

Appendix K

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

MOD 4 APPLICATION – CONSTRUCTION OF
MUSHROOM FARM FACILITIES

LOT 13 DP 1138749

108 MULGRAVE ROAD, MULGRAVE

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Abbreviations

Abbreviation	Meaning
AOBV	Areas of Outstanding Biodiversity Value
AWTS	Aerated Wastewater Treatment System
APZ	Asset Protection Zone (Bushfire Protection)
BAM	Biodiversity Assessment Methodology
BAM - C	Biodiversity Assessment Method Calculator
BC Act	<i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offsets Scheme
DA	Development Application
DCP	Development Control Plan
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DPIE	NSW Department of Planning, Industry and Environment (formerly OEH)
DEE	Department of Environment and Energy
EEC	Endangered Ecological Community
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Ha	Hectare
HTE	High Threat Exotic
LEP	Local Environmental Plan
LGA	Local Government Area
MU	Map Unit
NPWS	NSW National Parks and Wildlife Service
OEH	Office of Environment and Heritage
PCT	Native vegetation classification system approved by NSW Plant Community Type Control Panel
PFC	Projected Foliage Cover
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TBCD	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community

GLOSSARY

Acronym/ Term	Definition
Accredited Biodiversity Assessor	Individuals accredited by the Department of Planning, Industry and Environment (DPIE) to apply the Biodiversity Assessment Method.
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified.
Biodiversity Offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity from the impacts of development.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
Ecosystem credit	The class of biodiversity credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
Locality	A 1500m buffer area surrounding the Subject Land
Native Vegetation	Means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland.
Proposal	The development, subdivision, activity or action proposed.
SAIL entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAILs)
Species credit	The class of biodiversity credit that relate to threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject Land	The footprint of the proposed development.
Subject Properties	108 Mulgrave Road, Mulgrave (Lot 13 DP 1138749)

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CERTIFICATION

I, Alex Fraser of Fraser Ecological, hereby state that this Biodiversity Development Assessment Report (BDAR) for a development at 108 Mulgrave Road, Mulgrave (Lot 13 DP 1138749), has been prepared in accordance with the Biodiversity Assessment Method (BAM) 2020 established under the NSW *Biodiversity Conservation Act 2016*.

Fieldwork for this project was undertaken by Alex Fraser. Report writing was undertaken by Alex Fraser.

My qualifications are:

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BAM Accredited Assessor (BAAS 18156)
Member of the Ecological Consultants Association of NSW

Conflicts of Interest

The Accredited Assessors have signed an agreement to abide by the Accredited BAM Assessor Code of Conduct. The authors declare in accordance with the Assessors Code of Conduct that no actual, perceived, or potential conflicts of interest exist.

Disclaimer

This document may only be used for the purposes for which it was commissioned. Fraser Ecological accepts no liability or responsibility in respect of any use or reliance upon this report by any third party. Unauthorised use of this report in any form is prohibited.



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EXECUTIVE SUMMARY

Fraser Ecological has been contracted to prepare a Biodiversity Development Assessment Report (BDAR) for a development ('the Proposal' or 'the Project') at 108 Mulgrave Road, Mulgrave (Lot 13 DP 1138749), in the Hawkesbury local government area.

This BDAR has been prepared in accordance with the Office of Environment and Heritage (OEH) (2020) Biodiversity Assessment Method (BAM). The Biodiversity Offset Scheme (BOS) applies to the Proposal, as it would require clearing of native vegetation that is mapped on the Biodiversity Values Map (BVM). Note, this is a 'streamlined assessment', in accordance with Appendix C of the BAM ('Streamlined assessment module – Small area').

The site comprises of an existing industrial use facility with extensive areas of factory buildings and associated hard surfaces. The surrounding areas subject to the proposed development include existing open areas of compacted fill, stormwater detention basins/ponds and boundary screen plantings that comprise of native species.

There are also native planted areas on the embankment immediately to the west of the existing buildings (subject to proposed removal). The western most portion of this subject property comprises of introduced exotic pastureland. Native plantings also occurs on the western property boundary adjoining South Creek as depicted in vegetation mapping figures provided on the following pages.

We have broken up the site into the following vegetation zones for ease of reference as follows:

- Vegetation Zone A: Native landscape plantings (1.5ha proposed for removal)
- Vegetation Zone B: Exotic pastureland and dams (proposed for modification)
- Vegetation Zone C: Native landscape plantings adjacent to South Creek (proposed for retention)

Native landscape plantings occur on the embankment immediately to the west of the existing operating factory infrastructure as depicted in Figure 7. Whilst it is acknowledged that they are not remnant species, plantings species composition is consistent with PCT 4025 - Cumberland Red Gum Riverflat Forest, and therefore this has been mapped accordingly. The plantings are various ages up to 20 years old and provide a privacy screen. There is also a high abundance of introduced environmental weed species all of which have been documented within Section 3.2.1 of this report.

No significant fauna habitats occur within the proposed development area and for the remainder of the property with the exception of the riparian habitat outside the western most boundary within South Creek. No hollow bearing trees were recorded on-site.

The man-made stormwater detention basins provide poor quality habitat for common water bird species and is not considered significant or important wetland habitat. This is due to the industrial nature of these ponds and the dominance of aquatic weeds. They are not likely to be used by threatened amphibians because the western overflow dam is to be maintained to be empty as an existing condition of consent.

The proposed removal of the planted screen trees is unavoidable for the proposed development. However, the applicant intends to provide new screen tree plantings in the future (using locally native species).

The Vegetation Integrity Scores were as follows:

PCT	Vegetation Zone	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 4025 - Cumberland Red Gum Riverflat Forest plantings	Vegetation Zone A (1.5ha)	10.8	18	19.1	15.5

Biodiversity credit retirement

Due to the poor condition of the vegetation proposed for removal there is no biodiversity credit requirement for impacted planted PCTs. However, due to the proximity of the proposed development to dams on site and dams on nearby properties we have assumed presence as a precautionary measure for Southern Myotis and a credit obligation is required as per below.

Threatened Species Requiring an Offset

Species	Area of Impacted Habitat (ha)	SAIL entity	Number of Species Credits Required
<i>Myotis macropus</i> / Southern Myotis (Fauna)	1.5	No	12

Serious and Irreversible Impacts (SII's)

Species and ecological communities with a 'very high' biodiversity risk weighting will be a potential serious and irreversible impact (SII). These 'potential SII entities' are identified within the BAM calculator (OEH 2018b).

None of the ecological communities, or species relevant to this assessment are potential SII entities.

I INTRODUCTION

Fraser Ecological has been engaged by ELF Farm Supplies, to provide a Biodiversity Development Assessment Report (BDAR) for the proposed development at 108 Mulgrave Road, Mulgrave (Lot 13 DP 1138749) located in the Hawkesbury Council LGA.

See Figure 1 and 2 for the location & aerial maps showing property boundaries.

The subject site itself is not on the NSW DCCEEW's Sensitive Biodiversity Values Map (<https://www.environment.nsw.gov.au/biodiversity/biodiversity-values-map.htm>) and is trigger this requirement for this assessment (Figure 4).

BAM plot/ quadrat surveys were undertaken on the 3rd of October 2024.

I.1 Description of the site and proposal

The site at Elf Farm Supplies is an existing mushroom substrate plant. The proposed extension works would occur on filled land that was previously cleared and used for farming. The filled area has been extended on a number of occasions in the past associated with plant augmentation and upgrades. Screening or landscaping vegetation has been planted around the filled area on each occasion.

The current modification proposal requires the filled area to be extended to the west removing all of the planted vegetation on that side which will be progressively replaced. There is a stormwater pond in the centre of the site with planted vegetation that will also be filled.

The proposed development footprint does not overlap the New South Wales DCCEEW 'Sensitive Biodiversity Values Land' map. However, the proposed development requires the clearing of a planted native vegetation community that is consistent with Plant Community Type (PCT) and the New South Wales BIONET vegetation classification system.

This report has been requested by New South Wales government Department of Planning and the State Significant Development Application (SSDA) which is the legislative trigger requirements for a Biodiversity Assessment Report (BDAR).

In accordance with the '*Streamlined assessment module planted native vegetation - Biodiversity Assessment Method operational manual Department of Climate Change, Energy, the Environment and Water (2024)*' a Biodiversity assessment report (BDAR) is unavoidable because the 'BAM' applies. i.e. All the native plantings are proposed for removal are consistent with the local native vegetation community otherwise known as a 'PCT (Plant community type), however, is not 'remnant' vegetation and does not form part of a condition of consent obligation.

This BDAR will be prepared as a site-based 'Streamlined assessment module – small area development that requires consent' as it does not exceed the area clearing threshold for small area developments as outlined in the BAM (DPIE 2020a; Table 1).

I.2 Aim and Approach

This report has been prepared in accordance with the BAM (DPIE 2020a) and aims to:

- Describe the biodiversity values present within the Subject Land, including the extent of native vegetation, vegetation integrity and the presence of Threatened Ecological Communities (TECs);
- Determine the habitat suitability within the Subject Land for candidate threatened species;
- Prepare an impact assessment in regard to potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and SALLs within the Subject Land;
- Discuss and recommend efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e., ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker as to the number and class of offset credits required to be purchased and retired as a result of the proposal.

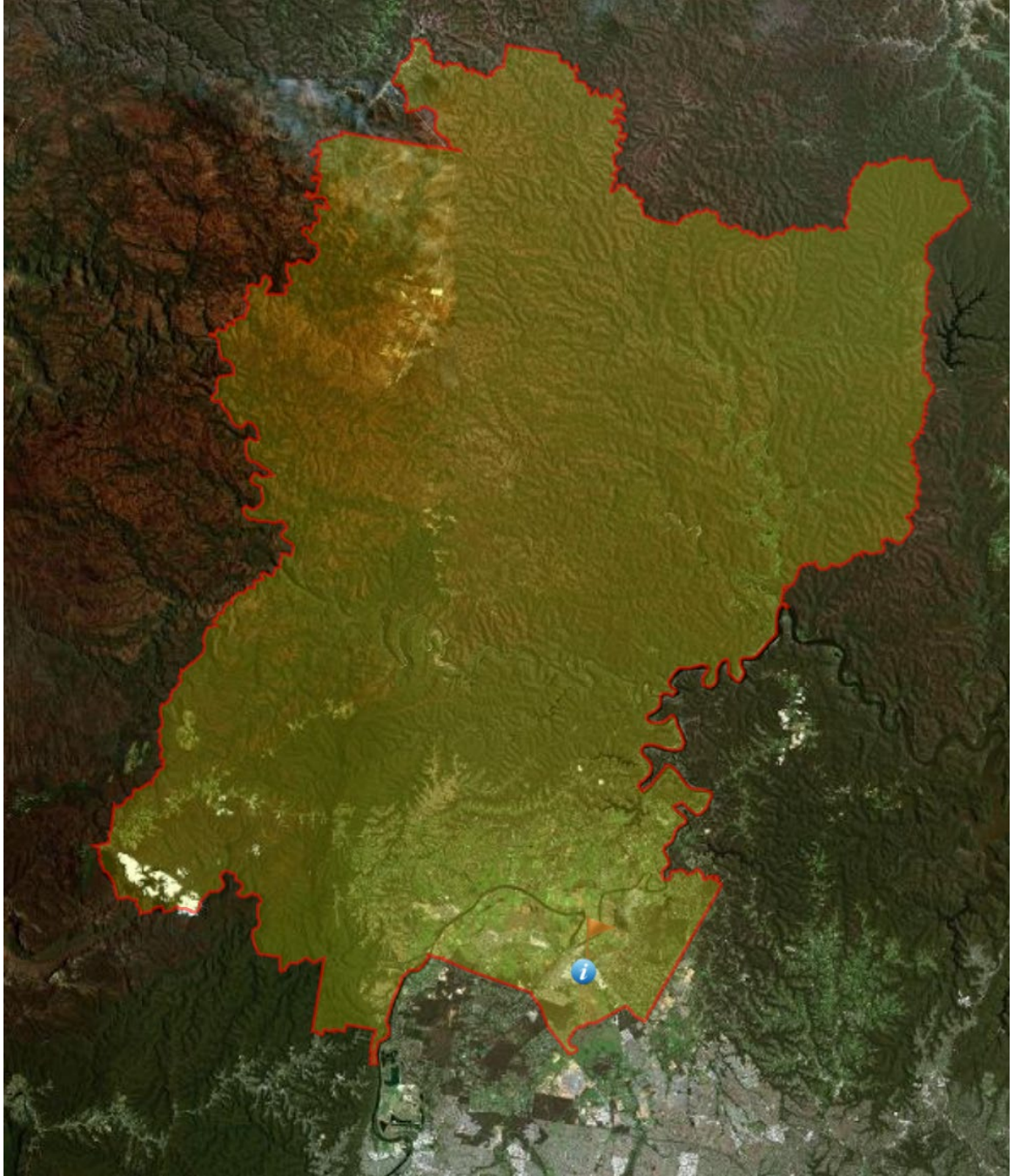


Figure 1: The site in relation to the Hawkesbury LGA extent map (Source: SIX Maps.com)

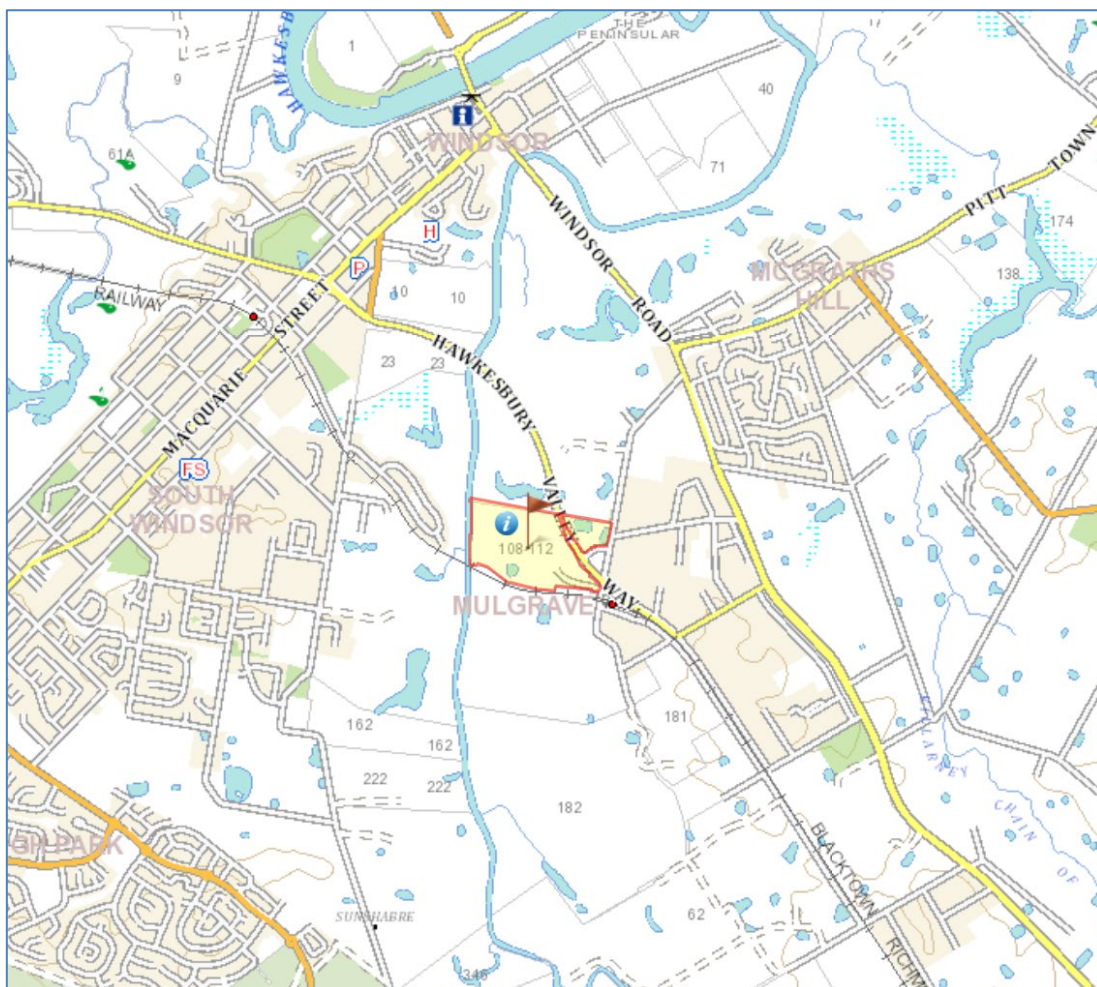


Figure 2: Locality aerial map (Source: SIX Maps.com)



Figure 3: Aerial map showing property boundaries (Source: Nearmap.com)



Figure 4: Sensitive biodiversity values map (Source: NSW DCCEEW accessed 12/10/24)

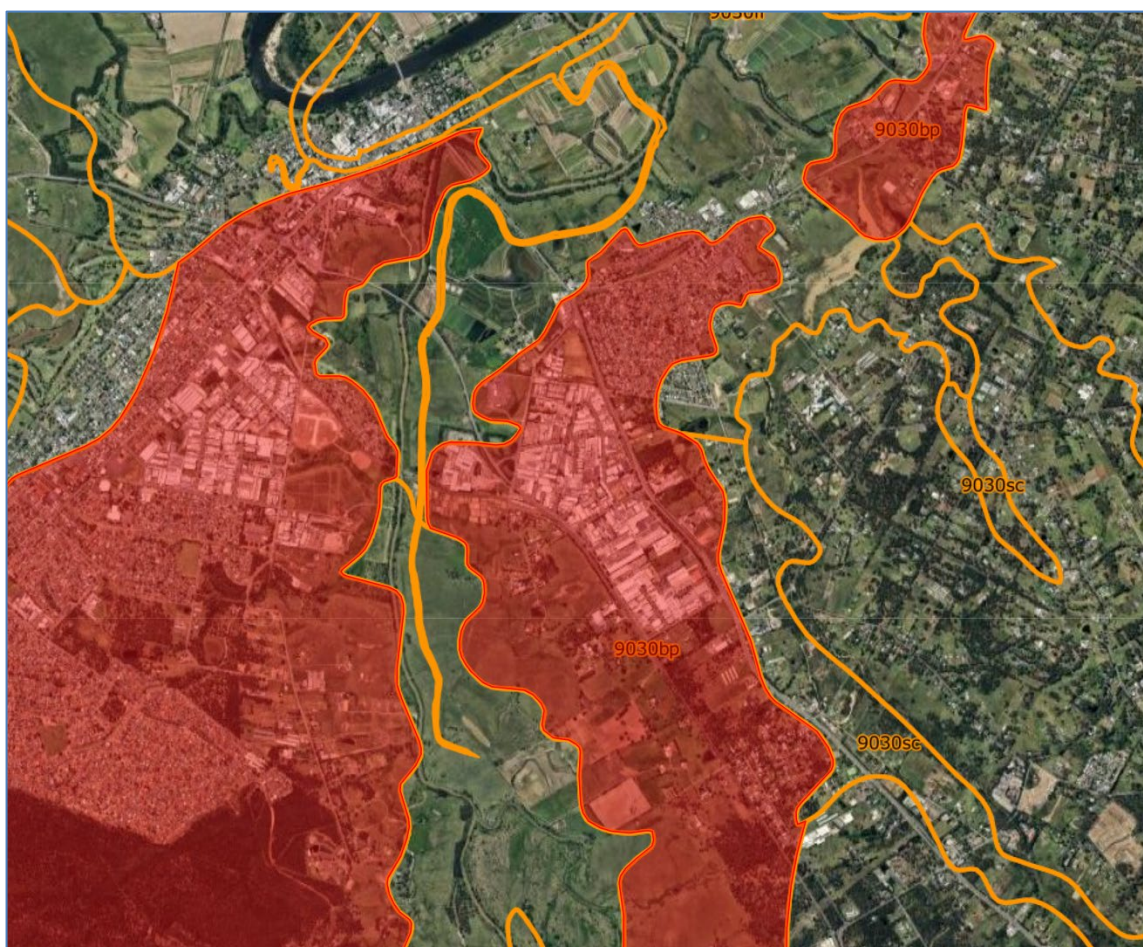
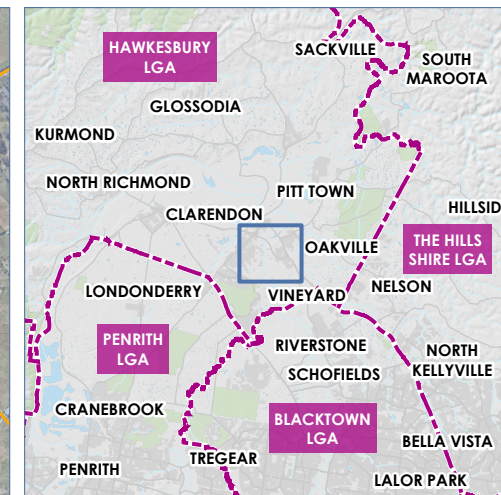
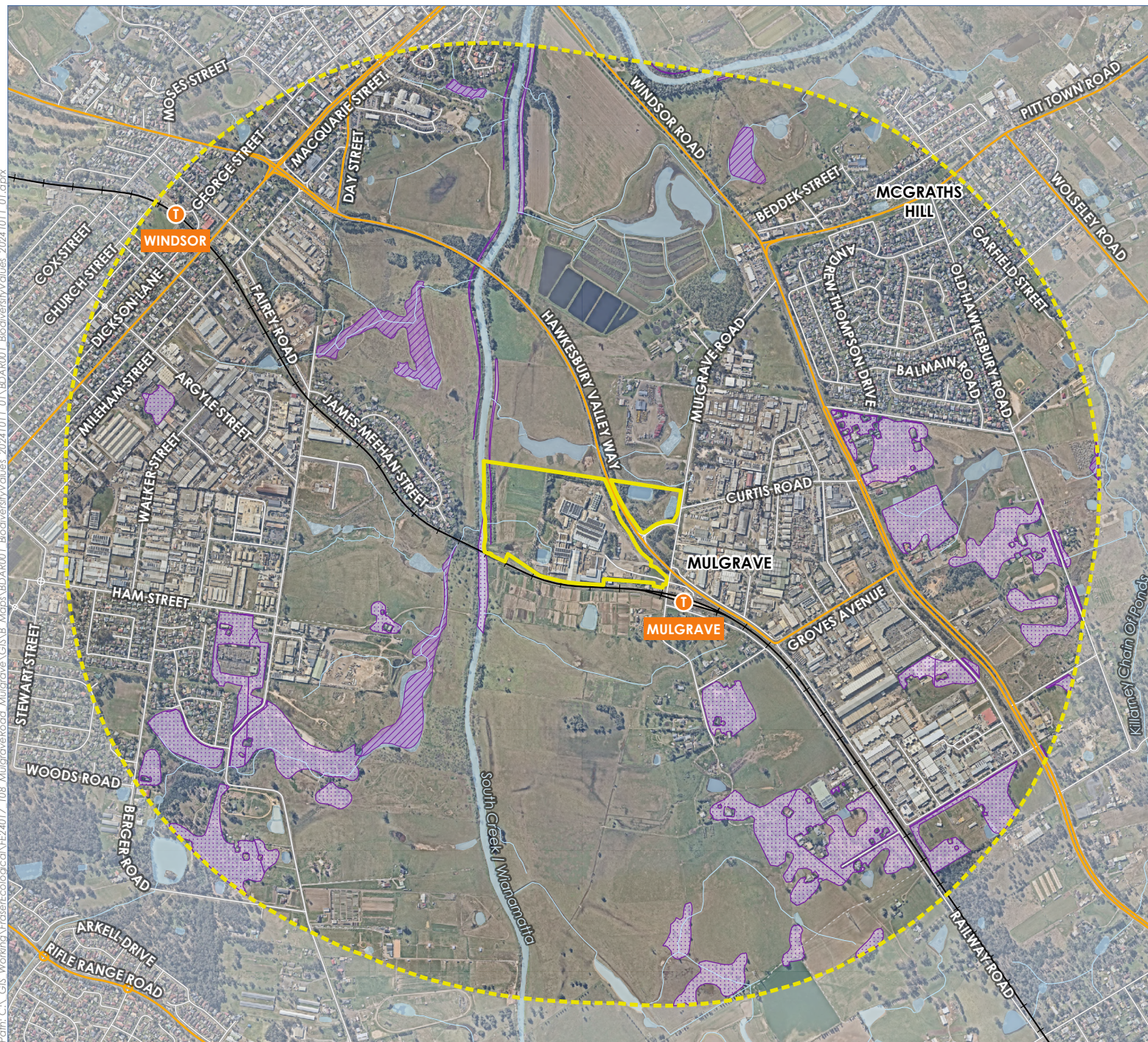


Figure 5: The site is located within the Berkshire Park Soil Landscape
(Source: E-Spade Version 2.0 managed by the NSW Office of Environment and Heritage)

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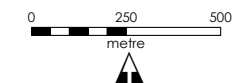
LEGEND

- Subject land (22,124 ha)
- Subject land - 1,500 m buffer (1,040,084 ha)
- Railway station
- Rail
- Minor road
- Local road
- Vehicular track
- Watercourse/drainage line
- Waterbody
- National park/reserve (refer to inset)
- Local government area (refer to inset)
- Biodiversity values mapping (DCCEW (2018) v16.14)
 - Biodiverse riparian land (1,547 ha)
 - Coastal Management Act - Wetlands (10,528 ha)
 - Threatened species or communities with potential for serious and irreversible impacts (59,367 ha)

Figure A: Subject land in relation to Biodiversity Values mapping

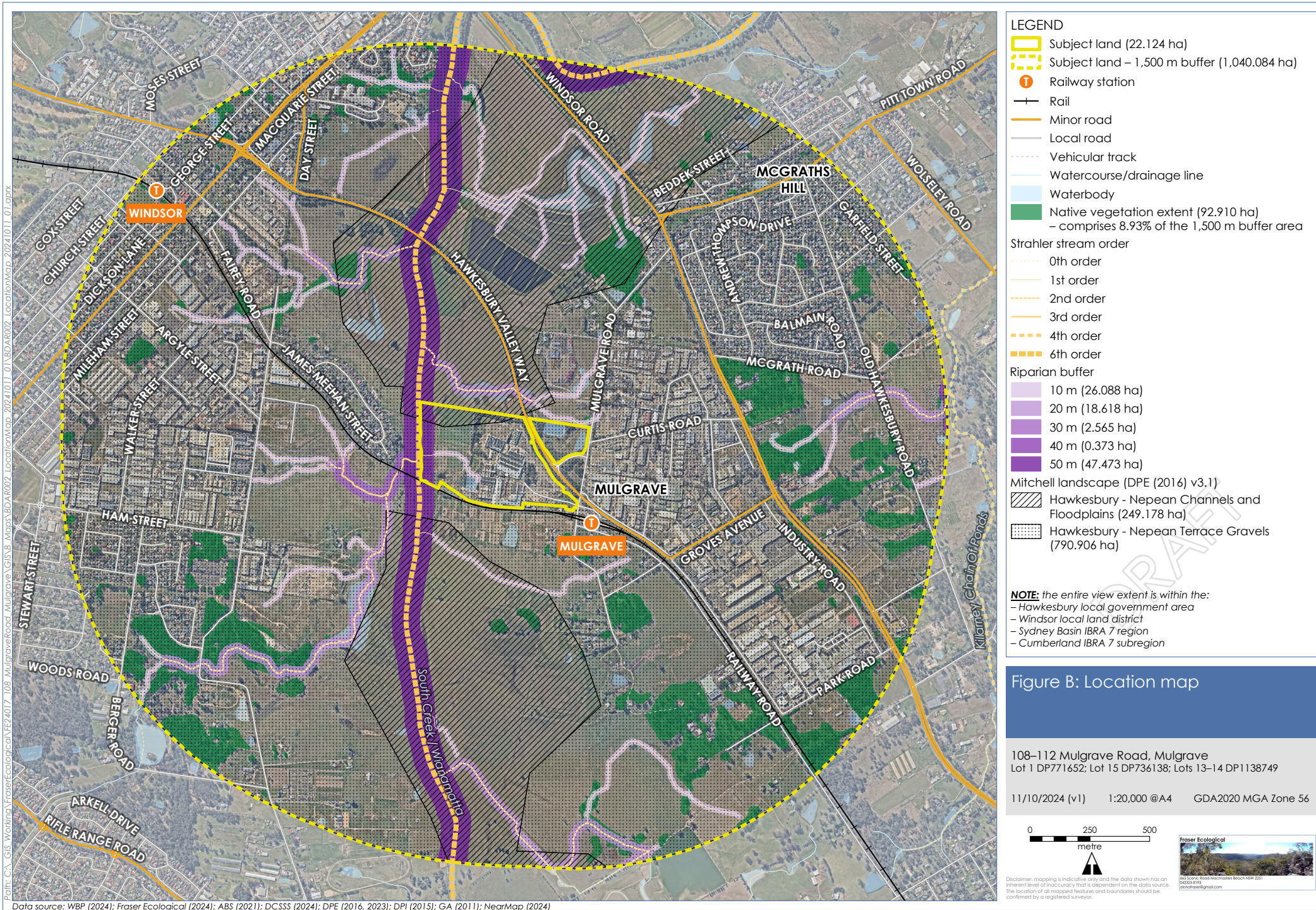
108-112 Mulgrave Road, Mulgrave
Lot 1 DP771652; Lot 15 DP736138; Lots 13-14 DP1138749

11/10/2024 (v1) 1:20,000 @A4 GDA2020 MGA Zone 56

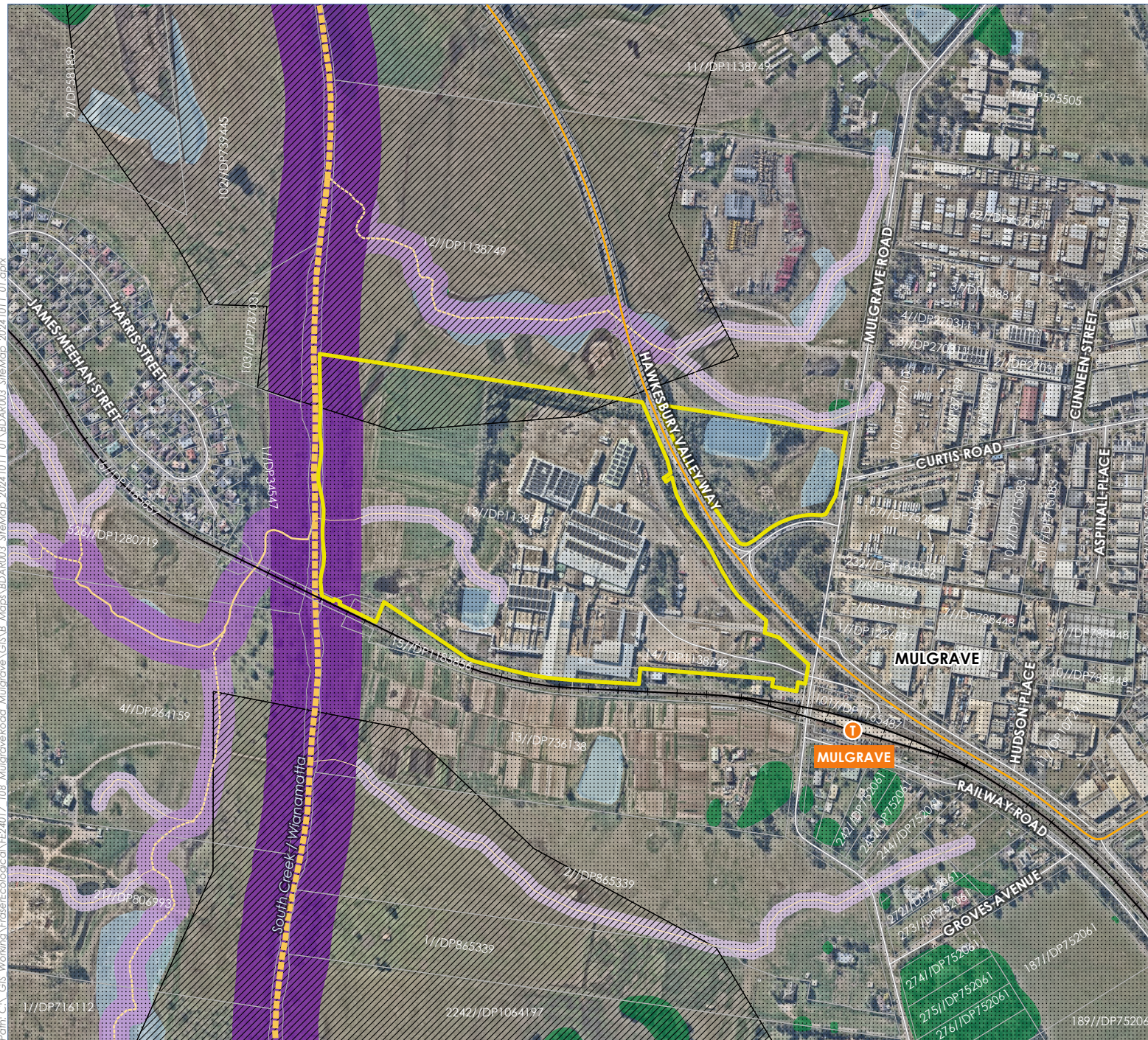


Disclaimer: mapping is indicative only and the data shown has an inherent level of inaccuracy that is dependent on the data sources. The location of all mapped features and boundaries should be confirmed by a registered surveyor.

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LEGEND

 Subject land (22.124 ha)

● Railway station

— Rail

— Minor road

— Local road

--- Vehicular track

 Waterbody

 Lot boundary

 Native vegetation extent

Strahler stream order

— 1st order

— 2nd order

— 3rd order

— 6th order

Riparian buffer

 10 m

 20 m

 30 m

 50 m

Mitchell landscape (DPE (2016) v3.1)

 Hawkesbury - Nepean Channels and Floodplains

 Hawkesbury - Nepean Terrace Gravels

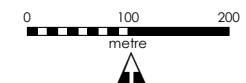
NOTE: the entire view extent is within the:

- Hawkesbury local government area
- Windsor local land district
- Sydney Basin IBRA 7 region
- Cumberland IBRA 7 subregion

Figure C: Site map

108–112 Mulgrave Road, Mulgrave
Lot 1 DP771652; Lot 15 DP736138; Lots 13–14 DP1138749

11/10/2024 (v1) 1:7,500 @A4 GDA2020 MGA Zone 56



Data source: WBP (2024); Fraser Ecological (2024); DCSSS (2024); DPE (2016, 2023); DPI (2015); GA (2011); NearMap (2024)

I.2.1 Database Searches

The following database searches were undertaken, in order to compile a list of threatened flora and fauna species predicted to occur in the area:

- Review of threatened fauna and flora records within a 10 km radius of the site, contained in the OEH Atlas of NSW Wildlife (NSW BioNet).
- Review of the MNES records within a 10 km radius of the site, using the Commonwealth Department of Environment and Energy (DEE), EPBC Act Protected Matters Search Tool.

I.2.2 Vegetation Mapping

Southeast NSW Native Vegetation Classification and Mapping (NSW OEH 2011 update)- SCIVI. VIS_ID 2230

Classification and descriptions of native vegetation types of southeast NSW (including the South Coast and parts of the eastern tablelands), and map of extant distribution of these veg types at 1:100 000 interpretation scale. Based on the South Coast - Illawarra Vegetation Integration (SCIVI) Project, which aimed to integrate many previous vegetation classification and mapping works to produce a single regional classification and map plus information on regional conservation status of vegetation types, to inform the South Coast and Illawarra Regional Strategies. Vegetation classification based on a compilation of ~ 8,500 full-floristic field survey sites from previous studies. Classified vegetation types referred to previous studies. Distribution of veg types was mapped by spatial interpolation (modelling) from classified sites, using a hybrid decision-tree/expert system. Final model was cut to 'extant' boundaries using a compiled coverage of aerial photograph interpretation (API) of woody and wetland vegetation boundaries. A total of 189 vegetation types were identified, and types related to Endangered Ecological Communities are highlighted.; VIS_ID 2230.

NSW State Vegetation Type Map (Department of Planning and Environment 2022)

The State Vegetation Type Map (SVTM) is a regional-scale map of NSW Plant Community Types. This map represents the current extent of each Plant Community Type, Vegetation Class and Vegetation Formation, across all tenures in NSW. Further, a SVTM map of pre-clearing is also available separately here. This map is updated periodically as part of the Integrated BioNet Vegetation Data program to improve quality and alignment to the NSW vegetation classification hierarchy.

It is accessed via the following link:

<https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map>

This release represents the first state-wide vegetation coverage using the NSW vegetation classification hierarchy, including the revised eastern NSW PCT classification C1.1. The “M1” in the version release number (C1.1.M1), represents the first map release against PCT master list version C1.1

This coverage supersedes pre-release versions (v1.1 and v1.1.1) and 7 individual prior regional coverages including: Sydney Metropolitan Area Mapping, SVTM Border Rivers Gwydir – Namoi, SVTM Central West – Lachlan, SVTM Riverina – Murray, SVTM Western, SVTM Central Tablelands, and SVTM Upper Hunter.

Limitations on Use: This mapping data may be used as a guide to the occurrence and distribution of Plant Community Types, Vegetation Classes, and Vegetation Formations, before and after clearing.

Users of these maps should note the following issues which will be address in future SVTM versions:

- PCT attribution errors – corrected as better information becomes available
Spatial errors or omissions (eg, gaps and slithers or mapping linework inaccuracies)
- Eastern NSW PCT classification topologies differ from central and western NSW classification topologies
- Some PCTs mapped as part of earlier regional coverages have since been discontinued
- Some PCTs approved in BioNet have not been mapped due to technical issues
- Spatial and data gaps and discontinuities may occur at the edges of former regional coverages.
- Pre-clearing coverage for central NSW is not currently available

Map data may be downloaded, viewed within the SEED Map Viewer, or accessed via the underlying ArcGIS REST Services or WMS for integration in GIS or business applications.

The Trees Near Me NSW app provides quick access to view the map using a mobile device or desktop. Download the app from Google Play or the App Store, or access the web site at <https://treesnearme.app>.

I.2.3 Literature Review

Information sources reviewed included, but were not necessarily limited to:

- Aerial Photograph Interpretation (API);
- Relevant guidelines, including:
 - OEH *Biodiversity Assessment Method*, 2017 No 469

-
- *NSW Guide to Surveying Threatened Plants* (OEH, 2016)
 - *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018)
 - *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation (DEC), 2004)
- OEH Threatened Species, Populations and Ecological Communities website
 - Commonwealth DEE Species, Profile and Threats Database;
 - OEH Threatened Species, Populations and Ecological Communities website
 - Commonwealth DEE Species, Profile and Threats Database;
 - Threatened species survey and assessment guidelines: field survey methods for fauna: Amphibians (DEC 2009);
 - NSW Guideline to Surveying Threatened Plants (OEH 2016b);
 - Operational Manual for BioMetric 3.1. (DECCW 2011);
 - Survey guidelines for Australia's threatened birds. Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2010a);
 - Survey guidelines for Australia's threatened bats. Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999(Commonwealth of Australia 2010b);
 - Survey guidelines for Australia's threatened frogs. Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2010c);
 - Survey guidelines for Australia's threatened mammals. Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2011);
 - Survey guidelines for Australia's threatened orchids.
 - Guidelines for detecting bats listed as 'threatened' under the Environment Protection and Biodiversity Conservation Act 1999(Commonwealth of Australia 2013).

It was not possible to determine with certainty all the fauna that utilise habitats in the subject site. This is because of the likely seasonal occurrences of some fauna species, the occasional occurrence of vagrant species, and because some species are difficult to detect because of their timid or cryptic behaviour. Therefore, in addition to targeted fauna surveys, investigations comprised an assessment of fauna habitats present on site and an indication of their potential to support native wildlife populations and, in particular, threatened species.

I.2.4 Other sources and consultant reports

A desktop survey was performed to ensure all relevant documentation is considered when preparing the plan. Documents and other information resources utilised include:

- Aerial photographs (Google Maps, NearMaps & DPI Land Information)
- NSW Land and Property Information SIX Maps Viewer (<https://maps.six.nsw.gov.au/>)
- The Southeast NSW Native Vegetation Classification and Mapping (NSW OEH 2010) mapped using QGIS software overlaid with cadastral boundaries obtained from the NSW Planning Portal database collection
- NSW State Vegetation Type Map (Department of Planning and Environment 2022)
- Soil Landscapes of the Sydney 1:100,000 Sheet (Chapman and Murphy 1989) using the Espade Version 2.0 managed by the NSW Office of Environment and Heritage accessed 12th October 2024

2 LANDSCAPE FEATURES

2.1 IBRA Bioregions, Subregion & Mitchell Landscapes

Dominant landscape forms have been used to divide Australia into bioregions. The site is within the **NSW Sydney Basin IBRA bioregion** and **Cumberland IBRA Subregion** (Figure 6).

Mitchell Landscapes are used to describe areas in NSW in a broad sense and group together areas with relatively homogenous geomorphology, soils and broad vegetation types and are mapped at a scale of 1:250000.

The subject site is within the Hawkesbury Nepean Terrace Gravels Landscape (Figure 7). This landscape region has an estimated cleared fraction of 0.2 and has 'over-cleared' land status.

2.2 Native Vegetation Extent

All areas of native vegetation cover, within the site and within a 1,500 m buffer area surrounding the site, have been mapped (refer to Figure A and B). It is estimated, from GIS mapping, that the native vegetation cover would be 8.9% provided within the BDAR manual and this was used in the BAM Offsets calculator (Section 6).

2.3 Wetland, Rivers, Streams and Estuaries

No significant wetlands, rivers, streams and estuaries are present within the subject land.

A mapped hydro line known as South Creek occurs along the western property boundary outside the proposed development impact area.

2.4 Connectivity Features

The biodiversity value of corridor networks is well known. Landscapes that retain more connections between patches of otherwise isolated areas of vegetation are more likely to maintain more numerous and more diverse populations of various plant and animal species (Lindenmayer and Fischer, 2006). Conversely, a lack of landscape connectivity can have a range of negative impacts on species populations (Lindenmayer and Fischer, 2006). It is thought that if existing remnants are left to persist without sufficient immigration to maintain genetic diversity, continued losses of biodiversity are certain (Parker *et al.* 2008).

The proposed development will not fragment bushland or significantly impact upon the corridor function of bushland on site as trees will be retained around the development site.

2.5 Areas of Geological Significance and Soil Hazard Features

Not present.

The site is located within the Berkshire Park soil landscape as depicted in previous Figure 5.

Characteristics of the landscape are as follows:

Landscape – gently undulating rises on Wianamatta Group shale. Local relief to 30 m; slopes are usually <5%. Broad rounded crests and ridges with gently inclined slopes. Almost completely cleared eucalypt woodland, open-forest and tall open-forest (wet sclerophyll forest).

Soils – shallow to moderately deep (<150 cm) Red Podzolic Soils and Brown Podzolic Soils (Dr3.21, Dr3.41, Db2.11) on crests, upper slopes and well-drained areas; deep (150 – 300 cm) Yellow Podzolic Soils and Soloths (Dy2.11, Dy3.41) on lower slopes and in drainage depressions and localised areas of poor drainage.

Limitations – moderately reactive, highly plastic subsoils, low soil fertility.

2.6 Areas of Outstanding Biodiversity Value

Under the BC Act, the Minister for the Environment may declare Areas of Outstanding Biodiversity Value (AOBV). These are special areas that contain irreplaceable biodiversity values that are considered important to NSW, Australia or globally.

No listed AOBV occur within the site or within a 1,500 m buffer around the site.

2.7 Site Context

2.7.1 Native Vegetation Cover

Native vegetation cover is calculated as a percentage cover on the subject land and the surrounding 1,500 m buffer area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, considering vegetation condition and extent.

The native vegetation cover is estimated at approximately 8.9%.

2.7.2 Patch Size

Patch size is used to describe an area of intact native vegetation, that includes native vegetation with a gap of less than 100 m from the next area of moderate to good condition native vegetation. This gap is less than or equal to 30 m for non-woody ecosystems.

The patch size for the vegetation on-site is less than 10 hectares.

3 NATIVE VEGETATION

3.1 Native Vegetation Extent Within the Site

The total area of native vegetation occurring within the subject site proposed for removal is 1.5 ha for the BAM calculator.

PCT	Vegetation Zone
PCT 4025 Planted Cumberland Red Gum Riverflat Forest (plantings – not remnant vegetation)	Vegetation Zone A (1.5 ha)

3.2 Plant Community Types

The site comprises of an existing industrial use facility with extensive areas of factory buildings and associated hard surfaces.

The surrounding areas subject to the proposed development include existing open areas of compacted fill, stormwater detention basins/ ponds and boundary screen plantings that comprise of native species.

There are also native planted areas on the embankment immediately to the west of the existing buildings (subject to proposed removal). The western most portion of this subject property comprises of introduced exotic pastureland.

We have broken up the site into the following vegetation zones for ease of reference as follows:

- Vegetation Zone A: Native landscape plantings (proposed for removal)
- Vegetation Zone B: Exotic pastureland and dams (proposed for modification)

-
- Vegetation zone C: Native landscape plantings adjacent to South Creek (proposed for retention)

Photographs have been provided on the following pages.

3.2.1 Plant communities recorded on site

The site comprises of an existing industrial use facility with extensive areas of factory buildings and associated hard surfaces.

The surrounding areas subject to the proposed development include existing open areas of compacted fill, stormwater detention basins/ ponds and boundary screen plantings that comprise of native species.

There are also native planted areas on the embankment immediately to the west of the existing buildings (subject to proposed removal). The western most portion of this subject property comprises of introduced exotic pastureland. Planted native vegetation occurs on the western property boundary adjoining South Creek.

We have broken up the site into the following vegetation zones for ease of reference as follows:

- Vegetation Zone A: Native landscape plantings (proposed for removal)
- Vegetation Zone B: Exotic pastureland and dams (proposed for modification)
- Vegetation zone C: Native plantings adjacent to South Creek

Photographs have been provided on the following pages.

Vegetation Zone A: Native landscape plantings (proposed for removal)

Native landscape plantings occur on the embankment immediately to the west of the existing operating factory infrastructure as depicted in Figure 7. It comprises of the following native species:

Tree (TG)	Acacia parramattensis
Tree (TG)	Acacia decurrens
Tree (TG)	Eucalyptus amplifolia

Tree (TG)	Eucalyptus moluccana
Tree (TG)	Eucalyptus crebra
Tree (TG)	Casuarina glauca
Tree (TG)	Allocasuarina littoralis
Tree (TG)	Acacia binervata
Tree (TG)	Grevillea robusta
Shrub (SG)	Bursaria spinosa
Shrub (SG)	Ozothamnus diosmifolius
Shrub (SG)	Breynia oblongifolia
Shrub (SG)	Acacia floribunda
Grass & grasslike (GG)	Oplismenus aemulus
Grass & grasslike (GG)	Lomandra longifolia
Grass & grasslike (GG)	Cynodon dactylon
Grass & grasslike (GG)	Imperata cylindrica
Forb (FG)	Dichondra repens

Whilst it is acknowledged that they are not remnant species, plantings species composition is consistent with PCT 4025 - Cumberland Red Gum Riverflat Forest, and therefore this has been mapped accordingly.

The plantings are various ages up to 20 years old and provide a privacy screen.

There is also a high abundance of introduced environmental weed species that are listed as follows:

- *Cardamine paucijuga* Bitter-cress X
- *Centipeda minima* Spreading Sneezeweed
- *Potamogeton tricarinatus* Floating Pondweed
- *Paspalidium distans* Paspalidium

-
- *Paspalum distichum* Water Couch
 - *Alternanthera denticulata* Lesser Joyweed
 - *Eragrostis leptostachya* Paddock Love-grass
 - *Chloris truncata* Windmill Grass X
 - *Epaltes australis* Spreading Nut-heads
 - *Hypericum gramineum* Small St John's Wort
 - *Hypoxis hygrometrica* Golden Weather-grass
 - *Rumex* sp. Dock
 - *Solanum pungetium* Jagged Nightshade X
 - *Sporobolus creber* Slender Rats-tail Grass
 - *Urtica incisa* Stinging Nettle X
 - *Alternanthera pungens* Khaki Weed
 - *Araujia hortorum* Moth Vine
 - *Axonopus fissifolius* Carpet Grass
 - *Chloris gayana* Rhodes Grass
 - *Cirsium vulgare* Spear Thistle
 - *Conyza* sp. Fleabane
 - *Cirsium vulgare* Spear Thistle
 - *Cestrum parqui* Green Cestrum
 - *Cyperus brevifolius* Sedge
 - *Datura stromonium* Common Thornapple
 - *Ehrarta erecta*
 - *Eragrostis curvula* African Lovegrass
 - *Gamochaeta americana* American Cudweed
 - *Gomphrena celosioides* Gomphrena
 - *Grevillea robusta* Silky Oak
 - *Heliotropium amplexicaule* Blue Heliotrope
 - *Lantana camara* Lantana
 - *Ligustrum sinense* Small-leaved Privet
 - *Ludwigia peploides* Water Primrose
 - *Modiola caroliniana* Red-flowered Mallow
 - *Morus* Mulberry
 - *Opuntia stricta* Prickly Pear
 - *Paspalum dilatatum* Paspalum
 - *Pennisetum clandestinum* Kikuyu Grass
 - *Phytolacca octandra* Inkweed
 - *Rubus fruticosus* sp. agg. Blackberry
 - *Senecio madagascariensis* Fireweed
 - *Setaria gracilis* Slender Pigeon Grass
 - *Sida rhombifolia* Paddy's Lucerne
 - *Solanum nigrum* Black Nightshade

-
- *Sporobolus indicus* Parramatta Grass
 - *Stellaria flaccida* Chickweed
 - *Verbena bonariensis* Purpletop
 - *Yucca aloifolia* Yucca

This vegetation zone is impacted by the proposed development (despite it being planted native vegetation), and therefore, data recorded on-site forms the BAM plot that has been entered into the BAM calculator.

Vegetation Zone B: Exotic pastureland and dams (proposed for modification)

The paddocks on the property are dominated by exotic species, particularly Kikuyu Grass *Pennisetum clandestinum*, and other introduced species such as *Paspalum dilatatum*, Carpet Grass *Axonopus fissifolius*, Slender Pigeon Grass *Setaria gracilis* and Parramatta Grass *Sporobolus indicus*.

The native and common Couch Grass *Cynodon dactylon* is also present and sometimes common. Pasture weeds such as Spear Thistle *Cirsium vulgare*, Fireweed *Senecio madagascariensis*, Paddy's Lucerne *Sida rhombifolia* and Purpletop *Verbena bonariensis* are common in most places.

With the exception of the farm dam in the north-eastern corner, the dams on the property are poorly vegetated.

They contain a few wetland plant species, e.g. Water Couch *Paspalum distichum*, Spreading Sneezeweed *Centipeda minima*, Floating Pondweed *Potamogeton tricarlinatus*, Common Rush *Juncus usitatus*, and the exotic Water Primrose *Ludwigia peploides*, but these species are not extensive in occurrence. The dam in the north-eastern corner, however, contains wetland plants and is edged with occasional trees and shrubs.

The site adjoining the existing substrate plant at Mulgrave is on unnatural ground that has been recontoured over the years. There is no naturally occurring native vegetation on the site, which is dominated by Kikuyu Grass *Pennisetum clandestinum* and has previously been grazed by cattle.

Vegetation zone C: Native plantings adjacent to South Creek (proposed for retention)

Kevin Mills and Associates (KMA) undertook previous ecological surveys along the western boundary of the site adjoining South Creek for the original development application under the former *Threatened Species Conservation Act 1995* guidelines and

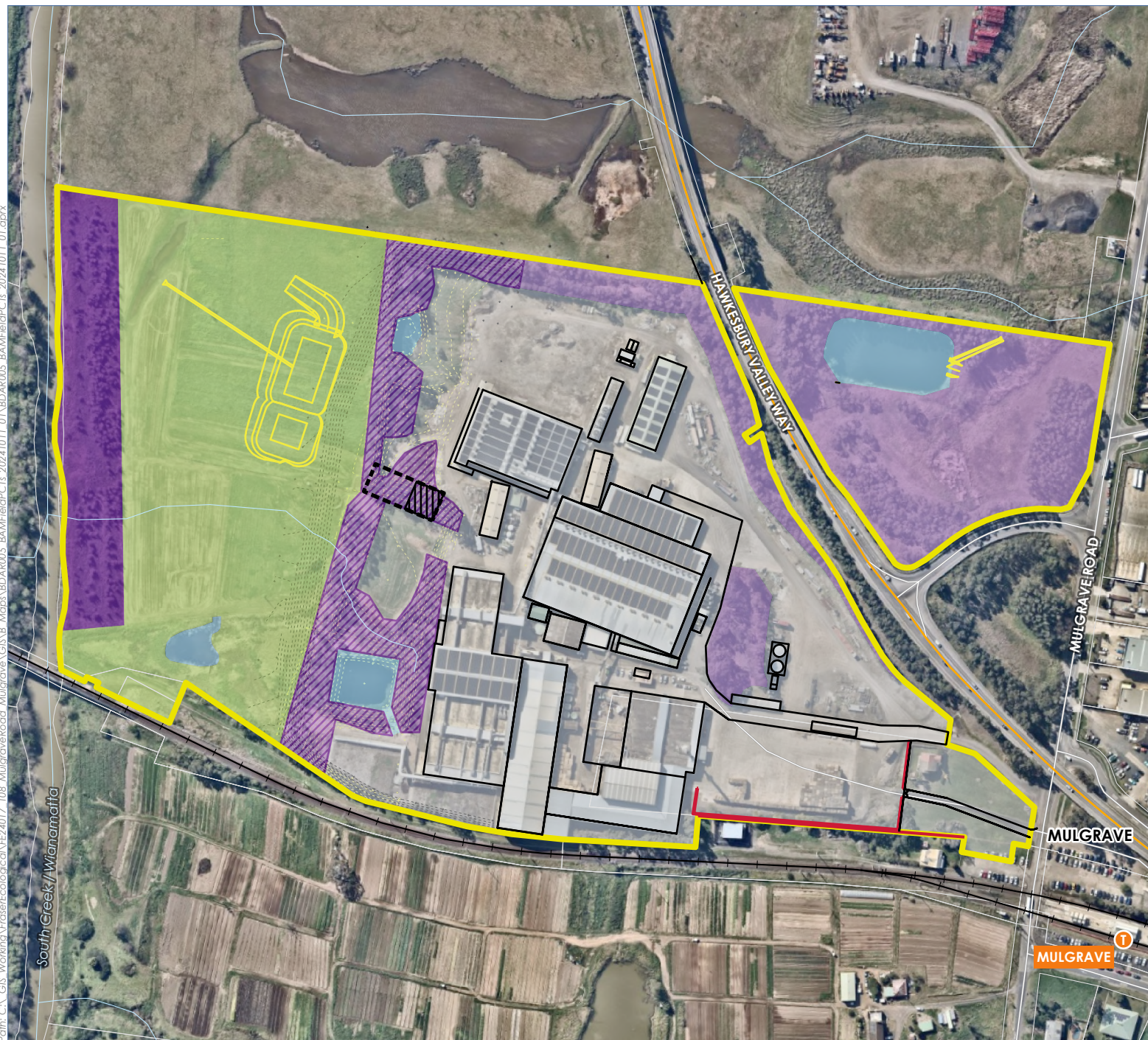
previous vegetation mapping systems used by the government at the time. They did not record any threatened flora or fauna on the site.

KMA noted that the site adjoining the existing substrate plant at Mulgrave is on unnatural ground that has been recontoured over the years. There is no naturally occurring native vegetation on the site, which is dominated by Kikuyu Grass *Pennisetum clandestinum* and is currently grazed by cattle. There are strips of planted trees in the surrounding area, these are local tree species planted to provide a visual screen. The small dam in the paddock to the north, will be enlarged to accommodate runoff from the new facility.

Native grasses and herbs dominated in only a few locations.

Figure 6: NSW State Vegetation Type Map and field validated vegetation zones

Path: C:\GIS\Working\FraserEcological\VE24017 108 MulgraveRoad\Mulgrave\GIS\B_Maps\BDA005 BAMFieldPCTs 2024\01\01.dbx



Data source: WBP (2024); Fraser Ecological (2024); DCSSS (2024); DPE (2023); NearMap (2024)

LEGEND

- Subject land (22.124 ha)
- Site detail
- Noise barrier
- Proposed basin works
- Proposed fill (existing topography)
- Proposed final topography
- Cleared
- Waterbody
- Exotic grassland

PCT 4025 | Cumberland Red Gum Riverflat Forest

- Planted (retain) (1.208 ha)
- Planted (retain) (3.370 ha)
- Planted (impacted) (1.514 ha)

BAM plot location

- 20 m x 20 m
- 20 m x 50 m

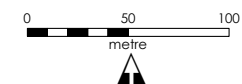
Existing environment

- Railway station
- Rail
- Minor road
- Local road
- Watercourse/drainage line
- Lot boundary

Field-validated vegetation mapping & BAM plot survey locations

108-112 Mulgrave Road, Mulgrave
Lot 1 DP771652; Lot 15 DP736138; Lots 13-14 DP1138749

15/10/2024 (v1) 1:3,750 @A4 GDA2020 MGA Zone 56



Disclaimer: mapping is indicative only and the data shown has an inherent level of inaccuracy that is dependent on the data source. The location of all mapped features and boundaries should be confirmed by a registered surveyor.

3.2.2 Fauna habitat and species

No significant fauna habitats occur within the proposed development area and for the remainder of the property with the exception of the planted riparian habitat outside the western most boundary within South Creek.

No hollow bearing trees were recorded on-site.

The man-made stormwater detention basins provide poor quality habitat for common water bird species and is not considered significant or important wetland habitat. This is due to the industrial nature of these ponds and the dominance of aquatic weeds. They are not likely to be used by threatened amphibians because the western overflow dam is to be maintained to be empty as an existing condition of consent.

There are some native plant species including *Typha orientalis* that have colonised the basin edges.

A summary of the fauna habitat assessment is provided in Table 2 (below).

Table 2: Fauna habitat assessment

Notes 21 Fauna Habitat Assessment

TOPOGRAPHY				
Flat	Gentle ✓	Moderate ✓	Steep ✓	Drop-offs
VEGETATION STRUCTURE				
Closed Forest	Open Forest	Woodland ✓	Heath	Grassland ✓
DISTURBANCE HISTORY				
Fire	Under-scrubbing ✓		Cut and fill works - Drainage culvert	
Tree clearing ✓	Grazing ✓		Mowing ✓	
SOIL LANDSCAPE				
DEPTH:	Deep	Moderate ✓	Shallow	Skeletal
TYPE:	Clay ✓	Loam ✓	Sand	Organic
VALUE:	Surface foraging		Sub-surface foraging	Denning/burrowing
WATER RETENTION:	Well Drained ✓	Damp / Moist ✓	Water logged ✓	Swamp / Soak
ROCK HABITAT				
CAVES:	Large	Small	Deep	Shallow
CREVICES:	Large	Small	Deep	Shallow
ESCARPMENTS:	Winter / late sunny aspects		Shaded winter / late aspects	
OUTCROPS:	High Surface Area Hides		Med. Surface Area Hides	Low Surface Area Hides
SCATTERED / ISOLATED:	High Surface Area Hides		Med. Surface Area Hides	Low Surface Area Hides
FEED RESOURCES				
FLOWERING TREES:	Eucalypts ✓	Corymbias		Melaleucas ✓
	Banksias	Acacias		
SEEDING TREES:	Allocasuarinas ✓	Conifers		
WINTER FLOWERING EUCALYPTS:	<i>C. maculata</i>	<i>E. crebra</i> ✓	<i>E. globoidea</i>	<i>E. sideroxylon</i>
	<i>E. squamosa</i>	<i>E. grandis</i>	<i>E. multicaulis</i>	<i>E. scias</i>
	<i>E. robusta</i>	<i>E. tereticornis</i>	<i>E. agglomerata</i>	<i>E. siderophloia</i>
FLOWERING PERIODS:	Autumn	Winter	Spring	Summer

OTHER:	Mistletoe	Figs / Fruit	Sap / Manna	Termites
FOLIAGE PROTECTION				
UPPER STRATA:	Dense	Moderate	Sparse	✓
MID STRATA:	Dense	Moderate	Sparse	
PLANT / SHRUB LAYER:	Dense	Moderate	Sparse	
GROUNDCOVERS:	Dense	Moderate	Sparse	✓
HOLLOWES / LOGS				
TREE HOLLOWES:	Large	Medium	Small	
TREE HOLLOW TYPES	Spouts / branch	Trunk	Broken Trunk	Basal Cavities Stags
GROUND HOLLOWES:	Large	Medium	Small	
VEGETATION DEBRIS				
FALLEN TREES:	Large	Medium	Small	
FALLEN BRANCHES:	Large	Medium	Small	
LITTER:	Deep	Moderate	Shallow	✓
HUMUS:	Deep	Moderate	Shallow	✓
DRAINAGE CATCHMENT				
WATER BODIES	Wetland(s)	Soak(s)	Dam(s) ✓	Drainage line(s) Creek(s) River(s)
RATE OF FLOW:	Still ✓	Slow	Rapid	
CONSISTENCY:	Permanent	Perennial	Ephemeral	
RUNOFF SOURCE:	Urban / Industrial ✓	Parkland	Grazing	Natural
RIPARIAN HABITAT:	High quality	Moderate quality	Low quality	Poor quality
ARTIFICIAL HABITAT				
STRUCTURES:	Sheds	Infrastructure ✓	Equipment	
SUB-SURFACE	Pipe / culvert(s)	Tunnel(s)	Shaft(s)	
FOREIGN MATERIALS:	Sheet	Pile / refuse ✓		

3.2.3 Plot-based Floristic Vegetation Surveys

Plot-based floristic vegetation surveys were conducted, in accordance with s.5.2.1.9 of the BAM, by Alex Fraser on the 3rd October 2024 and their location is shown in Figure 7.

One 20 m x 20 m plot were sampled for the presence of flora species within each vegetation zone. The plot was carefully examined to identify all flora species present. Searches continued until it was confident that all flora species within a plot were detected. Data collected for each species included:

- Stratum and layers in which each species occurs
- Growth form for each species
- Scientific and common name for each species
- Percentage foliage cover (PFC) across the plot, of each species rooted in or overhanging the plot
- Abundance rating for each species

Plant Community Types (PCTs) on the site were identified according to the NSW PCT classification described in the BioNet Vegetation Classification.

Vegetation zone A is the only location where BAM lots were undertaken as this is the only area impacted by the proposed development. As mentioned earlier, whilst it is acknowledged that they are not remnant species, plantings species composition is consistent with PCT 4025 - Cumberland Red Gum Riverflat Forest, and therefore has been mapped accordingly.

A map showing the distribution of PCTs has been provided including the NSW state-wide PCT vegetation mapping (refer to Figure D on the following page).

Plot data is provided in Appendix B.

The location of the BAM plot is provided within Figure 7.



Photograph 1: Vegetation Zone A - BAM Plot midline (view south)



Photograph 2: Vegetation Zone A - BAM Plot midline (view north)



Photograph 3: Plantings of native species adjacent to the existing detention pond in the southern portion of the proposed development site



Photograph 4: View eastwards towards the existing infrastructure showing native planted screen trees in the southern portion of the proposed development area



Photograph 5: Edge of native planted screen trees and pasture grass paddocks in the northern portion of the proposed development area



Photograph 6: Edge of native planted screen trees and pasture grass paddocks in the northern portion of the proposed development area - view towards northern boundary



Photograph 7: Edge of native planted screen trees and pasture grass paddocks in the northern portion of the proposed development area - view towards the southern boundary



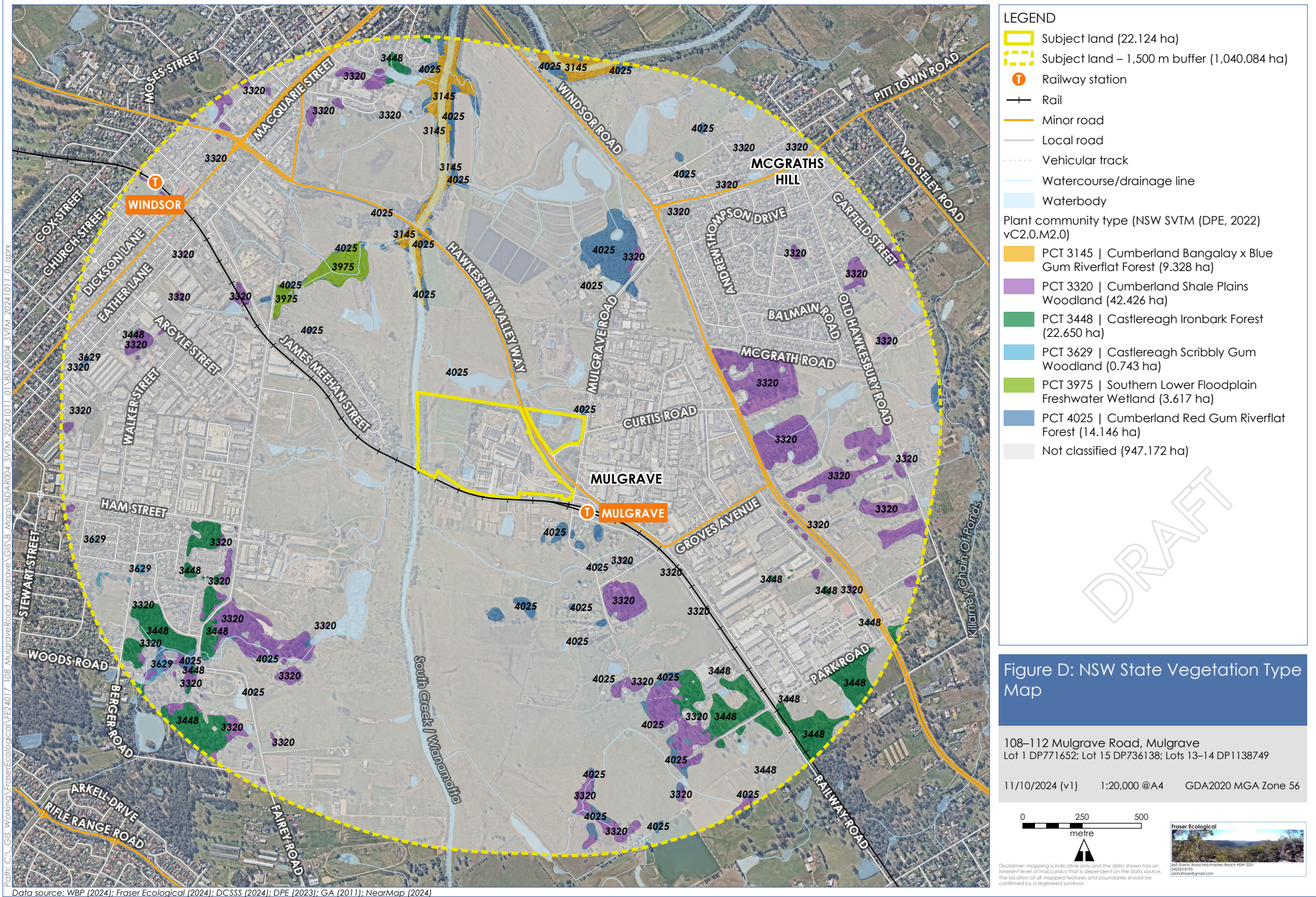
Photograph 8: Interface area between existing infrastructure and the detention basin in the northern portion of the proposed development area - dominated by introduced grasses and other weeds with native screen tree plantings in the background



Photograph 9: existing stormwater detention basin surrounded by native screen tree plantings in the northern portion of the proposed development area



Figure 7: Location of BAM plot (red rectangle)



BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 4025

PCT Name: Cumberland Red Gum Riverflat Forest

Classification Confidence Level: 3-Medium

Total Number of Replicates: 80

Number of Primary Replicates: 66

Number of Secondary Replicates: 14

Vegetation Description: A tall to extremely tall sclerophyll open forest with a mid-stratum of soft-leaved shrubs and small trees and dense, grassy ground layer situated on the alluvial flats alongside streams that drain the Cumberland Plain or more rarely the broad alluvial flats of the Hawkesbury and Nepean river systems to the west of Sydney. The canopy almost always includes red gums (*Eucalyptus tereticornis*, *Eucalyptus amplifolia*), occasionally associated with an apple (*Angophora floribunda*, *Angophora subvelutina*), which may be locally prominent. A sparse mid-stratum almost always includes *Bursaria spinosa* and one or more *Acacia* species, of which *Acacia parramattensis* is the most frequent and abundant. The ground layer is typically characterised by a dense cover of grasses along with soft-leaved forbs and ferns. A high cover of *Microlaena stipoides* is almost always present with more scattered *Dichondra repens*, *Oplismenus aemulus* and *Solanum prinophyllum* being very frequent. The largest remaining areas are situated along the smaller streams and, while widespread, this PCT primarily occurs in small, often disturbed patches and is threatened by ongoing weed invasion following flood events. It typically occurs in a warm, moist climate at low elevation with a mean of 60 metres asl, however may occur up to 320 metres in southern parts of the Cumberland Plain. Where saline soils occur on the floodplain, this PCT grades into PCT 4023 which includes *Casuarina glauca* in its canopy. Where the floodplain narrows in valleys with sandstone escarpments upslope, it grades into PCT 4058 which includes a wider range of shrubs and scramblers including *Sigesbeckia orientalis* subsp. *orientalis*, *Breynia oblongifolia* and *Rubus parvifolius*. As elevation or distance from the margin of the floodplain increases, this PCT grades into grassy woodlands of the Cumberland Plain (PCT 3320) in which *Eucalyptus moluccana* is common.

Vegetation Formation: Forested Wetlands;

Vegetation Class: Coastal Floodplain Wetlands;

IBRA Bioregion(s): Sydney Basin;

IBRA Sub-region(s): Burragorang; Cumberland; Yengo;

LGA: BLACKTOWN; CAMDEN; CAMPBELLTOWN; FAIRFIELD; HAWKESBURY; LIVERPOOL; CITY OF PARRAMATTA; PENRITH; RYDE; THE HILLS SHIRE; WOLLONDILLY;

Elevation (m) (Min, Median, Max): 2.5 52.5 327.6

Annual Rainfall (mm) (Min, Median, Max): 742 836 1002

Annual Mean Temperature (deg C) (Min, Median, Max): 14.72 16.61 17.12

Median Native Species Richness per plot: 32

TEC Assessed: Has associated TEC

TEC List: Listed BC Act,CE: Elderslie Banksia Scrub Forest (Part); Listed BC Act,E: River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part); Listed EPBC Act,CE: River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Part); Listed EPBC Act,CE: Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion (Part);

TEC Comments: (Comment TEC1) Relates to the NSW Elderslie Banksia Scrub Forest TEC where it occurs on the Tertiary alluvium of Spring Farm Elderslie area as per Section 4.3 of the Final Determination. (Comment TEC2) Relates to the NSW River-Flat Eucalypt Forest on Coastal Floodplains TEC where it occurs within stated elevation range as per paragraph 1 of the Final Determination. (Comment TEC3) Relates to the Commonwealth Elderslie Banksia Scrub Forest TEC where it occurs on the Tertiary alluvium of Spring Farm Elderslie area as per Section 3.5.1 of the Conservation Advice. (Comment TEC4) Relates to the Commonwealth River-flat Eucalypt Forest on Coastal Floodplains TEC where it occurs at elevations below 250 m asl and satisfies condition thresholds as per section 5.2 of the Conservation Advice.

PCT Percent Cleared: 88.84

PCT Definition Status: Approved

Species By Growth Form Group

Growth Form Group	Species	Median cover score	Frequency
Unassigned (UA)	<i>Wurmbea dioica</i>	1	2
Fern (EG)	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	2	69
Fern (EG)	<i>Adiantum aethiopicum</i>	2	25
Fern (EG)	<i>Blechnum spinulosum</i>	2	8
Fern (EG)	<i>Pellaea falcata</i>	2	8
Fern (EG)	<i>Pteridium esculentum</i>	2	8
Fern (EG)	<i>Asplenium flabellifolium</i>	2	7
Fern (EG)	<i>Cheilanthes distans</i>	1	5
Fern (EG)	<i>Doodia aspera</i>	1	5
Fern (EG)	<i>Adiantum hispidulum</i>	2	2

Fern (EG)	Davallia solida var. pyxidata	2	2
Fern (EG)	Pellaea paradoxa	2	2
Forb (FG)	Dichondra repens	2	90
Forb (FG)	Solanum prinophyllum	2	75
Forb (FG)	Lobelia purpurascens	2	67
Forb (FG)	Oxalis perennans	2	66
Forb (FG)	Veronica plebeia	2	54
Forb (FG)	Wahlenbergia gracilis	2	49
Forb (FG)	Brunoniella australis	2	47
Forb (FG)	Commelina cyanea	2	46
Forb (FG)	Centella asiatica	2	40
Forb (FG)	Einadia hastata	2	40
Forb (FG)	Poranthera microphylla	2	40
Forb (FG)	Sigesbeckia orientalis subsp. orientalis	2	37
Forb (FG)	Galium leiocarpum	2	32
Forb (FG)	Opercularia diphylla	1	23
Forb (FG)	Plectranthus parviflorus	2	22
Forb (FG)	Dianella longifolia	1	20
Forb (FG)	Arthropodium milleflorum	2	19
Forb (FG)	Einadia trigonos	2	19
Forb (FG)	Hypericum gramineum	2	16
Forb (FG)	Plantago debilis	2	16
Forb (FG)	Tricoryne elatior	1	16
Forb (FG)	Oxytes brachypoda	1	14
Forb (FG)	Rumex brownii	1	14
Forb (FG)	Alternanthera denticulata	1	13
Forb (FG)	Euchiton sphaericus	2	13
Forb (FG)	Hydrocotyle sibthorpioides	2	13
Forb (FG)	Vernonia cinerea	1	13
Forb (FG)	Phyllanthus similis	2	11
Forb (FG)	Asperula conferta	2	10
Forb (FG)	Geranium solanderi	2	10
Forb (FG)	Caesia parviflora	2	8
Forb (FG)	Phyllanthus virgatus	1	8
Forb (FG)	Pseuderanthemum variabile	2	8
Forb (FG)	Stellaria flaccida	2	8
Forb (FG)	Geranium homeanum	2	7
Forb (FG)	Haloragis heterophylla	2	7
Forb (FG)	Hypoxis hygrometrica	2	7
Forb (FG)	Lagenophora gracilis	2	7
Forb (FG)	Laxmannia gracilis	1	7
Forb (FG)	Persicaria decipiens	2	7
Forb (FG)	Scutellaria humilis	2	7

Forb (FG)	Senecio diaschides	2	7
Forb (FG)	Senecio hispidulus	1	7
Forb (FG)	Solanum pungetium	2	7
Forb (FG)	Ajuga australis	1	5
Forb (FG)	Brunoniella pumilio	2	5
Forb (FG)	Cardamine paucijuga	1	5
Forb (FG)	Dianella caerulea	1	5
Forb (FG)	Eclipta platyglossa	2	5
Forb (FG)	Galium leptogonium	2	5
Forb (FG)	Goodenia hederacea	1	5
Forb (FG)	Hydrocotyle laxiflora	2	5
Forb (FG)	Mentha satureioides	1	5
Forb (FG)	Persicaria hydropiper	2	5
Forb (FG)	Persicaria praetermissa	1	5
Forb (FG)	Scaevola albida	2	5
Forb (FG)	Alisma plantago-aquatica	1	4
Forb (FG)	Brachyscome angustifolia	2	4
Forb (FG)	Centipeda minima subsp. minima	2	4
Forb (FG)	Cotula australis	2	4
Forb (FG)	Desmodium rhytidophyllum	1	4
Forb (FG)	Dichondra sp. Inglewood	4	4
Forb (FG)	Einadia nutans	2	4
Forb (FG)	Galium gaudichaudii	2	4
Forb (FG)	Oxalis exilis	2	4
Forb (FG)	Pomax umbellata	2	4
Forb (FG)	Schenkia spicata	1	4
Forb (FG)	Sida corrugata	2	4
Forb (FG)	Veronica calycina	2	4
Forb (FG)	Viola hederacea	2	4
Forb (FG)	Wahlenbergia communis	2	4
Forb (FG)	Xerochrysum bracteatum	2	4
Forb (FG)	Arthropodium minus	2	2
Forb (FG)	Arthropodium sp. South-east Highlands	1	2
Forb (FG)	Calotis cuneifolia	1	2
Forb (FG)	Centipeda cunninghamii	2	2
Forb (FG)	Crassula sieberiana	2	2
Forb (FG)	Cycnogeton procerum	2	2
Forb (FG)	Cymbonotus lawsonianus	1	2
Forb (FG)	Daucus glochidiatus	2	2
Forb (FG)	Desmodium gunnii	1	2
Forb (FG)	Einadia polygonoides	2	2
Forb (FG)	Euchiton involucratu	2	2
Forb (FG)	Gonocarpus tetragynus	1	2

Forb (FG)	Goodenia paniculata	1	2
Forb (FG)	Hydrocotyle pterocarpa	1	2
Forb (FG)	Hydrocotyle tripartita	1	2
Forb (FG)	Hypoxis pratensis	2	2
Forb (FG)	Lagenophora stipitata	1	2
Forb (FG)	Lobelia anceps	2	2
Forb (FG)	Myriophyllum variifolium	2	2
Forb (FG)	Opercularia aspera	1	2
Forb (FG)	Opercularia hispida	1	2
Forb (FG)	Opercularia varia	1	2
Forb (FG)	Persicaria lapathifolia	1	2
Forb (FG)	Plectranthus graveolens	2	2
Forb (FG)	Pseudognaphalium luteoalbum	2	2
Forb (FG)	Samolus valerandi	1	2
Forb (FG)	Senecio bathurstianus	2	2
Forb (FG)	Senecio minimus	1	2
Forb (FG)	Senecio quadridentatus	1	2
Forb (FG)	Solanum opacum	1	2
Forb (FG)	Stackhousia viminea	1	2
Forb (FG)	Tetragonia tetragonioides	2	2
Forb (FG)	Thysanotus tuberosus	1	2
Forb (FG)	Tricoryne simplex	1	2
Forb (FG)	Urtica incisa	2	2
Forb (FG)	Wahlenbergia stricta	1	2
Forb (FG)	Wurmbea biglandulosa	2	2
Grass & grasslike (GG)	Microlaena stipoides	4	100
Grass & grasslike (GG)	Oplismenus aemulus	2	81
Grass & grasslike (GG)	Entolasia marginata	2	66
Grass & grasslike (GG)	Echinopogon ovatus	2	57
Grass & grasslike (GG)	Eragrostis leptostachya	2	47
Grass & grasslike (GG)	Echinopogon caespitosus	2	37
Grass & grasslike (GG)	Themeda triandra	2	32
Grass & grasslike (GG)	Dichelachne micrantha	1	31
Grass & grasslike (GG)	Lomandra longifolia	2	31
Grass & grasslike (GG)	Paspalidium distans	2	28
Grass & grasslike (GG)	Cynodon dactylon	2	25
Grass & grasslike (GG)	Cyperus gracilis	2	23
Grass & grasslike (GG)	Lomandra filiformis	1	23
Grass & grasslike (GG)	Juncus usitatus	2	20
Grass & grasslike (GG)	Aristida vagans	2	19
Grass & grasslike (GG)	Digitaria parviflora	1	17
Grass & grasslike (GG)	Oplismenus imbecillis	2	17
Grass & grasslike (GG)	Entolasia stricta	2	14

Grass & grasslike (GG)	Sporobolus creber	1	14
Grass & grasslike (GG)	Carex longebrachiata	1	13
Grass & grasslike (GG)	Eragrostis brownii	2	13
Grass & grasslike (GG)	Rytidosperma racemosum	2	13
Grass & grasslike (GG)	Carex inversa	2	11
Grass & grasslike (GG)	Gahnia aspera	1	11
Grass & grasslike (GG)	Austrostipa ramosissima	2	10
Grass & grasslike (GG)	Carex appressa	1	10
Grass & grasslike (GG)	Lachnagrostis filiformis	2	10
Grass & grasslike (GG)	Aristida ramosa	2	8
Grass & grasslike (GG)	Austrostipa rudis	1	8
Grass & grasslike (GG)	Carex breviculmis	1	8
Grass & grasslike (GG)	Fimbristylis dichotoma	1	8
Grass & grasslike (GG)	Lomandra multiflora subsp. multiflora	2	8
Grass & grasslike (GG)	Bothriochloa macra	2	7
Grass & grasslike (GG)	Chloris ventricosa	2	7
Grass & grasslike (GG)	Cymbopogon refractus	2	7
Grass & grasslike (GG)	Cyperus laevis	2	7
Grass & grasslike (GG)	Panicum effusum	2	7
Grass & grasslike (GG)	Digitaria ramularis	2	5
Grass & grasslike (GG)	Imperata cylindrica	3	5
Grass & grasslike (GG)	Juncus homalocaulis	1	5
Grass & grasslike (GG)	Panicum simile	1	5
Grass & grasslike (GG)	Rytidosperma tenuius	2	5
Grass & grasslike (GG)	Cyperus enervis	2	4
Grass & grasslike (GG)	Hemarthria uncinata	2	4
Grass & grasslike (GG)	Isolepis inundata	2	4
Grass & grasslike (GG)	Juncus continuus	2	4
Grass & grasslike (GG)	Lepidosperma laterale	2	4
Grass & grasslike (GG)	Lomandra confertifolia	2	4
Grass & grasslike (GG)	Poa affinis	1	4
Grass & grasslike (GG)	Poa labillardierei var. labillardierei	1	4
Grass & grasslike (GG)	Rytidosperma caespitosum	2	4
Grass & grasslike (GG)	Sporobolus elongatus	2	4
Grass & grasslike (GG)	Austrostipa bigeniculata	1	2
Grass & grasslike (GG)	Austrostipa verticillata	2	2
Grass & grasslike (GG)	Bolboschoenus caldwellii	2	2
Grass & grasslike (GG)	Chloris truncata	1	2
Grass & grasslike (GG)	Cyperus gunnii subsp. gunnii	2	2
Grass & grasslike (GG)	Cyperus polystachyos	2	2
Grass & grasslike (GG)	Cyperus sanguinolentus	2	2
Grass & grasslike (GG)	Cyperus trinervis	2	2
Grass & grasslike (GG)	Eleocharis acuta	2	2

Grass & grasslike (GG)	Eleocharis cylindrostachys	1	2
Grass & grasslike (GG)	Elymus scaber	1	2
Grass & grasslike (GG)	Eragrostis benthamii	1	2
Grass & grasslike (GG)	Eragrostis parviflora	1	2
Grass & grasslike (GG)	Juncus prismatocarpus	2	2
Grass & grasslike (GG)	Lachnagrostis aemula	1	2
Grass & grasslike (GG)	Lomandra cylindrica	1	2
Grass & grasslike (GG)	Lomandra gracilis	2	2
Grass & grasslike (GG)	Paspalidium albobillosum	2	2
Grass & grasslike (GG)	Paspalidium aversum	1	2
Grass & grasslike (GG)	Paspalidium criniforme	3	2
Grass & grasslike (GG)	Phragmites australis	2	2
Grass & grasslike (GG)	Rytidosperma bipartitum	1	2
Grass & grasslike (GG)	Rytidosperma longifolium	2	2
Grass & grasslike (GG)	Rytidosperma pilosum	1	2
Grass & grasslike (GG)	Scleria mackaviensis	1	2
Grass & grasslike (GG)	Sorghum leiocladum	1	2
Grass & grasslike (GG)	Sporobolus virginicus	1	2
Other (OG)	Glycine tabacina	2	64
Other (OG)	Desmodium varians	2	52
Other (OG)	Glycine microphylla	2	50
Other (OG)	Glycine clandestina	2	43
Other (OG)	Clematis glycinoides	2	31
Other (OG)	Cayratia clematidea	2	16
Other (OG)	Polymeria calycina	2	14
Other (OG)	Geitonoplesium cymosum	1	13
Other (OG)	Clematis aristata	1	10
Other (OG)	Pandorea pandorana subsp. pandorana	1	8
Other (OG)	Passiflora herbertiana subsp. herbertiana	2	8
Other (OG)	Parsonsia straminea	2	7
Other (OG)	Billardiera scandens	1	5
Other (OG)	Gynochthodes jasminoides	1	5
Other (OG)	Hardenbergia violacea	1	5
Other (OG)	Smilax glyciophylla	2	5
Other (OG)	Stephania japonica var. discolor	1	5
Other (OG)	Amyema pendula	1	4
Other (OG)	Cassytha pubescens	2	4
Other (OG)	Convolvulus erubescens	1	4
Other (OG)	Tylophora barbata	2	4
Other (OG)	Aphanopetalum resinosum	1	2
Other (OG)	Calochlaena dubia	1	2
Other (OG)	Dendrophthoe vitellina	1	2
Other (OG)	Eustrephus latifolius	1	2

Other (OG)	Marsdenia rostrata	2	2
Shrub (SG)	Bursaria spinosa	3	96
Shrub (SG)	Ozothamnus diosmifolius	2	34
Shrub (SG)	Breynia oblongifolia	2	23
Shrub (SG)	Acacia floribunda	2	17
Shrub (SG)	Rubus parvifolius	1	17
Shrub (SG)	Leucopogon juniperinus	1	16
Shrub (SG)	Olearia viscidula	2	16
Shrub (SG)	Exocarpos cupressiformis	1	14
Shrub (SG)	Kunzea ambigua	2	14
Shrub (SG)	Melaleuca linariifolia	1	14
Shrub (SG)	Hibbertia diffusa	1	13
Shrub (SG)	Melaleuca decora	3	13
Shrub (SG)	Acacia implexa	1	10
Shrub (SG)	Calotis dentex	2	10
Shrub (SG)	Trema tomentosa var. aspera	2	8
Shrub (SG)	Melaleuca styphelioides	3	7
Shrub (SG)	Myrsine variabilis	2	7
Shrub (SG)	Polyscias sambucifolia	2	7
Shrub (SG)	Jacksonia scoparia	1	5
Shrub (SG)	Lissanthe strigosa	1	5
Shrub (SG)	Melaleuca nodosa	4	5
Shrub (SG)	Melicytus dentatus	2	5
Shrub (SG)	Pittosporum revolutum	2	5
Shrub (SG)	Acacia falciformis	2	4
Shrub (SG)	Daviesia ulicifolia	1	4
Shrub (SG)	Eremophila debilis	2	4
Shrub (SG)	Hibbertia aspera	2	4
Shrub (SG)	Indigofera australis	1	4
Shrub (SG)	Leptospermum polygalifolium	1	4
Shrub (SG)	Persoonia linearis	2	4
Shrub (SG)	Acacia elongata	2	2
Shrub (SG)	Acacia falcata	1	2
Shrub (SG)	Acacia linifolia	1	2
Shrub (SG)	Astroloma humifusum	1	2
Shrub (SG)	Bossiaea buxifolia	1	2
Shrub (SG)	Cassinia trinerva	1	2
Shrub (SG)	Denhamia silvestris	2	2
Shrub (SG)	Dillwynia sieberi	1	2
Shrub (SG)	Dodonaea viscosa	1	2
Shrub (SG)	Duboisia myoporoides	1	2
Shrub (SG)	Grevillea mucronulata	1	2
Shrub (SG)	Hakea sericea	1	2

Shrub (SG)	Hibbertia circumdans	1	2
Shrub (SG)	Hibbertia obtusifolia	1	2
Shrub (SG)	Leptospermum trinervium	3	2
Shrub (SG)	Persoonia oblongata	2	2
Shrub (SG)	Phebalium squamulosum	1	2
Shrub (SG)	Phyllanthus gunnii	2	2
Shrub (SG)	Pittosporum undulatum	2	2
Shrub (SG)	Zieria smithii	1	2
Tree (TG)	Eucalyptus tereticornis	3	64
Tree (TG)	Acacia parramattensis	2	52
Tree (TG)	Acacia decurrens	3	41
Tree (TG)	Angophora floribunda	2	38
Tree (TG)	Eucalyptus amplifolia	3	37
Tree (TG)	Eucalyptus eugenoides	2	17
Tree (TG)	Angophora subvelutina	3	13
Tree (TG)	Eucalyptus moluccana	1	13
Tree (TG)	Eucalyptus crebra	2	10
Tree (TG)	Casuarina glauca	2	8
Tree (TG)	Clerodendrum tomentosum	1	8
Tree (TG)	Notelaea longifolia	1	8
Tree (TG)	Eucalyptus baueriana	3	7
Tree (TG)	Allocasuarina littoralis	1	5
Tree (TG)	Corymbia maculata	3	5
Tree (TG)	Eucalyptus punctata	1	5
Tree (TG)	Melia azedarach	1	5
Tree (TG)	Allocasuarina torulosa	3	4
Tree (TG)	Brachychiton populneus	1	4
Tree (TG)	Casuarina cunninghamiana subsp. cunninghamiana	2	4
Tree (TG)	Eucalyptus deanei	2	4
Tree (TG)	Eucalyptus fibrosa	3	4
Tree (TG)	Eucalyptus globoidea	1	4
Tree (TG)	Eucalyptus sclerophylla	1	4
Tree (TG)	Acacia binervata	1	2
Tree (TG)	Angophora bakeri	2	2
Tree (TG)	Banksia integrifolia	2	2
Tree (TG)	Eucalyptus longifolia	3	2
Tree (TG)	Eucalyptus piperita	1	2
Tree (TG)	Eucalyptus saligna	3	2
Tree (TG)	Grevillea robusta	2	2

3.3 Vegetation Integrity Assessment

3.3.1 Vegetation Zones

For the purposes of the BAM, a vegetation zone is an area of native vegetation on the site that is the same PCT and has a similar broad condition state. The assigned vegetation zone for the PCT occurring on the site are described below.

3.3.2 Patch Sizes

A patch size area has been assigned to each vegetation zone, as a class. Patch size classes are provided in Table 3-1.

Table 3-1: Patch Size Classes

PCT	Vegetation Zone	Patch Size Class
PCT 4025 - Cumberland Red Gum Riverflat Forest	Vegetation Zone A	10ha

3.3.3 Vegetation Integrity Scores

Each vegetation zone identified on the site has been surveyed to obtain a quantitative measure for each zone, of the composition, structure and function attributes listed in Table 3 of the BAM. These attributes are listed below:

- Growth form groups used to assess composition and structure:
 - Tree
 - Shrub
 - Grass and grass like
 - Forb
 - Fern
 - Other
- Attributes used to assess function:
 - Number of large trees
 - Tree regeneration
 - Tree stem size class
 - Total length of fallen logs
 - Litter cover

-
- High threat exotic vegetation cover
 - Hollow-bearing trees

Plot-base surveys were conducted, in accordance with s.5.3.4 of the BAM, by an ecologist (Alex Fraser). Survey plots were established around a central 50 m transect and included:

- One 400 m² (20 m x 20 m) plot to assess the composition and structure attributes listed above.
- One 1000 m² (20 m x 50 m) plot to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs.
- Five 1 m² sub-plots to assess average litter cover (and other optional groundcover components).

See previous Figure 7 for plot locations. Plot data is provided in Appendix B. Table 3-2 details the vegetation integrity scores for each vegetation zone.

Table 3-2: Vegetation Integrity Scores

PCT	Vegetation Zone	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 4025 - Cumberland Red Gum Riverflat Forest plantings	Vegetation Zone A (1.5ha)	10.8	18	19.1	15.5

4 THREATENED SPECIES

4.1 Ecosystem Credit Species

Ecosystem credit species are those where the likelihood of occurrence of the 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 Threatened Biodiversity Data Collection (TBCD) has identified several ecosystem credit species as requiring assessment as shown on the following page.

Table 3 Ecosystem credit species to be considered (threatened species reliably predicted to use the site)

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00052156/BAAS18156/24/00052157	108 Mulgrave Road Mulgrave MOD 4 application	28/10/2024
Assessor Name	Report Created	BAM Data version *
Alex FRASER	23/11/2024	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18156	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
2	BOS Threshold: Area clearing threshold	23/11/2024

* 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.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	Botaurus poiciloptilus	4025-Cumberland Red Gum Riverflat Forest
Australian Painted Snipe	Rostratula australis	4025-Cumberland Red Gum Riverflat Forest
Black Falcon	Falco subniger	4025-Cumberland Red Gum Riverflat Forest
Black-necked Stork	Ephippiorhynchus asiaticus	4025-Cumberland Red Gum Riverflat Forest
Black-tailed Godwit	Limosa limosa	4025-Cumberland Red Gum Riverflat Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	4025-Cumberland Red Gum Riverflat Forest
Comb-crested Jacana	Irediparra gallinacea	4025-Cumberland Red Gum Riverflat Forest
Diamond Firetail	Stagonopleura guttata	4025-Cumberland Red Gum Riverflat Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	4025-Cumberland Red Gum Riverflat Forest

BAM Predicted Species Report

Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	4025-Cumberland Red Gum Riverflat Forest
Eastern Osprey	Pandion cristatus	4025-Cumberland Red Gum Riverflat Forest
Flame Robin	Petroica phoenicea	4025-Cumberland Red Gum Riverflat Forest
Grey-headed Flying-fox	Pteropus poliocephalus	4025-Cumberland Red Gum Riverflat Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	4025-Cumberland Red Gum Riverflat Forest
Little Bent-winged Bat	Miniopterus australis	4025-Cumberland Red Gum Riverflat Forest
Little Lorikeet	Glossopsitta pusilla	4025-Cumberland Red Gum Riverflat Forest
Regent Honeyeater	Anthochaera phrygia	4025-Cumberland Red Gum Riverflat Forest
South-eastern Glossy Black-Cockatoo	Calyptrorhynchus lathami lathami	4025-Cumberland Red Gum Riverflat Forest
Speckled Warbler	Chthonicola sagittata	4025-Cumberland Red Gum Riverflat Forest
Spotted-tailed Quoll	Dasyurus maculatus	4025-Cumberland Red Gum Riverflat Forest
Swift Parrot	Lathamus discolor	4025-Cumberland Red Gum Riverflat Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	4025-Cumberland Red Gum Riverflat Forest
White-throated Needle-tail	Hirundapus caudacutus	4025-Cumberland Red Gum Riverflat Forest

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
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4.2 Species Credit Species (Candidate Species)

Species credit species (or candidate species) are those where the likelihood of occurrence of the species or elements of suitable habitat for the species, cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey. The TBDC has identified several candidate species as requiring assessment as provided on the following page (refer to Table A on the following page).

Table A: Candidate species justification table

Scientific Name	Common Name	BC Act 2016 status	EPBC Act 1999 status	Distribution	Habitat and Ecology	Habitat Constraints Breeding	Survey months	SAIL	Likelihood of occurrence of on site?
<i>Eucalyptus benthamii</i>	Camden White Gum	Critically Endangered	Vulnerable	Occurs on the alluvial flats of the Nepean River and its tributaries. There are two major subpopulations: in the Kedumba Valley of the Blue Mountains National Park and at Bents Basin State Recreation Area. Several trees are scattered along the Nepean River around Camden and Cobbitty, with a further stand at Werriberri (Monkey) Creek in The Oaks. At least five trees occur on the Nattai River in Nattai National Park. Large areas of habitat were inundated by the formation of Warragamba Dam in 1933.	Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Recruitment of juveniles appears to be most successful on bare silt deposits in rivers and streams.; ¹ The recorded elevation range for the species is from 30m ASL at Bents Basin to 750m ASL in the Kedumba population. Most of the individuals are around 60 to 300m ASL.; ² Occurs in open forest. Associated species at the Bents Basin site include <i>Eucalyptus elata</i> , <i>E. bauerina</i> , <i>E. amplifolia</i> , <i>E. deanei</i> and <i>Angophora subvelutina</i> . Understorey species include <i>Bursaria spinosa</i> , <i>Pteridium esculentum</i> and a wide variety of agricultural weeds. The Kedumba Valley site lists <i>E. crebra</i> , <i>E. deanei</i> , <i>E. punctata</i> , <i>Leptospermum flavescens</i> , <i>Acacia filicifolia</i> and <i>Pteridium esculentum</i> among its associated species.; ³	N/A	January,February, March, April, May, June, July, August, September, October, November, December	Yes	Low. This species does not need further consideration.
<i>Deyeuxia appressa</i>	Deyeuxia appressa	Endangered	Endangered	A highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. Was first collected in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown. Was then collected in 1941 from Killara, near Hornsby. Has not been collected since and may now be extinct in the wild due to the level of habitat loss and development that has occurred within these areas.	Given that <i>D. appressa</i> hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology.; ¹ Flowers spring to summer and is mesophytic (grows in moist conditions)	N/A	December	Yes	Low. This species does not need further consideration.
<i>Persoonia hirsuta</i>	Hairy Geebung	Endangered	Endangered	<i>Persoonia hirsuta</i> has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Hilltop in the south west, Dombarton in the south east and the Blue Mountains to the west. <i>Persoonia hirsuta</i> has a large area of occurrence, but occurs in small populations or isolated individuals, increasing the species' fragmentation in the landscape.	The Hairy Geebung is found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagong Formation and on the upper Hawkesbury Sandstone.; ¹ It is usually present as isolated individuals or very small populations.; ² Plants are generally killed by all but the lowest intensity	N/A	January,February, March, April, May, June, July, August, September, October, November, December	Yes	Low. This species does not need further consideration.

Scientific Name	Common Name	BC Act 2016 status	EPBC Act 1999 status	Distribution	Habitat and Ecology	Habitat Constraints Breeding	Survey months	SAIL	Likelihood of occurrence of on site?
					fire or partial burning. Fire may promote germination of soil-stored seed, although it may also kill some of the seedbank if it is of high severity. ;3 Extreme wet-dry weather cycles may also promote germination of soil-stored seed.;4				
<i>Hibbertia sp. Bankstown</i>	Hibbertia sp. Bankstown	Critically Endangered	Critically Endangered	"This species is endemic to New South Wales and is currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs, in the Bankstown local government area.					Low. This species does not need further consideration.
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Vulnerable	Not Listed	Eastern Bentwing-bats occur along the east and north-west coasts of Australia.	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.;1 Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.;2 Maternity caves have very specific temperature and humidity regimes.;3 At other times of the year, populations disperse within about 300 km range of maternity caves.;4 Cold caves are used for hibernation in southern Australia.;5 Breeding or roosting colonies can number from 100 to 150,000 individuals.;6 Hunt in forested areas, catching moths and other flying insects above the tree tops.;7	Caves;Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	N/A	Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat."	Low. This species does not need further consideration.
<i>Miniopterus australis</i>	Little Bent-winged Bat	Vulnerable	Not Listed	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW.	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas.;1 Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.;2 They often share roosting sites with the Common Bentwing-bat and, in	Caves;Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in	N/A	Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat."	Low. This species does not need further consideration.

Scientific Name	Common Name	BC Act 2016 status	EPBC Act 1999 status	Distribution	Habitat and Ecology	Habitat Constraints Breeding	Survey months	SAIL	Likelihood of occurrence of on site?
					winter, the two species may form mixed clusters.;3 In NSW the largest maternity colony is in close association with a large maternity colony of Eastern Bentwing-bats (<i>Miniopterus schreibersii</i>) and appears to depend on the large colony to provide the high temperatures needed to rear its young.;4 Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer.;5 Only five nursery sites /maternity colonies are known in Australia.;6	cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.			
<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically Endangered	Critically Endangered	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species.	Other;As per Important Habitat Map	N/A	No	Low. This species does not need further consideration.
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Critically Endangered	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes.	Migrates to the Australian south-east mainland between February and October.;	Other;As per Important Habitat Map	N/A	No	Low. This species does not need further consideration.
<i>Myotis macropus</i>	Southern Myotis	Vulnerable	Not Listed	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.;1 Forage over streams and pools catching insects and small fish by raking their feet across the		January,February, March, October, November, December	No	This species has been assumed to be present as a precautionary measure. Potential habitat occurs

Scientific Name	Common Name	BC Act 2016 status	EPBC Act 1999 status	Distribution	Habitat and Ecology	Habitat Constraints Breeding	Survey months	SAIL	Likelihood of occurrence of on site?
					water surface.;2 In NSW females have one young each year usually in November or December.;3				within 200m of the subject site.

4.3 Description of Impacts

4.3.1 Potential Direct Impacts

Vegetation and habitat removal

Tree removal will be necessary to establish the proposed development.

Essentially none of the native vegetation proposed for removal is the original remnant forest. It all comprises of screen plantings that were established over 20 years ago.

It is envisaged that future landscaping will establish screen plantings using locally native species again after work have been completed.

No hollow bearing trees occur on site.

The 2 stormwater detention basins proposed for removal do not contain significant fauna habitat.

Risk of runoff, erosion and sedimentation, during construction

Surface water quality may be affected during construction activities. Construction activities could potentially encourage soil erosion and increase the sediment loads in downstream areas. Further, accidental leaks/spills of oil, fuel, cement or other substances entering watercourses could pollute surface waters.

The Construction Environment Management Plan (CEMP) can be provided with the application addresses these issues es (prior to the release of the Construction Certificate).

The riparian habitats of nearby South Creek will not be indirectly impacted by the proposed development.

Temporary noise, dust, light and vibration disturbance, during construction work

Impacts of noise, dust, light and vibration upon fauna are difficult to predict. Potential impacts may include effects on predator-prey interactions and changes to mating and nesting behaviour. These are unlikely to be significant in relation to existing situation.

4.3.2 Potential Indirect Impacts

Minor hydrological changes

Hard surfaces created as a result of construction typically cause some hydrological changes; however, in this case, hydrological changes are expected to be very minor.

4.3.3 Indirect impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the Subject Site. Impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat (Table 5.1.2 below).

Table 5.1.2 Indirect impacts, extent and duration and consequences

Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(a) inadvertent impacts on adjacent habitat or vegetation	The proposed development may lead to enhanced weed infiltration into adjacent habitat by enhanced edge effects. This impact is likely to be restricted the immediate area surrounding the development to a couple of metres.	Nil	Edge effects will not be created and increase weed intensity and reduce vegetation integrity.
(b) reduced viability of adjacent habitat due to edge effects	The proposed development may lead to enhanced weed infiltration into adjacent habitat by enhanced edge effects. This impact is likely to be restricted the immediate area surrounding the development to a couple of metres.	Nil	Edge effects will not be created and increase weed intensity and reduce vegetation integrity.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	The proposed works are unlikely to significantly exacerbate any of these issues which are all currently in effect within surrounding lots, or otherwise unlikely to occur within the Subject Site.	Nil	Nil

Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(d) transport of weeds and pathogens from the site to adjacent vegetation	The proposed development may lead to enhanced weed infiltration into adjacent habitat by enhanced edge effects. This impact is likely to be restricted the immediate area surrounding the development to a couple of metres. Active weed control efforts will be undertaken prior to and post construction.	Nil	Edge effects will not be created and increase weed intensity and reduce vegetation integrity.
(e) increased risk of starvation, exposure and loss of shade or shelter	This issue is unlikely to occur on the Subject Site. It is unlikely that any threatened fauna relies on habitat within the Subject Site, such that the proposed impacts will lead to increased risks from starvation, exposure, shade and shelter. All habitat resources removed will be replaced through implementation of the recommendations outlined in this report.	Nil	Nil
(f) loss of breeding habitats	Nil	Nil	Nil
(g) trampling of threatened flora species	This issue is not likely to affect the Subject Site. No threatened flora species were identified within the Subject Site.	Nil	Nil

Indirect Impact	Extent and duration	Threatened species, threatened ecological communities and their habitats likely to be affected.	Consequences of the impacts for the bioregional persistence of the threatened species, threatened ecological communities and their habitats.
(h) inhibition of nitrogen fixation and increased soil salinity	This issue is not likely to affect the Subject Site.	Nil	Nil
(i) fertiliser drift	This issue is not likely to affect the Subject Site.	Nil	Nil
(j) rubbish dumping	This issue is not likely to affect the Subject Site.	Nil	Nil
(k) wood collection	This issue is not likely to significantly affect the Subject Site.	Nil	Nil
(l) bush rock removal and disturbance	No bush rock occurs on-site.	Nil	Nil
(m) increase in predatory species populations	It is unlikely that the proposed works will influence or alter predatory species populations.	Nil	Nil
(n) increase in pest animal populations	It is unlikely that the proposed works will influence or alter pest species populations.	Nil	Nil
(o) increased risk of fire	This issue is not relevant to the Subject Site as there is little identified bushfire hazard.	Nil	Nil
(p) disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	There is no specialist breeding or foraging habitat on the Subject Site. The site contains a stand of mixed, nectar producing canopy trees which can provide intermittent nectar resources for several threatened fauna species.	Nil	Nil

4.3.4 Prescribed and Uncertain Impacts

This section of the BDAR addresses relevant prescribed impacts identified in Section 6.

This list of impacts includes all of those impacts on biodiversity values not caused by direct vegetation clearing or development that have been prescribed by the Biodiversity Conservation Regulation 2017 (Table 12).

This chapter identifies relevant prescribed additional impacts on biodiversity values, in accordance with Section 6 of BAM 2020.

Prescribed impacts are identified in clause 6.1 of the BC Regulation and BAM Stage 1, Chapter 6 (see also BAM Operational Manual – Stage 1).

Prescribed impacts may affect biodiversity values in addition to, or instead of, impacts from clearing native vegetation. They can be direct and/or indirect impacts.

These impacts may be difficult to quantify or offset, as they often affect biodiversity values that are irreplaceable; consequently, avoiding or minimising such impacts is critical.

Table 4: Overall Consideration of Potential Prescribed or Uncertain Impacts of the Proposed Action

Will there be impacts on any of the following	Yes/No	If Yes, must address all of the assessment questions from section 9.2.1 of the BAM
Species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance	No	n/a
Habitat of threatened species or ecological communities associated with rocks	No	n/a
Habitat of threatened species or ecological communities associated with human made structures	No	n/a
Habitat of threatened species or ecological communities associated with non-native vegetation	No	n/a
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	No	Habitat connectivity continues to exist across the site. It is unlikely that the small area of impact will interrupt connectivity for any threatened fauna or flora species.

Will there be impacts on any of the following	Yes/No	If Yes, must address all of the assessment questions from section 9.2.1 of the BAM
Movement of threatened species that maintains their life cycle	No	Habitat connectivity continues to exist across the site. It is unlikely that the small area of impact will interrupt movement of any threatened fauna or
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development)	No	n/a
Wind turbine strikes on protected animals	No	n/a
Vehicle strikes on threatened species of animals or on animals that are part of a TEC	No	n/a

4.4 Avoidance of Impacts

The proposed removal of the planted screen trees is unavoidable for the proposed development.

However, the applicant is willing to provide new screen tree plantings in the future (using locally native species).

4.5 Minimisation of Impacts

Several mitigation measures are proposed to minimise potential impacts; these are summarised in Table 4-5. These include measures to be implemented in the pre-construction, construction and post-construction phases. It is considered that these measures would serve to minimise any potential direct or indirect impacts.

Table 4.5 Mitigation measures proposed to minimise potential impacts

Action	Outcome/measure	Risk/ consequence of residual impacts	Timing	Responsibility
Project location	The location of the proposed development has been positioned in order to avoid and minimise the potential resulting impacts on biodiversity values within the Subject Site, where possible.	Risk = low Consequence = Harm to native vegetation and native fauna	Pre-construction phase	Proponent
Project design	The proposed development has been designed to avoid and minimise impacts on native vegetation and habitat where possible within the Subject Site. Where this is not possible, mitigation measures have been designed and recommended to reduce potential ecological impact. While there will be some impact on native vegetation, this falls above the Biodiversity Offset Scheme threshold. The design of the proposed development includes the retention of a majority of the trees on the property. The poor condition of the vegetation occurring on-site is reflected in the low Vegetation Integrity Score calculated for the property.	Risk = low Consequence = Harm to native vegetation and native fauna	Pre-construction phase	Proponent
Tree protection	Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970) outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. It is an area isolated from construction disturbance so that the tree remains viable. Ideally, works should be avoided within the TPZ. A Minor Encroachment is	Risk = low Consequence = Harm to native vegetation and native fauna. Proliferation of weeds.	Pre-construction phase	

Action	Outcome/measure	Risk/ consequence of residual impacts	Timing	Responsibility
	less than 10% of the TPZ and is outside the SRZ. A Minor Encroachment is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. A Major Encroachment is greater than 10% of the TPZ or inside the SRZ. Major Encroachments generally require root investigations undertaken by non-destructive methods or the use of tree sensitive construction methods..			
Avoidance of hollow-bearing trees	No hollow-bearing trees occur within the proposed development footprint.	Risk = low Consequence = Loss of fauna habitat. Loss of native vegetation.	Construction phase	Proponent
Avoidance of woody debris	Woody debris within the development footprint should be relocated, by the proponent to the area of native vegetation in the northern extent of the Subject Site.	Risk = low Consequence = Loss of fauna habitat.	Construction phase	Proponent
Erosion and sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during construction. As minimum such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	Risk = low Consequence = Degradation of vegetation,	Construction phase	Construction Contractor
Erosion protection fencing	Temporary fencing should be erected around the extent of native vegetation to be retained in order to minimise any disturbance resulting from the proposed construction works.	Risk = high Consequence = Permanent damage or degradation of vegetation.	Construction phase	Construction Contractor
Storage and Stockpiling (Soil and Materials)	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site.	Risk = moderate Consequence = Harm to native vegetation and native fauna	Construction phase	Construction Contractors
Weed eradication and suppression	All priority weeds should be eradicated across all areas of the Subject Site. Very low weed invasion was recorded on-site. Any weeds should be continually suppressed and prevented from re-establishing within retained native vegetation.	Risk = moderate Consequence = Harm to native vegetation and native fauna habitat.	Construction phase and Post-construction phase	Proponent
Stormwater	The proposed development is unlikely to result in significant changes to stormwater runoff so it is expected there will be no exacerbated impact on native species of flora and fauna. Stormwater flow from future developments and hard surfaces will be directed to newly installed water storage tanks. Prior to any	Risk = low Consequence = Harm to native vegetation and native fauna habitat.	Post-construction phase	Proponent Construction Architect

Action	Outcome/measure	Risk/ consequence of residual impacts	Timing	Responsibility
	release, all stormwater is to be piped through any tanks that may be required by the regulating authorities.			

A Construction Environment Management Plan (CEMP) can be provided with the application prior to the release of the Construction Certificate to address all issue in Table 4.5.

5 IMPACT SUMMARY

5.1 Impacts Which Require an Offset

Tables 5-1 and 5-2 provide a summary of the impacts that require an offset, under the BAM.

Table 5-1: Vegetation Zones Requiring an Offset

Vegetation Zone	PCT	Area Impacted	Current Vegetation Integrity Score	Future Vegetation Integrity Score	Number of Ecosystem Credits Required
A	PCT 4025 - Cumberland Red Gum Riverflat Forest (plantings)	1.5ha	15.5	0	0

Table 5-2: Threatened Species Requiring an Offset

Species	Area of Impacted Habitat (ha)	SAIL entity	Number of Species Credits Required
<i>Myotis macropus</i> / Southern Myotis (Fauna)	1.5	Yes	12

5.2 Impacts Not Requiring an Offset

N/A

5.3 Identification of Areas Not Requiring Assessment

N/A

5.4 Serious and Irreversible Impacts (SAIL's)

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

- it will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline
- it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size
- it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution
- the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

Species and ecological communities with a 'very high' biodiversity risk weighting will be a potential serious and irreversible impact (SAIL). These 'potential SAIL entities' are identified within the BAM calculator.

The determination of serious and irreversible impacts on biodiversity values is to be made by the consent authority in accordance with the principles set out in the BC Regulation.

To assist the consent authority, the guidance document Guidance to assist a decision-maker to determine a serious and irreversible impact includes criteria that enable the application of the four principles set out in clause 6.7 of the BC Regulation to identify the species and ecological communities that are likely to be the subject of serious and irreversible impacts.

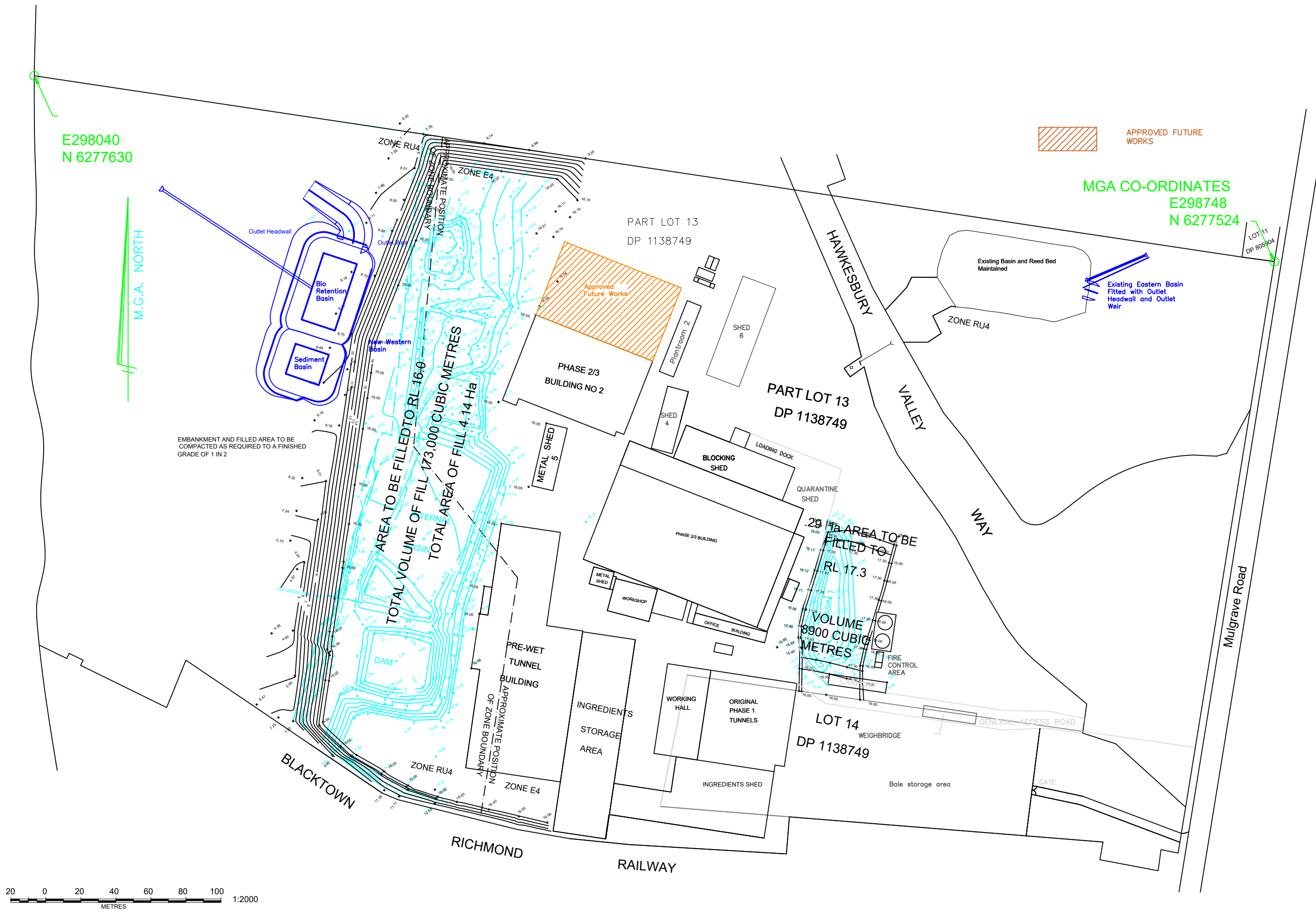
None of the PCTs identified on site are listed as threatened entities.

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APPENDIX A SITE PLANS



ELF FARM SUPPLIES EXISTING & PROPOSED TOPOGRAPHY 108 MULGRAVE ROAD MULGRAVE	Scale A3 1:2000	Designed	ASSURED INDUSTRIES EBENEZER N.S.W. 2756 Ph. 0419400884		AMENDMENTS		Sheet no. 1
	Datum	Drawn P. Atkins			Rev A		of sheets
	Date 12.06.2024	Checked					Our Ref.
	COUNCIL	Council Ref.					Mod 4

APPENDIX B PLOT DATA

BAM Site – Plot Species List

400m ² plot: Sheet ___ of ___	Survey Name	Plot ID	Recorders
Date: 3rd October 2024	108 Mulgrave Road Mulgrave	A	ALEX FRASER

[illegible]

N: native, **E:** exotic, **HTE:** high threat exotic, **GF** – circle code if ‘top 3’

Cover: 0.1, 0.2, 0.3..... 1,2,3,.....,10, 15, 20, 25, 100% (foliage cover). *Note: 0.1% cover is approx.. 63x63 cm or a circle about 71 cm diameter, 0.5% approx. 1.4 x 1.4m, 2% cover is approx. 2 x 2m, 5% = 4 x 5m, 25% 10 x 10m*

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

Stratum: E – emergent, C – canopy, M – mid-storey / sub canopy, S – shrub layer, G – ground layer

BAM Site – Field Survey Form

Survey Name		Date	Zone ID	Recorders
108 Mulgrave Road Mulgrave		3rd October 2024	A	A Fraser
Zone: 56	Datum: MGA	Plot ID: A	Plot dimensions: 50x20 m	Photo #:
Easting: 298292	Northing: 6277417	IBRA region: Cumberland		Midline bearing from 0 m:
Vegetation Class: Forested Wetlands/ Coastal Floodplain Wetlands				Confidence H M L
Plant Community Type: 4025 - Cumberland Red Gum Riverflat Forest (planted)			EEC: Y	Confidence H M L

Record easting and northing at 0m on midline. Dimensions (Shape) of 0.04ha base plot.

BAM Attribute (400m ² plot)	Sum values	
	Count of native richness	Cover
Trees	3	20
Shrubs		
Grasses etc.		
Forbs		
Ferns		
Other		
High threat weed cover		

Cover: 0.1, 0.2, 0.3.....
1,2,3,.....,10, 15, 20, 25,
100% (foliage cover). *Note:*
0.1% cover is approx. 63x63 cm
or a circle about 71 cm diameter,
0.5% approx. 1.4 x 1.4m, 2%
cover is approx. 2 x 2m, 5% = 4
x 5m, 25% 10 x 10m

BAM Attribute (1000m ² plot)		
DBH	#Tree Stems Count	#Stems with Hollows
80 + cm	0	0
50 – 79 cm	0	0
30 – 49 cm	Present	0
20 – 29 cm	Present	0
10 – 19 cm	Present	0
5 – 9 cm	0	0
<5 cm	0	
Length of logs (m) (≥ 10 cm diameter, >50cm in length)	Tally: 0	Total: 0

Counts apply when the number of tree stems within a size class is ≤ 10. Estimate can be used when > 10 (eg. 10, 20, 30....100, 200). For a multi-stemmed tree, only the largest living stem is included in the count / estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)																				
	Litter cover %					Bare ground cover %					Cryptogam cover %					Rock cover %				
Subplot score % in each	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45
	15	15	15	15	15															
Average of the 5 subplots	15																			

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter)

APPENDIX C QUALIFICATION, LICENSING AND CERTIFICATION

Alexander Fraser

alohafraser@gmail.com

0423238193

665 The Scenic Rd Macmasters Beach, NSW 2251

Key skills

- 12+ years private ecological consulting (Fraser Ecological Consulting)
- 15 + years local government ecological assessment for DAs (Hornsby Shire Council – current employer)
- 10 + years Land & Environment Court expert witness experience
- 2 years state government ecological assessment (NSW OEH)
- High level botanical field identification skills, plot surveys and project management
- Fauna survey and field assistant experience
- Biodiversity Assessment Reporting (BDAR) preparation and Stewardship Site (BSAR) under the NSW BOS Credit Scheme

Qualifications

Bachelor Environmental Science
(Honours) Southern Cross University

Certificate 3 Natural Area Restoration

Certificate 3 Vertebrate Animal Pest
Control (NSW DPI, Orange)

NPWS Scientific Licence - S10445

Animal Ethics Authority - 11/4299

Accredited under the Biodiversity
Assessment Methodology - BAM
(Accreditation No. BAAS18156)

Practising member of NSW Ecological
Consultants Association (ECA)

Summary

Alex Fraser (Principal Ecologist, Fraser Ecological) has extensive experience in DA related ecological assessment as both an assessor (Hornsby Shire Council) and private consultancy (Fraser Ecological) which actively and currently involve a wide array projects. Fraser Ecological is based locally on the Central Coast, however, project experience extends to South Coast, Blue Mountains, Mid-north Coast and mainly in the Sydney Basin Bioregion.

Previous work roles include ecological consulting for Parsons Brinckerhoff (large infrastructure), NPWS threatened species unit (biodiversity surveys), former NSW Department of Climate Change/ OEH (SIS DGRs and major projects assessment) and Hornsby Shire Council (DA assessment officer) have focussed primarily on ecological survey, development assessment, project management and policy development for consent authorities.

Alex offers high level botanical ID and field survey skills which includes targeted surveys and BAM plot surveys. Fraser Ecological has extensive experience in the preparation of over 15 BDARs under the new BC Act 2016 BOS credit trading scheme. Alex has experience dealing with consent authorities including Council, Crown Lands, Metropolitan Land Council, RFS, Biodiversity Conservation Trust and Department of Planning for major projects including SSDI proposals.

Fraser Ecological has established a wide network of ecological specialists including the Royal Botanic Gardens and Australian Museum as well academic institutions for expert advice when required. Alex is a current member of the North Sydney Regional Land Managers Group that includes staff from Central Coast Council, Northern Beaches, Ku-ring-gai Council, Hornsby Council (HSC), NPWS and Crown Lands) as project manager developing the Natural Area Recreation Strategy for HSC. Current main role at Council is development assessment and review of Flora and Fauna Reports and Biodiversity Assessment Reports.

Fraser Ecological has been engaged by various Councils (Central Coast, Ku-ring-gai, Liverpool City, Blacktown City Council, Hornsby Shire Council and Hawkesbury City Council) to undertake biodiversity assessments for major civil works projects. He is continuously providing biodiversity assessments for private clients for a range of development proposals across coastal and western NSW. We have also undertaken threatened flora and fauna species survey and monitoring for the NSW OEH Save our Species grants.

Key skills:

- Targeted flora and fauna surveys
- BAM plots in accordance with the BAM
- Ecological monitoring & Opportunity and Constraints mapping
- Preparation of BDARs, BAM calculator and credit reporting
- Retirement of credits for approved projects via BCT and brokers
- Establishment of stewardship sites and other offset packages
- Expert witness reporting and attendance in the LAEC Compliance investigations and auditing
- Preparation of Vegetation Management Plans
- Preparation of Nestbox Monitoring Plans

CERTIFICATE OF ACCREDITATION AS A BIODIVERSITY ASSESSMENT METHOD ASSESSOR under the *Biodiversity Conservation Act 2016* (NSW)

BAM Assessor		
Alex FRASER		
Accreditation number	Accreditation date (Date of issue)	Expiry Date of
BAAS18156	October 18, 2024	October 17, 2027

The person named above is accredited under section 6.10 of the *Biodiversity Conservation Act 2016* (NSW) (**BC Act**) as a Biodiversity Assessment Method Assessor to apply the Biodiversity Assessment Method in connection with the preparation of biodiversity stewardship site assessment reports, biodiversity development assessment reports and biodiversity certification assessment reports pursuant to Part 6 of the BC Act.

The accreditation is in force until and including the Expiry Date. The accreditation is subject to the conditions set out in the *Accreditation Scheme for the Application of the Biodiversity Assessment Method*, under the BC Act, and the conditions specified on the reverse of this certificate.



STEEN GYRN

Senior Team Leader, Accreditation and Training
Biodiversity and Conservation Division | Department of Climate Change, Energy, the Environment and Water

NOTES

- DCCEEW maintains a register of Accredited Biodiversity Assessment Method (BAM) Assessors accessible from the DCCEEW website.
- The BAM Assessor's accreditation expires on the Expiry Date unless renewed in accordance with the *Accreditation Scheme for the Application of the Biodiversity Assessment Method*. It is the BAM Assessor's responsibility to monitor the Expiry Date of their accreditation, and apply for any renewal with sufficient time for the application to be processed prior to the Expiry Date.
- Words and expressions used in this accreditation instrument and which are also used in the Act have the same meaning.

SUMMARY OF CONDITIONS UNDER SCHEME

The following are conditions of all accreditations granted under the Scheme:

1. an accredited person must prepare Biodiversity Assessment Reports (and conduct surveys and other activities in connection with the preparation of such reports) in accordance with:
 - a. the Biodiversity Assessment Method Manual,
 - b. the Credit Calculator Operational Manual,
 - c. Accredited Person Code of Conduct.
 - d. this Scheme,
 - e. any guidance materials published by the Department of Climate Change, Energy, the Environment and Water in connection with preparation of Biodiversity Assessment Reports or the application of the BAM
 - f. any accreditation requirements notified by the Department of Climate Change, Energy, the Environment and Water to the accredited assessor from time to time.
2. an accredited person must maintain a detailed and up to date working knowledge of, and comply with, all relevant legislation.
3. an accredited person must maintain records of surveys and assessments, including field data sheets and targeted flora and fauna surveys, undertaken and used as part of the preparation of a Biodiversity Assessment Report, for at least ten years after certification of the relevant Biodiversity Assessment Report.
4. all records required to be kept by an accredited person must be in legible form, or in a form that can be readily reduced to a legible form.
5. an accredited person must provide to the Department of Climate Change, Energy, the Environment and Water any information related to biodiversity assessment reports required to be provided by all accredited persons, or by a group of accredited persons, by way of a notice specified on a website maintained by it, in the form and within the time frames required in that notice.
6. an accredited person must comply with any scientific licence conditions relating to survey records.
7. an accredited person must possess, or operate under, an appropriate scientific licence as required for the type work, they are completing in the Biodiversity Offsets Scheme.

Note. Information that the Environment Agency Head (EAH) may require to be provided may include information collected during the application of the BAM such as site specific survey data.

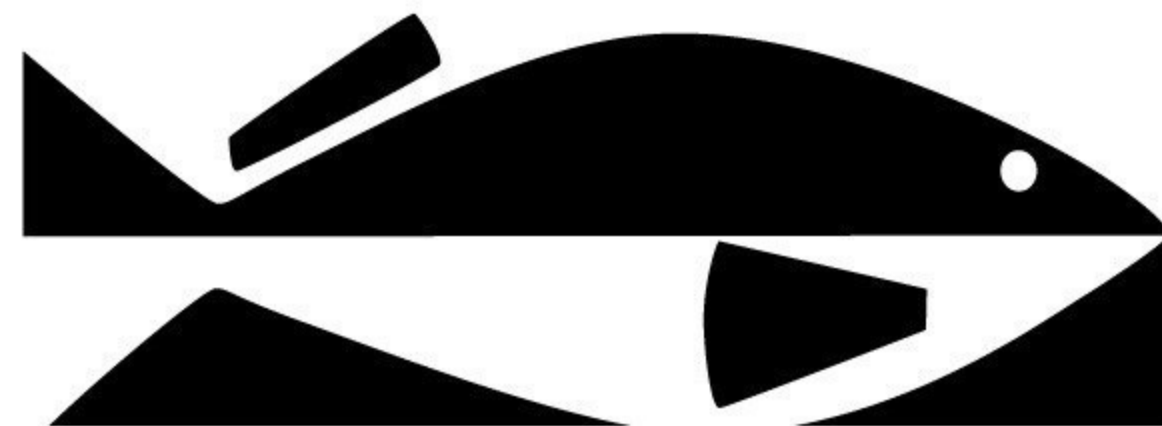
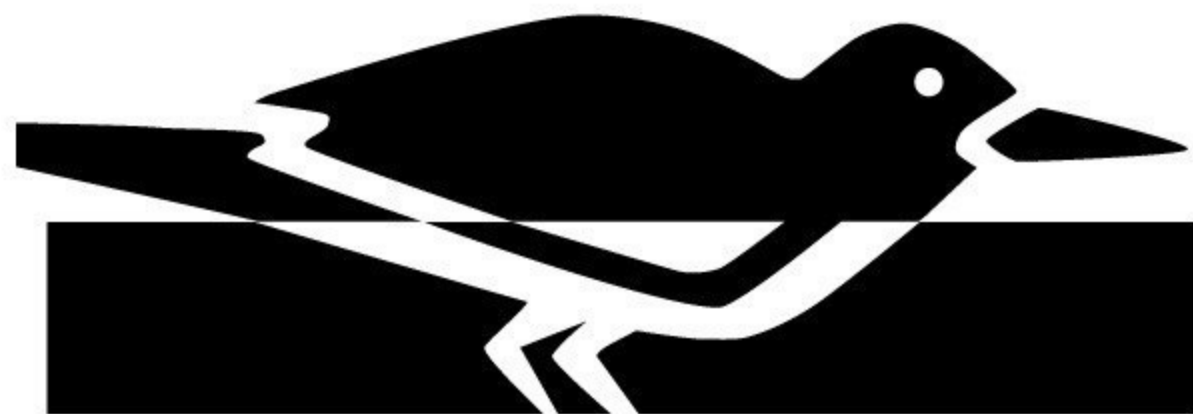
Note. In addition to the conditions above, accredited persons must comply with obligations under the BC Act and regulations, including Part 6 Division 3 of the BC Act. Failure to comply with any of the conditions above may result in the EAH exercising the power to vary, suspend or cancel that accreditation under Part 5 of this Scheme.

ADDITIONAL CONDITIONS TO WHICH THIS ACCREDITATION IS SUBJECT

Nil

ECA

ECOLOGICAL
CONSULTANTS
ASSOCIATION of NSW Inc



2024

PRACTISING MEMBER

APPENDIX D BAM SUMMARY REPORTS

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00052156/BAAS18156/24/00052157

Assessor Name

Alex FRASER

Proponent Name(s)

Terry Perram

Assessment Revision

2

Date Finalised

23/11/2024

Proposal Name

108 Mulgrave Road Mulgrave MOD 4 application

Assessor Number

BAAS18156

Report Created

23/11/2024

BOS entry trigger

BOS Threshold: Area clearing threshold

BAM data last updated *

28/10/2024

BAM Data version *

Current classification (live - default) (80)

BAM Case Status

Finalised

Assessment Type

Part 4 Developments (Small Area)

* 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

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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
4025-Cumberland Red Gum Riverflat Forest	Not a TEC	1.5	0	0	0.00

4025-Cumberland Red Gum Riverflat Forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Coastal Floodplain Wetlands This includes PCT's: 4015, 4023, 4024, 4025, 4026, 4027, 4029, 4034, 4035, 4036, 4037, 4041, 4042, 4044, 4046, 4049, 4050, 4051, 4055, 4059	Coastal Floodplain Wetlands >=70% and <90%	4025_Class name1	No	0	Cumberland,Burraborang, 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

BAM Biodiversity Credit Report (Variations)

	Forested Wetlands	Tier 2 or higher threat status	4025_Classname1	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
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Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Myotis macropus / Southern Myotis	4025_Classname1	1.5	12.00

Credit Retirement Options Like-for-like options

Myotis macropus / Southern Myotis	Spp		IBRA region
	Myotis macropus /Southern Myotis		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.

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00052156/BAAS18156/24/00052157	108 Mulgrave Road Mulgrave MOD 4 application	28/10/2024
Assessor Name	Report Created	BAM Data version *
Alex FRASER	23/11/2024	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18156	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
2	BOS Threshold: Area clearing threshold	23/11/2024

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List of Species Requiring Survey

Name	Presence	Survey Months
<i>Myotis macropus</i> Southern Myotis		☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

Common Name	Scientific Name
Southern Myotis	<i>Myotis macropus</i>

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Camden White Gum	<i>Eucalyptus benthamii</i>	Refer to BAR
<i>Deyeuxia appressa</i>	<i>Deyeuxia appressa</i>	Refer to BAR
Hairy Geebung	<i>Persoonia hirsuta</i>	Refer to BAR

BAM Candidate Species Report

Hibbertia sp. Bankstown	Hibbertia sp. Bankstown	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Refer to BAR
Little Bent-winged Bat	Miniopterus australis	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Refer to BAR
Swift Parrot	Lathamus discolor	Refer to BAR

Proposal Details

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BAAS18156	Finalised	23/11/2024
Assessment Revision	BOS entry trigger	Assessment Type
2	BOS Threshold: Area clearing threshold	Part 4 Developments (Small Area)

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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 SAI	Ecosystem credits

Cumberland Red Gum Riverflat Forest

1	4025_Classname1	Not a TEC	15.5	15.5	1.5	PCT Cleared - 89%	High Sensitivity to Gain			2.00		0
											Subtotal	0
											Total	0

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 SAIL	Species credits
Myotis macropus / Southern Myotis (Fauna)									
4025_Classname1	15.5	15.5	1.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	12
								Subtotal	12

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00052156/BAAS18156/24/00052157	108 Mulgrave Road Mulgrave MOD 4 application	28/10/2024
Assessor Name	Report Created	BAM Data version *
Alex FRASER	23/11/2024	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18156	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
2	BOS Threshold: Area clearing threshold	23/11/2024

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Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Australasian Bittern	Botaurus poiciloptilus	4025-Cumberland Red Gum Riverflat Forest
Australian Painted Snipe	Rostratula australis	4025-Cumberland Red Gum Riverflat Forest
Black Falcon	Falco subniger	4025-Cumberland Red Gum Riverflat Forest
Black-necked Stork	Ephippiorhynchus asiaticus	4025-Cumberland Red Gum Riverflat Forest
Black-tailed Godwit	Limosa limosa	4025-Cumberland Red Gum Riverflat Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	4025-Cumberland Red Gum Riverflat Forest
Comb-crested Jacana	Irediparra gallinacea	4025-Cumberland Red Gum Riverflat Forest
Diamond Firetail	Stagonopleura guttata	4025-Cumberland Red Gum Riverflat Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	4025-Cumberland Red Gum Riverflat Forest

BAM Predicted Species Report

Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	4025-Cumberland Red Gum Riverflat Forest
Eastern Osprey	Pandion cristatus	4025-Cumberland Red Gum Riverflat Forest
Flame Robin	Petroica phoenicea	4025-Cumberland Red Gum Riverflat Forest
Grey-headed Flying-fox	Pteropus poliocephalus	4025-Cumberland Red Gum Riverflat Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	4025-Cumberland Red Gum Riverflat Forest
Little Bent-winged Bat	Miniopterus australis	4025-Cumberland Red Gum Riverflat Forest
Little Lorikeet	Glossopsitta pusilla	4025-Cumberland Red Gum Riverflat Forest
Regent Honeyeater	Anthochaera phrygia	4025-Cumberland Red Gum Riverflat Forest
South-eastern Glossy Black-Cockatoo	Calyptrorhynchus lathami lathami	4025-Cumberland Red Gum Riverflat Forest
Speckled Warbler	Chthonicola sagittata	4025-Cumberland Red Gum Riverflat Forest
Spotted-tailed Quoll	Dasyurus maculatus	4025-Cumberland Red Gum Riverflat Forest
Swift Parrot	Lathamus discolor	4025-Cumberland Red Gum Riverflat Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	4025-Cumberland Red Gum Riverflat Forest
White-throated Needletail	Hirundapus caudacutus	4025-Cumberland Red Gum Riverflat Forest

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
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BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00052156/BAAS18156/24/00052157	108 Mulgrave Road Mulgrave MOD 4 application	28/10/2024
Assessor Name	Report Created	BAM Data version *
Alex FRASER	23/11/2024	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18156	Part 4 Developments (Small Area)	Finalised
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2	BOS Threshold: Area clearing threshold	23/11/2024

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Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	4025_Classname1	4025-Cumberland Red Gum Riverflat Forest	Classname1	1.5	1	