoral grasses and weeds dominated by *Eragrostis curvula* (African lovegrass), *Chloris gayana* (Rhodes grass) and *Cortaderia jubata* (Pampas grass).

This vegetation type is not required to be offset under the Biodiversity Offsetting Scheme, unless it is found to provide habitat for threatened species, which are identified as species credit species.

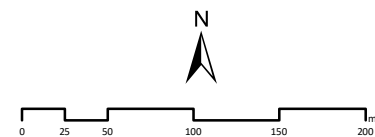


Figure 3-1 Native vegetation

Coordinate System: MGA Zone 56 (GDA 94)
Image sources:
Nearmap 22 June 2018

4. Threatened Species

4.1 Overview

Section 6 of the BAM, details the process for determining the habitat suitability for threatened species.

Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. 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 a targeted survey has a low probability of detection, are identified as 'ecosystem' credit species.

Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and cannot be reliably detected by survey are identified as 'species' credit species.

A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species may have foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject lands, and the results of targeted surveys for candidate threatened species.

4.2 Methods

4.2.1 Desktop Assessment

Database searches of the BioNet Atlas of NSW Wildlife (10 x 10 km search area) and EPBC Act Protected Matters Search Tool were carried out to identify previously recorded threatened flora and fauna species, populations and threatened ecological communities in accordance with State and Federal statutory requirements.

Past flora and fauna surveys relevant to the subject site assisted in assessing the known or likelihood of threatened flora and fauna species, populations and threatened ecological communities to occur within the subject site and the general locality.

Relevant studies are listed below and study areas shown in Figure 1-2.

- Cumberland Ecology (2016a) Biodiversity Assessment Report - Oakdale West Estate
- Cumberland Ecology (2016b) Biodiversity Assessment Report - Oakdale South Estate
- Travers Bushfire and Ecology (2014) Ecology and Flora and Fauna Assessment CSR Brick Plant
- Cumberland Ecology (2007) Ecological Assessment - Oakdale Industrial Estate Concept Plan

4.2.2 Preliminary field surveys

Preliminary surveys conducted on the 4th July 2018 and 12th September 2018 assessed the presence of habitat features that are likely to support threatened flora and fauna species, populations and threatened ecological communities listed under the BC Act and EPBC Act.

A general habitat assessment was undertaken and involved incidental sightings of fauna, with only sporadic targeted searches for *Meridolum corneovirens* (Cumberland Plain Land Snail) undertaken.

4.2.3 BAM calculator

Threatened species that require assessment are initially identified based upon the following criteria:

- The distribution of the species includes the IBRA subregion (Cumberland IBRA subregion).
- The study area is within any geographic constraints of the distribution of the species within the IBRA subregion.
- The species is associated with any of the PCTs identified within the study area
- The native vegetation cover within an assessment area including a 1500m buffer around the study area is equal to or greater than the minimum required for the species.
- The patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species.
- The species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM Calculator. The PCTs identified within the study area, patch sizes and native vegetation cover, as outlined in Section 3, were entered into the BAM Calculator and a preliminary list of threatened species were identified.

Ecosystem Credit Species

The ecosystem credit species predicted by the BAM Calculator are listed in Table 4-1. All ecosystem credit species were maintained in the assessment, as the TS Multiplier is at its maximum due to the presence of CPW CEEC.

Table 4-1. Ecosystem credit species predicted to occur within the development site

Scientific Name	Common Name	BAM type
<i>Anthochaera phyrgia</i>	Regent Honeyeater	Predicted - foraging
<i>Artamus cyanopterus</i>	Dusky Woodswallow	Predicted
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Predicted - foraging
<i>Chthonicola sagittata</i>	Speckled Warbler	Predicted
<i>Circus assimilis</i>	Spotted Harrier	Predicted
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Predicted
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Predicted
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Predicted
<i>Glossopsitta pusilla</i>	Little Lorikeet	Predicted
<i>Grantiella picta</i>	Painted Honeyeater	Predicted
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Predicted - foraging
<i>Hieraaetus morphnoides</i>	Little Eagle	Predicted - foraging
<i>Lathamus discolor</i>	Swift Parrot	Predicted - foraging
<i>Lophoictinia isura</i>	Square-tailed Kite	Predicted - foraging
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	Predicted
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	Predicted
<i>Miniopterus australis</i>	Little Bentwing-bat	Predicted - foraging
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing Bat	Predicted - foraging
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	Predicted
<i>Neophema pulchella</i>	Turquoise Parrot	Predicted

Scientific Name	Common Name	BAM type
<i>Ninox strenua</i>	Powerful Owl	Predicted - foraging
<i>Petroica boodang</i>	Scarlet Robin	Predicted
<i>Petroica phoenicea</i>	Flame Robin	Predicted
<i>Phascolarctos cinereus</i>	Koala	Predicted - foraging
<i>Pteropus poliocephalus</i>	Grey-headed Flyingfox	Predicted - foraging
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Predicted
<i>Stagonopleura guttata</i>	Diamond Firetail	Predicted
<i>Tyto novaehollandiae</i>	Masked Owl	Predicted - foraging

Species Credit Species

Species credit species are predicted in the BAM Calculator following assessment of geographic and habitat features in the credit calculator, such as site location (IBRA subregion), PCTs and condition, patch size and the area of surrounding vegetation within the 1,500 m buffer of the study area. Some species require further assessment of habitat constraints and/or geographic limitations before being confirmed as candidate species for assessment. Table 4-2 and Table 4-3 outline the flora and fauna species credit species (respectively) returned in the BAM Calculator.

Table 4-2. Species credit flora species

Scientific Name	Common Name
<i>Acacia bynoeana</i>	Bynoe's Wattle
<i>Acacia pubescens</i>	Downy Wattle
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid
<i>Cynanchum elegans</i>	White-flowered Wax Plant
<i>Dillwynia tenuifolia</i>	
<i>Dillwynia tenuifolia</i>	Endangered population <i>Dillwynia tenuifolia</i> , Kemps Creek
<i>Eucalyptus benthamii</i>	Camden White Gum
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Juniper-leaved Grevillea
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population	<i>Marsdenia viridiflora</i> R. Br. subsp. <i>viridiflora</i> population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas
<i>Persoonia bargoensis</i>	Bargo Geebung
<i>Pimelea curviflora</i> var. <i>curviflora</i>	
<i>Pimelea spicata</i>	Spiked Rice-flower
<i>Pterostylis saxicola</i>	Sydney Plains Greenhood
<i>Pultenaea pedunculata</i>	Matted Bush-pea
<i>Thesium australe</i>	Austral Toadflax

Table 4-3. Species credit fauna species

Scientific Name	Common Name	BAM type
<i>Anthochaera phrygia</i>	Regent Honeyeater	Species (breeding)
<i>Burhinus grallarius</i>	Bush Stone-curlew	Species
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Species (breeding)

Scientific Name	Common Name	BAM type
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Species
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Species
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Species (breeding)
<i>Hieraaetus morphnoides</i>	Little Eagle	Species (breeding)
<i>Lathamus discolor</i>	Swift Parrot	Species (breeding)
<i>Litoria aurea</i>	Green and Golden Bell Frog	Species
<i>Lophoictinia isura</i>	Square-tailed Kite	Species (breeding)
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	Species
<i>Miniopterus australis</i>	Little Bentwing-bat	Species (breeding)
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	Species (breeding)
<i>Myotis macropus</i>	Southern Myotis	Species
<i>Ninox strenua</i>	Powerful Owl	Species (breeding)
<i>Petaurus norfolcensis</i>	Squirrel Glider	Species
<i>Phascolarctos cinereus</i>	Koala	Species (breeding)
<i>Pommerhelix duralensis</i>	Dural Woodland Snail	Species
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Species (breeding)
<i>Tyto novaehollandiae</i>	Masked Owl	Species (breeding)

4.3 Identify candidate species credit species for further assessment

In accordance with Section 6.4.1.17 of the BAM, a predicted candidate species can be considered unlikely to occur within the subject land (or specific vegetation zones) where habitat is substantially degraded such that the species is unlikely to utilise area, or where an expert report identifies that the species is unlikely to be present within the subject land (or a vegetation zone within the subject land).

A predicted candidate species credit species that is not considered to have suitable habitat on the subject land (or specific vegetation zones) does not require further assessment on the subject land (or specific vegetation zones). The reasons for determining that a predicted species credit species is unlikely to have suitable habitat on the subject land (or specific vegetation zones) must be documented.

As discussed in Section 3, much of the vegetation within the subject land has been previously cleared and fragmented, which would represent substantial degradation for selected species credit species.

To inform how habitat degradation has impacted on candidate species credit species the results from the OEH Bionet database search, review of OEH threatened species profiles and relevant literature (surveys undertaken in the locality) were used to determine the following factors for each species:

- Whether records occur in the search area and the currency of records (i.e. recent or historical);
- Geographic constraints and distribution; and
- Habitat features important to each species.

Table 4-3 outlines the predicted candidate species which were deemed not to require further consideration in terms of targeted surveys and/or input into the BAM calculator, and justification. More detailed information regarding distribution, habitat requirements and search records are provided in habitat summary tables provided in Appendix C.

Table 4-4. Candidate species credit species not considered to require further assessment

Species	Justification
Flora species and populations	
<i>Acacia bynoeana</i>	Not previously recorded within 10 km search area, and not found during surveys
<i>Acacia pubescens</i>	
<i>Caladenia tessellata</i>	Known only from old records from Sydney area and none from search area
<i>Cynanchum elegans</i>	Not previously recorded within 10 km search area, and habitat absent
<i>Dillwynia tenuifolia</i> (species)	Not previously recorded within 10 km search area, and habitat absent
<i>Dillwynia tenuifolia</i> (population)	Not previously recorded within 10 km search area, and habitat absent
<i>Eucalyptus benthamii</i>	Not previously recorded within 10 km search area, and habitat absent
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Despite its tolerance to disturbed sites, it is a conspicuous plant and was not found surveys
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i> - endangered population	Not previously recorded within 10 km search area, and habitat absent
<i>Persoonia bargoensis</i>	No <i>Persoonia</i> species found during surveys
<i>Pimelea curviflora</i> var. <i>curviflora</i>	Habitat absent
<i>Pimelea spicata</i>	Habitat absent
<i>Pterostylis saxicola</i>	Not previously recorded within 10 km search area, and habitat absent
<i>Pultenaea pedunculata</i>	Not previously recorded within 10 km search area, and habitat absent
<i>Thesium australe</i>	Not previously recorded within 10 km search area, and habitat absent
Fauna species	
<i>Anthochaera Phrygia</i> [#]	Not previously recorded within 10 km search area, breeding habitat absent
<i>Burhinus grallarius</i>	Not previously recorded within 10 km search area, and habitat absent
<i>Callocephalon fimbriatum</i> [#]	Breeding habitat absent
<i>Cercartetus nanus</i>	Not previously recorded within 10 km search area, habitat absent
<i>Chalinolobus dwyeri</i>	Not previously recorded within 10 km search area, habitat absent
<i>Haliaeetus leucogaster</i> [#]	Last recorded in search area 15 years ago (2003), breeding habitat absent
<i>Hieraaetus morphnoides</i> [#]	Breeding habitat absent
<i>Lathamus discolor</i> [#]	Recorded >6km from development site >10yrs ago, breeding habitat absent
<i>Litoria aurea</i>	Not previously recorded within 10 km search area, not found during this and other assessments in locality
<i>Lophoictinia isura</i> [#]	Recorded >10 yrs from north of Warragamba Pipelines in an area since developed, breeding habitat not observed
<i>Miniopterus australis</i> [#]	Breeding habitat absent
<i>Miniopterus schreibersii oceanensis</i> [#]	Breeding habitat absent
<i>Myotis macropus</i>	Breeding habitat absent

Species	Justification
<i>Ninox strenua</i> [#]	Breeding habitat absent
<i>Petaurus norfolcensis</i>	Not previously recorded within 10 km search area, habitat absent
<i>Phascolarctos cinereus</i> [#]	Not previously recorded within 10 km search area, habitat absent
<i>Pommerhelix duralensis</i>	Not previously recorded within 10 km search area, habitat absent
<i>Pteropus poliocephalus</i> [#]	Breeding habitat absent
<i>Tyto novaehollandiae</i> [#]	Breeding habitat absent
# denotes ecosystem species	

Confirmed candidate species were assessed consistent with Steps 4-6 of Section 6.4 of the BAM. Targeted surveys for species credit species were undertaken in accordance within section 6.5 of the BAM, including undertaking surveys during the nominated survey period specified for each candidate species and in accordance with OEH threatened species survey guidelines. The survey effort, timing and locations for threatened flora and fauna are outlined in the following sections

4.3.1 Targeted field surveys - flora

No candidate threatened flora species were considered likely to occur within the development site. Site surveys further supported this finding.

As can be seen from photographic plates provided in Sections 3.3.3 and 3.3.4, the site's vegetation is highly degraded, lacks a shrub layer and has a depauperate ground layer. In combination with the relatively small areas, the vegetated areas of the development site were able to be walked and scanned extensively.

4.3.2 Targeted field surveys - fauna

Despite most of the candidate species credit species not considered to require further consideration (refer Table 4-3) site surveys targeting a range of fauna types were conducted as outlined in Table 4-5.

Table 4-5. Fauna surveys undertaken

Fauna group	Date	Weather conditions	Survey technique(s)	Survey effort
Diurnal birds	12/09/2018	no rain, temp 19-31°C	Diurnal opportunistic	3hrs
	2/10/2018	no rain, temp 18.5-24.9°C		4hrs
	3/10/2018	no rain, temp 17.1-25.5°C		3hrs 25min
	4/10/2018	4mm rain, temp 14.4-15.1°C		2hrs
	5/11/2018	no rain, temp 18.3-28.9 °C		2hrs
Nocturnal birds	2/10/2018	no rain, temp 18.5-24.9°C	Spotlighting	3hrs 30min
	3/10/2018	no rain, temp 17.1-25.5°C		3hrs min
	4/10/2018	4mm rain, temp 14.4-15.1°C		2hrs 30min
Aboreal mammals	As above	As above	As above	As above
Terrestrial mammals	4/10/2018	4mm rain, temp 14.4-15.1°C	Hair tubes	6 days
	4/10/2018	4mm rain, temp 14.4-15.1°C	Remote camera	25 days
Bats	2/10/2018	no rain, temp 18.5-24.9°C	Spotlighting / Anabat SD-2	3hr 30min
	3/10/2018	no rain, temp 17.1-25.5°C		3hr min
	4/10/2018	4mm rain, temp 14.4-15.1°C		2hr 30min
Reptiles	2/10/2018	no rain, temp 18.5-24.9°C	Habitat search, opportunistic	1hr
	3/10/2018	no rain, temp 17.1-25.5°C		2hrs
	4/10/2018	4mm rain, temp 14.4-15.1°C		2hrs

Fauna group	Date	Weather conditions	Survey technique(s)	Survey effort
Amphibians	2/10/2018	no rain, temp 18.5-24.9°C	Call-playback (GGBF)	1hr
	3/10/2018	no rain, temp 17.1-25.5°C		1hr
	4/10/2018	4mm rain, temp 14.4-15.1°C		1hr
Molluscs	12/09/2018	no rain, temp 19-31°C	Target searches	1hr
	2/10/2018	no rain, temp 18.5-24.9°C		2hrs
	3/10/2018	no rain, temp 17.1-25.5°C		2hrs
	5/11/2018	4mm rain, temp 14.4-15.1°C		1hr

4.4 Results

4.4.1 Literature review

écologique (2019)

Field surveys conducted for the Austral Bricks Plant #3 Crusher Relocation DA identified the lack of habitat due to highly degraded conditions, which is exacerbated by grazing across the study area (including the subject site of this assessment) by large numbers of feral goats.

écologique (2018)

Field surveys conducted for the Oakdale East DCP resulted in the following:

- Redefining OEH (2013) mapping boundaries of both PCT 849 and PCT 835;
- Identification of potential Cumberland Plain land snail habitat in areas of PCT 835; and
- Preliminary assessment of low potential for threatened flora and fauna species habitat.

écologique (2018) identified the lack of fencing between the DCP boundary and neighbouring lot to the east, which has resulted in continued access by cattle, horses and goats and, in turn, the negligible native shrub and ground cover.

Travers Bushfire and Ecology (2014)

Surveys of the neighbouring CSR Brick Plant (Lot 1 DP 106143 Old Wallgrove Road) undertaken by Travers Bushfire and Ecology (2014) found:

- Cumberland Plain Woodland (PCT 849) to occur throughout the eastern vegetated portion of the study area in medium to high condition covering approximately 10.6 ha;
- Smaller fragmented remnants of PCT 849 (3.60ha) within the western portion of the site, which were found to be low in native species diversity;
- Tree hollows, were found to be generally small and at very low density, with no large hollows observed within the study area and therefore no suitable nesting or hollow roosting habitat for forest owls;
- Threatened species inclusive of the Large-footed Myotis, Greater Broad-nosed Bat and the Cumberland Plain Land Snail; and
- EPBC Act migratory species including *Gallinago hardwickii* (Latham's Snipe) and *Ardea ibis* (Cattle Egret)

Cumberland Ecology (2017)

Surveys undertaken for Oakdale West Estate (SSDA) found the presence of the following vegetation communities: PCT 849, Cumberland Plain Woodland on shale (PCT 850), River-flat Eucalypt Forest (PCT 835), Swamp Oak Floodplain Forest (PCT 1234).

Fauna surveys found the presence of the migratory Cattle Egret. No threatened flora species were found.

Cumberland Ecology (2016)

Remnant vegetation found within the study area included the NSW endangered ecological communities River-flat Eucalypt Forest and Swamp Oak Floodplain Forest (associated with the Ropes Creek riparian corridor and its tributaries) and a small isolated patch of PCT 849.

Fauna surveys found the presence of the migratory Cattle Egret. No threatened flora species were found.

Cumberland Ecology (2007)

Flora and fauna surveys undertaken for Oakdale Industrial Estate Concept Plan found bat species identified as potentially occurring on the subject land (from recorded calls), as follows:

- Eastern Bentwing-bat;
- Eastern Freetail-bat; and
- Greater Broad-nosed Bat.

All recordings were made at dam sites, where bats would have been foraging for insects over water.

No threatened flora species were found.

Literature review relevance to the development site

With the exception of écologique (2019) the above biodiversity assessments included areas not representative of the development site as follows:

- Considerably larger areas of remnant PCT 849 vegetation than that found in the development site; and/or
- Vegetated riparian corridors associated with 2nd and 3rd order streams (Reedy Creek and Ropes Creek respectively); and/or
- Farm dams or other water bodies.

Larger remnant vegetation and vegetated riparian corridors provide a higher potential for threatened species habitat than that found within the development sites.

The presence of watercourses and waterbodies in these sites also provides for habitat not found within the development site.

Irrespective, a relatively small subset of the total predicted threatened species were found in these sites. Most of which were associated with the larger more intact areas of PCT 849 and foraging habitat over waterbodies.

4.4.2 Field surveys

Field surveys of the areas to be impacted within the development site and surrounding environs did not detect any threatened flora or fauna species. In summary:

- Remote cameras left in situ for over 25 days only captured images of the European Fox, Hare and Feral Goats.
- Hair tubes left in situ for over 6 days were found with bait untouched and no evidence of mammalian hair.
- Anabat surveys detected microbat activity as follows:
 - over reservoirs within a larger quarry in between the development site and Reedy Creek riparian area,
 - within more intact PCT 849 located in the Burley Road easement,
 - No activity within the development site.

- The presence of Cumberland Plain Land Snail in River-flat Eucalypt Forest in the wider DCP area, but outside of the proposed development site.
- The presence of the threatened Dusky Woodswallow within more intact PCT 849 located in the Burley Road easement.
- No activity found within trees identified as potential habitat within more intact PCT 849 (located in the Burley Road easement), the riparian zone of Reedy Creek, and isolated areas of River-flat Eucalypt Forest in the wider DCP area.
- No results for Green and Golden Bell Frog call back and habitat searches within the wider DCP area (despite confirmation that this species was actively calling at other locations within the Sydney Basin bioregion at the time of surveys).

5. Avoiding and minimising impacts on biodiversity values

5.1 Avoiding and minimising impacts

A total of 0.1 ha of PCT 849 would be cleared by the proposal. A further 0.64 ha derived woodland, and 9 ha of exotic grassland and existing plant (quarries, buildings, roads) would also be cleared.

The impacts associated with the proposal, including the clearing of native vegetation, have been situated to avoid impacts to better condition, more intact and more connected areas of native vegetation identified in the Oakdale East DCP.

These areas are concentrated around the Reedy Creek riparian zone as shown in Figure 5-1.

Initial master planning for the development extended considerably further to the east than the footprint, which would have impacted on areas of native vegetation connected to the Reedy Creek riparian zone and also Cumberland Plain Land Snail habitat.

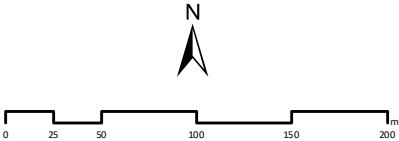
Figure 5-1 demonstrates how the masterplan (and subject of this proposed development) has avoided and minimised impacts to biodiversity values of the site.

5.2 Avoiding and minimising prescribed biodiversity impacts during project planning

No prescribed biodiversity impacts are anticipated from the proposed development.



- DA footprint
- DA avoidance
- Reedy Creek
- Lot 1 DP843901
- CumberlandPlainWest_2013_E_4207



Oakdale East Estate

Figure 5-1 Avoidance/Minimisation of Impacts

Coordinate System: MGA Zone 56 (GDA 94)
Image sources:
Nearmap 22 June 2018

6. Assessing and offsetting impacts

6.1 Assessment of direct impacts

6.1.1 Vegetation Clearing

A total of 0.74 ha of remnant and derived native vegetation will be cleared for the proposed development. The extent of clearing is based on the design footprint and additional buffer zones to allow for machinery and equipment movement to enable construction.

The nature of the vegetation to be cleared is highly degraded and has been determined to provide suboptimal foraging habitat for a range of resident birds and wildlife corridor for feral animals only. The age of the trees in the communities are varied with no old age or larger trees (greater than 80cm dbh) or with hollows that would support

A further 8 ha of cleared land comprising quarries, roads and exotic grassland would also be impacted by the proposal.

The direct clearing and subsequent development of the site would represent a permanent impact, or loss, of this native vegetation and potential habitat. However this assessment has concluded that potential habitat for any threatened species is unlikely.

PCT 849 is a critically endangered ecological community under both the BC Act and the EBPC Act.

In accordance with the BC Act, PCT 849 has been assessed via the BAM calculator.

In accordance with the EPBC Act, the stand of PCT 849 within the development site (including that contiguous with vegetation with the Burley Road reserve and the derived woodland) does not meet the threshold requirements of the nationally endangered Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community (i.e. patches are less than 0.5 ha, the patches are not contiguous with other patches 5 ha or greater in size, the perennial understorey vegetative cover is not made of greater than 30% native species, and there are no trees > 80cm dbh or that contains hollows). Therefore a referral under the EBPC Act is not triggered.

6.1.2 Habitat Loss

The native vegetation to be removed is highly degraded and does not contain a number of important habitat features (e.g. structural diversity, large woody debris, hollows). Vegetation on the development site does not provide a continuous wildlife corridor due to the surrounding roads, cleared land and industrial development.

6.1.2 Mortality of fauna

Small birds, microbats and arboreal mammals that utilise tree hollows, trees and shrubs as nesting locations, may potentially be encountered during clearing operations.

Providing that pre-clearing inspections are undertaken as a mitigation measure (refer Section 6.4) it is considered unlikely that the risk of any fauna mortality (as a result from the proposal's construction) would be a low risk.

6.2 Assessment of indirect impacts

6.2.1 Erosion/sedimentation

Vegetation clearing and earthworks will inevitably expose soils and subsoils, which following rainfall may erode and mobilise soils in runoff. Providing that best practices in erosion and sedimentation management is implemented as a mitigation measure it is considered unlikely that soil erosion would result in a significant impact on the subject site or the wider lot area's biodiversity

6.2.2 Stormwater runoff

Stormwater runoff from the development site will be collected in a purpose built sediment detention basin, which will not be connected to drainage that discharges to Reedy Creek until post

construction. On 90% completion of the development site, the sediment detention basin will be re-established to act as a bio-retention basin, with overflow discharge piped to Reedy Creek.

Post development flows will be required to mimic pre-development runoff into Reedy Creek. The outflow has been located within a cleared area within the Reedy Creek riparian zone, thereby avoiding native vegetation clearing.

The outlet will be designed to include adequate flow dissipation for heavy rainfall events and to minimise the risk of erosion in the downstream Reedy Creek.

6.2.3 Noise/light spill

The existing Austral Bricks operation comprises frequent movement of large mobile plant and trucks for both quarrying and stockpiling activities.

The development site itself is immediately adjacent to existing roads (Burley Road and Old Wallgrove Road). Oakdale Central Industrial Estate and an existing CSR quarry are located beyond these roads to the west and southwest of the development site.

In combination, existing plant operations, roads and neighbouring industrial properties all generate a relatively high level of noise and light. Therefore it is most likely that resident and visiting wildlife are already accustomed to a highly modified environment in terms of light and noise.

The proposal is considered unlikely to reduce viability of any adjacent native vegetation or habitat due to edge effects, noise or light spill, or disturbance to potential breeding habitats.

6.2.4 Exotic species

The development site contains a number of introduced plant species, a number of which are priority weed species as identified under the Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022 (LLS 2017).

Construction activities have the potential to both spread existing weed infestations and introduce new weed species on machinery and equipment that have not been adequately cleaned prior to use at the development site.

Providing that the recommended mitigation measures are implemented (refer Section 6.4) the risk of spread, and introduction of new, weed infestations is unlikely to significantly impact on the development site and the wider lot area's biodiversity.

6.2.5 Pathogens and disease

Surveys undertaken for this assessment did not identify any areas of pathogen occurrence. Notwithstanding, to avoid the introduction and/or spread of soil borne pathogens and disease, appropriate hygiene procedures as recommended (refer Section 6.4) will minimise the risk of significant impacts to the subject site and the wider lot area's biodiversity.

6.3 Assessing prescribed biodiversity impacts

No prescribed biodiversity impacts are anticipated from the proposed development.

6.4 Mitigating and managing impacts on biodiversity values

As described above, the proposed development has been situated to minimise impacts to native vegetation where achievable. Where avoidance of impacts to native vegetation have not been possible, a range of mitigation measures shall be implemented to ensure minimisation, mitigation and management measures relevant to the protection of native flora and fauna. This will be detailed within a fauna and flora management plan (FFMP), which would be prepared as a subplan to the Construction Environmental Management Plan (CEMP).

The objective of the FFMP is to ensure implementation of all avoidance, minimisation, mitigation and management measures relevant to the protection of native flora and fauna. Key objectives and actions include the following but would not be limited to:

- A suitably qualified ecologist will carry out pre-clearing surveys of the proposal area to be cleared;
- During clearing operations that involve the clearing of habitat (if found during pre-clearing surveys) the ecologist is to be present to supervise the operations and ensure that any fauna are rescued and relocated in accordance with a fauna rescue and release procedure that is to be detailed within the FFMP;
- The proposal shall not clear more than 0.74 ha vegetation;
- Minimise injury/mortality to all fauna;
- Minimise all erosion and sedimentation during clearing operations;
- Minimise clearing for ancillary facilities. e.g. stockpile areas, site compounds shall be provided for within existing cleared areas;
- No impact on fauna habitats outside of approved work zone; and
- New weeds and pathogens are not introduced to the site. Protocols for weed management and pathogen mitigation (e.g. hygiene procedures) will be specified in the FFMP.

6.5 Adaptive management for uncertain impacts

Excluding the need for a CEMP, no additional adaptive management measures are proposed.

6.6 Thresholds for the assessment and offsetting of impacts of development

6.6.1 Serious and Irreversible impacts

The Biodiversity Offsets Scheme recognises that there are some types of serious and irreversible impacts (SAILs). Cumberland Plain Woodland (PCT 849) is an identified SAIL entity.

In accordance with Section 10.2 of the BAM the following additional impact assessment provisions for ecological communities information must be provided:

a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SAIL

Figure 5-1 demonstrates how the masterplan (and subject of this proposed development) has avoided and minimised impacts to clearing of vegetation within the development site.

b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone.

The following vegetation would be cleared:

Zone	PCT	Area	Condition	Vegetation integrity score
1	PCT 849	0.095 ha	Moderate-low	27.8
2	PCT 849 (derived - planted woodland)	0.64 ha	Low	21

c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SAIL

To be determined

- d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint**

To be determined

- e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration**

PCT 849 is largely confined to the Cumberland subregion, but also occurs in margins of the Burragorang, Sydney Cataract and Yengo subregions.

The current estimate of PCT 849 in the Cumberland Plain is 6,800 ha. The proposed clearing of native vegetation would not significantly reduce the current extent.

- f) an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion**

To be determined

- g) the development proposal's impact on:**

- i. abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns**

The proposal will not alter groundwater levels or surface water patterns at this location, above that which currently exists as a result of historical quarrying operations.

- ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants**

The proposal will not alter characteristic or functionally important species through inappropriate fire/flooding regimes.

The development site's vegetation lacks understorey species. The condition of overstorey species is relatively poor due to the highly degraded environment and artificial nature of soils on which vegetation has established.

- iii. the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC**

The proposal would not exacerbate indirect impacts above that which already exist with the Burley Road easement. Conversely there is likely to be an improvement through mitigation of these threats within the development site.

- h) direct or indirect fragmentation and isolation of an important area of the potential TEC**

The areas of vegetation to be cleared are not considered to directly or indirectly fragment or isolate an important area of PCT 849.

PCT 849 at this locality is already highly fragmented as a result of surrounding roads, cleared areas of the quarry and industrial development.

The adjacent PCT 849 located within the Burley Road easement is identified as within the future location of an arterial road (future Southern Link Road) and therefore this area of the community is unlikely to be viable in the longer term.

- i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.

Impacts associated with PCT849 will be offset under the BAM (refer Section 6.6.2).

6.6.2 Impacts which require an offset

The ecosystem credits required to offset the proposal are shown below. A total of 10 ecosystem credits are required to offset the development.



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012080/BAAS17054/19/00013045	Oakdale East Industrial Estate	04/01/2019
Assessor Name	Report Created	BAM Data version *
Kathryn Duchatel	08/03/2019	6
Assessor Number	* 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.	
BAAS17054		

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAIL	Ecosystem credits
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion								
1	849_Mod-low		27.8	0.1	0.25 High Sensitivity to Potential Gain	2.50	TRUE	2
2	849_Low		21.0	0.6	0.25 High Sensitivity to Potential Gain	2.50	TRUE	8
							Subtotal	10
							Total	10

6.6.3 Impacts that do not require further assessment

Impacts to those areas identified as 'Exotic grassland' do not require offsetting.

7. References

Cumberland Ecology (2007) Ecological Assessment - Oakdale Concept Plan. Report prepared for Goodman

Cumberland Ecology (2017) Biodiversity Assessment Report - Oakdale West Estate. Report prepared for Goodman

Cumberland Ecology (2016b) Biodiversity Assessment Report - Oakdale South Estate. Report prepared for Goodman

écologique (2019) Biodiversity Assessment Report _ Austral Bricks Plant#3 Crusher Relocation (DA). Report prepared for Austral Bricks

écologique (2018) Biodiversity Assessment Report _ Oakdale East Development Control Plan (DCP). Report prepared for Goodman

Greater Sydney Local Land Services (2017) Greater Sydney Regional Strategic Weed Management Plan 2017-2022 Version: June 2017

Travers Bushfire and Ecology (2014) Ecology and Flora and Fauna Assessment CSR Brick Plant Lot 1 DP 106143 - Old Wallgrove Road, Horsley Park

Appendix A. BioBanking report



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012080/BAAS17054/19/00013045	Oakdale East Industrial Estate	04/01/2019
Assessor Name	Report Created	BAM Data version *
Kathryn Duchatel	08/03/2019	6
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BAAS17054		

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAI	Ecosystem credits
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion								
1	849_Mod-low	27.8	0.1	0.25	High Sensitivity to Potential Gain	2.50	TRUE	2
2	849_Low	21.0	0.6	0.25	High Sensitivity to Potential Gain	2.50	TRUE	8
							Subtotal	10
							Total	10



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