Attachment 2 to Item 2.1.1.

Biodiversity Development Assessment

Date of meeting: 21 November 2024
Location: Audio-visual link
Time: 10am

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

FOUR-LOT RESIDENTIAL SUBDIVISION

LOT 31 DP 7565

457 BELLS LINE OF ROAD, KURMOND

Prepared by:

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Prepared for:	Wayne Attard (c/o Mckinlay Morgan and Associates)
Reference No.	BDAR Rev E
Document Status & Date:	27th August 2024

Abbreviations

Abbreviation	Meaning
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Methodology
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
DCP	Development Control Plan
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DEE	Department of Environment and Energy
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectare
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 the NSW Plant Community Type Control Panel
PFC	Projected Foliage Cover
SAII	Serious and Irreversible Impacts
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 subdivision.
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.
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
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	457 Bells line of Road, Kurmond

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FIGURES

CERTIFICATION

I, Alex Fraser of Fraser Ecological, hereby state that this Biodiversity Development Assessment Report (BDAR) for a residential subdivision development at 457 Bells Line of Road, Kurmond 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 and Jesse McIvor. Report writing was undertaken by Alex Fraser and Jesse McIvor.

Our qualifications are:

Alex Fraser, Principal Ecologist
B.Sc. (Hons)
Certificate 3 Natural Area Restoration
BAM Accredited Assessor (BAAS 18156)
Member of the Ecological Consultants Association of NSW

Jesse McIvor, Ecologist
B.Sc. (Hons)

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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BAAS18156 Accredited Assessor
Principal Ecologist, Fraser Ecological

EXECUTIVE SUMMARY

Fraser Ecological has been engaged by Wayne Attard (c/o McKinlay Morgan and Associates) to prepare a Biodiversity Development Assessment Report (BDAR) for prepare an impact assessment of the proposed four lot residential subdivision on the terrestrial ecology located at 457 Bells Line of Road, Kurmond in the Hawkesbury City Council LGA.

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 vegetation tree canopy identified on-site is consistent with Plant Community Type (PCT) No. PCT 3320 – Cumberland Shale Plains Woodland in highly degraded form:

- PCT Vegetation Formation: Grassy woodlands
- PCT Vegetation Class: Coastal valley grassy woodlands

The PCT 3320 is consistent with a form of Cumberland Plain Woodland Threatened Ecological Community – Critically Endangered Ecological Community listed under the *Biodiversity Conservation Act 2016* and *Environmental Protection and Biodiversity Conservation Act 1999.* **This has been updated in the BAM C entry as part of this revision for the credit reports.**

Future development on-site as a result of the proposal would require the minimum removal of seven (7) locally native trees which is not considered a significant area of vegetation removal in relation to the other twenty (21) other trees to be retained (see Figure 9 and Figure 10) for the location of native trees on the Subject Land).

The patches of vegetation community within the four-lot subdivision have a canopy and sub-canopy comprised of the following species:

- *Eucalyptus tereticornis* (Forest Redgum)
- *Eucalyptus saligna* (Sydney Bule Gum)
- *Ceratopetalum apetalum* (Coachwood)

The condition of the vegetation on site can considered to be in very poor condition (Vegetation Zone 1 & 2). This is reflected in the low Vegetation Integrity Score. It is limited to canopy species with limited regeneration of the understorey. It generally lacks small trees shrubs and extensive areas of native groundcovers typically associated with a remnant vegetation community in good condition.

There is a small patch of regenerating *Acacia* spp. and some Couch (*Cynodon dactylon*) occurring in the middle of the property that have been taken into account for updated Vegetation 2 (refer Council RFI Aug 2024). The ground cover is dominated by introduced pasture grasses and High Threat Exotic weeds.

The vegetation within the Subject Land is comprised primarily of exotic paddock grasses and isolated paddock trees with most of the ground covered by introduced grasses and forbs (this was verified by recent grassland quadrats undertaken across the site). The condition of the vegetation for a majority of the site is in very poor condition. It is limited to canopy species with no native regeneration of the understorey. There is only a very small cover of leaf litter and a few logs of fallen dead timber (dead timber can be relocated to VMP areas without influencing bushfire fuel loads).

There is a sparse occurrence of native grasses and forbs were also present amongst the groundcover, including locally common *Geranium homeanum* and *Microlaena stipoides* recorded in the BAM plot (south-eastern corner of the property). This been accounted for in the BAM calculator impacts for Vegetation Zone 1. Most of these areas will be protected and enhanced as part of the future proposed VMP area.

The native vegetation community within Vegetation Zone 1 & 2 does not retain its original structural integrity and has mostly been modified as pasture grazing paddock. It generally has low native resilience and ability for the soil seed bank to regenerate to a fully structured community – particularly in the middle of the property (Vegetation Zone 2).

One hollow-bearing tree may indirectly impacted by the proposed development (Tree 15) despite the proposed building envelope showing this tree could be retained (refer to Figure 10). It contains potential roosting habitat for common marsupials and microbats. We have updated this version of the report to include this tree into the 'indirectly impacted' area calculations as directed in the latest Council RFI.

Adhering to the recommended pre-clearing protocols under the supervision of a Project Ecologist will avoid significant impacts to local fauna populations. The hollow can also be re-located by suitably experienced professionals and will be assessed in further detail as part of future dwelling house construction development application after subdivision stage. It can be relocated into the proposed VMP native vegetation protection and enhancement areas. It is not considered a significant tree and has a low Safe Use Life Expectancy (SULE) rating.

The recently amended plans include the provision of three (3) VMP areas that can be revegetated with fully structured native vegetation. These areas would be subject to a Vegetation Management Plan (VMP) and a positive covenant on the title of the property to inform future owners of these restriction as to user requirements. We have made sure that these three vegetation areas do not contradict bushfire or wastewater requirements. This allows on-site revegetation as biodiversity

offset, in addition to the mandatory retirement of biodiversity offset credit retirement recommended below (BAM-C Credit Reports provided in Appendix D).

As will be detailed in the separate VMP Report (provided prior to the release of the Subdivision Certificate), the VMP areas will be planted with additional native canopy species, shrubs and grasses. This will be maintained to promote a healthier vegetation community that better reflects the original plant community that existed before disturbance (PCT 3320). It will not contradict bushfire APZ requirements (this has been confirmed by applicant's bushfire consultant).

The total area of native vegetation (Vegetation Zone 1 – directly and indirectly impacted) occurring within the subject site has an overly conservative of 0.28 ha for the BAM calculator (some of this area calculator overlaps in the proposed VMP area).

The total area of native vegetation (Vegetation Zone 2 – directly impacted) occurring within the middle of the subject site has an overly conservative of 0.297 ha for the BAM calculator.

The following Vegetation Integrity Score (VIS) was determined:

PCT	Vegetation Zone	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 3320	Vegetation Zone 1 (0.28ha)	8.5	24.8	47.9	21.6
PCT 3320	Vegetation Zone 2 (0.297ha)	8.7	16.2	8.9	10.8

Vegetation Zones Requiring an Offset

Vegetation Zone	PCT	Area Impacted	Current Vegetation Integrity Score	Future Vegetation Integrity Score***	Number of Ecosystem Credits Required
1	PCT 3320	0.28ha	21.6	8.3	2
2	PCT 3320	0.297ha	10.8	0	0

****Takes into account areas to be protected and enhanced under a future Vegetation Management Plan and 88b and 88e instrument on title equating to approx. 0.4ha***

1 INTRODUCTION

Fraser Ecological have been engaged by Wayne Attard (c/o McKinlay Morgan and Associates) to provide a Biodiversity Development Assessment Report (BDAR) on the impact of the proposed four lot residential subdivision development at 457 Bells line of Road Kurmond located in the Hawkesbury City Council LGA.

See Figure 1 and 2 for the location & aerial maps showing property boundaries. The subdivision layout and proposed dwelling parcels, roads, and APZ are displayed in Figure 2.

The trigger for this BDAR is that the Subject Land is marked on the NSW DPE's Sensitive Biodiversity Values Map (https://www.environment.nsw.gov.au/biodiversity/biodiversity-values-map.htm) (Figure 3).

BAM plot and quadrat surveys were undertaken on the 13th April 2023. Further vegetation surveys and plots were conducted on the 23rd April 2024.

This revision of the report addresses Council's Request For Further Information/ Peer Review letter dated 21st March 2024 and 8th August 2024.

1.1 Description of the Site and Proposal

The study site is located approximately 65 km north-west of the Sydney CBD situated in the Hawkesbury City Council LGA (Figure 1). The surrounding neighbourhood is characterised by rural lands and remnant bushland. The subject property is known as 457 Bells Line of Rd, Kurmond NSW (Lot 31, DP7565). The total property size is 2.37 ha.

The site is located within the:

- Sydney Basin Bioregion
- Yengo IBRA Subregion
- Cumberland Mitchell landscape

The proposed plans prepared by McKinlay and Morgan & Associates show the layout of the proposed subdivision and dwelling envelopes. The proposed development comprises a four-lot subdivision (referred to as Lots 21-24). Please refer to the proposed development plans provided on the following pages.

Future development on-site as a result of the proposed subdivision would require the minimum removal of seven (7) locally native trees (Figure 9 and Figure 12). This is not considered a significant area of vegetation removal in relation to the twenty-one (21) native trees to be retained, protected and enhanced by the provision of a future Vegetation Management Plan (which can include revegetation of canopy trees).

We have added in the following proposed impact areas to address Council's latest RFI (8th August 2024) for indirect impacts:

- Vegetation Zone 1 (BAM Plot 1) isolated paddock trees with some native understorey (0.28 ha directly impacted for indicative building envelope and other areas indirectly by future APZs)
- Vegetation Zone 2 (BAM Plot 4) showing some regenerating Acacias and isolated paddock trees (0.297ha directly impacted for indicative building envelope and other areas indirectly by future APZs)

Improvements to the three remnant patches of native vegetation on the Subject Property will be specified in a separate Vegetation Management Plan Report (VMP) provided prior to the release of the Subdivision Certificate. The three distinct Vegetation Management Plan Zones are depicted in Figure 9 and Figure 10 (northern boundary, south-east and south west corner of property).

As already stated in the previous BDAR revision, the following points briefly summarise the intended outcome of the three VMP Zones:

- Improvement to the health and condition of the native vegetation community. The existing vegetation has been identified as a 'poor' condition PCT 3320 (mostly isolated paddock trees with an understorey of predominantly exotic groundcovers). The planting of representative vegetation from PCT 3320 in the VMP Zones, much of which is not currently present on the Subject Land, will improve the vegetation community.
- The VMP will form part of a Positive Covenant on the title of the property under the *Conveyancing Act 1919*. This will ensure the VMP Zones are able to be properly maintained, enable regeneration and long-term establishment of native PCT 3320 as on-site offset. It will be legally enforceable by Council.

The total area of native vegetation that will be impacted the Subject Land has been estimated using accurate GIS software to be updated to 0.577 ha (formerly 0.14 ha). This value was re-entered into the BAM calculator as part of this revision. Due to the poor condition of Vegetation 2 (middle of the site), this has not increased the ecosystem credit retirement requirements.

1.2 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 SAIIs 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 subdivision 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.

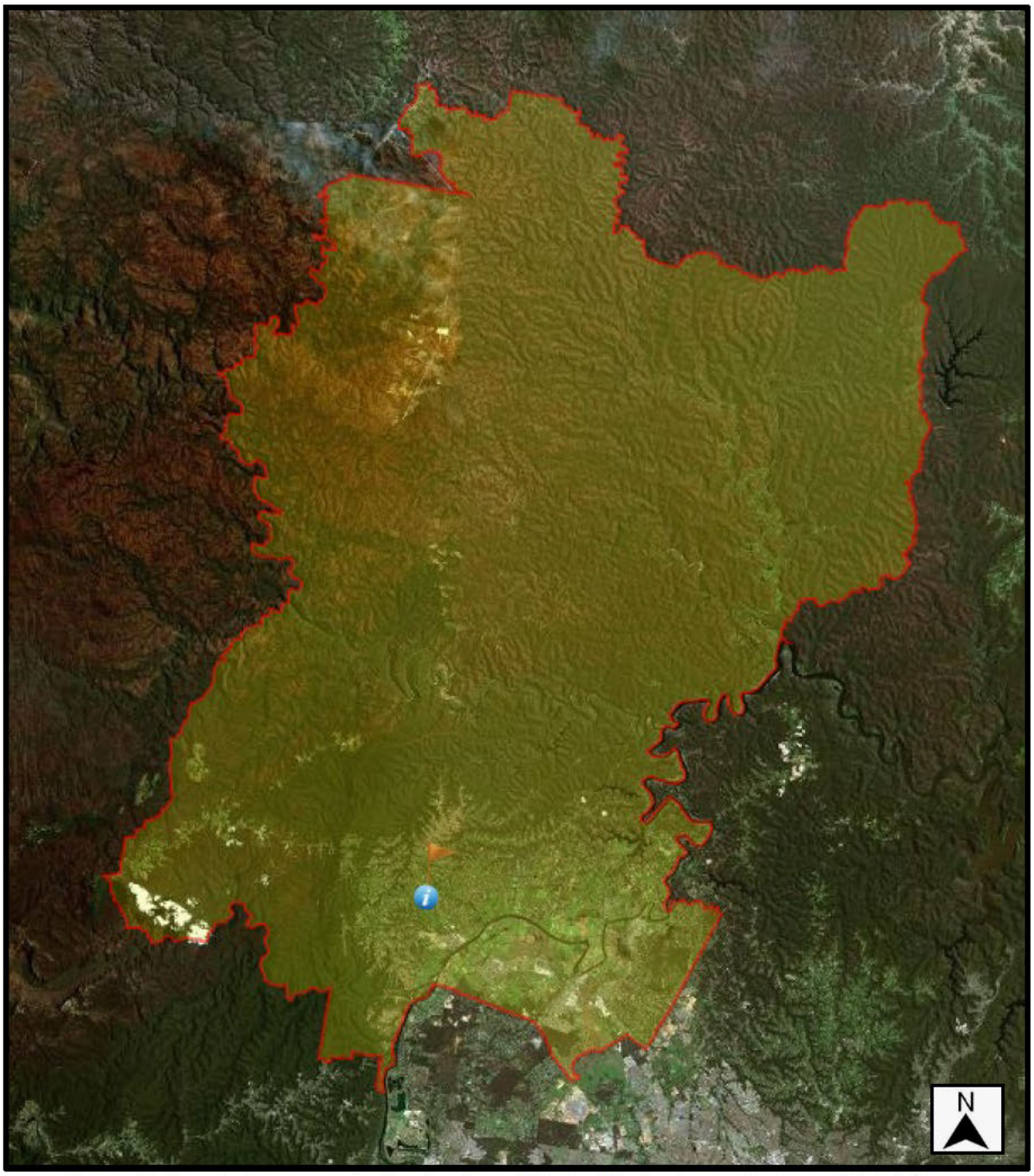

Figure 1. The study area and wider locality within the Hawkesbury City Council LGA (Source: SIX maps.com)

Figure 2. Site Map displaying subdivision layout and proposed dwelling parcels, roads, and APZ (Created by Waratah Bushfire Planning (GIS))

Data source: WBP (2024); Fraser Ecological (2024); DCCE (2012); DCSSS (2024); DPE (2016, 2023); DPI (2015); GA (2011); NearMap (2024)

LEGEND

- Site boundary (surveyed)
- Subdivision boundary
- Subject land (dwelling envelope)
- Effluent disposal area
- Driveway
- Proposed VMP area
- Electricity transmission line
- Minor road
- Local road
- Lot boundary
- Native vegetation extent (42.86% of the 1,500 m buffer area)

Mitchell Landscape (DPE (2016) – v3.1)

- Cumberland Plain

Strahler stream order

- 1st order
- 2nd order

Riparian buffer

- 10 m
- 20 m

NOTE: *the entire view extent is within:*
- *the Sydney Basin IBRA 7 region*
- *the Cumberland IBRA 7 subregion*
- *the Hawkesbury local government area*
- *the Windsor local land district*

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Site map

Lot 31 DP7565 – 457 Bells Line of Road, Kurmond

29/05/2024 (v2) 1:3,500 @A4 GDA2020 MGA Zone 56

0 50 100 metres

Figure prepared by Waratah Bushfire Planning (GIS)

Figure 3. DPIE Sensitive Biodiversity Values Map (Source: NSW Department of Planning and Environment, Created by Waratah Bushfire Planning (GIS)).

Path: C:_GIS_Working\FraserEcological\FE24005_457_BellsLineOfRoad_Kurmond\GIS\8_Maps\BDAR001_BiodiversityValues_20240529_03_BDAR001_BiodiversityValues_20240529_03.aprx

Data source: WBP (2024); Fraser Ecological (2024); DCSSS (2024); DPE (2018); GA (2011); NearMap (2024)

LEGEND

- Site boundary (surveyed)
- Subdivision boundary
- Subject land (dwelling envelope)
- Effluent disposal area
- Driveway
- Proposed VMP area
- Electricity transmission line
- Minor road
- Local road
- Watercourse/drainage line
- Lot boundary
- Biodiversity values mapping (DPE (2018) – v16.10 Threatened species or communities with potential for serious and irreversible impacts

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Subject land in relation to Biodiversity Values mapping

Lot 31 DP7565 – 457 Bells Line of Road, Kurmond

29/05/2024 (v3) 1:3,500 @A4 GDA2020 MGA Zone 56

0 50 100
metres

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.

Figure prepared by Waratah Bushfire Planning (GIS)

1.2.1 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.

1.2.2 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.

The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489

This layer contains digital mapping of the native vegetation communities of the Sydney Metropolitan area. Vegetation communities have been derived from the analysis of 2200 floristic sites collated for the study area. Identified vegetation communities have been related to currently listed threatened ecological communities listed under the NSW TSC Act, 1995 and the Commonwealth EPBC Act, 1999. Native vegetation communities have been mapped using a combination of detailed image interpretation, relationships between sample sites and abiotic environmental variables. The derived digital data layer includes fields that describe the vegetation community, interpreted dominant species and understorey characteristics, interpretation confidence, disturbance type and severity, NSW vegetation formation and classes and related NSW Plant Community Types. These

are described in detail in technical reports OEH (2016) The Native Vegetation of the Sydney Metropolitan Area. Volume 1: Technical Report. Version 3.0. Office of Environment and Heritage Sydney. OEH (2016) The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0. NSW Office of Environment and Heritage, Sydney. Version 3.0 of the Native Vegetation of the Sydney Metropolitan Area updates the Plant Community Type and Biometric Vegetation Type of each map unit.

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.

1.2.3 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.

Section 4.2 outlines the reasoning behind why no targeted fauna surveys were considered necessary for the proposed development. This mainly because no candidate 'species credit' species will be affected by the proposal as potential habitat is absent.

1.2.4 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 (prepared Waratah Bushfire and Ecology GIS services).
- 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 April 2023.

- Proposed site plans prepared by McKinlay Morgan & Associates dated 27/05/2024 (Rev I) – refer to Appendix A
- Arboricultural Impact Assessment report prepared by Jacksons Nature Works dated September 2022.

2 LANDSCAPE FEATURES

2.1 IBRA Bioregions and Subregions

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 4).

NSW Landscape Regions (Mitchell Landscapes)

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 Cumberland Landscape (Figure 4). This landscape region has an estimated cleared fraction of 0.89 and has 'over-cleared' land status.

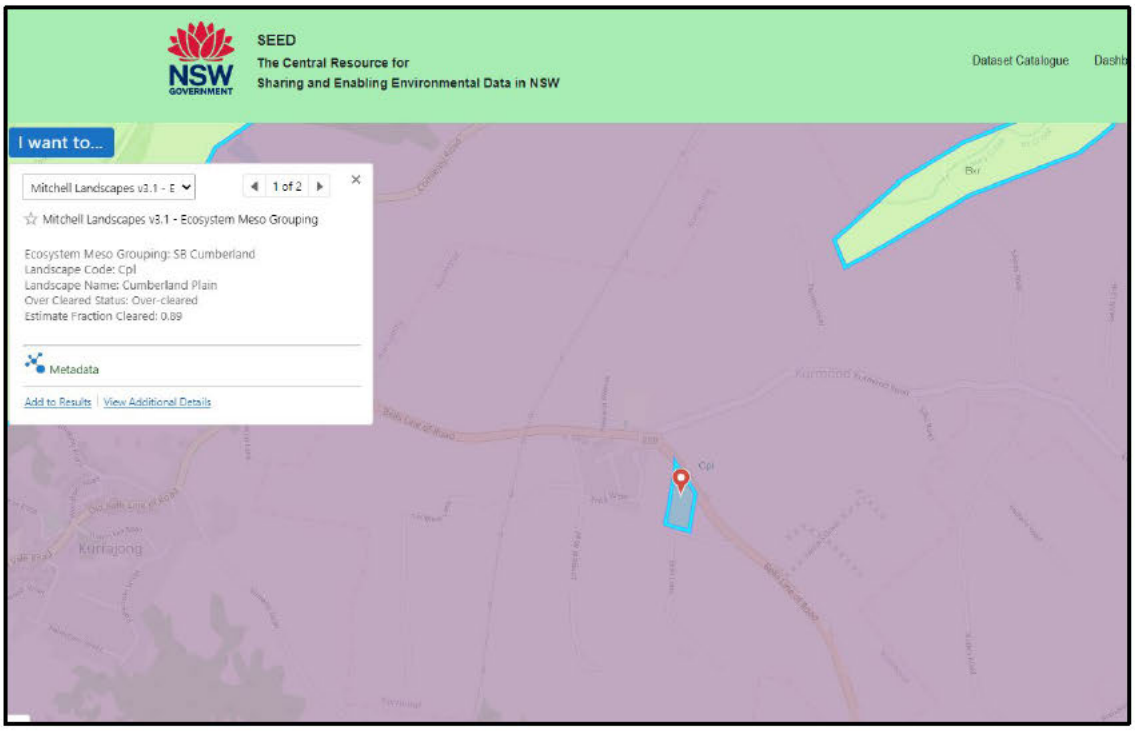

Figure 4. Location of site within the Cumberland Mitchell Landscape.

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 (see Figure 5). It is estimated, from this mapping, that the native vegetation cover would be 80% as provided within the BDAR manual. As an overly caution measure to alleviate and Council assessor previous concerns we haven entered and overly cautious 80% in the BAM Offsets calculator to prove that it makes no change credit species considered in this assessment (Section 6).

Figure 5: Assessment Area Location Map (Created by Waratah Bushfire Planning (GIS))

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Data source: WBP (2024); Fraser Ecological (2024); DCCE (2012); DCSSS (2024); DPE (2016, 2023); DPI (2015); GA (2011); NearMap (2024)

LEGEND

- Site boundary (surveyed)
- Subject land (dwelling envelope)
- Subject land 1,500 m buffer
- Electricity transmission line
- Minor road
- Local road
- Watercourse/drainage line

Strahler stream order
- 1st order
- 2nd order
- 3rd order

Riparian buffer
- 10 m
- 20 m
- 30 m

- Native vegetation extent (42.86% of the 1,500 m buffer area)

Mitchell Landscape (DPE (2016) – v3.1)
- Blaxlands Ridge
- Cumberland Plain

NOTE: *the subject land 1,500 m buffer area is within:*
- *the Sydney Basin IBRA 7 region*
- *the Cumberland IBRA 7 subregion*
- *the Hawkesbury local government area*
- *the Windsor local land district*

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Location map

Lot 31 DP7565 – 457 Bells Line of Road, Kurmond

29/05/2024 (v2) 1:17,500 @A4 GDA2020 MGA Zone 56

0 250 500 metres

Figure prepared by Waratah Bushfire Planning (GIS)

2.3 Wetland, Rivers, Streams and Estuaries

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

The Subject Property has been fully traversed during site inspections on multiple occasions. A dam is not present on the Subject Property (despite references to one in the Council ecology Peer Review). Historical aerial imagery indicates a dam was present on the Subject Land, however it was filled-in in 2021 (see Figure 6, dates indicated in the bottom right corner).

Figure 6. Aerial imagery demonstrating the decommissioning of the dam.

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. **The proposed VMP will protect and enhance connectivity.**

2.5 Areas of Geological Significance and Soil Hazard Features

Not present.

The site is located within the Luddenham soil landscape as depicted in Figure 7.

Characteristics of the landscape are as follows:

Landscape—undulating to rolling low hills on Wianamatta Group shales, often associated with Minchinbury Sandstone. Local relief 50–80 m, slopes 5–20%. Narrow ridges, hillcrests and valleys. Extensively cleared tall open forest (wet sclerophyll forest).

Soils—shallow (<100 cm) dark Podzolic Soils (Dd3.51) or massive Earthy Clays (Uf6.71) on crests; moderately deep (70–150 cm) Red Podzolic Soils (Dr2.11, Dr2.41, Dr3.11) on upper slopes; moderately deep (<150 cm) Yellow Podzolic Soils (Dy4.22) and Prairie Soils (Gn3.26) on lower slopes and drainage lines.

Limitations—water erosion hazard, localised steep slopes, localised mass movement hazard, localised shallow soils, localised surface movement potential; localised impermeable highly plastic subsoil, moderately reactive.

Figure 7. Luddenham Soil Landscape is mapped on the Subject Land.

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 of Assessment Area

Native vegetation cover is calculated as a percentage cover on the Subject Land and the surrounding 1,500 m buffer area (referred to as the Assessment 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 for the Assessment Area has been calculated using GIS software to be approximately 42.86% (see Figure 5).

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 approximately (100) hectares.

3 NATIVE FLORA AND FAUNA

3.1 Native Vegetation Description and Extent

The vegetation within the Subject Land is comprised primarily of exotic paddock grasses and isolated paddock trees (average DBH of 590mm) with most of the ground covered by grasses and forbs. The condition of the vegetation on site is in very poor condition. It is limited to canopy species with no regeneration of the understory. There is only a very small cover of leaf litter and a few logs of fallen dead timber (see APPENDIX B for Plot Data).

The total area of native vegetation within the Subject Land has been calculated using GIS software to be 0.14 ha for the BAM calculator (refer to Figure 9).

The results from the 5 BAM Plots conducted on the Subject Land highlight the dominance of exotic grasses (see APPENDIX B). The patches of remnant woodland are primarily comprised of:

- *Eucalyptus tereticornis* (Forest Redgum)
- *Eucalyptus saligna* (Sydney Bule Gum) – planted or seeded by bird or bat dispersal
- *Ceratopetalum apetalum* (Coachwood)
- *Acacia implexa (small patch in Vegetation Zone 2)*
- *Acacia parramatensis (small patch in Vegetation Zone 2)*

The ground cover is dominated by introduced pasture grasses and environmental exotic introduced weeds. The groundcover is composed principally of the exotic species *Cenchrus clandestinus* and *Paspalum dilatatum*.

Native grasses and forbs present amongst the groundcover layer included

- *Geranium homeanum (Vegetation Zone 1)*
- *Microlaena stipoides (Vegetation Zone 1)*
- *Eragrostis leptostachya (Vegetation Zone 1)*
- *Oplismenus hirtellus (Vegetation Zone 1)*
- *Cynodon dactylon (small patch in Vegetation Zone 2)*

Exotic species present in the groundcover included:

- *Ehrharta erecta*
- *Bidens pilosa*

- *Chloris gayana*
- *Sida rhombifolia*
- *Euryops chrysanthemoides*
- *Solanum mauritianum*
- *Araujia sericifera*
- *Ligustrum sinense*

One hollow-bearing tree (Tree 15 in the Arboriculture Impact Assessment, seen in Figure 12). This tree is a dead stag and has "Poor Vitality' as indicated in the Arboriculture Impact Assessment. The tree is decaying, dead branches surround it with a low SULE rating. See section 3.3.1 for further details on the HBT.

3.2 Plant Community Types

The most prevalent canopy tree is *E. tereticornis*. This species is also dominant in the NSW SVTM Plant Community Type (PCT) 3320 – Cumberland Shale Plains Woodland which is mapped on the Subject Land (see Figure 8 'Community Profile Report' below). The dominance of E. tereticornis within the remnant paddock trees has been used as a diagnostic species to allocate PCT 3320 as the representative plant community, but in highly degraded form. The extent of this PCT as mapped on the NSW SVTM over the Subject Land is shown in Figure 10. Ground-truthing observations indicate that much of the mapped PCT extent is actually exotic grassland. The extent of native vegetation as determined from site surveys is depicted in Figure 9.

Eucalyptus saligna was identified in one section of the Subject Land, within BAM Plot 1 (see APPENDIX A). This species is not described as part of PCT 3320. The presence of *E. saligna* is highly likely either from direct planting or from seed from the neighbouring property. The owner of the adjacent property (next to BAM Plot 1) explained that numerous *E. saligna* saplings were planted approx. 20 years ago on his property.

Allocated PCT for Subject Land	
PCTID	3320 – Cumberland Shale Plains Woodland
Formation	Grassy Woodland
Class	Coastal Valley Grassy Woodland

PCT 3320 is consistent with a form of Cumberland Plain Woodland Threatened Ecological Community – Critically Endangered Ecological Community listed under the *Biodiversity Conservation Act 2016* and *Environment Protection and Biodiversity Conservation Act 1999*.

The NSW State Vegetation Type Map (Department of Planning and Environment 2022) identifies patches of vegetation on the site been consistent with Cumberland Shale Plains Woodland (Figure 11). This vegetation community is listed as a critically endangered ecological community under the New South Wales *Biodiversity Conservation Act 2016* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Figure 8. PCT 3320 Community Profile Report (p 1 of 12).

BioNet Vegetation Classification - Community Profile Report

Plant Community Type ID (PCT ID): 3320

PCT Name: Cumberland Shale Plains Woodland
Classification Confidence Level: 2-High
Total Number of Replicates: 350
Number of Primary Replicates: 333
Number of Secondary Replicates: 17
Vegetation Description: A tall sclerophyll open forest or woodland with a sparse mid-stratum of soft-leaved shrubs and small trees with a grassy ground cover on the undulating Wianamatta Group shale plains of western Sydney. The canopy very frequently includes Eucalyptus tereticornis and Eucalyptus moluccana, with ironbarks (Eucalyptus crebra and Eucalyptus fibrosa) occasionally present and sometimes prominent in localised areas. The sparse shrub to small tree layer very frequently includes Bursaria spinosa and one or more species of Acacia, of which Acacia parramattensis, Acacia decurrens and Acacia falcata are the most frequent and abundant. Presence of these Acacia species helps to distinguish this PCT from the related PCT 3319 on rises of the southern Cumberland Plain which typically includes Acacia implexa. The mid-dense ground layer typically includes grasses, forbs, twiners and hardy small ferns. Microlaena stipoides is almost always present and Themeda triandra, Dichondra repens, Brunoniella australis, Cheilanthes sieberi subsp. sieberi, Desmodium varians, Aristida vagans and Glycine tabacina are very frequent. This is the most widespread PCT on the Cumberland Plain, occupying much of the plain between Bankstown and the Hawkesbury and Nepean rivers. It typically occurs in a warm, moist climate below 120 metres asl however can occur up to 200 metres asl on the undulating terrain between Douglas Park and Campbelltown to the east of the Nepean River. A northern outlier occurs near Maroota on a small remnant on a narrow shale ridge. While widespread on the main part of the plain, this PCT primarily occurs in small, often disturbed patches within a rural or urban matrix. In the hilly country to the west of the Nepean River, this PCT is replaced by PCT 3319. On thinner shales above sandstone around the periphery of the Cumberland Plain, it grades into PCT 3321. Ironbarks are very frequent and Eucalyptus punctata is common in the canopy of PCT 3321, and Eucalyptus moluccana and Eucalyptus tereticornis are both rare.
Vegetation Formation: Grassy Woodlands;
Vegetation Class: Coastal Valley Grassy Woodlands;
IBRA Bioregion(s): Sydney Basin;
IBRA Sub-region(s): Cumberland; Wollemi; Yengo;
LGA: BLACKTOWN; CAMDEN; CAMPBELLTOWN; CANTERBURY-BANKSTOWN; CUMBERLAND; FAIRFIELD; HAWKESBURY; LIVERPOOL; CITY OF PARRAMATTA; PENRITH; THE HILLS SHIRE; WOLLONDILLY;
Elevation (m) (Min, Median, Max): 9.1 64.9 208.3
Annual Rainfall (mm) (Min, Median, Max): 746 837 938
Annual Mean Temperature (deg C) (Min, Median, Max): 15.46 16.66 17.09
Median Native Species Richness per plot: 36
TEC Assessed: Has associated TEC
TEC List: Listed BC Act,CE: Cumberland Plain Woodland in the Sydney Basin Bioregion (Part); Listed BC Act,E: Shale Gravel Transition Forest in the Sydney Basin Bioregion (Part); Listed EPBC Act,CE: Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Part);
TEC Comments: (Comment TEC1) Primarily relates to the NSW Cumberland Plain Woodland TEC (CPW). Paragraphs 2 and 7 of the CPW Final Determination may assist users to distinguish the Shale Plains Woodland component of CPW from the Shale Gravel Transition Forest TEC at a site. Paragraph 2 provides information on substrate and paragraph 7 refers to Tozer et al. (2006) and earlier studies which have a list of diagnostic plant species for Shale Plains Woodland. Tozer et al. (2006) also provides a mapped expression of Shale Plains Woodland. (Comment TEC2) A component may relate to the NSW Shale Gravel Transition Forest TEC (SGTF). Paragraphs 5 and 6 of the SGTF Final Determination may assist users to distinguish SGTF from the Shale Plains Woodland component of the Cumberland Plain Woodland TEC at a site. Paragraph 5 provides information on substrate and paragraph 6 refers to NPWS (2000a and 2000b) which has a list of diagnostic plant species for SGTF. NPWS (2000a and 2000b) also provides a mapped expression of SGTF. (Comment TEC3) Relates to the Commonwealth Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest TEC where a patch satisfies key diagnostic characteristics and condition thresholds as per Sections 4 and 5 of the Listing Advice.
PCT Percent Cleared: 93.03
PCT Definition Status: Approved

Figure 9. BAM Plot and VMP locations, and native vegetation extent on the Subject Land (Created by Waratah Bushfire Planning (GIS))

Path: C:_GIS_Working\FraserEcological\FE24005_457_BellsLineOfRoad_Kurmond\GIS\8_Maps\8DAR004_SVTM_20240529_02.aprx

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

LEGEND

- Site boundary (surveyed)
- Subdivision boundary
- Subject land (dwelling envelope)
- Effluent disposal area
- Driveway
- Proposed VMP area
- Electricity transmission line
- Minor road
- Local road
- Watercourse/drainage line
- Lot boundary

Plant community type (NSW SVTM vC2.0.M2.0)

- PCT 3111 | Sydney Hinterland Grey Myrtle Riparian Forest
- PCT 3320 | Cumberland Shale Plains Woodland

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NSW State Vegetation Type Map (SVTM)

Lot 31 DP7565 – 457 Bells Line of Road, Kurmond

29/05/2024 (v2) 1:3,500 @A4 GDA2020 MGA Zone 56

0 50 100 metres

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.

Figure prepared by Waratah Bushfire Planning (GIS)

Figure 10. STVM mapped extent over Subject Land (Created by Waratah Bushfire Planning (GIS)).

Path: C:_GIS_Working\FraserEcological\FE24005_457_BellsLineOfRoad_Kurmond\GIS\8_Maps\BDAR007_VegetationImpact_20240820_01\BDAR007_VegetationImpact_20240820_01.aprx

Data source: WBP (2024); Fraser Ecological (2024); DCSSS (2024); GA (2011); NearMap (2024)

LEGEND

- Site boundary (surveyed)
- Subdivision boundary
- Subject land (dwelling envelope)
- Effluent disposal area
- Driveway
- Proposed Vegetation Management Plan area
- Native tree to be retained (0.164 ha)
- Native tree to be removed (0.057 ha)
- —E— Electricity transmission line
- Minor road
- Local road
- Watercourse/drainage line
- Grassland Assessment Quadrat (20 x 20 m)
- BAM plot (50 x 20 m)***

Vegetation zone

- Vegetation zone 1 – no impact (0.175 ha)
- Vegetation zone 1 – direct & indirect impact (0.277 ha)
- Vegetation zone 2 – direct impact (0.297 ha)

***Whilst native trees and other vegetation will be retained (as per the black marked circles and VMP area) as a precautionary measure we have assumed all other understorey native vegetation within the BAM plot for Vegetation Zone 1 **& 2 may be directly**/indirectly impacted by the proposal and credit retirement will be required. A total of **0.574 ha** of native vegetation to be removed/**modified** and used for the BAM-C **across the 2 vegetation zones** (shapefiles supplied to Council).

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Native vegetation impact map

Lot 31 DP7565 – 457 Bells Line of Road, Kurmond

22/08/2024 (v1) 1:1,500 @A4 GDA2020 MGA Zone 56

0 25 50
metres

Figure prepared by Waratah Bushfire Planning (GIS)

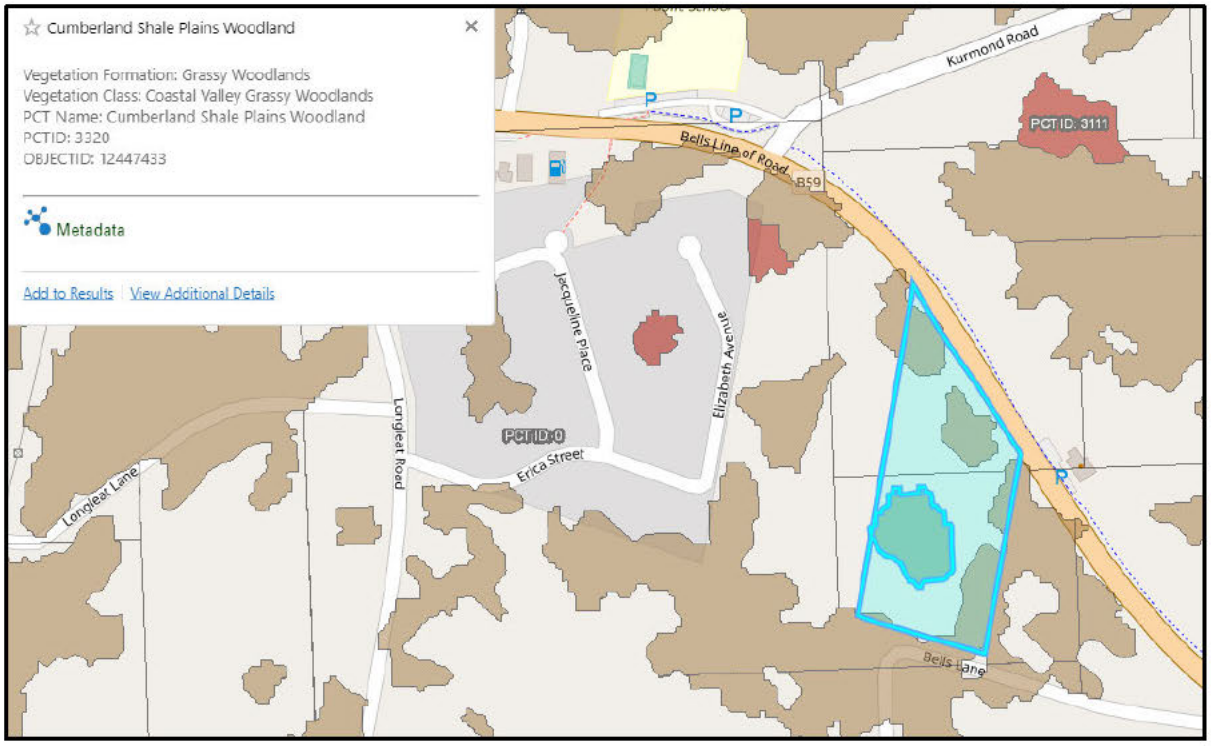

Figure 11. State government PCT vegetation mapping of the site indicating the presence of Cumberland Shale Plains Woodland PCT 3320.

3.3 Fauna Species and Habitat

3.3.1 Hollow Bearing Tree (HBT)

One large hollow bearing *Eucalyptus tereticornis* poses a potential fauna habitat within the proposed development area. This tree is number 15 on the Arboricultural Impact Assessment and the location can be seen in Figure 12. It is a dead stag and has "Poor Vitality' and low SULE rating as indicated in the Arboriculture Impact Assessment. The tree is decaying and dead branches can be seen caught in the forks (see Photograph 1).

Tree 16 is another *E. tereticornis* and is located close to Tree 15 (see Figure 12). Tree 16 was previously marked for removal (included in prior BDAR REVA), however the subdivision site plans have been adjusted (APPENDIX A) to retain this tree. Tree 16 is in good condition and nest boxes will be installed to provide compensatory habitat once Tree 15 either falls over or is removed professionally.

Additional trees within the VMP Zones could include nest boxes. Details of nest box installation can be specified in the separate VMP. Tree 16 will also be in the Positive Covenant on the property under the *Conveyancing Act 1919* and APZs – ensuring the tree will be retained for the long-term.

Photograph 1. Two images of the hollow-bearing *Eucalyptus tereticornis* to be removed.

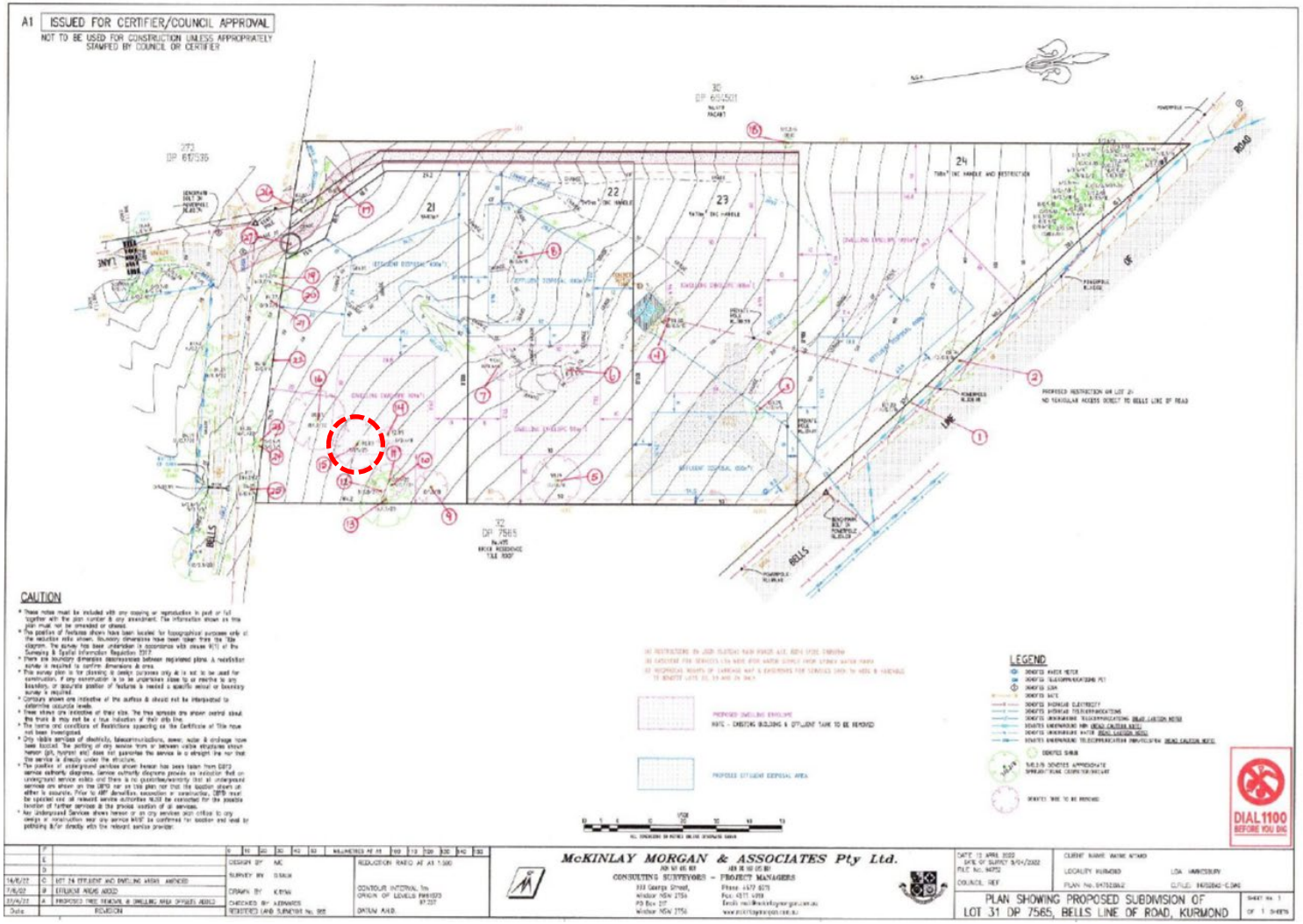

Figure 12. Location of the trees throughout the subject site on 457 Bells Line of Road, Kurmond. Tree 15 (hollow-bearing, marked for removal) is located in the south-east of the property (dashed red circle).

Table 1. Fauna habitat features recorded on the Subject Land.

Table 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 ✓			
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:	*C. 40gglomer*	*E. crebra*	*E. globoidea*	*E. sideroxylon*
	E. squamosa	*E. grandis*	*E. multicaulis*	*E. scias*
	E. robusta	*E. tereticornis* ✓	*E. 40gglomerate*	*E. siderophloia*
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	
HOLLOWS / LOGS				
TREE HOLLOWS:	Large	Medium ✓	Small	
TREE HOLLOW TYPES	Spouts / branch	Trunk	Broken Trunk ✓	Basal Cavities	Stags
GROUND HOLLOWS:	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	

3.4 Plot-based Floristic Vegetation Surveys

Plot-based floristic vegetation surveys were conducted, in accordance with s.5.2.1.9 of the BAM on the 13th April 2023 and their location is shown in Figure 11.

The site was re-inspected on 23rd April 2024. The original BAM Plot location was slightly modified in shape and location as requested by Council. An additional 4 grassland plots were conducted covering the Subject Property. In order to address Council's latest RFI letter (Aug 20204) we have included Vegetation 2 as an additional BAM plot (middle of the site). These vegetation data were used to identify PCT and ascertain the grass species on the whole of the Subject Land.

In total, five 20 m x 20 m plots were sampled for the presence of flora species. The plots were 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.

- One PCT, Cumberland Shale Plains Woodland (No. 3320) was identified on the site and has been described in Section 3.2.
- A map showing the distribution of PCTs can be seen in Figure 10.
- Plot data is provided in Appendix B.
- The location of the BAM plot is provided in Figure 9.
- The midline images for BAM Plot 1 are provided in Photograph 2 and Photograph 3 below. All midline images for BAM Plots are provided in APPENDIX B.

Photograph 2. BAM Plot 1 midline (view north).

Photograph 3. BAM Plot 1 midline (view south).

Photograph 4. BAM plot 4 (Vegetation Zone 2) centre line (red arrow facing north)

3.5 Vegetation Integrity Assessment

3.5.1 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.

3.5.2 Patch Sizes

A patch size area has been assigned to each vegetation zone, as a class. Patch size classes are provided in Table 2.

Table 2. Patch Size Classes

PCT	Vegetation Zone	Patch Size Class
3320: Cumberland Shale Plains Woodland	Vegetation Zone 1 & 2	100ha

3.5.3 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-based 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 9 for plot location. Plot data is provided in Appendix B. Table 3 details the vegetation integrity scores for each vegetation zone.

Table 3. Vegetation Integrity Scores

PCT	Vegetation Zone	Composition Condition ore	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 3320	Vegetation Zone 1	8.5	24.8	47.9	21.6
PCT 3320	Vegetation Zone 2	8.7	16.2	8.9	10.8

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.

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.

In accordance with S.6.5.1.1. a species survey must be undertaken for all species credit species identified as likely to occur on the site based upon the application of Steps 1-3 in Section 6.4. Based upon the low quality of fauna habitat proposed for removal, no species credit species are likely to occur on-site. Therefore, no targeted fauna surveys were considered necessary.

The report on the following page shows species credit species to be considered for this assessment (Table 4).

Table 4. Candidate species to be considered for this assessment

Table 4.2 Candidate species assessment

Common name	Scientific name	Included in assessment	Targeted survey conducted?	Present within subject land?	Biodiversity risk weighting	No. of BIONET records in the locality (accessed 9/10/21)	Biodiversity Offset Credits required?
Large Bent-winged Bat (breeding)	*Miniopterus orianae oceanensis*	*This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment*	No	n/a	Very High -3	20	No
Large-eared Pied Bat	*Chalinolobus dwyeri*	*This species is known to occur within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. Whilst hilly terrain was observed within the surrounding locality of the Subject Land, aerial imagery revealed no such geological features (caves, overhangs escarpment etc.) within or adjacent to the Subject Land. It is therefore unlikely such habitat features would occur within the area surrounding the Subject Land. As such, this species was excluded from the assessment.*	No	n/a	Very High -3	3	No
Little Bent-winged Bat	*Miniopterus australis*	*This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.*	No	n/a	Very High -3	2	No
Regent Honeyeater	*Anthochaera phrygia*	*No, the subject land is not within the important areas mapped for this species*	No	n/a	Very High -3	6	No
Swift Parrot	*Lathamus discolor*	*No, the subject land is not within the important areas mapped for this species*	No	n/a	Very High -3	17	No
Thick Lip Spider Orchid	*Caladenia tessellata*	*The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in*	No	n/a	Very High -3	0	No

Common name	Scientific name	Included in assessment	Targeted survey conducted?	Present within subject land?	Biodiversity risk weighting	No. of BIONET records in the locality (accessed 9/10/21)	Biodiversity Offset Credits required?
		NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. *Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).* *The habitat is degraded to the point where the species will no longer be present. This is reflected in the low vegetation integrity score of 13.4 on-site.*					

5 IMPACTS ASSESSMENT

5.1 Potential Direct Impacts

This section details possible direct impacts resulting from the proposed subdivision. Avoidance and mitigation for these impacts is provided in section 5.3 and 5.4 of this BDAR.

5.1.1 Vegetation and Habitat Impacts

Future development on-site as a result of the proposed subdivision would require the minimum removal of seven (7) locally native trees (see Figure 9). This is not considered a significant area of vegetation removal in relation to the twenty-one (21) native trees to be retained. The subdivision and associated development have been designed to minimise impacts on native vegetation. The tree removal is required to cater for the proposed internal roads, effluent disposal areas and dwelling footprints.

The Subject Property occupies 2.37 ha of land. It is proposed to be subdivided into four lots with each containing a dwelling envelope and on-site treated effluent application areas.

The condition of the vegetation on site can considered to be in very poor condition (Vegetation Zone 1 & 2). This is reflected in the low Vegetation Integrity Score. It is limited to canopy species with limited regeneration of the understorey. It generally lacks small trees shrubs and extensive areas of native groundcovers typically associated with a remnant vegetation community in good condition.

There is a small patch of regenerating Acacia spp. and some Couch (*Cynodon dactylon*) occurring in the middle of the property that have been taken into account for updated Vegetation 2 (refer Council RFI Aug 2024). The ground cover is dominated by introduced pasture grasses and High Threat Exotic weeds.

The vegetation within the Subject Land is comprised primarily of exotic paddock grasses and isolated paddock trees with most of the ground covered by introduced grasses and forbs (this was verified by recent grassland quadrats undertaken across the site). The condition of the vegetation for a majority of the site is in very poor condition. It is limited to canopy species with no native regeneration of the understorey. There is only a very small cover of leaf litter and a few logs of fallen dead timber (dead timber can be relocated to VMP areas without influencing bushfire fuel loads).

There is a sparse occurrence of native grasses and forbs were also present amongst the groundcover, including locally common *Geranium homeanum and Microlaena stipoides* recorded in the BAM plot (south-eastern corner of the property). This been accounted for in the BAM calculator impacts for Vegetation Zone 1. Most of these areas will be protected and enhanced as part of the future proposed VMP area.

The native vegetation community within Vegetation Zone 1 & 2 does not retain its original structural integrity and has mostly been modified as pasture grazing paddock. It generally has low native resilience and ability for the soil seed bank to regenerate to a fully structured community – particularly in the middle of the property (Vegetation Zone 2).

One hollow-bearing tree will be impacted by the proposed development (Tree 15) (refer to Figure 12). It contains potential roosting habitat for common marsupials and microbats. We have updated this version of the report to include this tree into the 'indirectly impacted' area calculations as directed in the latest Council RFI.

As will be detailed in the separate VMP Report (provided prior to the release of the Subdivision Certificate), the VMP areas will be planted with additional native canopy species, shrubs and grasses. This will be maintained to promote a healthier vegetation community that better reflects the original plant community that existed before disturbance (PCT 3320). It will not contradict bushfire APZ requirements (this has been confirmed by applicant's bushfire consultant).

The total area of native vegetation (Vegetation Zone 1 – directly and indirectly impacted) occurring within the subject site has an overly conservative of 0.28 ha for the BAM calculator (some of this area calculator overlaps in the proposed VMP area).

The total area of native vegetation (Vegetation Zone 2 – directly impacted) occurring within the middle of the subject site has an overly conservative of 0.297 ha for the BAM calculator.

5.1.2 Asset Protections Zones (APZs)

As the canopy coverage does not exceed 15% throughout the Subject Land, removal of additional trees for an APZ is not required for any proposed future developments. The canopy of existing trees are sufficiently spaced from one another to generally meet these requirements.

The proposal has genuinely demonstrated all efforts to avoid impacts. The indicative building envelope on each of the four proposed lots is within a relatively cleared area where the quality of native vegetation is in very poor condition.

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) provided with the application addresses these issues.

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.

The Construction Environment Management Plan (CEMP) provided with the application addresses these issues.

5.2 Potential Indirect Impacts

This section details possible indirect impacts resulting from the proposed subdivision. Avoidance and mitigation for these impacts is provided in section 5.3 and 5.4 of this BDAR.

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).

Potential indirect impacts to flora and fauna include:

- Fauna habitat disturbance
- Fragmentation of native vegetation

5.2.1 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. All water run-off will be directed to the local stormwater management system.

Table 5. Indirect Impacts Table

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 proposal 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 proposal 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	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.
	occur within the Subject Site.		
(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 proposal 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	Only one tree with a hollow spout is proposed for removal (Tree 15). No caves will be impacted by the proposal.	Nil	The implementation of the actions prescribed in this report should see an increase in the availability of potential habitat for

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.
			these threatened species within the Subject Site.
(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
(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

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.
(p)disturbancetospecialist 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 nectarresourcesfor several threatened fauna species.	Nil	Nil

5.2.2 Prescribed and Uncertain Impacts

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 6).

Table 6. Potential prescribed or uncertain impacts of the proposed action

ill 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

ill 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
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Yes	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.
Movement of threatened species that maintains their life cycle	Yes	Habitat connectivity continues to exist across the site. It is unlikely that the small area of impact will interrupt movement of any threatened fauna
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

5.3 Avoidance of Impacts

5.3.1 Vegetation Management Plan (VMP) Zones

Three (3) VMP Zones have been included in the subdivision design (location can be seen in Figure 9 and Figure 11).

All vegetation within the VMP Zones will be conserved under a Positive Covenant on the title of property under the *Conveyancing Act 1919*. This will ensure the vegetation will be maintained and supported for the long-term.

The VMP Zones are to be implemented to avoid impacts to habitat corridors and eliminate fragmentation of vegetated areas.

The inclusion of the VMPs will result in an overall increased area of native vegetation in good condition compared to the current poor condition vegetation community on the Subject Land.

As will be detailed in the separate VMP Report (provided prior to the release of the Subdivision Certificate), the VMP areas will be planted with additional native canopy species, shrubs and grasses. This will be maintained to promote a healthier vegetation community that better reflects the original plant community that existed before disturbance (PCT 3320).

5.4 Minimisation of Impacts

5.4.1 Subdivision and Development Design

The internal roads, dwelling footprints and effluent disposal zones have been positioned to minimise the impact to native canopy species.

5.4.2 HBT Impact Minimisation and Removal Procedure

Tree 15 is a hollow-bearing tree may be removed as part of future dwelling house Das post subdivision. As already detailed in Section 3.3.1, to provide additional fauna habitat Tree 16 is to now be retained and nest boxes installed. Tree 16 will also be in the Positive Covenant on the property under the Conveyancing Act 1919 and APZs – ensuring the tree will be retained for the long-term.

HBT Removal Procedure

- Prior to any habitat removal, a comprehensive search for fauna and habitat is to be undertaken to relocate any terrestrial individuals and identify any important nesting to be protected until fledging.

- A complete hollow-bearing tree survey is to be undertaken within the proposed development areas to identify hollow resources in these areas. Hollow-bearing trees are to be clearly marked prior to clearing. This is so that potential habitat for hollow- dependent species can be identified and quantified. Where possible these trees should be retained in-situ.

- The felling of hollow-bearing trees is to be conducted under the supervision of a fauna ecologist to ensure appropriate animal welfare procedures are taken, particularly for threatened species. Hollows of high quality or with fauna recorded residing within should be dismantled for relocation and all hollows should be inspected for occupation, signs of previous activity and potential for reuse.

- Subsequent hollows of retention value are to be relocated to nearby conservation areas. If these are placed as on ground habitat and are not reattached to a new recipient tree then they are to be replaced with appropriately sized nest boxes affixed to a retained tree. All hollow sections considered suitable for arboreal marsupials should where possible be recovered and prepared for placement into an appropriate retained tree.

- Constructed nest boxes should as priority target recorded hollow-dependent threatened species (and their prey species). Boxes should be constructed all of weatherproof timber (marine ply), fasteners and external paint and appropriately affixed to a recipient tree under the guidance of a fauna ecologist.

- If a threatened species is found to be occupying the hollow at the time of removal then this hollow section is to be reattached to a recipient tree within the nearby conservation areas as selected and directed by the fauna ecologist. The welfare and temporary holding of the residing animal(s) is at the discretion of the fauna ecologist.

- The relocated hollow section and nest boxes should be well secured in the recipient tree in a manner that will not compromise the current or future health of that tree.

- Similarly with hollows, rocky shelter habitat and quality terrestrial shelter logs are to be relocated from development areas into conserved habitat. This is to be done under the supervision of a fauna ecologist to ensure best habitat outcomes, such as high surface area rock on rock shelter outcomes.

- If any fauna species, a nest or roost is located during development works, then works should cease until safe relocation can be advised by a contact fauna ecologist.

5.4.3 Additional Impact Mitigation Measures

Several mitigation measures are proposed to minimise potential impacts; these are summarised in Table 7. 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.

As will be detailed in the separate VMP Report (**provided prior to the release of the Subdivision Certificate**), the VMP areas will be planted with additional native canopy species, shrubs and grasses. This will be maintained to promote a healthier vegetation community that better reflects the original plant community that existed before disturbance (PCT 3320). The VMP will include:

- commitment to impact mitigation, including tree replacement (should replace at least 3 trees for each 1 tree removed), ensuring future landscaping species selections in and around retained CPW CEEC trees is locally indigenous and representative of CPW CEEC so as to be sympathetic with the vegetation that remains on the property
- replacement of tree hollows removed with augmented tree hollows (3 nest hollows to replace each one lost) implementation of a VMP (for at least 5 years)
- retaining a Project Ecologist to undertake pre-clearing surveys for threatened and protected species, and be on site at all times during vegetation clearing and construction to capture, treat and relocate displaced fauna.

Table 7. Mitigation measures are 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 significant area of existing bushland without disturbance. This area of retained bushland will allow for the implementation of mitigation measures that will aim to reduce any ecological impact resulting from the proposed development.	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 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	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
	investigations undertaken by non-destructive methods or the use of tree sensitive construction methods..			
Avoidance of hollow-bearing trees	One hollow-bearing tree occurs (tree 15) 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 a suitable area of retained native vegetation in 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 supressed 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 dwellings and hard surfaces will be directed to newly installed water storage tanks. Prior to any release, all stormwater is to be piped through any tanks that may be required by the regulating authorities.	Risk = low Consequence = Harm to native vegetation and native fauna habitat.	Post-construction phase	Proponent Construction Architect
Wastewater	All sewerage produced on site will be contained in with the new wastewater treatment area. The certified sprinkler system will eliminate any adverse effects	Risk = low Consequence = Harm to native vegetation and native fauna	Post-construction phase	Proponent

Action	Outcome/measure	Risk/ consequence of residual impacts	Timing	Responsibility
	to the local ecology. Trees will be retained in this area.	habitat.		

5.5 Impact Offset Summary

5.5.1 Impacts which require an offset

Table 8 and Table 9 provide a summary of the impacts that require an offset, under the BAM.

Table 8. Vegetation Zones Requiring an Offset

Vegetation Zone	PCT	Area Impacted	Current Vegetation Integrity Score	Future Vegetation Integrity Score***	Number of Ecosystem Credits Required
1	PCT 3320	0.28ha	21.6	8.3	2
2	PCT 3320	0.297ha	10.8	0	0

******Takes into account areas to be protected and enhanced under a future Vegetation Management Plan and 88b and 88e instrument on title equating to approx. 0.4ha***

Table 9. Threatened Species Requiring an Offset

Species	Area of Impacted Habitat	Number of Species Credits Required
NIL	NIL	0

5.5.2 Impacts not requiring an offset

N/A

5.5.3 Identification of areas not requiring assessment

N/A

5.6 Serious and Irreversible Impacts (SAII's)

The OEH (2020) *Guidance to Assist a Decision-maker to Determine a Serious and Irreversible Impact* lists the ecological communities and species that are 'potential serious and irreversible impact (SAII) entities'.

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.

These principles are set out in clause 6.7 of the Biodiversity Conservation Regulation 2017.

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

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.

CPWL in the Sydney Basin Bioregion in the Sydney Basin Bioregion is listed as Endangered under the BC Act 2016 and EPBC Act 1999 and is listed as a threatened entity in the Threatened Biodiversity Data Collection (DPIE 2021d).

Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the proposed impacts are serious and irreversible is to be undertaken in accordance with Section 9.1 of the BAM (DPIE 2020a) as outlined in Table 5.4. Proposed development is unlikely to have a significant impact upon the local population of CPWL.

Table 10. SAII Assessment Table

Table 5.5 Additional Impact Assessment for CPWL TEC at Risk of an SAII

No	Assessment Criteria	SAII Assessment Information
2a	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of reduction in geographic distribution as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)*	It is difficult to ascertain the 1970 extent; however, the CPWL Final determination estimates that there has been a 90% reduction in the total geographic extent of CPWL since European Settlement (ie since 1788). The CPWL Final Determination states the following in relation to a reduction in geographic extent: '*Only 6% of the original extent of the community remained in 1988 (Benson, D. & Howell, J. 1990 Proc. Ecol. Soc. Aust. 16, 115-127) in the form of small and fragmented stands. Although some areas occur within conservation reserves, this in itself is not sufficient to ensure the long term conservation of the Community unless the factors threatening the integrity and survival of the Community are ameliorated.*". *Based on aerial photography flown in November 1998, Tozer (2003) estimated the total extent of woody vegetation referred to as Cumberland Plain Woodland was 11 054 (±1 564) ha (upper and lower plausible bounds, sensu Keith et al. 2009), representing 8.8 (±1.2)% of the pre-European distribution of the community. Patches of the community lacking woody vegetation are very small in extent and can be considered to be included within the plausible bounds. For that part of the community's distribution to the east of the Hawkesbury-Nepean River, earlier mapping at coarser resolution by Benson & Howell (1990b) suggests a similar level of depletion, with an estimated 6 420 ha of 'Cumberland Plain Woodlands', representing 6% of the pre-European distribution east of the Hawkesbury-Nepean River. An update of Tozer's (2003) map, based on interpretation of imagery flown in January-March 2007 shows that the extent of Cumberland Plain Woodland east of the Hawkesbury – Nepean River had declined by 442±46 ha, a reduction of 5.2±0.6% in 9 years (NSW Scientific Committee & Simpson 2008). These estimates indicate that the geographic distribution of the community has undergone a very large reduction over a time frame appropriate to the life cycle and habitat characteristics of its component species.*
2bi	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: change in community structure*	The CPWL Final Determination states the following in relation to the changein community structure: *"Remnants of CPWL have historically been subjected to a range of anthropogenic disturbances including logging, grazing by domesticated livestock and burning at varyingintensities (Benson and Howell 1994). These disturbances have affected thestructure and potentially the composition of remnants. For example, the density and average basal diameter of trees in remnants sampled by Benson and Howell (1994) suggested that the removal of large older trees has led to higher densities of smaller trees such that remnants typically have the structure of regrowth forest."*

No	Assessment Criteria	SAII Assessment Information
2bii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: change in species composition*	
2biii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: disruption of ecological processes*	The CPWL Final Determination states the following in relation to the disruption of ecological processes: "*The threats to CPWL listed above are ongoing and likely to cause continuing declines in geographic distribution and disruption of biotic processes andinteractions.*" *The reduction in the geographic distribution of Cumberland Plain Woodland was initially due to tree-felling for timber and clearing for crops and pastures (Benson & Howell 1990a). Benson & Howell (1990b) estimated that the community had been reduced to approximately half of its pre-European extent by 1850. Following World War II, there was a marked acceleration in urban and industrial development, which continues to deplete the distribution of the community to the present day.* *These trends appear likely to continue into the future as the urban area continues to expand to accommodate Sydney's increasing population, which is projected to grow by 1.0-1.1 million people during the 20 years 2007-2026 and 2.2-3.3 million during the 50 years 2007-2056 (Australian Bureau of Statistics 2008). Recent draft plans to develop growth centres in north-west and south-west Sydney, for example, identify staged release of land for residential and employment development over the next 25 years.* *These areas contain approximately 2000 ha (one-fifth) of the estimated remaining Cumberland Plain Woodland based on Tozer (2003), of which about two-thirds will be available for development, the loss of which is planned for offsetting through voluntary land acquisition and/or the establishment of conservation agreements on lands outside the Growth Centres (Growth Centres Commission 2007) for the primary purpose of biodiversity conservation. While important examples of Cumberland Plain Woodland are represented within conservation reserves, much of the remaining area of the community occurs on private land or on public easements, where it is at risk from small-scale clearing associated with housing, industrial development and transport infrastructure.* *There are significant logistic and technological constraints and time lags*

		associated with efforts to restore the community (Wilkins et al. 2003; Nichols 2005; Nichols et al. 2005). 'Clearing of native vegetation' is listed as a Key Threatening Process under the Threatened Species Conservation Act 1995.
2biv	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: invasion and establishment of exotic species*	The CPWL Final Determination (2009) states the following in relation to weed invasion: *Weed invasion also poses a major threat to Cumberland Plain Woodland. While very large numbers of weed species have invaded many different areas of the community, principal weed species include (Benson 1992; Tozer 2003; Benson & von Richter 2008).* *Several of these species, particularly grasses, form a dense ground layer capable of smothering indigenous plants, reducing both reproduction and survival, and inhibiting emergence and establishment of their seedlings. The propagules of weeds are spread into Cumberland Plain Woodland by stormwater, dumping of refuse, frugivorous birds and wind (Benson & Howell 1990b), making it difficult to abate the invasion process, especially for those species capable of establishing in sites that have been exposed to relatively little disturbance (J. Sanders, in litt. January 2008). Hill et al. (2005) found that high species richness and abundance of weeds was associated with remnants that either had a history of clearing and grazing, were in close proximity to creeks or downslope from sealed roads. They also found some relationship between weeds and elevated total soil phosphorus, conductivity and water retention capacity, but relationships with these soil properties were weak and varied between sites with different types of disturbance history.* *The dramatic recent expansion of African Olive poses the greatest invasive threat to Cumberland Plain Woodland. Initially introduced to south-western Sydney in the 1820s, it was generally confined to the Camden-Picton area until the 1970s and now occurs frequently throughout the distribution of the community (Tozer 2003; Cuneo & Leishman 2006). Roberts (1999) mapped approximately 1000 ha of Cumberland Plain Woodland (c. 10% of total remaining) which had a dense understorey of African Olive that was visible on aerial photographs flown in November 1997. Tozer (2003) recorded African Olive in 43% of 198 plots surveyed throughout the distribution of Cumberland Plain Woodland.* *Cuneo et al. (2009) found that 837 ha of Cumberland Plain Woodland in south-west Sydney was invaded by African Olive (8.5% of the area assessed). The species is highly fecund, with fleshy fruit spread widely by a range of frugivorous birds, and seedlings establish readily in relatively undisturbed bushland, as well as fragmented edges (Cuneo & Leishman 2006). As shrubs grow, their canopies cast deep shade and suppress and ultimately eliminate most native shrub and groundcover species.* *Cook et al. (2005) and Tozer (in litt. October 2007, based on data from Tozer 2003), both recorded strong inverse relationships between the cover*

		abundance of African Olive and the diversity and cover of native ground layer species. Other weeds that pose future threats to the community include Ailanthus altissima, Asparagus asparagoides, Acer negundo, Gleditsia triacanthos and Macfadyena unguis-cati (Benson & Howell 2002; J. Howell in litt. August 2007; J. Sanders in litt. January 2008; L. Harrold pers comm. 2009). The invasion and establishment of exotic weeds is resulting in a very large reduction in the ecological function of Cumberland Plain Woodland. 'Invasion of exotic perennial grasses' and 'Invasion and establishment of exotic vines and scramblers' are listed as Key Threatening Processes under the Threatened Species Conservation Act 1995.

No	Assessment Criteria	SAII Assessment Information
2bv	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: degradation of habitat*	The CPWL Final Determination (2009) states the following in relation to the changeinCPWL composition: *"Some areas of Cumberland Plain Woodland subjected to a history of partial clearing and grazing have recently undergone a change in management to conserve the community. Examples include Mt Annan Botanic Garden, Scheyville National Park, Western Sydney Regional Park, Elizabeth Macarthur Agricultural Institute, Orchard Hills Defence Site and the former Australian Defence Industries site at St Marys. Experience from these areas suggests that the community is capable of some recovery, provided the soil has not been disturbed by earthworks, cultivation, 70ertilizer application or other means of nutrient or moisture enrichment (Benson & Howell 2002; Pellow 2003; Keith et al. 2005; J. Howell in litt. August 2007; J. Sanders in litt. January 2008). In contrast, restoration of Cumberland Plain Woodland has proved to be problematic on sites that have been exposed to such soil disturbance.* *At Western Sydney Regional Park, for example, Wilkins et al. (2003), Nichols (2005) and Nichols et al. (2005) studied the recovery of abandoned pastures that had been planted with more than 20 native tree and shrub species of Cumberland Plain Woodland. Over 10 years they found no evidence of convergence in species composition with nearby remnant stands of the community and the species composition of restored areas remained indistinguishable from untreated pastures. There was some evidence that restored vegetation had begun to develop more species-rich assemblages of moths and butterflies compared to untreated pastures, although after 10 years, it lacked a number of species characteristic of remnant woodland (Lomov et al. 2006).* *Ant communities also showed marked differences between restored and remnant vegetation although some ecological processes, such as pollination and seed dispersal, showed some evidence of development at restored sites (Lomov 2005). These results suggest that sites with a history of soil disturbance will be extremely slow to recover characteristics of Cumberland Plain Woodland, if at all, and that experimentation with alternative restoration technologies is required.* *As a large proportion of the former distribution of the community has either undergone similar histories of soil disturbance or are now occupied by urban development, opportunities for restoration of the community across significant areas appear limited.'* ***Moderate to heavy grazing of Cumberland Plain Woodland by livestock and rabbits results in the decline and disappearance of palatable plant species, including shrubs and herbs, and compaction and erosion of topsoil, making re-establishment of a diverse native understorey problematic. The effects of such overgrazing may be exacerbated under drought conditions. Habitat degradation associated with overgrazing and erosion contributes to a large reduction in ecological function of the community.***

		21. The soils of Cumberland Plain Woodland have undergone chemical and structural modification associated with agricultural land uses. Trampling by livestock has resulted in localised areas of soil compaction, primarily around watering points. Research carried out at the University of Western Sydney found that mean soil inorganic nitrogen levels were two to three times higher in areas of former agricultural land use than in remnant woodland, but was unable to detect differences in other soil properties (E. C. Morris in litt. June 2007). Addition of carbon and burning reduced soil inorganic nitrogen and reduced growth of exotic ground layer species relative to native species, suggesting that elevated soil inorganic nitrogen could favour exotics to the detriment of natives in Cumberland Plain Woodland (E. C. Morris in litt. June 2007). Hill et al. (2005) found elevated levels of phosphorus and conductivity in former agricultural areas compared to remnant woodland, but did not examine soil nitrogen. The sources of nutrient addition to soils of Cumberland Plain Woodland include addition of fertilisers during previous agricultural land use, deposition of livestock dung, rubbish dumping and stormwater runoff from urban areas. Expansion of urban land uses across the Cumberland Plain is likely to increase urban runoff from sealed surfaces into remaining bushland fragments, resulting in further nutrient enrichment of soils and associated replacement of native flora by exotic species. Disruption of ecological processes and degradation of habitat associated with nutrient enrichment contributes to a very large reduction in ecological function of the community.
2bvi	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes indicated by: fragmentation of habitat*	The CPWL Final Determination states the following in relation to fragmentation of CPWL habitat: *Fragmentation of habitat associated with clearing has resulted in a very large reduction in the ecological function of Cumberland Plain Woodland. The remaining area of the community is severely fragmented, with more than half of the remaining tree cover mapped by Tozer (2003) occurring in patches of less than 80 ha and half of all mapped patches being smaller than 3 ha (Tozer in litt. October 2007). The integrity and survival of small, isolated stands is impaired by the small population size of many species, enhanced risks from environmental stochasticity, disruption to pollination and dispersal of fruits or seeds, and likely reductions in the genetic diversity of isolated populations (Young et al. 1996; Young & Clarke 2000). The impacts of fragmentation and associated processes are most evident in the loss of vertebrate fauna from the community (Farrell 2005; Farrell in litt. June 2007; Leary 2005; in litt, August 2007). As well, some invertebrate species, such as the Endangered Cumberland Land Snail, appear to be in decline, at least in the smaller fragments (M. Shea in litt. June 2007). The dieback of eucalypt canopies observed in stands of Cumberland Plain Woodland at Scheyville (D. Keith pers. comm. October 2008) may be a result of complex interactions involving insect attack, weed invasion, nutrient enrichment and drought, in which fragmentation also plays a role (Reid & Landsberg 2000; Wardell-Johnson et al. 2006). Despite their history of fragmentation, some very small and apparently degraded remnants may contain a surprisingly high diversity of species and important examples of rare species, particularly plants (James et al. 1999; Benson & Keith 1984; McBarron et al. 1988; Benson & Howell 1990a; Kirkpatrick & Gilfedder 1995). However, clearing and continuing degradation of these patches reduces the likelihood that all of these species will persist, particularly because a large proportion of species are known from very few locations which are not clustered in predictable ways*

		(Benson & Howell 2002; Tozer 2003). Fragmentation also results in reduced fire frequencies within some patches, which may reduce the viability of some native plant populations, and hence the diversity of species within the patches (Clarke 2000; Watson 2005)
2ci	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of restricted geographic distribution, based on the TEC's geographic range in NSW according to the: extent of occurrence*	The CPWL Final Determination states the following with respect to extent of occurrence in NSW: *Cumberland Plain Woodland is restricted to the Sydney Basin Bioregion (sensu Thackway and Cresswell) and is currently known to occur within the local government areas of Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly, but may occur elsewhere within the bioregion. Using map data from Tozer (2003), Cumberland Plain Woodland was estimated to occur within an extent of occurrence of 2810 km2, and an area of occupancy of just under 2 100 km2 based on 2 x 2 km grid cells, the spatial scale recommended by IUCN (2008) for assessing areas of occupancy for species.* *Small areas of Cumberland Plain Woodland have been recorded from Kemps Creek, Mulgoa and Windsor Downs Nature Reserves, Scheyville National Park, and Leacock, Rouse Hill and Western Sydney Regional Parks.* *13. Based on aerial photography flown in November 1998, Tozer (2003) estimated the total extent of woody vegetation referred to as Cumberland Plain Woodland was 11 054 (±1 564) ha (upper and lower plausible bounds, sensu Keith et al. 2009), representing 8.8 (±1.2)% of the pre-European distribution of the community. Patches of the community lacking woody vegetation are very small in extent and can be considered to be included within the plausible bounds.* *For that part of the community's distribution to the east of the Hawkesbury-Nepean River, earlier mapping at coarser resolution by Benson & Howell (1990b) suggests a similar level of depletion, with an estimated 6 420 ha of 'Cumberland Plain Woodlands', representing 6% of the pre-European distribution east of the Hawkesbury-Nepean River.* *An update of Tozer's (2003) map, based on interpretation of imagery flown in January-March 2007 shows that the extent of Cumberland Plain Woodland east of the Hawkesbury – Nepean River had declined by 442±46 ha, a reduction of 5.2±0.6% in 9 years (NSW Scientific Committee & Simpson 2008). These estimates indicate that the geographic distribution of the community has undergone a very large reduction over a time frame appropriate to the life cycle and habitat characteristics of its component species.* *"The distribution of Sydney Turpentine-Ironbark Forestis highly restricted.*

		The extent of occurrence (EOO) of STIF is 4,479 km2 based on a minimum convex polygon enclosing known occurrences of the community as interpreted in Sections 4.2 – 4.10 and using the method of assessment recommended by IUCN (Bland et al. 2017). The estimated area of occupancy (AOO) is 12 10 km x 10 km grid cells, the scale recommended for assessing AOO by IUCN and applying a minimum occupancy threshold of1% (Bland et al. 2017)."
2cii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of restricted geographic distribution, based on the TEC's geographic range in NSW according to the: area of occupancy*	The CPWL Final Determination states the following with respect to extent of occurrence in NSW: *Based on aerial photography flown in November 1998, Tozer (2003) estimated the total extent of woody vegetation referred to as Cumberland Plain Woodland was 11 054 (±1 564) ha (upper and lower plausible bounds, sensu Keith et al. 2009), representing 8.8 (±1.2)% of the pre-European distribution of the community. Patches of the community lacking woody vegetation are very small in extent and can be considered to be included within the plausible bounds.* *For that part of the community's distribution to the east of the Hawkesbury-Nepean River, earlier mapping at coarser resolution by Benson & Howell (1990b) suggests a similar level of depletion, with an estimated 6 420 ha of 'Cumberland Plain Woodlands', representing 6% of the pre-European distribution east of the Hawkesbury-Nepean River.* *An update of Tozer's (2003) map, based on interpretation of imagery flown in January-March 2007 shows that the extent of Cumberland Plain Woodland east of the Hawkesbury – Nepean River had declined by 442±46 ha, a reduction of 5.2±0.6% in 9 years (NSW Scientific Committee & Simpson 2008). These estimates indicate that the geographic distribution of the community has undergone a very large reduction over a time frame appropriate to the life cycle and habitat characteristics of its component species.*
2ciii	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence of restricted geographic distribution, based on the TEC's geographic range in NSW according to the: number of threat-defined locations*	The Final Determination indicates that there is very little CPWL CEEC withinconservation reserves and "*Small areas of Cumberland Plain Woodland have been recorded from Kemps Creek, Mulgoa and Windsor Downs Nature Reserves, Scheyville National Park, and Leacock, Rouse Hill and Western Sydney Regional Parks*

No	Assessment Criteria	SAII Assessment Information
2d	*The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: Evidence that the TEC is unlikely to respond to management*	There is no information regarding evidence that the TEC is unlikely to respond to management. The *Department of Environment and Conservation (NSW). (2005) Document - Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland. Department of Environment and Conservation (NSW), Sydney* outlines theoretical and practical'best practice' guidance for the restoration of CPWL , including examples of small remnant patches.
3	*Where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Subsection 9.1.1(2.), the assessor must record this in the BDAR or BCAR.*	It is difficult to ascertain the 1970 extent of the TEC when most studies have focussed on pre-European extent, therefore pre-European data is referenced in (2a). No information was able to be presented in relation to (2bv) and (2d).
4ai	*Include data and information on the impact on the geographic extent of the TEC by estimating the total area of the TEC to be impacted by the proposal: in hectares. Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal.*	The property is 2.37 ha in total area. It has been proposed to be subdivided into four lots with each a dwelling envelope and on-site treated effluent application areas. Tree removal will be necessary to construct the proposed access roads and for some of the building envelopes within each the new lots. Future development on-site as a result of the proposal would require the minimum removal of seven (7) locally native trees which is not considered a significant area of vegetation removal in relation to the other twenty (21) other trees to be retained (subject to future dwelling house construction approval) (see Figure 9 for the location of native trees on the Subject Land). The total area of native canopy and other native vegetation removal equates to 0.5ha which is considered a relative small area in the relation to the local CPWL population extent. Tree 15 is a hollow-bearing tree. The hollow bearing tree proposed for removal was not considered to contain habitat for threatened species. It was concluded that the tree hollow is likely to be used by Common Brushtail Possum (*Trichosurus vulpecula*) that was observed near the hollow. Whilst it is not a threatened species (and locally common), tree removal shall be done in such a manner that does not harm this animal. The removal of approximately 0.5ha of poor condition tree canopy is considered an insignificant amount compared to the extent of the local population of CPWL.

4aii	*Include data and information on the impact on the geographic extent of the TEC by estimating the total area of the TEC to be impacted by the proposal: as a percentage of the current geographic extent of the TEC in NSW. Data and information should include direct impacts (i.e. from clearing) and indirect impacts where partial loss of the TEC is likely as a result of the proposal.*	The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH 2016a),Tozer (2013) and the Remnant Vegetation of the western Cumberland subregion (OEH 2013) mapping indicate approximately 10,000 ha of CPWL occurs within the Cumberland IBRA Subregion. This comprises fragmented patches of varying sizes. The conditions of these patches cannot be determined without ground truthing. Approximately 10,000ha of CPWL remaining within the Cumberland IBRA Subregion after the proposed development. The proposal requires the removal of 6 native trees. The removal of approximately 0.15ha of poor condition tree canopy is considered an insignificant amount compared to the extent of the local population of CPWL.
4bi	*The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by: estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals.*	The total area of the CPWL CEEC patch in the locality is greater than 50 ha. This patch will not be fragmented by the proposal.

<table>
<tr><th>No</th><th>Assessment Criteria</th><th>SAII Assessment Information</th></tr>
<tr><td>4bii</td><td>The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by: describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
• distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and
• estimated maximum dispersal distance for native flora species characteristic of the TEC, and
• other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development</td><td>The proposal will not significantly contribute to the further environmental degradation or disruption of the biotic processes of the community as including the:

• distance between isolated areas of the TEC, and

• estimated maximum dispersal distance for native flora species characteristic of the TEC,

This is because the EEC remains as part of a continuous area of bushland including areas off-site on adjacent properties. The removal of 6 locally native trees will not fragment community and prevent it from it functioning in dispersal of seed and pollen/ genetic material from canopy trees off the subject site.</td></tr>
<tr><td>4biii</td><td>The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC by: describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.</td><td>The Vegetation Integrity (VI) of the CPWL CEEC vegetation is 21.1 and is made up of the following scores for composition, structure and function:

<table>
<tr><th>PCT</th><th>Vegetation Zone</th><th>Composition Condition ore</th><th>Structure Condition Score</th><th>Function Condition Score</th><th>Vegetation Integrity Score</th></tr>
<tr><td>PCT 3320</td><td>Vegetation Zone 1</td><td>8.5</td><td>24.8</td><td>47.9</td><td>21.6</td></tr>
<tr><td>PCT 3320</td><td>Vegetation Zone 2</td><td>8.7</td><td>16.2</td><td>8.9</td><td>10.8</td></tr>
</table>

There are opportunities to revegetate the understorey with native groundcover species belonging to the CPWL community, while still complying with the bushfire asset protection zone requirements (via a VMP).</td></tr>
<tr><td>5</td><td>The assessor may also provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate.</td><td>N/A</td></tr>
</table>

6 BIODIVERSITY CREDIT REPORT

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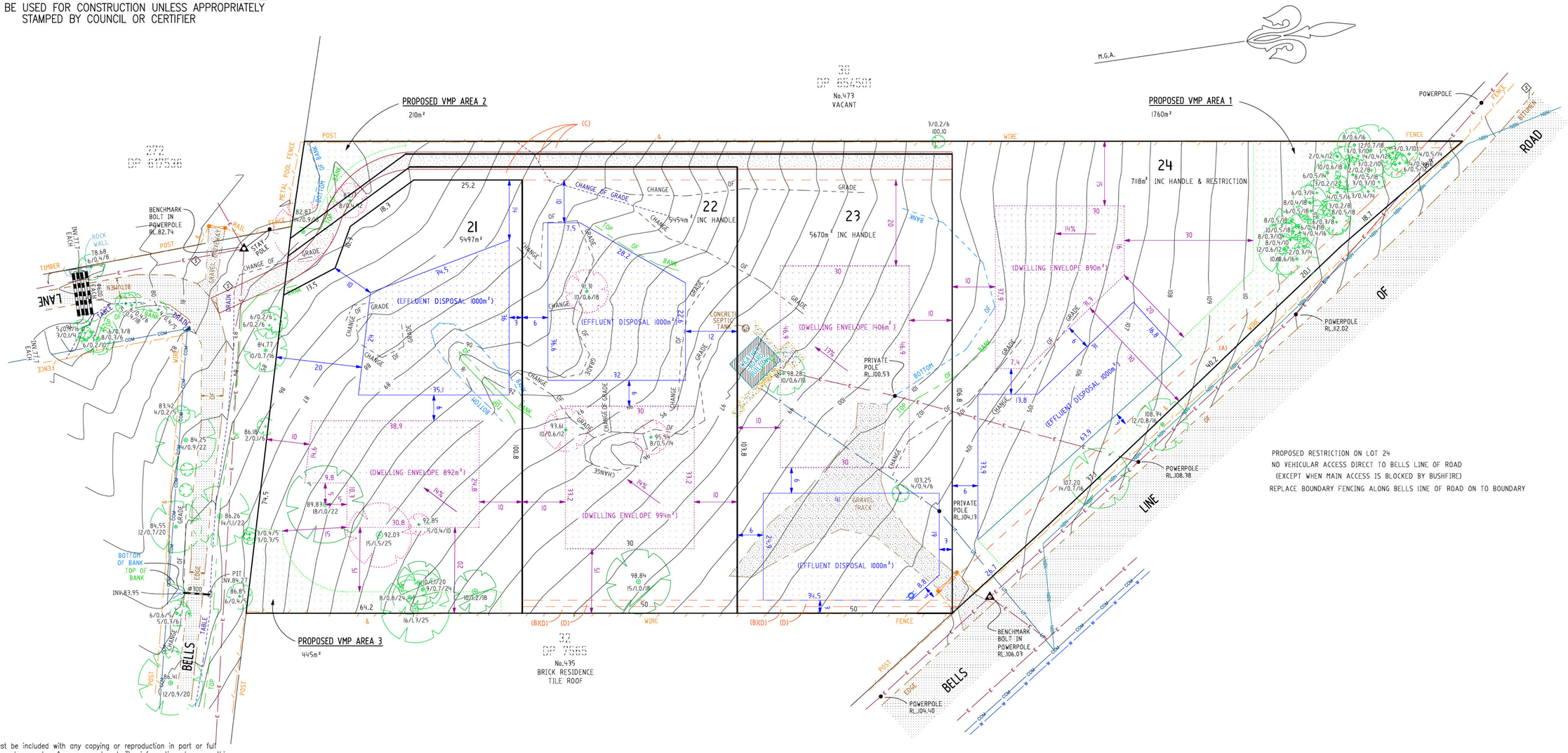
APPENDIX A SITE PLANS

A1 **ISSUED FOR CERTIFIER/COUNCIL APPROVAL**

NOT TO BE USED FOR CONSTRUCTION UNLESS APPROPRIATELY STAMPED BY COUNCIL OR CERTIFIER



PROPOSED RESTRICTION ON LOT 24
NO VEHICULAR ACCESS DIRECT TO BELLS LINE OF ROAD
(EXCEPT WHEN MAIN ACCESS IS BLOCKED BY BUSHFIRE)
REPLACE BOUNDARY FENCING ALONG BELLS LINE OF ROAD ON TO BOUNDARY

CAUTION

These notes must be included with any copying or reproduction in part or full together with the plan number & any amendment. The information shown on this plan must not be amended or altered.

* The position of features shown have been located for topographical purposes only at the reduction ratio shown. Boundary dimensions have been taken from the Title diagram. The survey has been undertaken in accordance with clause 9(1) of the Surveying & Spatial Information Regulation 2017.
* There are boundary dimension descrepancies between registered plans. A redefinition survey is required to confirm dimensions & area.
* This survey plan is for planning & design purposes only & is not to be used for construction. If any construction is to be undertaken close to or relative to any boundary, or accurate position of features is needed a specific setout or boundary survey is required.
* Contours shown are indicative of the surface & should not be interpolated to determine accurate levels.
* Trees shown are indicative of their size. The tree spreads are shown central about the trunk & may not be a true indication of their drip line.
* The terms and conditions of Restrictions appearing on the Certificate of Title have not been investigated.
* Only visible services of electricity, telecommunications, sewer, water & drainage have been located. The plotting of any service from or between visible structures shown hereon (pit, hydrant etc) does not guarantee the service is a straight line nor that the service is directly under the structure.
* The position of underground services shown hereon has been taken from DBYD service authority diagrams. Service authority diagrams provide an indication that an underground service exists and there is no guarantee/warranty that all underground services are shown on the DBYD nor on this plan nor that the location shown on either is accurate. Prior to ANY demolition, excavation or construction, DBYD must be updated and all relevant service authorities MUST be contacted for the possible location of further services & the precise location of all services.
* Any Underground Services shown hereon or on any services plan critical to any design or construction near any service MUST be confirmed for location and level by potholing &/or directly with the relevant service provider.

(A) RESTRICTIONS ON USER (S.27E(6) MAIN ROADS ACT, 1924) (VIDE G385934)
(B) EASEMENT FOR SERVICES 1.5m WIDE (FOR WATER SUPPLY FROM SYDNEY WATER MAIN)
(C) RECIPROCAL RIGHTS OF CARRIAGE WAY & EASEMENTS FOR SERVICES EACH 3m WIDE & VARIABLE TO BENEFIT LOTS 22, 23 AND 24 ONLY
(D) RIGHT OF WAY 3 WIDE - FOR EMERGENCY USE ONLY WHEN MAIN ACCESS IS BLOCKED BY BUSHFIRE

PROPOSED DWELLING ENVELOPE
NOTE - EXISTING BUILDING & EFFLUENT TANK TO BE REMOVED

PROPOSED EFFLUENT DISPOSAL AREA

LEGEND

- DENOTES WATER METER
- DENOTES TELECOMMUNICATIONS PIT
- DENOTES SIGN
- DENOTES GATE
- E — DENOTES OVERHEAD ELECTRICITY
- T — DENOTES OVERHEAD TELECOMMUNICATIONS
- UT — DENOTES UNDERGROUND TELECOMMUNICATIONS (READ CAUTION NOTE)
- NBN — DENOTES UNDERGROUND NBN (READ CAUTION NOTE)
- W — DENOTES UNDERGROUND WATER (READ CAUTION NOTE)
- COM — DENOTES UNDERGROUND TELECOMMUNICATION (NBN/TELSTRA) (READ CAUTION NOTE)
- DENOTES SHRUB
- 3/0.2/8 DENOTES APPROXIMATE SPREAD/TRUNK DIAMETER/HEIGHT
- DENOTES TREE TO BE REMOVED
- PROPOSED VEGETATION MANAGEMENT PLAN AREAS (VMP) TO BE BURDENED BY A POSITIVE COVENANT

1:500
10 5 0 10 20 30 40 50
ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN

DIAL 1100 BEFORE YOU DIG

Date		REVISION
27/5/24	1	DWELLING ENVELOPE ON LOT 21 AMENDED
21/5/24	G	BIODIVERSITY MAPPING REMOVED & PROPOSED VMP AREAS ADDED
9/4/24	F	BIODIVERSITY MAPPING ADDED
1/8/23	E	BUSHFIRE ACCESS EASEMENT ADDED
27/3/23	D	ENVELOPE GRADES ADDED, TREE REMOVAL UPDATED
14/6/22	C	LOT 24 EFFLUENT AND DWELLING AREAS AMENDED
7/6/22	B	EFFLUENT AREAS ADDED
27/4/22	A	PROPOSED TREE REMOVAL & DWELLING AREA OFFSETS ADDED

0 10 20 30 40 50 MILLIMETRES AT A1 100 110 120 130 140 150

DESIGN BY AJE
SURVEY BY O.SALM
DRAWN BY K.RYAN
CHECKED BY A.EDWARDS
REGISTERED LAND SURVEYOR No. 985

REDUCTION RATIO AT A1 1:500
CONTOUR INTERVAL 1m
ORIGIN OF LEVELS PM81573 97.737
DATUM A.H.D.

McKINLAY MORGAN & ASSOCIATES Pty Ltd.
ACN 169 615 801 ABN 90 169 615 801
CONSULTING SURVEYORS – PROJECT MANAGERS
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Phone. 4577 6011
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Email. mail@mckinlaymorgan.com.au
www.mckinlaymorgan.com.au

DATE 12 APRIL 2022
DATE OF SURVEY 5/04/2022
FILE No. 94752
COUNCIL REF

CLIENT NAME WAYNE ATTARD
LOCALITY KURMOND LGA HAWKESBURY
PLAN No. 94752:DA:2 C.FILE: 94752DA2-I.DWG

PLAN SHOWING PROPOSED SUBDIVISION OF LOT 31 DP 7565, BELLS LINE OF ROAD, KURMOND

SHEET No. 1
OF 1 SHEETS

APPENDIX B PLOT DATA

BAM Site – Field Survey Form

Survey Name		Date	Zone ID	Recorders	
457 Bells Line of Road, Kurmond		23/04/2024	1 – Location defined by Peer Review	Alex Fraser	
Zone:	Datum:	Plot ID: 1	Plot dimensions: 50x20 m		Photo #: 1 and 2
Easting: 285986	Northing: 6284882	IBRA region: Cumberland		Midline bearing from 0 m:	
Vegetation Class Coastal Valley Grassy Woodlands					Confidence H
Plant Community Type: 3320: Cumberland Shale Plains Woodland				EEC: YES	Confidence H

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	**2**	**20**
Shrubs	**0**	**0**
Grasses etc.	**3**	**13.5**
Forbs	**1**	**7**
Ferns	**0**	**0**
Other	**0**	**0**
High threat weed cover		**80**

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	5	1
50 – 79 cm	2	
30 – 49 cm	1	
20 – 29 cm	1	
10 – 19 cm		
5 – 9 cm		
<5 cm		
Length of logs (m) (≥ 10 cm diameter, >50cm in length)	**Tally: 11**	**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	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45	5	15	25	35	45
score % in each	2	5	3	5	5	1	5	2	2	2										

Average of the 5 subplots	**5**			

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

BAM Site – Plot Species List

400m² plot: Sheet 1 of 1	Survey Name	Plot ID	Recorders
Date: 23/04/2024	457 Bells Line of Road, Kurmond	1	Jesse McIvor

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
TG	*Eucalyptus tereticornis*	N	10	5			
TG	*Eucalyptus saligna*	N	10	2			
	Cenchrus clandestinus	E	70	1000			
	Paspalum dilatatum	HTE	10	100			
	Bidens Pilosa	HTE	10	100			
FG	*Geranium homeanum*	N	7	40			
GG	*Eragrostis leptostachya*	N	5	50			
	Sida rhombifolia	E	1	20			
	Euryops chrysanthemoides	E	0.2	30			
	Solanum mauritianum	E	0.05	2			
	Araujia sericifera	E	0.2	10			
	Ligustrum sinense	HTE	0.1	1			
	Ehrharta erecta	HTE	0.1	8			
GG	*Microlaena stipoides*	N	8	30			
GG	*Oplismenus hirtellus*	N	0.5	50			
	Plantago lanceolata	E	1	100			
	Verbena litoralis	E	0.05	20			
	Setaria parviflora	E	2	50			

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

11 Bells Ln, Kurmond NSW 2757, Australia

55°NE (T) -33.554413, 150.694597 ±15m ▲ 122m

23 Apr 2024, 2:44:32 pm


435 Bells Line of Rd, Kurmond NSW 2757, Australia
174°S (T) -33.554033, 150.694895 ±6m ▲ 112m
23 Apr 2024, 3:01:15 pm

BAM Site – Field Survey Form

Survey Name		Date	Zone ID	Recorders	
457 Bells Line of Road, Kurmond		23/04/2024	Veg Zone 2	Alex Fraser	
Zone: 56	Datum:	Plot ID: Veg Zone 2	Plot dimensions: 50x20 m		Photo #: 1 and 2
Easting: 285956	Northing: 6284961	IBRA region: Cumberland		Midline bearing from 0 m:	
Vegetation Class Coastal Valley Grassy Woodlands					Confidence H
Plant Community Type: 3320: Cumberland Shale Plains Woodland				EEC: YES	Confidence H

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	17
Shrubs	0	0
Grasses etc.	1	15
Forbs	0	0
Ferns	0	0
Other	0	0
High threat weed cover		23

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		
50 – 79 cm		
30 – 49 cm	1	
20 – 29 cm		
10 – 19 cm		
5 – 9 cm	2	
<5 cm		
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
	0	0	0	0	0															
Average of the 5 subplots	0																			

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

BAM Site – Plot Species List

400m² plot: Sheet 1 of 1	Survey Name	Plot ID	Recorders
Date: 23/04/2024	457 Bells Line of Road, Kurmond	**Veg Zone 2**	Jesse McIvor

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
TG	*Eucalyptus tereticornis*	N	5	1			
TG	*Acacia parramattensis*	N	8	12			
TG	*Acacia implexa*	N	4	12			
	Cenchrus clandestinus	E	25	100			
GG	*Cynodon dactylon*	N	15	50			
	Paspalum urvillei	E	10	40			
	Senecio madagascariensis	HTE	3	20			
	Verbena litoralis	E	2	20			
	Plantago lanceolata	E	1	20			

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 – Plot Species List

400m² plot: Sheet 1 of 1	Survey Name	Plot ID	Recorders
Date: 23/04/2024	457 Bells Line of Road, Kurmond	1	Jesse McIvor

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
TG	*Eucalyptus tereticornis*	N	10	5			
TG	*Eucalyptus saligna*	N	10	2			
	Cenchrus clandestinus	E	70	1000			
	Paspalum dilatatum	HTE	10	100			
	Bidens Pilosa	HTE	10	100			
FG	*Geranium homeanum*	N	7	40			
GG	*Eragrostis leptostachya*	N	5	50			
	Sida rhombifolia	E	1	20			
	Euryops chrysanthemoides	E	0.2	30			
	Solanum mauritianum	E	0.05	2			
	Araujia sericifera	E	0.2	10			
	Ligustrum sinense	HTE	0.1	1			
	Ehrharta erecta	HTE	0.1	8			
GG	*Microlaena stipoides*	N	8	30			
GG	*Oplismenus hirtellus*	N	0.5	50			
	Plantago lanceolata	E	1	100			
	Verbena litoralis	E	0.05	20			
	Setaria parviflora	E	2	50			

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 – Plot Species List

400m² plot: Sheet 1 of 1	Survey Name	Plot ID	Recorders
Date: 23/04/2024	457 Bells Line of Road, Kurmond	**2 – South-west corner**	Jesse McIvor

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
TG	*E. tereticornis*	N	5	1			
	Cenchrus clandestinus	E	90	1000			
	Paspalum dilatatum	HTE	10	100			
	Bidens Pilosa	HTE	1	100			
	Verbena litoralis	E	0.05	20			
	Senecio madagascariensis	E	0.5	50			

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 – Plot Species List

400m² plot: Sheet 1 of 1	Survey Name	Plot ID	Recorders
Date: 23/04/2024	457 Bells Line of Road, Kurmond	**3 – West middle of property towards boundary**	Jesse McIvor

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
	Cenchrus clandestinus	E	90	1000			
	Plantago lanceolata	E	1	100			
	Verbena litoralis	E	5	50			
	Paspalum urvillei	HTE	10	100			
	Senecio madagascariensis	HTE	5	50			

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 – Plot Species List

400m² plot: Sheet 1 of 1	Survey Name	Plot ID	Recorders
Date: 23/04/2024	457 Bells Line of Road, Kurmond	**Veg Zone 2 – Middle of Property**	Jesse McIvor

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
TG	*Eucalyptus tereticornis*	N	5	1			
TG	*Acacia parramattensis*	N	8	12			
TG	*Acacia implexa*	N	4	12			
	Cenchrus clandestinus	E	25	100			
GG	*Cynodon dectylon*	N	15	50			
	Paspalum urvillei	E	10	40			
	Senecio madagascariensis	HTE	3	20			
	Verbena litoralis	E	2	20			
	Plantago lanceolata	E	1	20			

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 – Plot Species List

400m² plot: Sheet 1 of 1	Survey Name	Plot ID	Recorders
Date: 23/04/2024	457 Bells Line of Road, Kurmond	**5 – Northern section of property next to *E. tereticornis* clump**	Jesse McIvor

GF Code	Top 3 native species in each growth form group: full species name mandatory. All other native and exotic species: full species name where practicable	N, E or HTE	Cover	Abund	Stratum	Voucher	Photo #
	Cenchrus clandestinus	E	70	1000			
	Bidens Pilosa	HTE	25	100			
	Plantago lanceolata	E	5	100			
	Verbena litoralis	E	5	100			
	Setaria parviflora	E	20	200			

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

APPENDIX C QUALIFICATIONS, 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 od 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		
Alexander Fraser		
Accreditation number	**Accreditation date (Date of issue)**	**Expiry Date of**
BAAS18156	17 October 2021	17 October 2024

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.

[redacted]

LUCIAN MCELWAIN

Manager Ecosytem Programs
Department of Planning, Industry & Environment

NOTES

- DPIE maintains a register of Accredited Biodiversity Assessment Method (BAM) Assessors accessible from the DPIE 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 Planning, Industry and Environment in connection with preparation of Biodiversity Assessment Reports or the application of the BAM
   f. any accreditation requirements notified by the Department of Planning, Industry and Environment 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 kept by an accredited person must be in legible form, or in a form that can be readily be reduced to a legible form.
5. an accredited person must provide to the Department of Planning, Industry and Environment 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.

Issued by the Department of Planning, Industry & Environment
4 Parramatta Square,12 Darcy Street | Locked Bag 5022, Parramatta NSW 2124
Email: info@environment.nsw.gov.au Website: www.dpie.nsw.gov.au

ECA ECOLOGICAL CONSULTANTS ASSOCIATION of NSW Inc

2023 PRACTISING MEMBER

APPENDIX D BAM SUMMARY REPORTS

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00048055/BAAS18156/24/00048056

Proposal Name
457 Bells Line of Road Kurmond May 2024

BAM data last updated *
14/03/2024

Assessor Name
Alex FRASER

Assessor Number
BAAS18156

BAM Data version *
67

Proponent Names
Wayne Attard

Report Created
21/06/2024

BAM Case Status
Finalised

Assessment Revision
2

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
21/06/2024

BOS entry trigger
BOS Threshold: Biodiversity Values Map

* 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
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3320-Cumberland Shale Plains Woodland

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
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
3320-Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.1	2	0	2

BAM Biodiversity Credit Report (Like for like)

3320-Cumberland Shale Plains Woodland	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_APZandClearing	Yes	2	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Biodiversity Credit Report (Like for like)

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00048055/BAAS18156/24/00048056

Proposal Name
457 Bells Line of Road Kurmond May 2024

BAM data last updated *
14/03/2024

Assessor Name
Alex FRASER

Assessor Number
BAAS18156

BAM Data version *
67

Proponent Name(s)
Wayne Attard

Report Created
21/06/2024

BAM Case Status
Finalised

Assessment Revision
2

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
21/06/2024

BOS entry trigger
BOS Threshold: Biodiversity Values Map

* 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
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3320-Cumberland Shale Plains Woodland

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
3320-Cumberland Shale Plains Woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion	0.1	2	0	2.00

3320-Cumberland Shale Plains Woodland

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 3319, 3320	-	3320_APZandClearing	Yes	2	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like options

BAM Biodiversity Credit Report (Variations)

BAM Candidate Species Report

Proposal Details

Assessment Id 00048055/BAAS18156/24/00048056	Proposal Name 457 Bells Line of Road Kurmond May 2024	BAM data last updated * 14/03/2024
Assessor Name Alex FRASER	Report Created 21/06/2024	BAM Data version * 67
Assessor Number BAAS18156	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Finalised
Assessment Revision 2	Date Finalised 21/06/2024	BOS entry trigger BOS Threshold: Biodiversity Values Map

* 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.

List of Species Requiring Survey

Name	Presence	Survey Months

Threatened species Manually Added

None added

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	Eucalyptus benthamii	Refer to BAR
Deyeuxia appressa	Deyeuxia appressa	Refer to BAR
Large Bent-winged Bat	Miniopterus orianae oceanensis	Refer to BAR
Large-eared Pied Bat	Chalinolobus dwyeri	Refer to BAR
Little Bent-winged Bat	Miniopterus australis	Refer to BAR
Micromyrtus minutiflora	Micromyrtus minutiflora	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Refer to BAR
Swift Parrot	Lathamus discolor	Refer to BAR

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00048055/BAAS18156/24/00048056	457 Bells Line of Road Kurmond May 2024	14/03/2024
Assessor Name	Report Created	BAM Data version *
Alex FRASER	21/06/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS18156	Finalised	21/06/2024
Assessment Revision	Assessment Type	BOS entry trigger
2	Part 4 Developments (Small Area)	BOS Threshold: Biodiversity Values Map

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

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

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

Cumberland Shale Plains Woodland												
1	3320_APZ andClearing	Cumberland Plain Woodland in the Sydney Basin Bioregion	21.1	21.1	0.14	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	2
											Subtotal	**2**
											Total	**2**

Species credits for threatened species

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

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00048055/BAAS18156/24/00048056	457 Bells Line of Road Kurmond May 2024	14/03/2024
Assessor Name	**Report Created**	**BAM Data version ***
Alex FRASER	21/06/2024	67
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18156	Part 4 Developments (Small Area)	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
2	BOS Threshold: Biodiversity Values Map	21/06/2024

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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)
Black Falcon	Falco subniger	3320-Cumberland Shale Plains Woodland
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3320-Cumberland Shale Plains Woodland
Black-necked Stork	Ephippiorhynchus asiaticus	3320-Cumberland Shale Plains Woodland
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3320-Cumberland Shale Plains Woodland
Diamond Firetail	Stagonopleura guttata	3320-Cumberland Shale Plains Woodland
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3320-Cumberland Shale Plains Woodland
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	3320-Cumberland Shale Plains Woodland
Eastern False Pipistrelle	Falsistrellus tasmaniensis	3320-Cumberland Shale Plains Woodland
Eastern Osprey	Pandion cristatus	3320-Cumberland Shale Plains Woodland
Flame Robin	Petroica phoenicea	3320-Cumberland Shale Plains Woodland

Gang-gang Cockatoo	Callocephalon fimbriatum	3320-Cumberland Shale Plains Woodland
Greater Broad-nosed Bat	Scoteanax rueppellii	3320-Cumberland Shale Plains Woodland
Grey-headed Flying-fox	Pteropus poliocephalus	3320-Cumberland Shale Plains Woodland
Large Bent-winged Bat	Miniopterus orianae oceanensis	3320-Cumberland Shale Plains Woodland
Little Bent-winged Bat	Miniopterus australis	3320-Cumberland Shale Plains Woodland
Little Eagle	Hieraaetus morphnoides	3320-Cumberland Shale Plains Woodland
Little Lorikeet	Glossopsitta pusilla	3320-Cumberland Shale Plains Woodland
Regent Honeyeater	Anthochaera phrygia	3320-Cumberland Shale Plains Woodland
Rosenberg's Goanna	Varanus rosenbergi	3320-Cumberland Shale Plains Woodland
Scarlet Robin	Petroica boodang	3320-Cumberland Shale Plains Woodland
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3320-Cumberland Shale Plains Woodland
Speckled Warbler	Chthonicola sagittata	3320-Cumberland Shale Plains Woodland
Spotted Harrier	Circus assimilis	3320-Cumberland Shale Plains Woodland
Spotted-tailed Quoll	Dasyurus maculatus	3320-Cumberland Shale Plains Woodland
Square-tailed Kite	Lophoictinia isura	3320-Cumberland Shale Plains Woodland
Swift Parrot	Lathamus discolor	3320-Cumberland Shale Plains Woodland
Turquoise Parrot	Neophema pulchella	3320-Cumberland Shale Plains Woodland
Varied Sittella	Daphoenositta chrysoptera	3320-Cumberland Shale Plains Woodland
White-bellied Sea-Eagle	Haliaeetus leucogaster	3320-Cumberland Shale Plains Woodland
White-throated Needletail	Hirundapus caudacutus	3320-Cumberland Shale Plains Woodland
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3320-Cumberland Shale Plains Woodland

Threatened species Manually Added

None added

BAM Predicted Species Report

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

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00048055/BAAS18156/24/00048056	457 Bells Line of Road Kurmond May 2024	14/03/2024
Assessor Name	**Report Created**	**BAM Data version ***
Alex FRASER	21/06/2024	67
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18156	Part 4 Developments (Small Area)	Finalised
Assessment Revision	**Date Finalised**	**BOS entry trigger**
2	21/06/2024	BOS Threshold: Biodiversity Values Map

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Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3320_APZandClearing	3320-Cumberland Shale Plains Woodland	APZandClearing	0.14	1	