RestoreAG.

ASCENTECOLOGY

Biodiversity Development Assessment Report – Residential subdivision Lot 1 DP995228, Hunter Street, Muswellbrook

Report to Oak Property Investments Pty Ltd

flora & fauna | planning & approvals | biodiversity offsetting | environmental management | environmental training

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Document and Project Control

Project name	Biodiversity Development Assessment Report – Residential subdivision Lot 1 DP995228, Hunter Street, Muswellbrook
Client name	Report to Oak Property Investments Pty Ltd.
Client number	C1003
Job number	J10169
Certification and declaration	I certify that this report has been prepared on the basis of the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act). I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest. This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.  Dr Christina Kindermann – BAM Accredited Assessor (BAAS12309)

Issue Status

Date	Revision No.	Prepared by	Reviewed by	Authorised by
20/05/2025	Draft (D1)	Christina Kindermann	Damian Licari and Christina Maloney	Damian Licari
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Glossary and list of abbreviations

Acronym	Definition
APZ	asset protection zone
Assessment area	The area which includes the development site and a 1,500 m buffer surrounding the outside edge of the boundary of the development site
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
BAM	Biodiversity Assessment Method 2020
BAMC	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offsets Scheme
CE	Critically Endangered
CEEC	Critically Endangered Ecological Community
DBH	diameter at breast height over bark
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DNG	Derived Native Grassland
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment (now DPE)
EEC	Endangered Ecological Community
E	Endangered
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
GIS	Geographic Information System
ha	Hectare
HTW	High Threat Weeds
IBRA	Interim Biogeographic Regionalisation for Australia
KUT	Koala use trees
km	Kilometre
LGA	Local Government Area
LLS	Local Land Services
LLS Act	Local Land Services Act 2013 (NSW)
Locality	The development site and surrounds, nominally the assessment area (above)
MHTW	Manageable High Threat Weed
m	Metre
m^2	Square metre
OEH	Office of Environment and Heritage (formerly DECCW, DECC, DEC, DPIE, now Department of Planning and Environment)
PCT	Plant Community Type
RAMSAR	Convention on Wetlands of International Importance
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
site	The Lot that is subject to the proposed development assessed in this report
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
V	Vulnerable
VI	Vegetation Integrity
VZ	Vegetation Zone
Vegetation SEPP	State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (NSW)

Information sources

This assessment has been prepared using the following information sources:

- Biodiversity Assessment Method 2020 (BAM)
- Biodiversity Assessment Methodology Calculator (BAMC; Version 80)
- BAM Operational Manual – Stage 1 (OEH 2018a)
- ArcGIS Map Service (ESRI ArcGIS Pro 3.5 2025)
- SIX Maps (DCS 2024)
- PlantNET (RGBSYD 2025)
- NSW Planning Portal Spatial Viewer (DPE 2024)
- Australian Soil Classification (ASC) soil type map of NSW v4.5 (DCCEEW 2024)
- BioNet Atlas - Threatened biodiversity profiles (DCCEEW 2025a)
- BioNet Vegetation Classification (DCCEEW 2025b)
- NSW State Vegetation Type Map (SVTM; DCCEEW 2025c)
- Species Profile and Threats Database (SPRAT) for information on EPBC Act lists, Conservation Advice, Listing Advice, recovery plans and information sheets. (DCCEEW 2025d)
- Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions) (Commonwealth DCCEEW 2024a)
- Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions) (Commonwealth DCCEEW 2024b)
- NSW (Mitchell) Landscapes v3.1 (DCCEEW 2016)
- NSW Hydrography (DCS 2024)

Naming conventions

- Flora names used are the currently accepted scientific name from PlantNet (RBGSYD 2024).
    - For threatened plants, the names used in the BioNet Atlas (DCCEEW 2025a) are also provided if different from those in the PlantNet database.
    - Exotic plant species are denoted with an asterisk (*).
- Fauna names used are the scientific name and common names in the BioNet Atlas (DCCEEW 2025a).
- Plant assemblages were assigned to the most appropriate Plant Community Type (PCT) in the BioNet Vegetation Classification Database (DCCEEW 2025b).
- Where relevant, each PCT was considered for its concurrence with Threatened Ecological Communities (TEC) listed under the NSW *Biodiversity Conservation Act 2016 (*BC Act) and/or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

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Executive summary

Ascent Ecology Pty Ltd (AE) in collaboration with RestoreAG Pty Ltd (RestoreAG) were engaged to prepare a Biodiversity Development Assessment Report (BDAR) for a proposed residential subdivision at Lot 1 DP995228 Hunter Street, Muswellbrook (the site).

The site (Lot 1 DP995228) covers approximately 9.62 ha, which the proposed development footprint is situated entirely upon. The site is comprised of 4.66 ha of native vegetation. An additional 1.26 ha was classified as planted native vegetation and was therefore excluded from vegetation integrity (VI) assessment. The rest of the site comprises of 3.70 ha of cleared/managed landscapes and exotic vegetation including existing infrastructure.

The site has been subject to a history of extensive modification, resulting in degraded habitat value and low biodiversity values as observed during the site assessment. Fauna species recorded were typical of those expected in this locality and in this type of habitat.

Native vegetation on the site is highly modified, with woody vegetation limited to small clumps or scattered trees isolated by low condition grassland with a high cover of exotics. Native vegetation on the site is consistent with Plant Community Type (PCT) *3431 – Central Hunter Ironbark Grassy Woodland.* One vegetation zone (VZ) was recorded on the site (PCT 3431_DNG). This vegetation is in a very low condition and the VI score was below 15, therefore below the assessment threshold and no ecosystem credits are required to offset the residual impact of development. This VZ aligns with the listed *Biodiversity Conservation Act 2016* (NSW) (BC Act) *Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions* threatened ecological community (TEC).

Targeted surveys were undertaken for candidate flora and fauna species and no threatened species were recorded except for two candidate microbat species detected by ultrasonic recording, namely; *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Vespadelus troughtoni* (Eastern cave bat). No rocky caves or overhangs were recorded on the site, and it is unlikely that these species utilise the site apart from marginal foraging. Suitable breeding or roosting habitat was not identified on the site, therefore these species were excluded from further assessment.

Direct impacts of the proposed development will be minimal and the total area of native vegetation that will be impacted by the proposed development is 4.66 ha of very low condition grassland. The proposed development will not require removal of any trees. Mitigation measures will be implemented to reduce potential offsite impacts during the construction phase. Indirect impacts that may be associated with the proposed development are considered to be minor and can be mitigated through the measures described in this report. Mitigation measures to minimise impacts to biodiversity are provided in Section 6.

The biodiversity credits offset obligation for the future development impacts were calculated by the BAMC (Revision 1) on 2 April 2025 using BAM Data version 80 based on inputs set out in this report. No species or ecosystem credits were generated for this site.

BAM Stage 1 – Biodiversity assessment

1 Introduction

Ascent Ecology Pty Ltd (AE) in collaboration with RestoreAG Pty Ltd (RestoreAG) were engaged by Oak Property Investments Pty Ltd to prepare a Biodiversity Development Assessment Report (BDAR) as specified under the NSW *Biodiversity Conservation Act 2016* (BC Act) using the Biodiversity Assessment Method 2020 (BAM).

This assessment has been undertaken to support a Development Application (DA) for a proposed two stage subdivision of Lot 1 DP995228 Hunter Street, Muswellbrook ('the site'):

- Stage 1 – Boundary adjustment to into 2 allotments, 3001 SRD and 3002 Future residential.
- Stage 2 – Subdivision of Lot 3002 into 56 residential allotments (Appendix 1; Figure 3).

The Stage 2 of the proposal will involve repurposing a well-located, industrial site to create a residential subdivision ('the proposed development') that contributes to the supply and diversification of housing in Muswellbrook.

This report describes the biodiversity values at the site, with particular emphasis on identification of native Plant Community Types (PCTs) and threatened ecological communities, populations, species and their habitats. It assesses the impact of the proposed development, contains measures to avoid and minimise impacts and describes and quantifies the biodiversity credits required to offset the residual impacts of the proposed development on biodiversity values Table 1.

Table 1 Site details

Item	Description
Lot and DP	Lot 1 DP995228
Address	Hunter Street, Muswellbrook
Tenure	Freehold
Local Government Area	Muswellbrook
Land use zone	E4 General Industrial, R1 General Residential and RE1 Public Recreation
Property area (ha)	9.62 ha
Development footprint (ha)	9.62 ha

1.1 Excluded impacts

The site contains 1.26 ha of planted native vegetation that were assessed using the decision-making key in BAM Appendix D Streamlined assessment module – Planted native vegetation. It was determined that the use of BAM Chapters 4 and 5 are not required to be applied to these areas. Evidence demonstrating the application of the decision-making key to the areas of planted native vegetation is presented in Appendix 2.

An additional 3.70 ha of the site is existing infrastructure that includes: the former Oak Milk factory building, residential dwellings, sheds, hardstands, roads, access tracks; cleared and heavily managed landscapes as well as exotic vegetation (Refer to Section 10 Site Photos). These areas were assigned to PCT 0, and were excluded from further assessment, except where required for the analysis of prescribed impacts (Section 6.3).

1.2 Biodiversity Offsets Scheme entry

Development Applications under the EP&A Act are required to address the Biodiversity Offset Scheme (BOS) entry requirements under the BC Act. In accordance with published guidance for local government (DPIE 2021), development proposals must consider the question:

- 'Is the proposal likely to significantly affect threatened species (TS)? (BC Act s. 7.2)' through application of the thresholds/triggers set out in Table 2.

If the answer is 'yes' to any of the threshold/trigger questions, then the BOS applies and a BDAR must be prepared by an accredited assessor to support the proposed modification application. These questions are addressed below in Table 2.

Table 2 Biodiversity Offset Scheme triggers and thresholds

Trigger or threshold	Response
Is there native vegetation clearing or a prescribed biodiversity impact on land mapped on the Biodiversity Values Map? (BC Act s. 7.2(1)(c) and BC Regulation c. 7.3)	Utilising the Biodiversity Values Map and Threshold Tool (BMAT; DPE 2023;), it was determined that no part of the Site is on an AOBV and that no part of the site is mapped on the Biodiversity Values Map (BV Map; Appendix 3). There would be no vegetation clearing or prescribed impacts on the area on the BV Map. This criterion therefore does not trigger entry into the BOS.
Does the clearing of native vegetation exceed the area threshold? (BC Regulation c. 7.2)	The site is zoned as E4 General Industrial, R1 General Residential and RE1 Public Recreation under the Muswellbrook Local Environmental Plan (MLEP 2014) and in this instance a 600m^2 minimum lot size applies. For the above minimum lot size, the threshold for clearing, above which the BOS applies is 0.25 ha or more (Appendix 3). The proposed development will clear 4.66 ha of native vegetation therefore this criterion triggers entry into the BOS.
Is it likely to significantly affect TS or ecological communities or their habitats, according to the TS Test of Significance? (BC Act s. 7.3)	This criterion was not considered as the proposed development exceeds the area threshold.

2 Site context

2.1 Site description and land use history

The site is located in the northern edge of the Muswellbrook and is surrounded by residential and industrial properties. Access to the site is gained via Hunter Street. The Main North railway line runs along the western boundary of the site and residential houses are located along the eastern boundary. The site has had various iterations of industrial and residential use.

The vegetation on site consists primarily of planted windrows of Corymbia and Eucalyptus species (primarily *Corymbia citriodora* and *Eucalyptus cladocalyx*) along the eastern boundary, planted windrows of Acacia and Casuarina species in the centre of the site and along the northern boundary, as well as planted ornamental species in the gardens of the residential dwellings. Exotic shrub species classified high threat weeds (HTW) including *Lycium ferocissimum* (African boxthorn) and *Olea europaea subsp. cuspidata* (African olive) are also present. Cleared sections of the site primarily consist of exotic grass and forb species.

Native vegetation on the site includes patches of regenerating *Acacia salicina* as well as native grass and forb species. Connectivity of the site is limited to small bands of exotic vegetation along the road reserve and drainage lines.

2.2 Landscape context

The site is located on upper Permian conglomerate of the Braxton Formation which can include conglomerate, sandstone and siltstone (Summerhayes 1983) and ranges from about 150 to 165 m above sea level. Both the Roxburgh (YP-rx) and Hunter (A-hu) soil landscape are mapped on the site. With Yellow Podzolic soils occurring on mid slopes (Roxburgh area) and alluvial soils in the flatter areas on the site (Hunter landscape).

Hydrological features of the site include an ephemeral drainage line on the northeastern boundary that flows into Sandy Creek and a drainage line on the southern boundary that flows into the Hunter River.

2.3 Landscape features

A desktop Geographic Information System (GIS) analysis was undertaken to identify landscape features of the site (Table 3, Figure 1, Figure 2). All geospatial data in in this assessment has been prepared in ArcGIS Pro.

Table 3 Landscape context, native vegetation cover and patch size

Item	Description
IBRA Bioregion	Sydney Basin
IBRA Subregion	Hunter
NSW (Mitchell) Landscape	Upper Hunter Channels and Floodplain
Rivers, streams and estuaries	Sandy Creek runs adjacent to the site, and an unnamed Strahler Stream Order 1 flows through the northern tip of the site (DCS 2004).
Wetlands	There are no RAMSAR or Nationally Important Wetlands within the site or within the 1,500 m assessment area (DCCEEW 2024).
Habitat connectivity	Sparse remaining trees within the subject site provides no connectivity to intact native vegetation. No mapped local or regional wildlife corridors occur within the 1,500 m assessment area.
Karst, caves, crevices, cliffs, rocks and other geological features of significance	There were no recorded karst, caves, crevices & cliffs or other areas of geological significance within the subject land or within the 1,500 m assessment area.
Areas of outstanding biodiversity value	There are no AOBVs recorded on the site or within the 1,500 m assessment area.
Soil hazard features	There are no acid sulphate soils mapped in the Muswellbrook Shire Council.

2.4 Native vegetation cover

Native vegetation cover (%) refers to the amount of woody and non-woody native vegetation that is estimated to remain in the landscape within the 1,500 m assessment area which includes the site and area surrounding the outside edge of the boundary of the site. It includes regrowth, planted native vegetation and derived native grasslands.

The extent and proportion of native vegetation cover within the assessment area was generated from digital aerial imagery and vegetation mapping (s.0) produced by Ascent Ecology for areas within the site and the SVTM (DCCEEW 2025c) for areas outside the site (Table 4, Figure 4).

Table 4 Native vegetation cover within the assessment area

Assessment area (ha)	948.90
Total area of native vegetation cover (ha)	192.45
Proportion of native vegetation cover (%)	20.28
Native vegetation cover category (DPIE 2020a)	10-30%

Land within the assessment area excluded from native vegetation cover calculations include: polygons identified as PCT 0 in SVTM mapping (DPE 2023c); dams, waterbodies, buildings, vehicle tracks, cropped or recently cropped cleared land based on analysis of digital aerial imagery; and land observed to be exotic vegetation from field observation.

There may be a considerable time lag between when the SVTM (DPE 2023c) was carried out and when publicly available digital aerial imagery (DPE 2023c) was recorded. Furthermore, there will always be a difference between these two geospatial datasets whether it be as a result of seasonality, drought or otherwise. Our comparative analysis of the two geospatial datasets employed in these calculations indicates that the differences are relatively minor. However, in instances where obvious clearing or regrowth of woody native vegetation has occurred, the SVTM (DPE 2023c) was adjusted accordingly.

2.5 Patch size

A patch is an area of woody and non-woody native vegetation that occurs on the site and includes native vegetation that has a gap of <100 m from the next area of woody native vegetation and ≤30 m for non-woody native vegetation (DPIE 2020a). Patch size(s) was calculated for each Vegetation Zone (VZ; Table 5).

Patch size was generated from vegetation mapping (s. 3.4) produced by Ascent Ecology for areas within the site and the SVTM (DCCEEW 2025c) for areas outside the site.

Although a patch may extend onto adjoining land, the assessment of patch size(s) was limited to the assessment area as the calculated result for patch size was in the ≥100 ha category in THE BAM (Table 5).

Table 5 Patch size within the assessment area

Assessment area (ha)	948.90
Total area of native vegetation cover (ha)	192.45
Patch size (ha) – All VZ	187.84
Patch size category (DPIE 2020a) – All VZ	≥100 ha

3 Native vegetation

3.1 Preliminary vegetation mapping

Vegetation on the site was initially mapped as part of a preliminary site assessment undertaken by RestoreAG in 2023. As part of the independent assessment by Ascent Ecology, this preliminary vegetation mapping required validation. Therefore, vegetation validation and plot-based vegetation surveys were conducted by Ascent Ecology on 27 October to 4 November 2024.

The original geospatial data from the preliminary site assessment was used by Ascent Ecology to conduct an initial desktop assessment. The initial desktop assessment included: analysis of the Plant Community Types (PCT) and their likely extent on the site; stratification of PCTs into Vegetation Zones (VZ) of the same broad condition state that could be determined from desktop analysis; and then preparation of a preliminary PCT/VZ map at a 1:5,000 scale to inform vegetation validation and plot-based vegetation surveys.

3.2 Vegetation validation surveys

Vegetation validation surveys were conducted by Ascent Ecology on 27 October 2024. A series of rapid data points (RDPs) were collected by Ascent Ecology across the site using the Fulcrum field data collection application on GPS capable mobile handheld devices. These RDPs included data on: dominant upper, mid and ground stratum native species, vegetation structure, PCT (based on dominant species and vegetation structure), VZ broad condition state, presence of disturbance (e.g. contemporary or historic logging, presence of HTW, presence pest animals and observed fire history). These data were later used to prepare the final PCT/VZ map (s. 3.4).

3.3 Plot-based vegetation surveys

Ascent Ecology undertook a systematic plot-based vegetation survey on 27-28 October and 3-4 November 2024 using documented and repeatable methods to collect floristic data using standard 20 m x 50 m nested plots (henceforth, 'BAM plots'). The vegetation survey was designed to survey the expected environmental variation in each preliminary PCT, the environmental variation in each stratified VZ and to fill gaps in existing mapping and site information. Vegetation surveys were undertaken in accordance with the BAM unless otherwise stated later in this section.

Floristic composition and structure data for each vascular plant species recorded in a 400 m^2 plot (standard 20 m x 20 m or linear 10 m x 40 m) and function data for the number of large trees, stem size class, tree regeneration and length fallen logs in a 1000 m^2 plot (standard 20 m x 50 m or linear 10 m x 100 m) were collected in accordance with BAM s. 4.2 and 4.3.

Based on the area size of each PCT/VZ, a total of six BAM plots were surveyed by Ascent Ecology and entered into the BAMC. All BAM plots were located to ensure they captured attributes relevant to that VZ as per BAM s. 4.3.4(5.). Where possible, BAM plots were located to avoid features such as ecotones, hydrolines and proximity to infrastructure. Due to the small size of the site some BAM plots were in close proximity to property boundaries and infrastructure.

Data was collected by Ascent Ecology using the Fulcrum field data collection application on GPS capable mobile handheld devices and/or on handwritten field sheets. Samples of plant species that were not readily identifiable in the field were identified in the lab with the aid of field guides and botanical keys. Once all plant species were identified, all data that was collected by Ascent Ecology on handwritten field sheets was entered into Fulcrum. Data entered into Fulcrum was then downloaded into Microsoft Excel for ease of data manipulation. Floristic BAM plot data is presented in Appendix 3 and BAM plot composition, structure and function scores are presented in Appendix 4.

3.4 Confirmation of PCTs, VZs and TECs

A formal process was employed to assign PCTs to the vegetation communities located on the site with reference to the PCT descriptions held in the BioNet Vegetation Classification (DCCEEW 2025b).

A combination of the quantitative data recorded in the plot-based vegetation surveys, analysis in the Plot to PCT Assignment Tool, site observations recorded in RDPs and preliminary mapping was then used to confirm the identification of PCTs and VZs that are in the same broad condition state. The assignment of PCT/VZ was based on consideration of the composition and structure attributes of the dominant species recorded in each stratum as well as geographic location, landscape position, soils and any other relevant factors. Derived native grassland communities were allocated to the most likely PCT based on PCT mapping for the site, remaining native flora species, adjacent PCTs and soil type. The evidence and steps taken to identify each confirmed PCT, justification for the selection of each PCT and description of each VZ is set out in Appendix 3.

Following confirmation of PCT/VZ, the linework of preliminary PCT/VZ map at a 1:5,000 scale was refined based the best available digital aerial imagery sourced from ArcGIS Map Service (2025) and SIX Maps (DCS 2023). Also, RDPs by Ascent Ecology were used alongside PCT matching results from the Plot to PCT Assignment Tool for each BAM plot. A 1:1,000 scale map of PCT/VZ was then produced.

A summary of the PCT/VZ recorded in the site is set out in Table 6 and the extent and distribution of vegetation assemblages are presented in Figure 6. Justification and site photos of this VZ are presented in Appendix 6.

3.5 Assessment of Threatened Ecological Communities

Plant Community Types identified during the mapping were cross-referenced with associated TECs from the BioNet Vegetation Classification (DCCEEW 2025b). Where a PCT/VZ was associated with one or more TECs quantitative data recorded in the plot-based vegetation surveys and site observations recorded in RDPs were reviewed against the relevant NSW Scientific Committee Determination and/or Commonwealth Listing Advice under the EPBC Act. Note, credits can only be created for TECs that are listed under the BC Act. Threatened Ecological

Communities listed under the EPBC Act are described for information and completeness of the assessment.

Where the PCT/VZ conformed to a TEC, appropriate justification is provided in Appendix 5. Where a PCT/VZ conformed to a TEC, the extent and distribution of the TEC was mapped.

PCT 3431 recorded on the site aligns with the *Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions* TEC that is listed as an Endangered Ecological Community (EEC) under the BC Act (Appendix 5, Figure 6).

PCT 3431 site also aligns with the TEC *Central Hunter Valley eucalypt forest and woodland* listed as Critically Endangered under the EPBC Act. However, the vegetation does not meet the condition thresholds to be considered a TEC under the EPBC Act (Appendix 5).

Table 6 PCTs, VZs, TECs and BAM plot requirement

PCT ID and name	VZ	Associated TEC (BC Act)	BC Act Status	EPBC Act Status	Area (ha)	No. VI plots required	No. VI plots surveyed	Patch size
PCT 3431 – Central Hunter Ironbark Grassy Woodland	3431_DNG	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	Endangered	Critically Endangered	4.66	3	6	187.84

3.6 Current Vegetation Integrity

The plot-based vegetation survey data (vegetation composition, structure and function) were entered into the BAMC to determine the current Vegetation Integrity (VI) for each VZ. Vegetation benchmark data Version 1.2 was used to determine VI scores for the site. Current VI scores including composition condition, structure condition and function condition scores for each VZ on the site are presented in Table 7.

Table 7 Current VI score for each PCT and VZ

VZ	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score	Hollow bearing trees present?
3431_DNG	9.3	0.8	32.7	6.7	No

4 Threatened species

Predicted (ecosystem credit) and candidate (species credit) threatened species likely to occur on the site were identified by the BAMC. Species were identified as likely to occur within the site, based on the location, PCTs present, patch size and percentage cover of native vegetation in the assessment area (latter two for fauna only).

4.1 Predicted threatened species

The BAMC identified 31 predicted threatened species were identified as likely to occur on the site. These species do not require survey and form part of the ecosystem credits generated for the site. Of these, two predicted species were excluded from consideration based on habitat constraints, geographic limitations or vagrancy in accordance with BAM s. 5.2.2 (Table 8). The list of predicted threatened species is provided in Appendix 7.

Table 8 Predicted species excluded from consideration

Scientific Name/ Common Name	Excluded Vegetation Zone(s)	Habitat Constraint	Justification for Exclusion
Ixobrychus flavicollis Black Bittern	3431_DNG	Waterbodies; Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	**Habitat constraint not met:** No freshwater and estuarine wetlands or permanent water occur within 40m of the site.
Ephippiorhynchus asiaticus Black-necked Stork	3431_DNG	Swamps; Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of these swamps. Waterbodies; Shallow lakes, lake margins and estuaries within 300m of these waterbodies	**Habitat constraint not met:** No freshwater and estuarine wetlands or Shallow lakes, lake margins and estuaries occur within 300 m of the site.

4.2 Candidate threatened species

Candidate threatened species are those that cannot be predicted from habitat surrogates. Targeted survey is required for these species if the site contains suitable habitat and is within the predicted range of the species. A total 39 candidate threatened species were generated by the BAMC (Appendix 8).

Species that have been excluded from the Species Credit Species list are provided in Table 9, along with the assessment of habitat and geographic requirements which were not met. Targeted survey is not required for these species.

Table 9 Candidate species excluded from further assessment

Scientific Name Common Name	Listing Status		Habitat/Geographic constraint	Habitat degraded ?	Justification for exclusion
	BC Act	EPBC Act			
Anthochaera phrygia Regent Honeyeater (Breeding)	CE	CE	Habitat: As per Important Habitat Map		**Reason for exclusion** Site not on Regent Honeyeater Important Habitat Map
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	E	N/A	Habitat: Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger	Yes	**Required microhabitats** This species requires mature, old-growth wet sclerophyll forests for breeding, with a critical dependence on large hollow bearing eucalypt trees as well as proximity to water sources (DWW 2022). **Microhabitats present on site** The vegetation on site is largely cleared with small patches of planted eucalypt species and garden ornamentals and would not be classified as a sclerophyll forest. The habitat is considered highly degraded within the site and this species excluded from further assessment. **Reason for exclusion** Microhabitats are degraded to the point that the species is unlikely to use the subject land.
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo (Breeding)	V	V	Living or dead tree with hollows greater than 15cm diameter and higher than 8m above ground		**Reason for exclusion** There are no hollows of this size category recorded on site
Cercartetus nanus Eastern Pygmy-possum	V	N/A	-	Yes	**Required microhabitats** This species depends on dense shrubby understorey vegetation rich in nectar-producing plants like Banksia, Eucalyptus, and Callistemon for food (Turner and Ward 1995). **Microhabitats present on site** The vegetation on site is largely cleared with small patches of

Scientific Name Common Name	Listing Status		Habitat/Geographic constraint	Habitat degraded ?	Justification for exclusion
	BC Act	EPBC Act			
					planted eucalypt species and garden ornamentals The site does not support a shrubby understorey vegetation rich in nectar-producing plants. **Reason for exclusion** Microhabitats required by the species are absent from the subject land.
Chalinolobus dwyeri Large-eared Pied Bat	E	E	Habitat: Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels		**Reason for exclusion** Site is not within 2 km of known rocky cliffs, over hangs, mines or tunnels.
Delma impar Striped Legless Lizard	V	V		Yes	**Required microhabitats** *Delma impar* is highly specialized, requiring a microhabitat with loose, sandy soils and intact native vegetation (Shine et al. 2006). **Microhabitats present on site** The site does not support intact native vegetation. **Reason for exclusion** Microhabitats required by the species are absent from the subject land.
Dromaius novaehollandiae - endangered population Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	E	N/A	Geographic limitations: Port Stevens LGA		**Reason for exclusion** Site outside of Port Stevens LGA

Scientific Name Common Name	Listing Status		Habitat/Geographic constraint	Habitat degraded ?	Justification for exclusion
	BC Act	EPBC Act			
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	V	N/A	Habitat: Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines		Reason for exclusion This species requires large areas of open water for foraging and prefers nesting in tall trees near water bodies (O'Donnel and Debus 2012). There are no raptor stick nest trees recorded on site. or suitable waterbodies mapped within 1km of the site.
Hieraaetus morphnoides Little Eagle (Breeding)	V	N/A	Habitat: Nest trees - live (occasionally dead) large old trees within vegetation)		Reason for exclusion There are no raptor stick nest trees recorded on site.
Lathamus discolor Swift Parrot (Breeding)	E	CE	Habitat: As per Important Habitat Map		Reason for exclusion Site not on Swift Parrot Important Habitat Map.
Limicola falcinellus Broad-billed Sandpiper (Breeding)	V	N/A	Habitat: As per Important Habitat Map		Reason for exclusion Site not on Broad-billed Sandpiper Important Habitat Map.
Lophoictinia isura Square-tailed Kite (Breeding)	V	N/A	Habitat; Nest trees		Reason for exclusion There are no raptor stick nest trees recorded on site.
Ninox connivens Barking Owl	V	N/A	Habitat: A living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground		Reason for exclusion There are no trees with hollows of this size and height category recorded on site
Ninox strenua Powerful Owl	V	N/A	Habitat: A living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground		Reason for exclusion There are no trees with hollows of this size and height category recorded on site
Pandion cristatus Eastern Osprey (Breeding)	V	N/A	Habitat: Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100 m of a floodplain for nesting)		Reason for exclusion There are no raptor stick nest trees recorded on site.
Persoonia pauciflora North Rothbury Persoonia	CE	CE	Geographic: Within 10 km of North Rothbury		Reason for exclusion Site is greater than 10 km from North Rothbury.

Scientific Name Common Name	Listing Status		Habitat/Geographic constraint	Habitat degraded ?	Justification for exclusion
	BC Act	EPBC Act			
Petrogale penicillata Brush-tailed Rock-wallaby	E	V	Habitat: Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.		Site does not occur within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines
Phascogale tapoatafa Brush-tailed Phascogale	V	N/A	N/A	Yes	Required microhabitats This species prefer dry sclerophyll forests with open canopies and sparse understorey (Mansfield et al. 2017, van der Ree et al. 2001). Microhabitats present on site The vegetation on site is largely cleared with small patches of planted eucalypt species and garden ornamentals and would not be classified as a sclerophyll forest. Reason for exclusion Microhabitats required by the species are absent from the subject land.
Planigale maculata Common Planigale	V	N/A	N/A	Yes	Required microhabitats This species shows a preference for areas with the following habitat features (Fisher and Dickman 1993, Russell and Wilson 2015): • Dense or scattered tree canopy cover • Dense ground-cover vegetation • Proximity to low-lying sites subject to seasonally wet conditions, with occasional short-term inundation Microhabitats present on site The vegetation on site is largely cleared with small patches of planted eucalypt species and garden ornamentals and does not meet these requirements. Reason for exclusion Microhabitats required by the species are absent from the subject land.

Scientific Name Common Name	Listing Status		Habitat/Geographic constraint	Habitat degraded ?	Justification for exclusion
	BC Act	EPBC Act			
Pteropus poliocephalus *Grey-headed Flying-fox* (Breeding)	V	N/A	Habitat constraint: Breeding camps		Reason for exclusion There are no flying fox camps recorded on or near site.
Tyto novaehollandiae Masked Owl	V	N/A	Habitat: A living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground		Reason for exclusion There are no trees with hollows of this size and height category recorded on site

4.3 Species credit species methods

Targeted threatened species surveys were undertaken for all candidate species credit species determined likely to occur within the site, as predicted by the BAMC. Targeted surveys were carried out within the approved survey period for the species targeted as identified within the BAMC and were implemented in accordance with BAM s. 6.5 of the and all relevant OEH threatened species survey guidelines.

Survey and associated data analysis methods are presented in this section. Timing and survey effort for targeted species is presented in Table 11.

4.3.1 Flora

Targeted threatened flora surveys were conducted using the parallel field traverse survey technique as described in *Surveying threatened plants and their habitats-NSW survey guide for the Biodiversity Assessment Method (DPIE 2020).* Distance between each traverse was between 5 and 10 m depending on vegetation density.

All transects were recorded by a Garmin handheld GPS Map65 unit, generally accurate to within 6m depending on canopy cover (reading +/- 6m accuracy under canopy at time of survey). GPS tracks are presented in Figure 5.

4.3.2 Fauna

4.3.2.1 Habitat constraints assessment

A field survey was undertaken to assess flora habitat constraints and microhabitats for threatened flora species within the site. The following features were assessed:

- Presence of Hollow Bearing Trees (HBT);
- Presence of flowering and/or fruiting trees;
- Nests;
- Logs on ground;
- Streams, wetlands (aquatic habitats).

4.3.2.2 Avian survey

Four acoustic recorders (Songmeters) were deployed across the site to detect calling nocturnal birds for 10 nights from 27/10 to 6/11/2024 yielding a total of 40 recorder nights. Locations are presented in Figure 5.

Acoustic Songmeter data was processed using the Kaleidoscope Pro application. This application employs cluster analysis to group similar calls based on characteristics such as pitch, duration, frequency patterns and harmonics. Clusters were manually verified to confirm their similarity and consistency, ensuring they represented the same type of call. After processing, representative calls and spectrograms from each cluster were manually examined to confirm species ID.

4.3.2.3 Arboreal mammal survey

Four remote camera traps were deployed across the site. Remote cameras were installed 1.5 m above the ground facing toward a tree approximately 1.5 to 3 m away and a ruler was placed in the image frame to allow for more accurate species identification. Remote cameras were baited to target arboreal mammals (bait canister filed with a mix of oats, honey, and peanut butter).

Remote cameras traps were deployed across the site for 43 nights from 27/10 to 8/12/2024 yielding a total of 172 trap nights. Locations of the remote cameras are presented in Figure 5.

Remote camera trap data was initially analysed by an ecologist. Following the initial analysis, a quality assurance process was undertaken by a senior ecologist.

4.3.2.4 Koala surveys

Koala scat searches were undertaken within general accordance with the Spot Assessment Technique (SAT) of Phillips and Callaghan (2011). All trees of any species that are known to be utilised by koala or otherwise considered to be of some importance for koala conservation or management purposes were assessed.

Furthermore, 4 acoustic recorders (Songmeters) were deployed across the site for 10 nights from 27/10 to 6/11/2024 yielding a total of 40 recorder nights. Locations are presented in Figure 5.

Acoustic Songmeter data was processed as per Section 4.3.2.2.

4.3.2.5 Amphibian survey

One survey transects/call playback point was identified on site. Tadpole dip netting was undertaken on two separate days followed by nocturnal call playback over two nights. Amphibian survey location is presented in Figure 5. At the time of visit the northern drainage line was dry and no surveys were undertaken in this area.

In addition, two acoustic recorders (Songmeters) were deployed near potential habitat, however, the ephemeral drainage line on the northeastern boundary was dry at the time of survey.

Acoustic recorders were deployed across the site for 10 nights from 27/10 to 6/11/2024 yielding a total of 20 recorder nights. Locations are presented in Figure 5.

Acoustic Songmeter data was processed as per Section 4.3.2.2.

4.3.2.6 Microbat surveys

A diurnal inspection of all existing sheds and buildings located within the site was carried out. Inside each structure, wall cavities, ceiling cavities, beams, upright pylons, crevices and any other areas considered to contain potential microbat roosting habitat for species known to roost in man-made structures were inspected. These areas were examined for signs of past or current microbat use (e.g. evidence of guano) and their value as roosting habitat was assessed. The outside of each structure was examined for potential microbat entry and exit points.

Furthermore, four ultrasonic recorders (Songmeters) were deployed across the site for 10 nights from 27/10 to 6/11/2024 yielding a total of 40 recorder nights. Locations are presented in Figure 5.

Analysis of ultrasonic microbat calls was completed by Land and Habitat Environmental (2025), with consideration of Australasian Bat Society guidelines (Appendix 9).

4.3.2.7 Incidental species

All fauna species and evidence of fauna presence observed was recorded by Ascent Ecology. An inventory of fauna species recorded is presented in Table 12.

4.4 Targeted Survey results

4.4.1 Flora

No threatened flora species were detected over the course of targeted threatened flora surveys, incidentally or in the BAM plot survey.

4.4.2 Fauna

4.4.2.1 Habitat features

Habitat features were recorded primarily within PCT 0_Planted_Native_B and are presented in Table 10 and Figure 7.

Table 10 Habitat features

Habitat feature	Description of suitable habitat	Latitude	Longitude
Hollow Bearing tree	Medium Spout (15 cm, 4 m high)	-32.2518	150.8947
Hollow Bearing tree	Medium Hollow (15 cm, 1.5 m high)	-32.2499	150.8964
Shed		-32.2503	150.8958
Hollow Bearing tree	Small Hollow (10 cm, 7 m high)	-32.2501	150.8966
Old building		-32.2523	150.8923
Drain line		-32.252	150.8923
Logs on ground		-32.2519	150.8923
Stag		-32.2486	150.8968
Stag		-32.2487	150.8969
Hollow Bearing tree	Hollow trunk (20 cm, 4 m high)	-32.2509	150.8953
Logs on ground		-32.2497	150.8970
Logs on ground		-32.2496	150.8972
nest box		-32.2508	150.8958
Hollow Bearing tree	Medium Hollow (15 cm, 4 m high)	-32.2506	150.8962
Logs on ground		-32.2497	150.8973
Hollow bearing tree		-32.2495	150.8974
Waterway		-32.2514	150.8896
Hollow Bearing tree	Small spout (10 cm, 14 m high)	-32.2499	150.8959
Hollow Bearing tree	Extra Large Hollow (>20 cm, 3 m high)	-32.2521	150.8934
Logs on ground		-32.2513	150.8942
Hollow Bearing tree	Medium spout (15 cm, 4 m high)	-32.2519	150.8946

4.4.2.2 Avian survey

No candidate avian fauna species were detected by acoustic recording. A summary of survey methods, dates surveyed, survey effort and results are presented in Table 11.

4.4.2.3 Arboreal mammal survey

No candidate fauna species were detected on remote cameras. A summary of survey methods, dates surveyed, survey effort and results are presented in Table 11.

4.4.2.4 Koala surveys

No koalas were detected through SAT surveys or by acoustic recording. A summary of survey methods, dates surveyed, survey effort and results are presented in Table 11.

4.4.2.5 Amphibian survey

No candidate amphibians were detected through nocturnal call playback surveys, dip net for tadpoles or by acoustic recording. A summary of survey methods, dates surveyed, survey effort and results are presented in Table 11.

4.4.2.6 Microbat surveys

No signs of microbats were observed on the site. Sheds on site were not assessed as unsuitable for breeding (most were being used, large and open, no suitable nooks for roosting). Most of the

sheds on site were being utilised for storage and the level of disturbance is likely too high for microbats to set up any permanent roosts (Hoye and Spence 2004).

Two candidate microbat species were detected on site by ultrasonic recording, namely; *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Vespadelus troughtoni* (Eastern Cave Bat). Due to the lack of rocky caves or overhangs required by these species, it is unlikely that these species utilise the site apart from marginal foraging. Suitable breeding or roosting habitat was not identified on the site, therefore these species were excluded from further assessment.

A summary of survey methods, dates surveyed, survey effort and results are presented in Table 11.

4.4.2.7 Incidental species

The fauna assemblage observed on site was typical of an urban environment. A full list of incidental species recorded on site is presented in Table 12.

Table 11 Species surveys for candidate flora and fauna species

Scientific Name Common Name	Survey method	Date Surveyed	BAMC/TBDC months of survey? Y/N	Survey effort/ area covered	Recorded on the site
Candidate flora species					
Acacia pendula - endangered population	Parallel Flora Transects – 5-10m	28/10/2024, 4/11/2024	Yes	ALL VZ and Planted Vegetation zones	No
Cymbidium canaliculatum - endangered population Cymbidium canaliculatum population in the Hunter Catchment	Parallel Flora Transects – 5-10m	28/10/2024, 4/11/2024	Yes	ALL VZ and Planted Vegetation zones	No
Diuris tricolor Pine Donkey Orchid	Parallel Flora Transects – 5-10m	24/09/2024, 28/10/2024	Yes	ALL VZ and Planted Vegetation zones	No
Diuris tricolor - *endangered population*	Parallel Flora Transects – 5-10m	24/09/2024, 28/10/2024	Yes	ALL VZ and Planted Vegetation zones	No
Eucalyptus glaucina Slaty Red Gum	Parallel Flora Transects – 5-10m	28/10/2024	Yes	ALL VZ and Planted Vegetation zones	No

Scientific Name Common Name	Survey method	Date Surveyed	BAMC/TBDC months of survey? Y/N	Survey effort/ area covered	Recorded on the site
Ozothamnus tesselatus	Parallel Flora Transects – 5-10m	28/10/2024, 4/11/2024	Yes	ALL VZ and Planted Vegetation zones	No
Pomaderris queenslandica Scant Pomaderris	Parallel Flora Transects – 5-10m	28/10/2024, 4/11/2024	Yes	ALL VZ and Planted Vegetation zones	No
Prasophyllum petilum Tarengo Leek Orchid	Parallel Flora Transects – 5-10m	28/10/2024, 4/11/2024	Yes	ALL VZ and Planted Vegetation zones	No
Prasophyllum sp. Wybong	Parallel Flora Transects – 5-10m	24/09/2024, 28/10/2024	Yes	ALL VZ and Planted Vegetation zones	No
Pterostylis chaetophora	Parallel Flora Transects – 5-10m	28/10/2024, 4/11/2024	Yes	ALL VZ and Planted Vegetation zones	No
Candidate fauna species					
Litoria aurea Green and Golden Bell Frog	Call playback, tadpoles dip-netting, Acoustic recorder	27/10 to 5/11/2024	Yes	4 transect replicates, 40 nights	No
Burhinus grallarius Bush Stone-curlew	Acoustic recorder	27/10 to 5/11/2024	Yes	40 nights	No
Petaurus norfolcensis Squirrel Glider	Camera traps	27/10/ to 8/12/2024	Yes	172 nights	No
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	Habitat Survey	27/10 to 5/11/2024		All sheds and disused buildings on site	No
Miniopterus australis Little bent-winged Bat (Breeding)	Habitat Survey	27/10 to 5/11/2024		All sheds and disused buildings on site	No
Myotis macropus Southern Myotis	Ultrasonic recorder	27/10 to 5/11/2024	Yes	40 nights	No
Phascolarctos cinereus Koala	Acoustic recorder SAT Survey	27/10 to 5/11/2024	Yes	Acoustic: 40 nights	No

Scientific Name Common Name	Survey method	Date Surveyed	BAMC/TBDC months of survey? Y/N	Survey effort/ area covered	Recorded on the site
				SAT Surveys: all trees on site	
Vespadelus troughtoni Eastern Cave Bat	Ultrasonic recorder Habitat survey	27/10 to 5/11/2024	Yes	40 nights	Yes

Table 12 Incidental fauna species recorded on site

Scientific name	Common Name	Observation type
Acridotheres tristis	Common myna	Incidental observation
Grallina cyanoleuca	Magpie-lark	Incidental observation
Manorina melanocephala	Noisy miner	Incidental observation
Gymnorhina tibicen	Australian Magpie	Incidental observation
Macropus giganteus	Eastern grey kangaroo	Incidental observation/Camera trap
Rattus rattus	Black rat	Camera trap
Felis catus	Cat	Camera trap

BAM Stage 2 – Impact Assessment

5 Avoid and minimise impacts

In accordance with the BAM, proponents are required to show how they will avoid, mitigate, and offset the impacts of a project on biodiversity values. This section of the report details the avoidance, management, and mitigation strategies that have been integrated into the proposal. Each Stage of the development (Stage 1 – Boundary adjustment and Stage 2 – Subdivision) will be assessed separately.

5.1 Avoid and minimise direct and indirect impacts

5.1.1 Project location and design

5.1.1.1 Stage 1 – Boundary adjustment to into 2 allotments

Stage 1 is a boundary adjustment without any direct, indirect or prescribed impacts on biodiversity.

5.1.1.2 Stage 2 – Subdivision of Lot 3002 into 56 residential allotments

The proposed development layout (Appendix 1; Figure 3) has avoided and minimised impacts in accordance with the BC Act s. 6.4(1) avoidance and minimisation hierarchy, whilst providing for the residential demand within the growing township of Muswellbrook.

Consideration of linkages to the existing surrounding development such as road, stormwater facilities and other services (electricity and water supplies) were considered in the design to ensure the proposed development could provide these services to the residents.

The proposal has avoided and minimised impacts based on the following considerations:

- Historical land use: The proposed development will repurpose a site that is significantly disturbed due to previous industrial and residential land use and consists of degraded habitat with low biodiversity values.
- Threatened species: No threatened species were recorded on the site with the exception of two candidate microbat species detected by ultrasonic recording, namely; Large-eared Pied Bat and Eastern cave bat. However, suitable breeding or roosting habitat was not identified on the site, therefore these species were excluded from further assessment.
- Threatened Ecological Communities: The proposed development will impact 4.66 ha of *Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions* TEC vegetation on the site. However, this vegetation is in a very low condition and the VI<15, therefore, below the assessment threshold for TECs. Furthermore, the proposed development will not require removal of any trees.
- Areas of high biodiversity value: No part of the Site is on an AOBV and no part of the site is mapped on the Biodiversity Values Map (Appendix 3). The proposed development will not directly impact any areas mapped on the Biodiversity Values Map.

- Habitat corridors: The site contains minor habitat connectivity values as it has been highly modified and contains degraded habitat and low biodiversity value.

6 Impact assessment

The following assessment evaluates the potential effects of the project on biodiversity, including both direct and indirect impacts as outlined in the BAM.

6.1 Direct Impacts

6.1.1.1 Stage 1 – Boundary adjustment

Stage 1 is a boundary adjustment without any direct impacts on biodiversity.

6.1.1.2 Stage 2 –Subdivision

A total of 4.66 ha of native vegetation (PCT 3431_DNG) on the site will be directly impacted during the construction stage of the proposed development. As per the BAM, Section 7 details the biodiversity credits required to offset the unavoidable impacts of the proposed modification.

The existing areas of planted native vegetation (PCT 0_Planted_Native_A, B and C) will not be cleared.

6.2 Indirect Impacts

6.2.1.1 Stage 1 – Boundary adjustment

Stage 1 is a boundary adjustment without any indirect impacts on biodiversity.

6.2.1.2 Stage 2 –Subdivision

Indirect impacts likely to occur on native vegetation, threatened entities and their habitat beyond the site have been presented in Table 14 with proposed mitigation measures identified. As a result of the indirect risk assessment, it was identified that the residual risk following the application of mitigation measures was very low.

6.3 Identifying Prescribed impacts

This section identifies prescribed biodiversity impacts which may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical in accordance with BAM s. 8.3. Prescribed biodiversity impacts relevant to the proposal have been identified in Table 13.

No prescribed impacts were identified.

Table 13 Prescribed impacts

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Karst, caves, crevices, cliffs, rocks or other geological features of significance	No	No Karst, caves, crevices, cliffs, rocks or other geological features of significance were recorded on site.	Does not apply.
Human-made structures	Yes	Old sheds and abandoned buildings are present on site.	Threatened microbats including *Chalinolobus dwyeri* (Large-eared Pied Bat) may utilise structures on site for temporary roosting. No signs of microbats were observed during site assessments (Section 4.3.3.4). and these structures are not considered suitable habitat.
Non-native vegetation	Yes	Exotic plant species are abundant across most of the site.	No threatened species considered likely to utilise the exotic vegetation were recorded.
Habitat connectivity	No	Sparse remaining trees within the subject site provide no connectivity to intact native vegetation. No mapped local or regional wildlife corridors occur within the proposal area.	N/A
Waterbodies, water quality and hydrological processes	Yes	Sandy Creek runs adjacent to the site, and an unnamed Strahler Stream Order 1 flows through the northern tip of the site (DCS 2004).	No threatened species considered likely to utilise these habitats were recorded.
Wind turbine strikes (wind farm development only)	Does not apply to the proposed development.		
Vehicle strikes	No	Increased plant, machinery and vehicles during construction. The proposed development would result in an intensification of human occupation and increase in vehicular traffic to the local area.	No threatened species considered likely to be impacted by vehicle strikes were recorded.

6.4 Serious and irreversible impacts

The Credit Summary Report (Appendix 10) for the assessment does not indicate that candidate Serious and Irreversible Impact (SAII) entities are likely to be present. Therefore, there is no requirement to assess for potential SAII entities.

The TBDC profile for the Large-eared Pied Bat and Eastern Cave Bat (which were detected on ultrasonic recorders) indicates the SAII threshold relates to impacts for breeding habitat only. As breeding/roosting habitat does not occur within the subject land (see Section 6.3.4.1) and therefore will not be impacted, no further assessment for SAII have been conducted for these Species.

6.5 Impact minimisation and mitigation

Measures to mitigate residual impacts are provided in Table 14. A site-specific Construction Environmental Management Plan (CEMP) will be required to be prepared prior to the commencement of any construction or clearing works.

Table 14 Recommended mitigation measures for direct impacts, indirect and prescribed impacts for Stage 2

Impact	Likelihood	Detail	Mitigation Measure	Responsibility	Timing
Direct Impacts					
Removal or modification of native vegetation.	Known	There will be 4.66 ha of Native Vegetation (with very low VI) mapped as PCT 3431_DNG removed. The proposed development will not require removal of any trees.	Clearly delineate the work site pre-construction to protect vegetation and habitat outside of the works area.	Surveyor/Project coordinator/ Clearing contractor	Prior to and during vegetation clearing.
Removal or modification of planted native vegetation.	Known	Based on current design plans planted native vegetation (PCT 0_Planted_Native_A, B and C) will not be cleared.	Clearly delineate the work site pre-construction to protect vegetation and habitat outside of the works area. It is recommended that all trees to be retained on the site should be protected during construction with temporary fencing in accordance with Australian Standard AS 4970-2009 Protection of trees on development sites.	Surveyor/Project coordinator/ Clearing contractor	Prior to and during vegetation clearing.
Loss of individuals of a threatened species.	None	No threatened flora or fauna were identified or considered likely to occur within the proposed development footprint.	N/A	N/A	N/A
Removal or modification of fauna habitat.	None	Based on current design plans no hollow bearing trees will be removed.	Clearly delineate the work site pre-construction to protect vegetation and habitat outside of the works area. It is recommended that all trees to be retained on the site should be protected during construction with temporary fencing in accordance with Australian Standard AS 4970-2009 Protection of trees on development sites.	Surveyor/Project coordinator/ Clearing contractor	Prior to and during vegetation clearing.

Impact	Likelihood	Detail	Mitigation Measure	Responsibility	Timing
Traffic impacts to fauna.	Low	The proposed development (Stage 2) will result in an intensification of human occupation and increase in vehicular traffic to the local area. This has the potential to increase the incidence of fauna vehicle collisions	Speed limits during construction should be limited to 40 km/hr or as per the CEMP. Speed dampening devices and signage could be used in potential wildlife crossing locations.	Project coordinator/ Clearing contractor	During construction and operation.
Injury/mortality of fauna during clearing.	Moderate	Animals within fallen logs, as well as dense vegetation and leaf litter have the potential to be injured or killed during clearing operations.	A clearing procedure will be implemented during the clearing of the disturbance area, as follows: • Preclearance surveys will be completed to determine if any nesting birds are present; and • A suitably trained fauna handler will be present during clearing to rescue and relocate displaced fauna if found on-site.	Clearing contractor /Project Ecologist	Prior to and during vegetation clearing.
Indirect impacts					
Erosion and sedimentation	Low	Unmanaged site stormwater runoff during construction and operation may carry sediment and pollutants into the local stormwater networks and waterways, which may bring about deterioration in water quality. This may, in turn, adversely affect the health of flora and habitat value to local fauna.	Appropriate erosion and sediment controls would be in place prior to the commencement of any excavation/earthworks. Controls would comply with the "Blue Book" (Soils and Construction, Managing Urban Stormwater Volume 1, 4th Edition 2004). Overland flows and surcharges should be collected and directed to the stormwater system.	Project coordinator.	During construction and operation.
Weed invasion	Low	The site is already highly weed infested. The project is considered unlikely to significantly increase weed invasion.	All vehicles, equipment, footwear and clothing should be clean and free of weed propagules prior to entering the Project Site. Any weeds that are removed during the construction phase should be disposed of via an appropriate waste facility.	Project coordinator.	During Construction.

Impact	Likelihood	Detail	Mitigation Measure	Responsibility	Timing
Noise, vibration and anthropogenic disturbances	Low	There may be an increase in noise, vibration during the construction and development phase of the project. However, due to the industrial nature of the current site, the impacts are negligible.	Specific measures to minimise the generation of Noise, vibration and anthropogenic disturbances on adjacent natural environments should include be managed through the CEMP.	Project coordinator.	During construction and operation.
Light	Low	Disturb resident fauna and disrupt their natural behaviour.	Lighting to comply with Australian standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting.	Project coordinator.	During construction and operation.
Increased dust levels	Low	There may be an increase in dust during the construction phase of the project. Dust levels are not anticipated to increase as a result of the proposed development.	Specific measures to minimise the generation of dust and associated impacts on adjacent natural environments should include be managed through the CEMP.	Project coordinator.	During Construction.
Introduction of feral and domestic predators	Low	Urban, industrial and rural developments are often associated with the introduction of non-native species i.e. rodents, cats and dogs accidentally and intentionally e.g. via creating habitat for such species (e.g. rats, Indian Myna) as well as pets.	The proposed development will increase the intensification of human occupation and activity. However, the site is currently used for industrial and residential purposes and has been subject to a history of extensive modification, resulting in degraded habitat value and low biodiversity values. The site is located directly adjacent to existing residential areas and amongst industrial areas and future planned residential areas. Therefore, the impacts are negligible.	Project coordinator/owner /occupants	During operation

7 Biodiversity credits

The current VI for VZ PCT 3431_DNG falls below the assessment threshold for Endangered Ecological Communities (i.e. VI < 15) and no ecosystem credits are required to offset the residual impact of development.

Table 15 Change in VI Score

PCT_VZ	Area (ha)	Before development			After development		Change in VI Score
		Composition	Structure	Function	VI Score	VI Score	
3431_DNG	4.66	9.3	0.8	32.7	6.7	0	-6.7

The biodiversity credits offset obligation for the future development impacts were calculated by the BAMC (Revision 5) on 2 April 2025 using BAM Data version 80 based on inputs set out in this report.

The proposed development will not impact potential habitat of any candidate species; therefore, no species credits were generated. The BAM Credit Summary Report is provided in Appendix 10.

8 Conclusion

This BDAR assessed the impact of a proposed residential subdivision on Lot 1 DP995228 Hunter Street, Muswellbrook and calculated offset requirements for residual impacts following avoid and mitigation efforts.

The site has been subject to a history of extensive modification, resulting in degraded habitat value and low biodiversity values. One vegetation community was identified on the site, consistent with PCT *3431 – Central Hunter Ironbark Grassy Woodland.* This vegetation aligns with the listed *Biodiversity Conservation Act 2016* (NSW) (BC Act) *Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions* TEC. This vegetation is in a very low condition and the VI < 15, therefore below the assessment threshold TECs. Consequently, no ecosystem credits are required to offset the residual impact of development.

Targeted surveys were undertaken for candidate flora and fauna species and no threatened species were recorded other than two candidate microbat species detected by ultrasonic recording, namely; Large-eared Pied Bat and Eastern cave bat. No rocky caves or overhangs were recorded on the site and it is unlikely that these species utilise the site apart from marginal foraging. Suitable breeding or roosting habitat was not identified on the site, therefore these species were excluded from further assessment.

The biodiversity credits offset obligation for the future development impacts were calculated by the BAMC (Revision 1) on 2 April 2025 using BAM Data version 80 based on inputs set out in this report. No ecosystem credits or species credits were generated for the proposed development.

The proposal is unlikely to result in direct impacts on SAIIs which are likely to contribute significantly to the risk of extinction of any threatened species or ecological community.

Direct impacts of the proposed development will be minimal and the total area of native vegetation that will be impacted by the proposed development is 4.66 ha of low condition grassland (PCT 3431). The proposed development will not require removal of any trees or hollow bearing trees. Mitigation measures will be implemented to reduce potential offsite impacts during the construction phase. Indirect impacts that may be associated with the proposed development are considered to be minor and can be mitigated through the measures described in this report.

9 Figures

Figure 1 Site Map

Coordinate System: GDA 1994 MGA Zone 56
Scale: 2,806@ A3
Job Number: J10169
Date: 23/04/2025

N

0 100 200m

ASCENTECOLOGY

Figure 2 Location Map

Coordinate System: GDA 1994 MGA Zone 56
Scale: 14,976@ A3
Job Number: J10169
Date: 23/04/2025

N

0 600 1200m

ASCENTECOLOGY

Legend

Proposed New Lot Boundaries

Lot Boundary

Road

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Figure 3 Proposed Development Layout

Job Number: J10169	Coordinate System: GDA 1994 MGA Zone 56
Date: 9/05/2025	Scale: 2,872@ A3

N

0 250 Meters

ASCENTECOLOGY

Figure 4 Native Vegetation Extent

Coordinate System: GDA 1994 MGA Zone 56

Scale: 14,884@ A3

Job Number: J10169

Date: 23/04/2025

N

0 600 1200m

ASCENTECOLOGY

Figure 5 Field Survey Locations

Coordinate System: GDA 1994 MGA Zone 56

Scale: 2,421@ A3

Job Number: J10169

Date: 23/04/2025

N

0 100 200m

ASCENTECOLOGY

Figure 6 PCTs, TECs and excluded impacts

Coordinate System: GDA 1994 MGA Zone 56
Scale: 2,421@ A3
Job Number: J10169
Date: 24/04/2025

N

0 100 200m

ASCENTECOLOGY

Legend

Habitat Features

- Frog habitat
- Hollow bearing tree
- Logs on ground
- Old building
- Shed
- Stag
- Nest box
- Site Boundary

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Figure 6 Threatened Species Surveys

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	2,806@ A3
Job Number:	J10169
Date:	24/04/2025

N

0 100 200m

ASCENTECOLOGY

10 Site Photos

Plate 1 Residential dwellings and sheds mapped as PCT 0

Plate 2 Planted exotic vegetation surrounding existing dwellings mapped as PCT 0

11 References

ArcGIS Map Service (ESRI ArcGIS Pro 3.5 2025)
https://services.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer

Commonwealth DCCEEW (2024a) Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions). Commonwealth of Australia and Department of Climate Change, Energy, the Environment and Water, Canberra. 2024. Available at: https://www.seed.nsw.gov.au/.

Commonwealth DCCEEW (2024b) Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions). Commonwealth of Australia and Department of Climate Change, Energy, the Environment and Water, Canberra. 2024. Available at: https://www.seed.nsw.gov.au/.

Department of Agriculture, Water and the Environment (2022). Conservation Advice for Callocephalon fimbriatum (Gang-gang Cockatoo). Canberra: Department of Agriculture, Water and the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/768-conservation-advice-02032022.pdf. In effect under the EPBC Act from 02-Mar-2022.

DCS (2024) Six Maps. Department of Customer Services Spatial Services, Bathurst. Available at: https://maps.six.nsw.gov.au/. Accessed: May 2025.

DCCEEW (2016) NSW (Mitchell) Landscapes, Version 3.1. State Government of NSW and Department of Planning and Environment 2016. Available at: https://www.seed.nsw.gov.au/.

DCCEEW (2024) Australian Soil Classification (ASC) Soil Type map of NSW, Version 4.5, NSW Department of Climate Change, Energy, the Environment and Water.

DCCEEW (2025a) BioNet Atlas - Threatened biodiversity profiles. NSW Department of Climate Change, Energy, the Environment and Water. Available at: http://www.bionet.nsw.gov.au/. Accessed: 2 December 2024.

DCCEEW (2025b) BioNet Vegetation Classification. NSW Department of Climate Change, Energy, the Environment and Water. Available at: https://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx. Accessed: November 2024.

DCCEEW (2025c) NSW State Vegetation Type Map. NSW Department of Climate Change, Energy, the Environment and Water. Available at: https://www.seed.nsw.gov.au/. Accessed: November 2024.

DCCEEW (2025d) Species Profile and Threats Database. Commonwealth of Australia Department of Climate Change, Energy, the Environment and Water, Canberra. 2024. Available at: https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

DPE (2023) Biodiversity Assessment Method 2020 Operational Manual – Stage 2. State of NSW and Department of Planning and Environment, Sydney, April 2023.

Department of the Environment (2015). *Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community*. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/130-conservation-advice.pdf. In effect under the EPBC Act from 07-May-2015.

DPIE (2025) eSPADE spatial viewer. Available from https://www.environment.nsw.gov.au/espade2webapp/Login

Fisher, D. O.; C.O. Dickman (September 1993). "Body Size-Prey Relationships in Insectivorous Marsupials: Tests of Three Hypotheses" (PDF). Ecology. 74 (6). Ecology, Vol. 74, No. 6: 1871–1883. doi:10.2307/1939944. JSTOR 1939944.

Glenn Hoye, Julie Spence, 2004. "The Large Bent-wing Bat *Miniopterus schreibersii* in Urban Environments: a survivor?", Urban Wildlife: More than meets the eye, Daniel Lunney, Shelley Burgin

Mansfield, C., Arnold, A. H., Bell, T. L., & York, A. (2017). Habitat characteristics of a threatened arboreal marsupial and its resource use in a degraded landscape: the brush-tailed phascogale (Phascogale tapoatafa tapoatafa) in central Victoria, Australia. *Wildlife Research*, *44*(2), 153-164.

O'Donnell, W. B., & Debus, S. J. (2012). Nest-sites and foraging of the White-bellied Sea-Eagle'Haliaeetus leucogaster'on the subtropical eastern coast of Australia. *Australian Field Ornithology*, *29*(3), 149-159.

OEH (2018a) BAM Operational Manual – Stage 1. State of NSW and Office of Environment and Heritage, Sydney, May 2018.

Pyke, G., & White, A. (1996). Habitat requirements for the green and golden bell frog Litoria aurea (Anura: Hylidae). *Australian Zoologist*, *30*(2), 224-232.

RBGSYD (2025) PlantNET (The NSW Plant Information Network System). Royal Botanic Gardens and Domain Trust, Sydney. Available at: https://plantnet.rbgsyd.nsw.gov.au.

Russell A. Mittermeier & Don E. Wilson, 2015, Dasyuridae, Handbook of the Mammals of the World – Volume 5 Monotremes and Marsupials, Barcelona: Lynx Edicions, pp. 232-348: 328-329

Shine, R., Phillips, B., & Harlow, P. (2006). *Ecology of the striped legless lizard, Delma impar*.

Summerhayes G., 1983, Muswellbrook 1:25 000 Geological Map, 9033-II-N, Geological Survey of New South Wales, Sydney.

Turner, V., and Ward, S. J. (1995). Eastern pygmy-possum Cercartetus nanus. In 'The Mammals of Australia'. (Ed. R. Strahan.) pp. 217–218. (Reed New Holland: Sydney.)

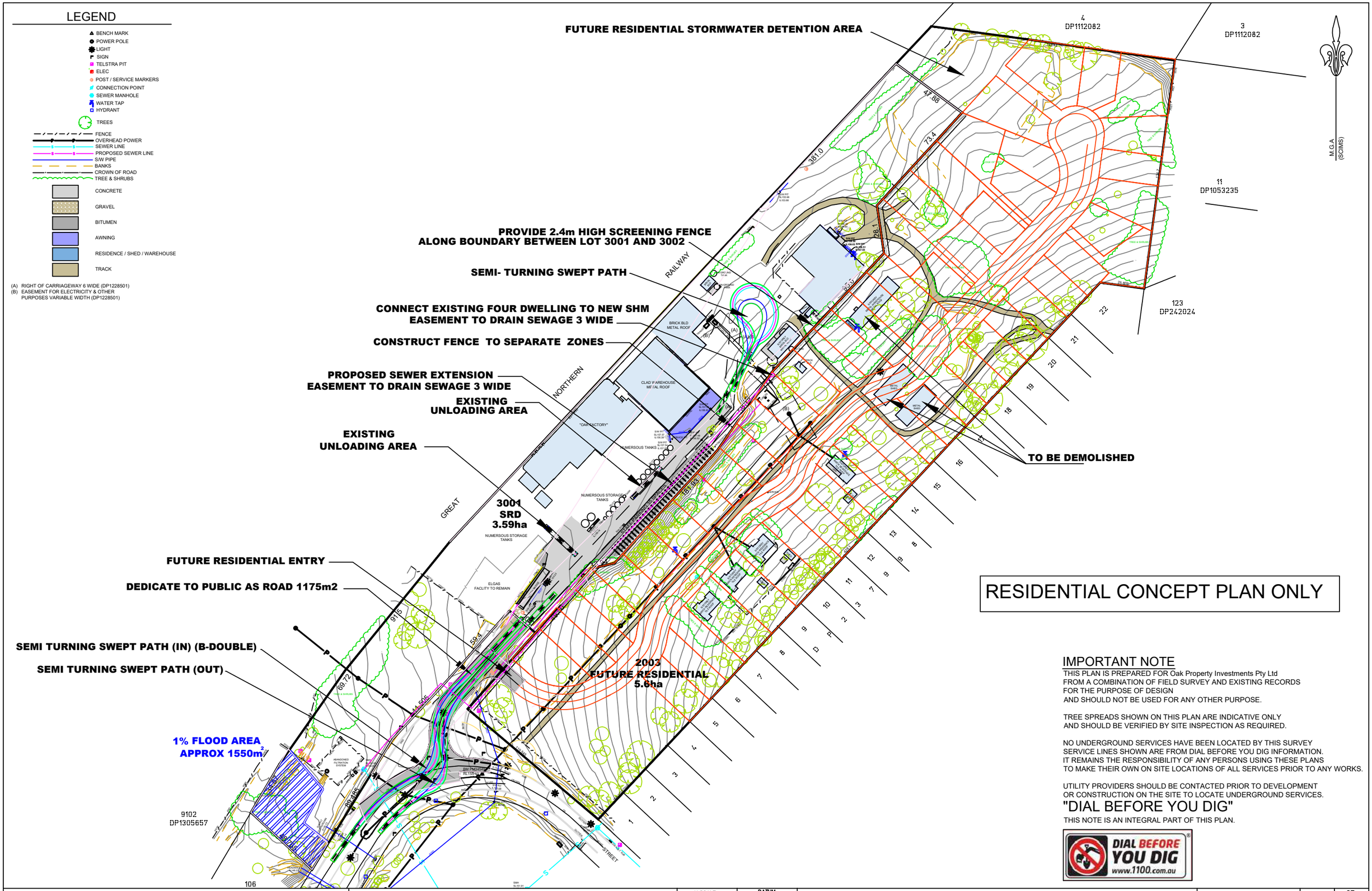
van der Ree, R., Soderquist, T. R., & Bennett, A. F. (2001). Home-range use by the brush-tailed phascogale (*Phascogale tapoatafa*) (Marsupialia) in high-quality, spatially limited habitat. Wildlife Research, 28(5), 517-525.

Appendix 1 – Proposed lot layout

LEGEND

- BENCH MARK
- POWER POLE
- LIGHT
- SIGN
- TELSTRA PIT
- ELEC
- POST / SERVICE MARKERS
- CONNECTION POINT
- SEWER MANHOLE
- WATER TAP
- HYDRANT
- TREES
- FENCE
- OVERHEAD POWER
- SEWER LINE
- PROPOSED SEWER LINE
- S/W PIPE
- BANKS
- CROWN OF ROAD
- TREE & SHRUBS
- CONCRETE
- GRAVEL
- BITUMEN
- AWNING
- RESIDENCE / SHED / WAREHOUSE
- TRACK

(A) RIGHT OF CARRIAGEWAY 6 WIDE (DP1228501)
(B) EASEMENT FOR ELECTRICITY & OTHER PURPOSES VARIABLE WIDTH (DP1228501)



RESIDENTIAL CONCEPT PLAN ONLY

IMPORTANT NOTE

THIS PLAN IS PREPARED FOR Oak Property Investments Pty Ltd
FROM A COMBINATION OF FIELD SURVEY AND EXISTING RECORDS
FOR THE PURPOSE OF DESIGN
AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

TREE SPREADS SHOWN ON THIS PLAN ARE INDICATIVE ONLY
AND SHOULD BE VERIFIED BY SITE INSPECTION AS REQUIRED.

NO UNDERGROUND SERVICES HAVE BEEN LOCATED BY THIS SURVEY
SERVICE LINES SHOWN ARE FROM DIAL BEFORE YOU DIG INFORMATION.
IT REMAINS THE RESPONSIBILITY OF ANY PERSONS USING THESE PLANS
TO MAKE THEIR OWN ON SITE LOCATIONS OF ALL SERVICES PRIOR TO ANY WORKS.

UTILITY PROVIDERS SHOULD BE CONTACTED PRIOR TO DEVELOPMENT
OR CONSTRUCTION ON THE SITE TO LOCATE UNDERGROUND SERVICES.

"DIAL BEFORE YOU DIG"

THIS NOTE IS AN INTEGRAL PART OF THIS PLAN.

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Surveying the Hunter since 1920
Ph: 02 65432475 Email: office@hbsurveys.com.au
PO Box 432, SCONE NSW 2337

PROPOSED SUBDIVISION LOT 1 in DP995228
PROPOSED SHOWING FUTURE RESIDENTIAL CONCEPT LAYOUT
HUNTER STREET, MUSWELLBROOK

H.SCALE 1:1000 (A3)	DATUM AHD: PM34549
VERT. SCALE	CONTOUR INTERVAL 0.5m
DATE 16.04.2025	FILE 224133CONCEPT.dwg
MICHAEL COLE Registered Land Surveyor	

CLIENT: Oak Property Investments Pty Ltd

LGA: MUSWELLBROOK	SHEET 1	OF SHEETS 1
PARISH: ROWAN	JOB REF: 224133	
COUNTY: DURHAM		

LEGEND

- BENCH MARK
- POWER POLE
- LIGHT
- SIGN
- TELSTRA PIT
- ELEC
- POST / SERVICE MARKERS
- CONNECTION POINT
- SEWER MANHOLE
- WATER TAP
- HYDRANT
- TREES
- FENCE
- OVERHEAD POWER
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- AWNING
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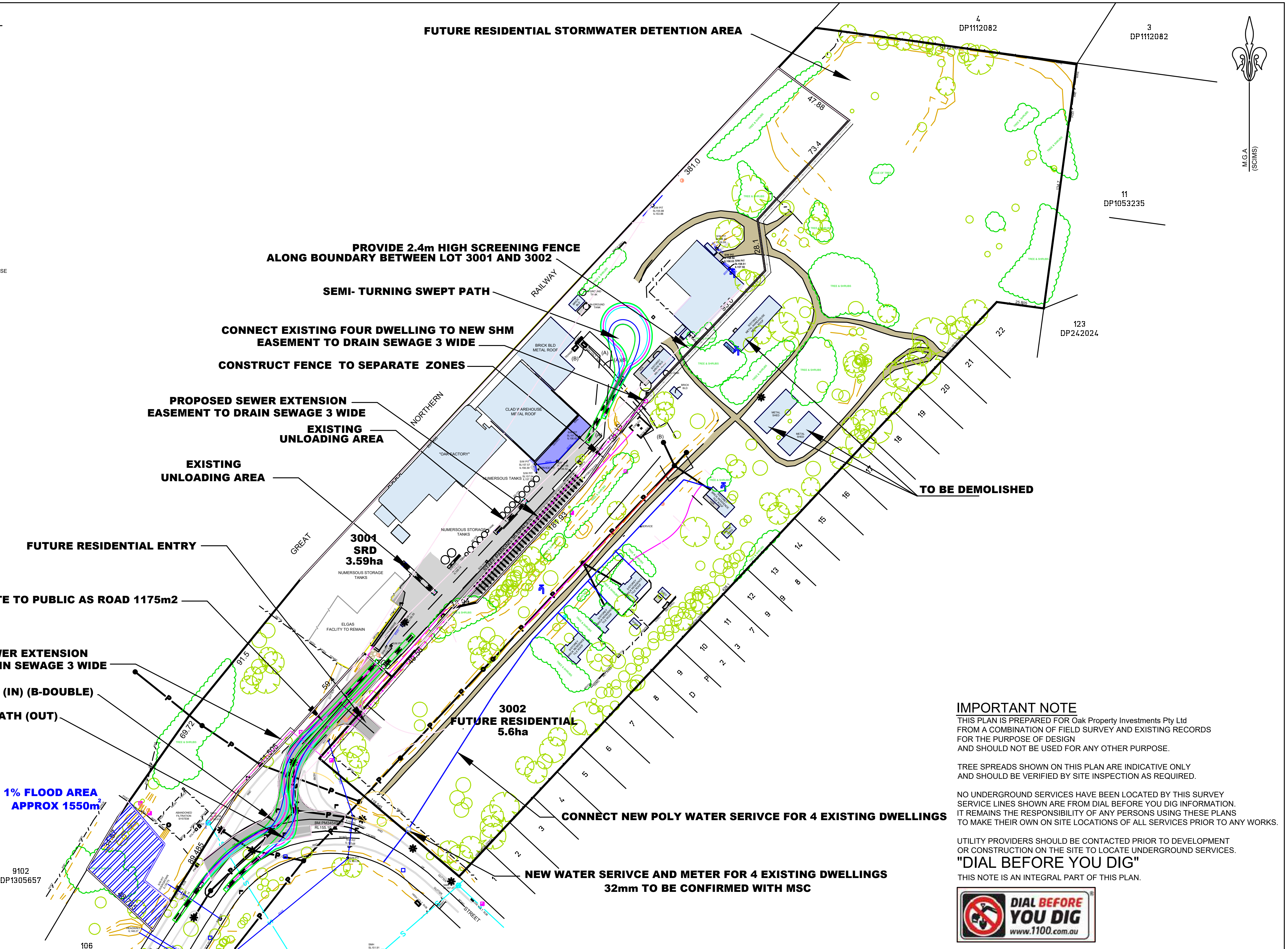
- TRACK

(A) RIGHT OF CARRIAGEWAY 6 WIDE (DP1228501)
(B) EASEMENT FOR ELECTRICITY & OTHER PURPOSES VARIABLE WIDTH (DP1228501)



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PO Box 432, SCONE NSW 2337

PROPOSED SUBDIVISION OF
LOT 1 in DP995228
"OAK FACTORY"
HUNTER STREET, MUSWELLBROOK

H.SCALE 1:1000 (A3)	DATUM AHD: PM34549
VERT. SCALE	CONTOUR INTERVAL 0.5m
DATE 16.04.2025	FILE 224133_DA.dwg
MICHAEL COLE Registered Land Surveyor	

CLIENT: Oak Property Investments Pty Ltd

LGA: MUSWELLBROOK	SHEET 1	OF SHEETS 1
PARISH: ROWAN	JOB REF:	
COUNTY: DURHAM	224133	

Appendix 2 – Determination of excluded impacts

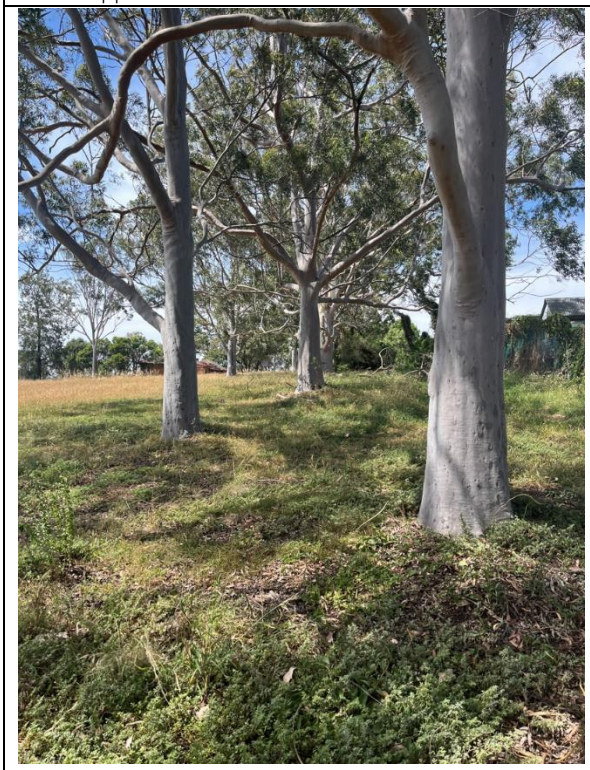
The Subject Site area (1.26ha) that are classified as Planted Native Vegetation; as per the BAM, require no assessment for the percentage native vegetation cover when using the planted assessment method, therefore no Vegetation Integrity Score was required to be determined.

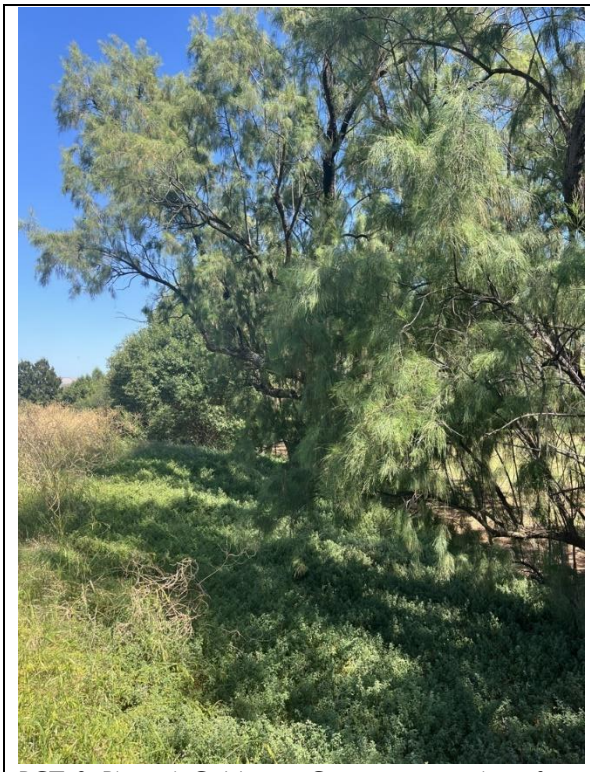
The assessment process followed in described below. Three planted vegetation zones were identified on site (Figure 6):

- PCT 0_Planted_Native_A: Windrow of Casuarina and Acacia species with scattered *Corymbia citriodora* in the centre of the site.
- PCT 0_Planted_Native_B: Rows of mature eucalypt species (primarily *Eucalyptus cladocalyx* and *Corymbia citriodora* (lemon-scented gum), other planted species within this zone include exotic palms and *Casuarina glauca*.
- PCT 0_Planted_Native_C: Row of *Casuarina Sp.* Planted along the fence line in the north of the site.

Assessment criteria	
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	PCT 0_Planted_Native_A: No PCT 0_Planted_Native_B: No PCT 0_Planted_Native_C: No The vegetation within the planted areas is not a native species in NSW. Canopy species include *Eucalyptus cladocalyx (*Sugar Gum) which is found in South Australia (however grown widely in plantations) and *Corymbia citriodora* (lemon-scented gum) which is endemic to north-eastern Australia. It was also evident that the plants had been planted in stands (trees were of similar size and were planted in rows) to provide shade within a paddock and in association within the curtilage of houses on site.
2. Is the planted native vegetation: a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	PCT 0_Planted_Native_A: No PCT 0_Planted_Native_B: No PCT 0_Planted_Native_C: No

Assessment criteria	
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: a. a species recovery project b. *Saving our Species* project c. other types of government funded restoration project d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or g. approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW *Water Management Act 2000*)?	PCT 0_Planted_Native_A: No PCT 0_Planted_Native_B: No PCT 0_Planted_Native_C: No
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	PCT 0_Planted_Native_A: No PCT 0_Planted_Native_B: No PCT 0_Planted_Native_C: No
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms?	0_Planted_Native_A: Yes-D2 applies 0_Planted_Native_B: Yes-D2 applies 0_Planted_Native_C: Yes-D2 applies
D.2 Assessment of planted native vegetation for threatened species habitat: • A field survey was undertaken to assess planted native vegetation for use by threatened species, this included recording the presence of hollows, nests as well as recording incidental sightings or evidence (e.g. scats, scratches). • Threatened flora surveys were conducted throughout planted vegetation zones using the parallel field traverse survey technique as described the relevant guidelines (DPIE 2020).	

Site Photos-Planted Vegetation Zone	
 Northern section of PCT 0_Planted_A dominated by Acacia spp.	 PCT 0_Planted_Native_B Planted eucalypts and Casuarina spp. along western fence line, looking south
 PCT 0_Planted_Native_B- Planted mature eucalypts along western fence line, looking north.	 Southern section of PCT 0_Planted_A dominated by Acacia spp. (looking south).

 PCT 0_Planted_C: Mature Casuarina spp. along fence line. Looking north-west.	 PCT 0_Planted_C: Mature Casuarina spp. along fence line. Looking north.

Appendix 3 – Biodiversity Values Map and Threshold tool report

Department of Planning and Environment

Biodiversity Values Map and Threshold Report

This report is generated using the Biodiversity Values Map and Threshold (BMAT) tool. The BMAT tool is used by proponents to supply evidence to your local council to determine whether or not a Biodiversity Development Assessment Report (BDAR) is required under the Biodiversity Conservation Regulation 2017 (Cl. 7.2 & 7.3).

The report provides results for the proposed development footprint area identified by the user and displayed within the blue boundary on the map.

There are two pathways for determining whether a BDAR is required for the proposed development:

1. Is there Biodiversity Values Mapping?
2. Is the 'clearing of native vegetation area threshold' exceeded?

Biodiversity Values Map and Threshold Report

Date of Report Generation		01/04/2025 11:23 AM
1. Biodiversity Values (BV) Map - Results Summary (Biodiversity Conservation Regulation Section 7.3)		
1.1	**Does the development Footprint intersect with BV mapping?**	no
1.2	Was ALL BV Mapping within the development footprinted added in the last 90 days? (dark purple mapping only, no light purple mapping present)	no
1.3	**Date of expiry of dark purple 90 day mapping**	N/A
1.4	**Is the Biodiversity Values Map threshold exceeded?**	no
2. Area Clearing Threshold - Results Summary (Biodiversity Conservation Regulation Section 7.2)		
2.1	**Size of the development or clearing footprint**	95,881.2 sqm
2.2	**Native Vegetation Area Clearing Estimate (NVACE)** (within development/clearing footprint)	45,319.6 sqm
2.3	**Method for determining Minimum Lot Size**	LEP
2.4	**Minimum Lot Size** (10,000sqm = 1ha)	600 sqm
2.5	**Area Clearing Threshold** (10,000sqm = 1ha)	2,500 sqm
2.6	**Does the estimate exceed the Area Clearing Threshold?** (NVACE results are an estimate and can be reviewed using the Guidance)	yes
REPORT RESULT: Is the Biodiversity Offset Scheme (BOS) Threshold exceeded for the proposed development footprint area? (Your local council will determine if a BDAR is required)		**yes**

What do I do with this report?

• If the result above indicates the BOS Threshold has been exceeded, your local council may require a Biodiversity Development Assessment Report with your development application. Seek further advice from Council. An accredited assessor can apply the Biodiversity Assessment Method and prepare a BDAR for you. For a list of accredited assessors go to: https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor.

• If the result above indicates the BOS Threshold has not been exceeded, you may not require a Biodiversity Development Assessment Report. This BMAT report can be provided to Council to support your development application. Council can advise how the area clearing threshold results should be considered. Council will review these results and make a determination if a BDAR is required. Council may ask you to review the area clearing threshold results. You may also be required to assess whether the development is '"likely to significantly affect threatened species" as determined under the test in Section 7.3 of the *Biodiversity Conservation Act 2016*.

• If a BDAR is not required by Council, you may still require a permit to clear vegetation from your local council.

• If all Biodiversity Values mapping within your development footprint was less than 90 days old, i.e. areas are displayed as dark purple on the BV map, a BDAR may not be required if your Development Application is submitted within that 90 day period. Any BV mapping less than 90 days old on this report will expire on the date provided in Line item 1.3 above.

For more detailed advice about actions required, refer to the Interpreting the evaluation report section of the Biodiversity Values Map Threshold Tool User Guide .

Review Options:

• If you believe the Biodiversity Values mapping is incorrect please refer to our BV Map Review webpage for further information.

• If you or Council disagree with the area clearing threshold estimate results from the NVACE in Line Item 2.6 above (i.e. area of Native Vegetation within the Development footprint proposed to be cleared), review the results using the Guide for reviewing area clearing threshold results from the BMAT Tool.

Acknowledgement

I, as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature: _____ Date:_____

(Typing your name in the signature field will be considered as your signature for the purposes of this form)

01/04/2025 11:23 AM

Biodiversity Values Map and Threshold Tool

The Biodiversity Values (BV) Map and Threshold Tool identifies land with high biodiversity value, particularly sensitive to impacts from development and clearing.

The BV map forms part of the Biodiversity Offsets Scheme threshold, which is one of the factors for determining whether the Scheme applies to a clearing or development proposal. You have used the Threshold Tool in the map viewer to generate this BV Threshold Report for your nominated area. This report calculates results for your proposed development footprint and indicates whether Council may require you to engage an accredited assessor to prepare a Biodiversity Development Assessment Report (BDAR) for your development.

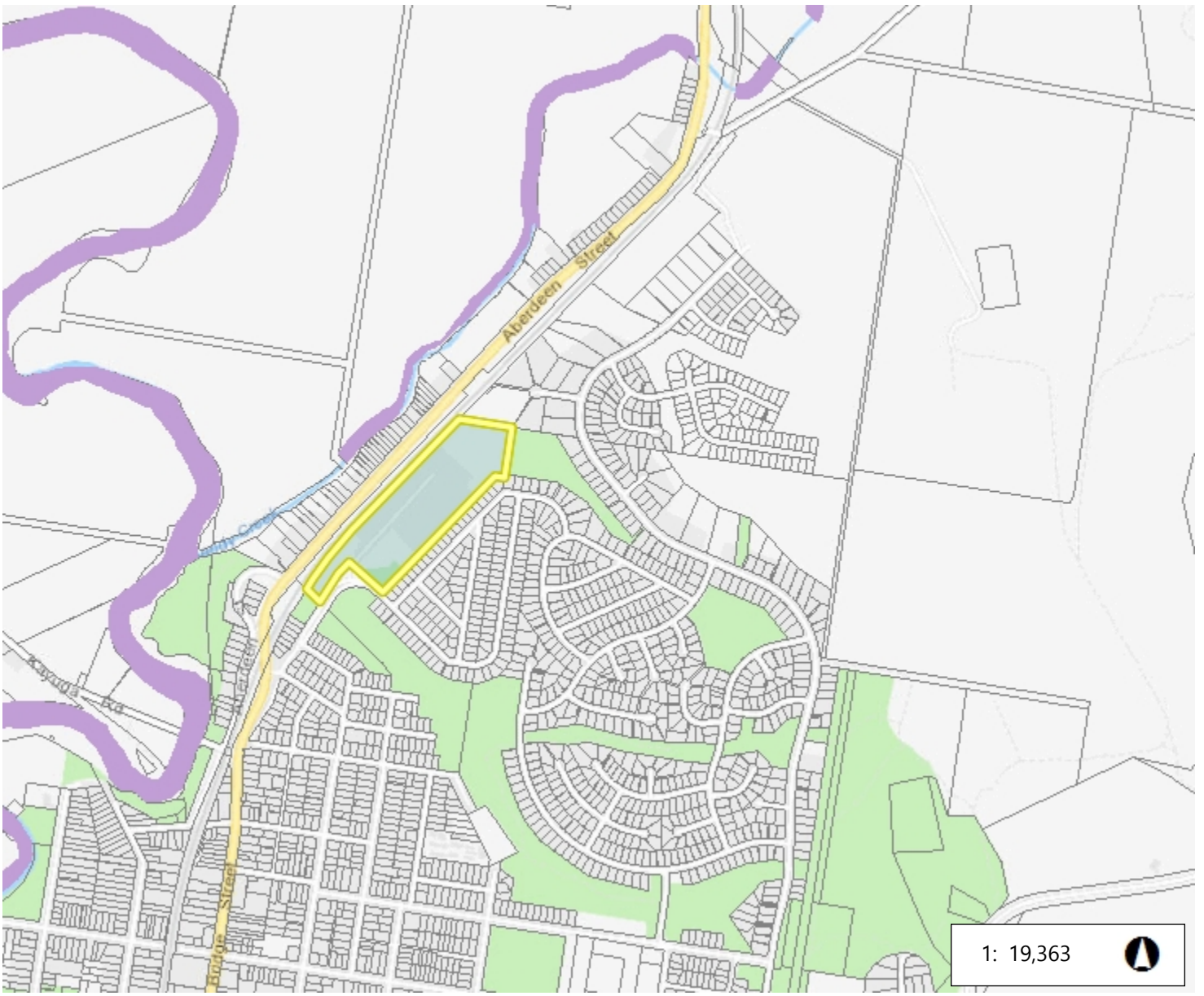
This report may be used as evidence for development applications submitted to councils. You may also use this report when considering native vegetation clearing under the State Environmental Planning Policy (Biodiversity and Conservation) 2021 - Chapter 2 vegetation in non-rural areas.

What's new? For more information about the latest updates to the Biodiversity Values Map and Threshold Tool go to the updates section on the Biodiversity Values Map webpage.

Map Review: Landholders can request a review of the BV Map where they consider there is an error in the mapping on their property. For more information about the map review process and an application form for a review go to the Biodiversity Values Map Review webpage.

If you need help using this map tool see our Biodiversity Values Map and Threshold Tool User Guide or contact the Map Review Team at map.review@environment.nsw.gov.au or on 1800 001 490.

Biodiversity Values Map



983.7 0 491.83 983.7 Metres

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days
- Native Vegetation Area Clearing Estimate (NVACE)
- Development area selected by proponent

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The results provided in this tool are generated using the best available mapping and knowledge of species habitat requirements.

This map is valid as at the date the report was generated. Checking the Biodiversity Values Map viewer for mapping updates is recommended.

Appendix 4 – Floristic plot data

Plot	PCT	Condition	Species scientific name	Species common name	Cover	Abundance	Exotic	Growth Form Group	High threat weed	Threatened species
TK01	3431	DNG	Galenia pubescens	Galenia	20	100	Y		HTW	No
TK01	3431	DNG	Nothoscordum borbonicum	Onion Weed	0.1	10	Y		N	No
TK01	3431	DNG	Cirsium vulgare	Spear Thistle	1	60	Y		N	No
TK01	3431	DNG	Conyza bonariensis	Flaxleaf Fleabane	0.1	10	Y		N	No
TK01	3431	DNG	Lactuca serriola	Prickly Lettuce	0.2	20	Y		N	No
TK01	3431	DNG	Sonchus oleraceus	Common Sowthistle	1	30	Y		N	No
TK01	3431	DNG	Raphanus raphanistrum	Wild Radish	0.1	6	Y		N	No
TK01	3431	DNG	Rapistrum rugosum	Turnip Weed	0.1	10	Y		N	No
TK01	3431	DNG	Opuntia stricta	Common Prickly Pear	0.2	10	Y		MHTW	No
TK01	3431	DNG	Malva parviflora	Small-flowered Mallow	0.1	5	Y		N	No
TK01	3431	DNG	Plantago lanceolata	Lamb's Tongues	0.5	30	Y		N	No
TK01	3431	DNG	Bromus catharticus	Praire Grass	20	2000	Y		N	No
TK01	3431	DNG	Chloris gayana	Rhodes Grass	5	60	Y		HTW	No
TK01	3431	DNG	Cynodon dactylon	Common Couch	5	1000	N	GG	N	No
TK01	3431	DNG	Megathyrsus maximum var. pubiglumis	green panic	5	100	Y		N	No
TK01	3431	DNG	Galium aparine	Goosegrass	3	100	Y		N	No
TK01	3431	DNG	Lycium ferocissimum	African Boxthorn	3	5	Y		MHTW	No
TK01	3431	DNG	Solanum americanum	Glossy Nightshade	0.1	5	Y		N	No
TK02	3431	DNG	Galenia pubescens	Galenia	1	50	Y		HTW	No
TK02	3431	DNG	Nothoscordum borbonicum	Onion Weed	0.1	10	Y		N	No
TK02	3431	DNG	Bidens pilosa	Cobbler's Pegs	0.1	1	Y		HTW	No
TK02	3431	DNG	Calotis lappulacea	Yellow Burr-daisy	0.1	8	N	FG	N	No
TK02	3431	DNG	Conyza bonariensis	Flaxleaf Fleabane	0.1	5	Y		N	No
TK02	3431	DNG	Euchiton sphaericus	Star Cudweed	0.1	10	N	FG	N	No
TK02	3431	DNG	Gamochaeta coarctata		0.1	5	Y		N	No
TK02	3431	DNG	Hypochaeris radicata	Catsear	0.2	30	Y		N	No
TK02	3431	DNG	Leontodon rhagadioloides	Cretan Weed	0.5	50	Y		N	No
TK02	3431	DNG	Pseudognaphalium luteoalbum	Jersey Cudweed	0.1	2	N	FG	N	No
TK02	3431	DNG	Senecio madagascariensis	Fireweed	0.5	100	Y		HTW	No
TK02	3431	DNG	Sonchus oleraceus	Common Sowthistle	0.1	10	Y		N	No
TK02	3431	DNG	Taraxacum officinale	Dandelion	0.1	1	Y		N	No
TK02	3431	DNG	Wahlenbergia gracilis	Sprawling Bluebell	0.1	20	N	FG	N	No
TK02	3431	DNG	Cyperus spp.		0.5	1	Y		N	No
TK02	3431	DNG	Glycine tabacina	Variable Glycine	0.1	2	N	OG	N	No
TK02	3431	DNG	Medicago polymorpha	Burr Medic	1	500	Y		N	No
TK02	3431	DNG	Acacia salicina	Cooba	1	1	N	TG	N	No

TK02	3431	DNG	Malva parviflora	Small-flowered Mallow	0.1	5	Y		N	No
TK02	3431	DNG	Modiola caroliniana	Red-flowered Mallow	0.1	10	Y		N	No
TK02	3431	DNG	Plantago lanceolata	Lamb's Tongues	2	500	Y		N	No
TK02	3431	DNG	Austrostipa scabra	Speargrass	0.1	20	N	GG	N	No
TK02	3431	DNG	Avena fatua	Wild Oats	0.2	20	Y		N	No
TK02	3431	DNG	Bromus catharticus	Praire Grass	5	2000	Y		N	No
TK02	3431	DNG	Bromus hordeaceus	Soft Brome	5	600	Y		N	No
TK02	3431	DNG	Chloris truncata	Windmill Grass	0.1	5	N	GG	N	No
TK02	3431	DNG	Cynodon dactylon	Common Couch	0.1	40	N	GG	N	No
TK02	3431	DNG	Dichanthium sericeum	Queensland Bluegrass	0.1	6	N	GG	N	No
TK02	3431	DNG	Ehrharta erecta	Panic Veldtgrass	0.5	100	Y		HTW	No
TK02	3431	DNG	Eriochloa pseudoacrotricha	Early Spring Grass	0.1	10	N	GG	N	No
TK02	3431	DNG	Hordeum leporinum	Barley Grass	5	500	Y		N	No
TK02	3431	DNG	Lolium perenne	Perennial Ryegrass	5	1000	Y		N	No
TK02	3431	DNG	Rytidosperma racemosum	Wallaby Grass	0.2	30	N	GG	N	No
TK02	3431	DNG	Rumex brownii	Swamp Dock	0.1	10	N	FG	N	No
TK02	3431	DNG	Lycium ferocissimum	African Boxthorn	0.1	1	Y		MHTW	No
TK02	3431	DNG	Solanum americanum	Glossy Nightshade	0.1	1	Y		N	No
TK02	3431	DNG	Verbena bonariensis	Purpletop	0.2	20	Y		N	No
TK03	3431	DNG	Galenia pubescens	Galenia	30	2000	Y		HTW	No
TK03	3431	DNG	Amaranthus spinosus	Needle Burr	0.1	4	Y		N	No
TK03	3431	DNG	Asphodelus fistulosus	Onion Weed	0.1	20	Y		N	No
TK03	3431	DNG	Bidens pilosa	Cobbler's Pegs	0.1	20	Y		HTW	No
TK03	3431	DNG	Bidens subalternans	Greater Beggar's Ticks	0.1	20	Y		HTW	No
TK03	3431	DNG	Cirsium vulgare	Spear Thistle	0.1	6	Y		N	No
TK03	3431	DNG	Conyza bonariensis	Flaxleaf Fleabane	0.1	20	Y		N	No
TK03	3431	DNG	Lactuca serriola	Prickly Lettuce	0.1	10	Y		N	No
TK03	3431	DNG	Pseudognaphalium luteoalbum	Jersey Cudweed	0.1	3	N	FG	N	No
TK03	3431	DNG	Sonchus oleraceus	Common Sowthistle	0.1	5	Y		N	No
TK03	3431	DNG	Raphanus raphanistrum	Wild Radish	0.1	10	Y		N	No
TK03	3431	DNG	Rapistrum rugosum	Turnip Weed	0.1	30	Y		N	No
TK03	3431	DNG	Opuntia stricta	Common Prickly Pear	0.1	3	Y		MHTW	No
TK03	3431	DNG	Einadia nutans subsp. linifolia	Climbing Saltbush	0.2	6	N	FG	N	No
TK03	3431	DNG	Medicago polymorpha	Burr Medic	0.1	7	Y		N	No
TK03	3431	DNG	Acacia salicina	Cooba	1	20	N	TG	N	No
TK03	3431	DNG	Malva parviflora	Small-flowered Mallow	0.1	3	Y		N	No
TK03	3431	DNG	Sida rhombifolia	Paddy's Lucerne	0.5	500	Y		N	No
TK03	3431	DNG	C	Lemon-scented Gum	0.5	0	Y		N	No

TK03	3431	DNG	Plantago lanceolata	Lamb's Tongues	0.1	10	Y		N	No
TK03	3431	DNG	Avena fatua	Wild Oats	0.1	10	Y		N	No
TK03	3431	DNG	Bromus catharticus	Praire Grass	5	1000	Y		N	No
TK03	3431	DNG	Chloris gayana	Rhodes Grass	5	60	Y		HTW	No
TK03	3431	DNG	Cynodon dactylon	Common Couch	4	2000	N	GG	N	No
TK03	3431	DNG	Megathyrsus maximus		0.1	3	Y		HTW	No
TK03	3431	DNG	Paspalum dilatatum	Paspalum	0.1	100	Y		HTW	No
TK03	3431	DNG	Galium aparine	Goosegrass	0.1	8	Y		N	No
TK03	3431	DNG	Lycium ferocissimum	African Boxthorn	2	20	Y		MHTW	No
TK04	3431	DNG	Galenia pubescens	Galenia	10	500	Y		HTW	No
TK04	3431	DNG	Pistacia chinensis	Chinese Pistachio	0.1	6	Y		MHTW	No
TK04	3431	DNG	Cyclospermum leptophyllum	Slender Celery	0.1	1	Y		N	No
TK04	3431	DNG	Bidens pilosa	Cobbler's Pegs	0.2	100	Y		HTW	No
TK04	3431	DNG	Cirsium vulgare	Spear Thistle	0.1	5	Y		N	No
TK04	3431	DNG	Lactuca serriola	Prickly Lettuce	0.1	10	Y		N	No
TK04	3431	DNG	Sonchus oleraceus	Common Sowthistle	0.1	20	Y		N	No
TK04	3431	DNG	Jacaranda mimosifolia	Jacaranda	0.1	1	Y		N	No
TK04	3431	DNG	Chenopodium album	Fat Hen	0.1	10	Y		N	No
TK04	3431	DNG	Einadia nutans subsp. linifolia	Climbing Saltbush	0.2	7	N	FG	N	No
TK04	3431	DNG	Cyperus gracilis	Slender Flat-sedge	0.1	3	N	GG	N	No
TK04	3431	DNG	Medicago polymorpha	Burr Medic	0.1	10	Y		N	No
TK04	3431	DNG	Acacia salicina	Cooba	5	8	N	TG	N	No
TK04	3431	DNG	Sida rhombifolia	Paddy's Lucerne	0.2	100	Y		N	No
TK04	3431	DNG	Corymbia citriodora	Lemon-scented Gum	0.1	1	Y		N	No
TK04	3431	DNG	Ligustrum lucidum	Large-leaved Privet	0.2	2	Y		HTW	No
TK04	3431	DNG	Olea europaea subsp. cuspidata	African Olive	30	20	Y		N	No
TK04	3431	DNG	Plantago lanceolata	Lamb's Tongues	0.1	2	Y		N	No
TK04	3431	DNG	Bromus catharticus	Praire Grass	1	200	Y		N	No
TK04	3431	DNG	Chloris gayana	Rhodes Grass	0.1	5	Y		HTW	No
TK04	3431	DNG	Cynodon dactylon	Common Couch	1	100	N	GG	N	No
TK04	3431	DNG	Ehrharta erecta	Panic Veldtgrass	25	1000	Y		HTW	No
TK04	3431	DNG	Lolium perenne	Perennial Ryegrass	0.1	20	Y		N	No
TK04	3431	DNG	Megathyrsus maximus		0.1	6	Y		HTW	No
TK04	3431	DNG	Paspalum dilatatum	Paspalum	0.2	20	Y		HTW	No
TK04	3431	DNG	Rumex brownii	Swamp Dock	0.1	6	N	FG	N	No
TK04	3431	DNG	Grevillea robusta	Silky Oak	0.5	1	N	TG	N	No
TK04	3431	DNG	Galium aparine	Goosegrass	0.2	4	Y		N	No
TK04	3431	DNG	Lycium ferocissimum	African Boxthorn	1	8	Y		MHTW	No

TK04	3431	DNG	Solanum americanum	Glossy Nightshade	0.1	8	Y		N	No
TK04	3431	DNG	Verbena bonariensis	Purpletop	0.1	1	Y		N	No
TK05	3431	DNG	Galenia pubescens	Galenia	15	1000	Y		HTW	No
TK05	3431	DNG	Cyclospermum leptophyllum	Slender Celery	0.1	50	Y		N	No
TK05	3431	DNG	Bidens pilosa	Cobbler's Pegs	0.1	50	Y		HTW	No
TK05	3431	DNG	Chrysocephalum apiculatum	Common Everlasting	0.1	20	N	FG	N	No
TK05	3431	DNG	Cirsium vulgare	Spear Thistle	0.1	3	Y		N	No
TK05	3431	DNG	Conyza bonariensis	Flaxleaf Fleabane	0.1	20	Y		N	No
TK05	3431	DNG	Lactuca serriola	Prickly Lettuce	0.1	5	Y		N	No
TK05	3431	DNG	Senecio madagascariensis	Fireweed	0.2	100	Y		HTW	No
TK05	3431	DNG	Silybum marianum	Variegated Thistle	0.2	60	Y		N	No
TK05	3431	DNG	Sonchus oleraceus	Common Sowthistle	0.3	200	Y		N	No
TK05	3431	DNG	Anredera cordifolia	Madeira Vine	0.5	4	Y		HTW	No
TK05	3431	DNG	Jacaranda mimosifolia	Jacaranda	1	1	Y		N	No
TK05	3431	DNG	Lepidium africanum	Common Peppercress	0.1	6	Y		N	No
TK05	3431	DNG	Polycarpon tetraphyllum	Four-leaved Allseed	0.1	1	Y		N	No
TK05	3431	DNG	Atriplex semibaccata	Creeping Saltbush	0.1	6	N	SG	N	No
TK05	3431	DNG	Einadia nutans subsp. linifolia	Climbing Saltbush	0.1	10	N	FG	N	No
TK05	3431	DNG	Dichondra repens	Kidney Weed	0.2	80	N	FG	N	No
TK05	3431	DNG	Polymeria calycina		0.1	10	N	OG	N	No
TK05	3431	DNG	Cyperus gracilis	Slender Flat-sedge	0.1	7	N	GG	N	No
TK05	3431	DNG	Glycine tabacina	Variable Glycine	0.1	20	N	OG	N	No
TK05	3431	DNG	Medicago polymorpha	Burr Medic	5	1000	Y		N	No
TK05	3431	DNG	Goodenia hederacea	Ivy Goodenia	0.1	20	N	FG	N	No
TK05	3431	DNG	Malva parviflora	Small-flowered Mallow	0.1	30	Y		N	No
TK05	3431	DNG	Corymbia citriodora	Lemon-scented Gum	5	2	Y		N	No
TK05	3431	DNG	Eucalyptus melliodora	Yellow Box	2	1	N	TG	N	No
TK05	3431	DNG	Plantago lanceolata	Lamb's Tongues	0.5	70	Y		N	No
TK05	3431	DNG	Austrostipa scabra	Speargrass	5	200	N	GG	N	No
TK05	3431	DNG	Austrostipa verticillata	Slender Bamboo Grass	0.1	7	N	GG	N	No
TK05	3431	DNG	Avena fatua	Wild Oats	0.1	8	Y		N	No
TK05	3431	DNG	Bothriochloa decipiens var. decipiens	Pitted Bluegrass	0.1	3	N	GG	N	No
TK05	3431	DNG	Bromus catharticus	Praire Grass	15	400	Y		N	No
TK05	3431	DNG	Bromus hordeaceus	Soft Brome	0.1	30	Y		N	No
TK05	3431	DNG	Dichanthium sericeum	Queensland Bluegrass	0.2	10	N	GG	N	No
TK05	3431	DNG	Ehrharta erecta	Panic Veldtgrass	0.5	50	Y		HTW	No
TK05	3431	DNG	Hordeum leporinum	Barley Grass	0.1	8	Y		N	No
TK05	3431	DNG	Lolium perenne	Perennial Ryegrass	0.3	300	Y		N	No

TK05	3431	DNG	Rytidosperma racemosum	Wallaby Grass	2	400	N	GG	N	No
TK05	3431	DNG	Grevillea robusta	Silky Oak	1	1	N	TG	N	No
TK05	3431	DNG	Lycium ferocissimum	African Boxthorn	0.2	3	Y		MHTW	No
TK05	3431	DNG	Solanum americanum	Glossy Nightshade	0.1	3	Y		N	No
TK06	3431	DNG	Galenia pubescens	Galenia	0.2	50	Y		HTW	No
TK06	3431	DNG	Cyclospermum leptophyllum	Slender Celery	0.1	20	Y		N	No
TK06	3431	DNG	Foeniculum vulgare	Fennel	0.1	3	Y		N	No
TK06	3431	DNG	Cirsium vulgare	Spear Thistle	1	40	Y		N	No
TK06	3431	DNG	Hypochaeris radicata	Catsear	0.3	30	Y		N	No
TK06	3431	DNG	Lactuca serriola	Prickly Lettuce	0.2	30	Y		N	No
TK06	3431	DNG	Senecio madagascariensis	Fireweed	0.2	100	Y		HTW	No
TK06	3431	DNG	Sonchus oleraceus	Common Sowthistle	0.1	20	Y		N	No
TK06	3431	DNG	Taraxacum officinale	Dandelion	0.1	10	Y		N	No
TK06	3431	DNG	Wahlenbergia gracilis	Sprawling Bluebell	0.2	70	N	FG	N	No
TK06	3431	DNG	Dichondra repens	Kidney Weed	0.2	200	N	FG	N	No
TK06	3431	DNG	Cyperus gracilis	Slender Flat-sedge	0.1	20	N	GG	N	No
TK06	3431	DNG	Medicago polymorpha	Burr Medic	15	2000	Y		N	No
TK06	3431	DNG	Melilotus indicus	Hexham Scent	1	200	Y		N	No
TK06	3431	DNG	Vicia sativa	Common vetch	0.3	30	Y		N	No
TK06	3431	DNG	Centaurium erythraea	Common Centaury	0.1	2	Y		N	No
TK06	3431	DNG	Corymbia citriodora	Lemon-scented Gum	0.1	5	Y		N	No
TK06	3431	DNG	Plantago lanceolata	Lamb's Tongues	5	500	Y		N	No
TK06	3431	DNG	Avena fatua	Wild Oats	0.5	60	Y		N	No
TK06	3431	DNG	Bromus catharticus	Praire Grass	10	1000	Y		N	No
TK06	3431	DNG	Chloris truncata	Windmill Grass	0.1	10	N	GG	N	No
TK06	3431	DNG	Cynodon dactylon	Common Couch	25	2000	N	GG	N	No
TK06	3431	DNG	Lolium perenne	Perennial Ryegrass	5	800	Y		N	No
TK06	3431	DNG	Paspalum dilatatum	Paspalum	0.2	30	Y		HTW	No
TK06	3431	DNG	Rytidosperma racemosum	Wallaby Grass	0.5	50	N	GG	N	No
TK06	3431	DNG	Galium aparine	Goosegrass	0.1	2	Y		N	No
TK06	3431	DNG	Verbena bonariensis	Purpletop	1	200	Y		N	No

Appendix 5 – Vegetation integrity survey plot data

plot	pct	area	patchsize	conditionclass	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLo	funTreeStem5t	funTreeStem1(	funTreeStem2(	funTreeStem3(	funTreeStem5(	funTreeRegen	funHighThreatExotic
Text[Maximum 10	Number	Number with	Number	Text[Letters, numbers,	[54 or 55 or 56]			Range in [0-359]	Number	Number	Number	Number	Number	Number	Number with 1 d	Number with 1 d	Number with 1	Number with 1 c	Number with 1	Number with 1 c	Number	Number	Number with 1	Number with 1	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	[0,1]	Number with 1 decimal p
TK01	3431	4.66	188	DNG	56	301839	6430038	103	0	0	1	0	0	0	0	0	5	0	0	0	0	0	2.8	0	0	0	0	0	0	0	28
TK02	3431	4.66	188	DNG	56	301559	6429691	105	1	0	6	5	0	1	1	0	0.7	0.5	0	0.1	0	0	9.6	0	0	1	0	1	0	1	2.2
TK03	3431	4.66	188	DNG	56	301913	6430045	177	1	0	1	2	0	0	1	0	4	0.3	0	0	1	0	36.2	0	1	1	1	0	1	1	37.4
TK04	3431	4.66	188	DNG	56	301804	6429949	158	2	0	2	2	0	0	5.5	0	1.1	0.3	0	0	0	0	30.4	0	1	1	0	1	0	1	36.9
TK05	3431	4.66	188	DNG	56	301590	6429649	27	2	1	6	4	0	2	3	0.1	7.5	0.5	0	0.2	5	0	31	1	0	0	0	0	1	1	16.5
TK06	3431	4.66	188	DNG	56	301490	6429716	201	0	0	4	2	0	0	0	0	25.7	0.4	0	0	0	0	49	0	0	0	0	0	0	0	0

Appendix 6 – PCT/ VZ descriptions and justification

PCT 3431 – Central Hunter Ironbark Grassy Woodland		
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)	
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests	
% cleared in NSW	86.47%	
BC Act TEC	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	
EPBC Act TEC	Central Hunter Valley eucalypt forest and woodland	
BioNet description summary	A tall sclerophyll open forest or woodland with a sparse cover of dry shrubs and a mid-dense grassy ground layer that occurs mainly on the undulating floor of the central Hunter valley with scattered areas on adjoining ranges.	
PCT description within the site		
Vegetation structure	Cleared grassland with scattered trees	
Landscape position	Flats or gentle rises on Permian sediments	
Fire history	Unknown, however, lack of fire indicators suggests a long fire interval.	
Upper stratum	Primarily cleared upper stratum consisting of scattered *Acacia salicina* and one *Eucalyptus melliodora.*	
Mid stratum	Sparse mid stratum contained only *Atriplex semibaccata.*	
Ground stratum	Ground layer was a dense mix of exotic and native species. Common native species in the ground stratum included *Austrostipa scabra, Cynodon dactylon, Dichondra repens, Einadia nutans subsp. Linifolia* and *Rytidosperma racemosum*	
Justification of PCT selection	Search Term	Selection
	IBRA Bioregion	Sydney Basin
	IBRA Sub-region	Hunter
	Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation), Grassy Woodlands
	Classification Confidence Level	Very High OR High OR Medium
	Plot to PCT Tool shortlist	
	Centroid Matches and Environmental thresholds.	The low number of floristic and low cover and abundance scores on site has likely impacted the Plot to PCT results. All PCT Matches were outside the distance threshold. PCT 4089, 3397 and 3538 had the closest centroid matches (With PCT 4089 also matching all environmental thresholds). • PCT 3538 was discarded as it occurs in the Lower Snowy River in southern NSW. • PCT 4089 was discarded as and found on alluvial floodplains and is classified as Forested Wetlands with a canopy of *Eucalyptus camaldulensis.* • PCT 3397 is a possible match and had the closest centroid match of 0.706 however was excluded based

PCT 3431 – Central Hunter Ironbark Grassy Woodland		
		on its landscape position and climate (occurs on basalt, colluvial and alluvial deposits and a variety of sedimentary substrates, in hot, dry environments).
	Characteristic species method	PCT 4088 was classed as a good match (>60) however was discarded as it occurs on South-west Slopes, with scattered occurrences on lower western margins of the Southern Tablelands. PCT 4089 and 4015 returned a "Plausible Match result". • PCT 4089 was discarded as it is found on alluvial floodplains and is classified as Forested Wetlands with a canopy of *Eucalyptus camaldulensis*. • PCT 4015 was considered a possible match due to the presence of *Acacia salicina*, however was discarded as it occurs on creek flats and described to be distinguishable from other PCTs due to its strong association with drainage channels.
	Selection	PCT 3431 was selected based on manual filtering (steps below).
	Bulk download PCT shortlist-manual filtering	
	Tree Growth Form	*Acacia salicina*
	Shrub Growth Form	*Atriplex semibaccata*
	Grass/Forb/Fern Growth Form	*Cynodon dactylon, Austrostipa scabra and Dichondra repens*
	Landscape position	Permian sediments
	Shortlist	Returned a short list of two PCTs: 3314 and 3431
	Selection	• PCT 3314 has a similar number of matching species (PCT 3144: U-1, M-1, G-18) however it was discarded as this PCT tends to be more coastal. • PCT 3431 was selected primarily based on PCT mapping, regrowth of *Acacia salicina* and ground cover species. Note, this PCT was a difficult to discern as a representative canopy species and shrub layers were largely absent. There are not any PCTs within the IBRA Region that are a particularly good fit. There is some overlap between species that were recorded in plot data and the species identified in the upper, mid and ground stratum: PCT 3144: U-2, M-1, G-19

Quantitative analysis

PCT 3431	Stratum (U, M, G)	Mean cover	Mean abundance	n
Acacia salicina	U	2.3	9.6	3
Eucalyptus melliodora	U	2	1	1
Grevillea robusta	U	0.8	1	2
Atriplex semibaccata	M	0.1	6	1
Austrostipa scabra	G	2.6	110	2
Austrostipa verticillata	G	0.1	7	1
Bothriochloa decipiens	G	0.1	3	1
Calotis lappulacea	G	0.1	8	1

PCT 3431 – Central Hunter Ironbark Grassy Woodland					
	Chloris truncata	G	0.1	7.5	2
	Chrysocephalum apiculatum	G	0.1	20	1
	Cynodon dactylon	G	7	1028	5
	Cyperus gracilis	G	0.1	10	3
	Dichanthium sericeum	G	0.2	8	2
	Dichondra repens	G	0.2	140	2
	Einadia nutans	G	0.2	6	1
	Einadia nutans subsp. linifolia	G	0.2	8.5	2
	Eriochloa pseudoacrotricha	G	0.1	10	1
	Euchiton sphaericus	G	0.1	10	1
	Glycine tabacina	G	0.1	11	2
	Goodenia hederacea	G	0.1	20	1
	Polymeria calycina	G	0.1	10	1
	Pseudognaphalium luteoalbum	G	0.1	2.5	2
	Rumex brownii	G	0.1	8	2
	Rytidosperma racemosum	G	0.9	160	3
	Wahlenbergia gracilis	G	0.2	45	2

Justification of TEC – BC Act	Although not a definitive list, due to the nature of the Scientific Committee determination, a precautionary approach was utilised and it was concluded that 4.66 ha of PCT 3431_DNG aligns with the Listed BC Act TEC: *Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions*. As assessment is provided in the steps below;	
	Diagnostic characteristics	Justification
	Generally, occurs on Permian sediments in the Hunter Valley and is characterised by the assemblage of species in paragraph 2 (below). The community typically forms an open forest to woodland. Characterised by the following assemblage of species: *Acacia pendula, Acacia bulgaensis, Ajuga australis, Allocasuarina luehmannii, Angophora floribunda, Aristida ramosa, Austrostipa scabra, Bothriochloa decipiens, Brachychiton populneus subsp. Populneus, Breynia oblongifolia, Brunoniella australis, Bursaria spinosa subsp. Spinosa, Calotis lappulacea, Callitris endlicheri, Cassinia quinquefaria, Cheilanthes sieberi subsp. Seiberi, Cheilanthes distans, Chloris ventricosa, Chrysocephalum apiculatum, Cymbopogon refractus, Cyperus gracilis, Desmodium varians, Dichondra repens, Dodonaea viscosa, Einadia nutans, Eragrostis leptostachya, Eremophila debilis, Eucalyptus crebra, Eucalyptus moluccana, Glycine tabacina, Lomandra multiflora subsp. Multiflora, Microlaena stipoides var. stipoides, Melichrus ureceolatus, Notelaea microcarpa var. microcarpa, Phyllanthus*	PCT 3431_DNG is located on Permian sediments and is highly disturbed. It is likely to have formed an open forest or woodland prior to clearing. The site contained the following matching species. *Austrostipa scabra, Bothriochloa decipiens var. decipiens, Calotis lappulacea, Cyperus gracilis, Dichondra repens, Einadia nutans subsp. Linifolia* and *Glycine tabacina.*

PCT 3431 – Central Hunter Ironbark Grassy Woodland			
	virgatus, Solanum cinereum, Sporobolis creber, Vittadinia cuneata		
	The total species list of the community is considerably larger than that given above, with many species present in only one or two sites or in low abundance. The species composition of a site will be influenced by the size of the site, recent rainfall, drought condition and by its disturbance (including fire and grazing) history.		Species composition of 3431_DNG is likely to be highly influenced by disturbance and weed incursion.
	Central Hunter Grey Box – Ironbark Woodland typically forms a woodland dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark), *Brachychiton populneus subsp. populneus* (Kurrajong) and Eucalyptus *moluccana* (Grey Box). Other tree species may be present and occasionally dominate or co-dominate and include *Angophora floribunda* (Rough-barked Apple) and *Callitris endlicheri* (Black Cypress Pine).		A canopy was largely absent from PCT 3431_DNG. Scattered *Brachychiton populneus* (Kurrajong) and *Eucalyptus moluccana* (Grey Box) were recorded on site (however were not recorded in BAM plots.
	A shrub layer may also be present and common shrub species include *Notelaea microcarpa* var. *microcarpa* (Native Olive), *Breynia* oblongifolia (Coffee Bush), Bursaria *spinosa* subsp. *spinosa* (Native Blackthorn), *Cassinia quinquefaria* (Cough Bush) and Dodonaea *viscosa* (Hop Bush).		One shrub species (*Atriplex semibaccata)* was recorded in 3431_DNG.
	Ground cover can be moderately dense to dense, and consist of numerous forbs and grass species, and a small number of ferns, sedges and twiners.		3431_DNG had a moderate to dense groundcover although this was heavily influence by external factors such as mowing and weed incursion.
	Central Hunter Grey Box – Ironbark Woodland has been recorded from the local government areas of Cessnock, Singleton and Muswellbrook but may occur elsewhere within the Sydney Basin Bioregion.		3431_DNG is within the Muswellbrook LGA.
Justification of TEC – EPBC Act	PCT 3431 is associated with *Central Hunter Valley eucalypt forest and woodland*, which is listed as Critically Endangered under the EPBC Act. Derived native grasslands and shrublands are not included in this nationally protected ecological community. The exceptions are where there is a gap, in or at the edge of a patch (DCCEEW 2015). On site PCT 3431 exists as a DNG surrounded by areas of PCT 0, planted vegetation and infrastructure. It is therefore concluded that 3431_DNG does not meet the criteria.		
VZ	Condition	Area (ha)	Plots
3431_DNG	DNG	4.66	TK01, TK02, TK03, TK04, TK05 and TK06

PCT 3431 – Central Hunter Ironbark Grassy Woodland	
3431_DNG	 The above photo was taken at plot TK01 within 3431_DNG
	 The above photo was taken at plot TK06 within 3431_DNG

PCT 3431 – Central Hunter Ironbark Grassy Woodland	
	 Scattered *Jacaranda mimosifolia* (Jacacanda) and *Grvilea robusta* (Silky Oak) near plot TK02 within 3431_DNG
	 Mature *Acacia salicina* (Cooba) within 2431_DNG

	This VZ was found to be in a DNG condition class and occurs throughout the site and has been The heavily modified through mowing, planting of exotic trees and garden ornamentals and minimal management of exotic species. Scattered mature and regenerating *Acacia salicina* (Cooba) are present along with thickets of exotic trees and shrubs including *Olea europaea subsp. cuspidata* (African olive) and Lycium ferocissimum (*African Boxthorn*) occur throughout the site, particularly along drainage channels, fine lines and around existing dwellings. Small clusters of regenerating *Corymbia citriodora* (Lemon-scented Gum) are scattered in the northern part of this VZ (likely seedlings from planted individuals). Infestations of forbs and grasses including *Galenia pubescens* (Galenia), *Ehrharta erecta* (Panic Velvetgrass) and *Bromus catharticus* (Praire Grass) are common in the ground stratum. This DNG demonstrates influences of PCT 4089 that would have likely occurred downslope historically (pre-development) as indicated by the presence of *Eucalyptus melliodora* and grassy ground layer however was assigned to PCT 3431 due to the high frequency of *Acacia salicina,* overlap of characteristic groundcover species and position in the landscape. The upper stratum is largely absent, with an almost absent shrub layer and mid-dense to dense ground stratum of sub-shrubs, grasses and forbs. No hollow bearing trees were recorded in BAM plots. No tree regeneration and no other tree stem size classes recorded.

Appendix 7 – BAM Predicted Species Report

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00053438/BAAS23019/24/00053439	Residential subdivision Lot 1 DP995228 Hunter Street Muswellbrook	28/10/2024
Assessor Name	**Report Created**	**BAM Data version ***
Christina Kindermann	12/06/2025	Current classification (live - default) (80)
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS23019	Part 4 Developments (General)	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
5	BOS Threshold: Area clearing threshold	12/06/2025

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

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

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	3431-Central Hunter Ironbark Grassy Woodland
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3431-Central Hunter Ironbark Grassy Woodland
Broad-billed Sandpiper	Limicola falcinellus	3431-Central Hunter Ironbark Grassy Woodland
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3431-Central Hunter Ironbark Grassy Woodland
Diamond Firetail	Stagonopleura guttata	3431-Central Hunter Ironbark Grassy Woodland
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3431-Central Hunter Ironbark Grassy Woodland
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	3431-Central Hunter Ironbark Grassy Woodland
Eastern Osprey	Pandion cristatus	3431-Central Hunter Ironbark Grassy Woodland
Flame Robin	Petroica phoenicea	3431-Central Hunter Ironbark Grassy Woodland

Gang-gang Cockatoo	Callocephalon fimbriatum	3431-Central Hunter Ironbark Grassy Woodland
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	3431-Central Hunter Ironbark Grassy Woodland
Grey-headed Flying-fox	Pteropus poliocephalus	3431-Central Hunter Ironbark Grassy Woodland
Large Bent-winged Bat	Miniopterus orianae oceanensis	3431-Central Hunter Ironbark Grassy Woodland
Little Bent-winged Bat	Miniopterus australis	3431-Central Hunter Ironbark Grassy Woodland
Little Eagle	Hieraaetus morphnoides	3431-Central Hunter Ironbark Grassy Woodland
Little Lorikeet	Glossopsitta pusilla	3431-Central Hunter Ironbark Grassy Woodland
Regent Honeyeater	Anthochaera phrygia	3431-Central Hunter Ironbark Grassy Woodland
Scarlet Robin	Petroica boodang	3431-Central Hunter Ironbark Grassy Woodland
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3431-Central Hunter Ironbark Grassy Woodland
Speckled Warbler	Chthonicola sagittata	3431-Central Hunter Ironbark Grassy Woodland
Spotted Harrier	Circus assimilis	3431-Central Hunter Ironbark Grassy Woodland
Spotted-tailed Quoll	Dasyurus maculatus	3431-Central Hunter Ironbark Grassy Woodland
Square-tailed Kite	Lophoictinia isura	3431-Central Hunter Ironbark Grassy Woodland
Swift Parrot	Lathamus discolor	3431-Central Hunter Ironbark Grassy Woodland
Turquoise Parrot	Neophema pulchella	3431-Central Hunter Ironbark Grassy Woodland
Varied Sittella	Daphoenositta chrysoptera	3431-Central Hunter Ironbark Grassy Woodland
White-bellied Sea-Eagle	Haliaeetus leucogaster	3431-Central Hunter Ironbark Grassy Woodland
White-throated Needletail	Hirundapus caudacutus	3431-Central Hunter Ironbark Grassy Woodland
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3431-Central Hunter Ironbark Grassy Woodland

Threatened species Manually Added

None added

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

BAM Predicted Species Report

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	3431-Central Hunter Ironbark Grassy Woodland
Black-necked Stork	Ephippiorhynchus asiaticus	3431-Central Hunter Ironbark Grassy Woodland

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
Black Bittern	Ixobrychus flavicollis	Habitat constraints
Black-necked Stork	Ephippiorhynchus asiaticus	Habitat constraints

Appendix 8 – BAM Candidate Species Report

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00053438/BAAS23019/24/00053439	Residential subdivision Lot 1 DP995228 Hunter Street Muswellbrook	28/10/2024
Assessor Name	**Report Created**	**BAM Data version ***
Christina Kindermann	12/06/2025	Current classification (live - default) (80)
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS23019	Part 4 Developments (General)	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
5	BOS Threshold: Area clearing threshold	12/06/2025

* 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
Acacia pendula - endangered population Acacia pendula population in the Hunter catchment	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Burhinus grallarius Bush Stone-curlew	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?

Cymbidium canaliculatum - endangered population Cymbidium canaliculatum population in the Hunter Catchment	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Diuris tricolor Pine Donkey Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Diuris tricolor - endangered population Pine Donkey Orchid population in the Muswellbrook local government area	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus glaucina Slaty Red Gum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Litoria aurea Green and Golden Bell Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Miniopterus australis Little Bent-winged Bat	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?

Miniopterus orianae oceanensis Large Bent-winged Bat	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Myotis macropus Southern Myotis	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☑ Dec ☐ Survey month outside the specified months?
Ozothamnus tesselatus Ozothamnus tesselatus	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascolarctos cinereus Koala	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Pomaderris queenslandica Scant Pomaderris	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Prasophyllum petilum Tarengo Leek Orchid	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Prasophyllum sp. Wybong Prasophyllum sp. Wybong	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pterostylis chaetophora Pterostylis chaetophora	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

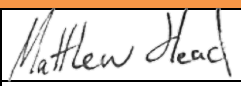
Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Broad-billed Sandpiper	Limicola falcinellus	Habitat constraints
Brush-tailed Phascogale	Phascogale tapoatafa	Habitat degraded
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Common Planigale	Planigale maculata	Habitat degraded
Eastern Cave Bat	Vespadelus troughtoni	Habitat constraints
Eastern Osprey	Pandion cristatus	Habitat constraints
Eastern Pygmy-possum	Cercartetus nanus	Habitat degraded

Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	Dromaius novaehollandiae - endangered population	Refer to BAR
Gang-gang Cockatoo	Callocephalon fimbriatum	Habitat degraded
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Little Eagle	Hieraaetus morphnoides	Habitat constraints
Masked Owl	Tyto novaehollandiae	Habitat constraints
North Rothbury Persoonia	Persoonia pauciflora	Refer to BAR
Powerful Owl	Ninox strenua	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat constraints
Square-tailed Kite	Lophoictinia isura	Habitat constraints
Striped Legless Lizard	Delma impar	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat constraints
White-bellied Sea-Eagle	Haliaeetus leucogaster	Habitat constraints

Appendix 9 – Microbat Call Analyses Report

Project Details			
Client	Ascent Ecology		
Client contact	Dr Christina Kindermann / Christina Maloney		
Position	Senior Ecologist / Senior Environmental Consultant		
Project Location	Muswellbrook, NSW		
Project number	AE01032025		
Version History			
Version No.	Date	Changed by	Nature of Amendment
0.1	31st of March 2025	M. Head	Final

Preparation of the Report			
Name	Mr. Matthew Head	Signature	
Position	Senior Ecologist	Date	31st of March 2025

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Contents

Introduction

Land and Habitat Environmental Services were engaged by Ascent Ecology to analyse song meter data gathered during an ecological survey in Muswellbrook Upper Hunter Region for the presence and possible identification of microbat species.

Call Capture and data

Ascent Ecology collected data using 4 *Song Meter Mini Bats (Wildlife Acoustics)* for 10 nights in October and November 2024. The data was supplied to Land and Habitat via mailed hard drive.

Call Identification, Methodology and Accuracy

This analysis used the following resources for call identification with the addition of geographical reference information for species for probability of occurrence.

- Anabat insight - acoustic analysis software (*Titley Scientific 2025*)
- Key to the bat calls of south-east Queensland and north-east New South Wales (*Reinhold et al 2001*)
- Key To The Bat Calls Of The Top End Of The Northern Territory (*Milne, D.J 2002*)
- Bat calls Of New South Wales (*Pennay et al 2004*)
- Australasian Bat Society - BatMap. (*http://ausbats.org.au/batmap - Accessed March 2025*)
- Australian Bats second edition (*Churchill 2008*)
- Strahan's Mammals of Australia (4th Edition) *(Baker, Andrew M. and Ian C. Gynther, editors*.)
- Australian Bats Field Guide App – (*Bruce Thomson, Sue Churchill and Amanda Lo Cascio 2024 V 1*)

The reliability of identification is as follows:

- **Definite** – at least one call recorded where there is no doubt about the identification of the species.
- **Possible** - call is comparable with the named species, or species complex but either has a low reliability or is impossible to attribute to a single species at that location.

Results

The data set contained 95,577 files. Simple noise filtering rejected 88333 files. Processing the remaining 7244 files showed these to contain at least 3 individual bat calls.

The 2024 data set contained 7244 files. 14.32% of these were positively identified to a separate taxon and the remaining 85.68% could not be positively identified and were grouped in unresolved species groups.

X = Definite – **at least one call** from the site was attributed unequivocally to the species

O = Possible – calls like those of the species were recorded but could not be reliably identified

2024 survey dates	27/10	28/10	29/10	30/10	31/10	1/11	2/11	3/11	4/11	5/11
Austronomus australis	X	X	X	X	X	X	X	X	X	X
Chalinolobus dwyeri	X			X			X	X		
Chalinolobus gouldii	X	X	X	X	X	X	X	X	X	X
Chalinolobus morio	X		X			X	X			
Ozimops planiceps	X	X	X	X	X	X	X	X	X	
Ozimops ridei	X	X	X	X	X	X	X	X	X	X
Scotorepens balstoni	X	X	X	X	X					
Vespadelus darlingtoni.	X				X		X			
Vespadelus regulus	X			X			X			
Vespadelus species *	X	X	X	X	X	X	X	X	X	X
Vespadelus troughtoni	X									

Figure 1 2024 Species list and survey night

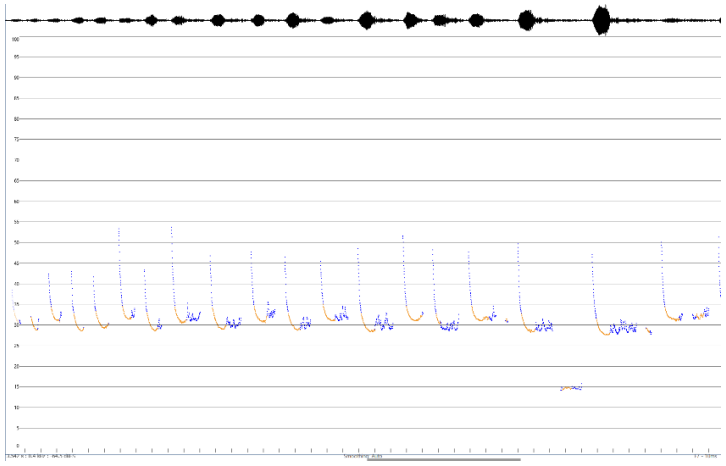
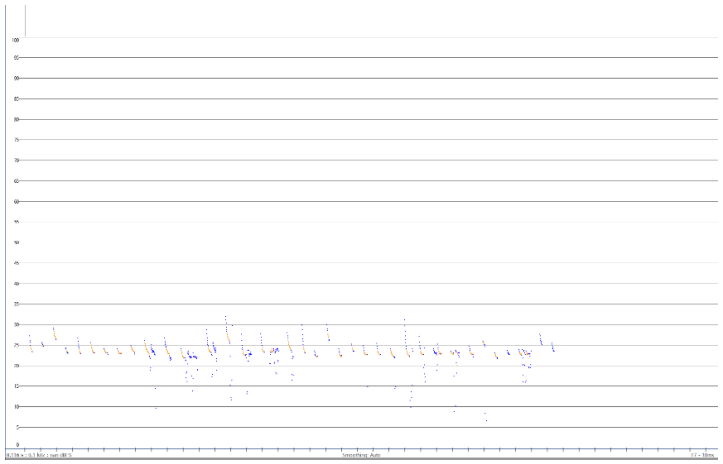
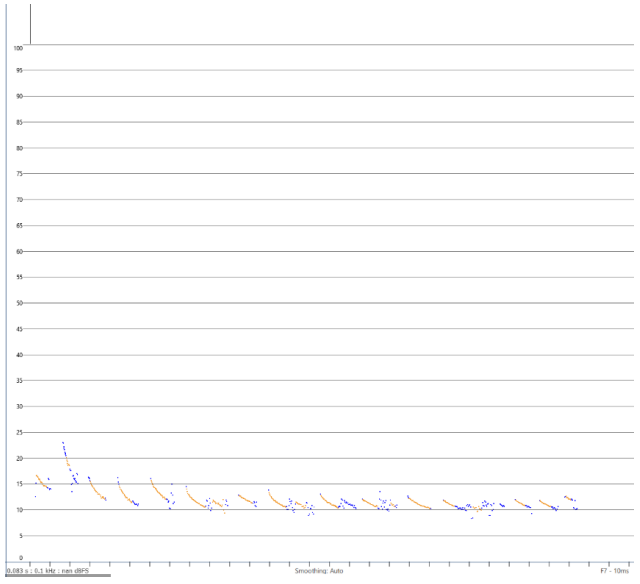
*Multiple Vespadelus species within certain frequency overlap at this location. *V. vulturnus,* V.troughtoni, *V. pumilus and V. vulturnus* all overlap at 50 – 53. Positive id can be assigned with some other call charatistics.

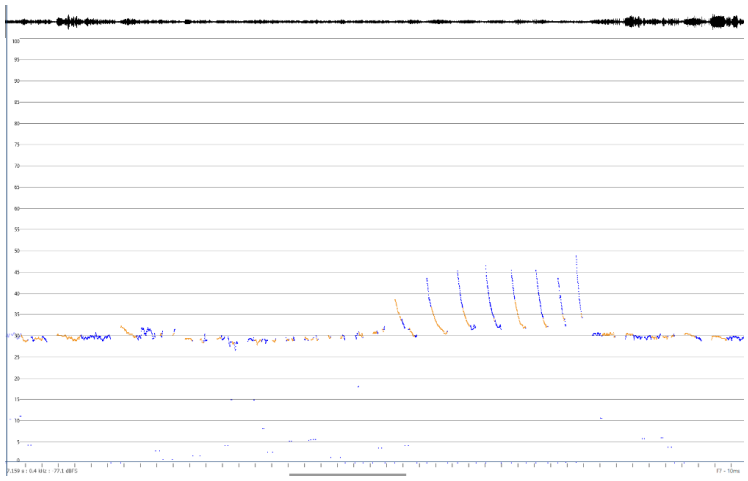
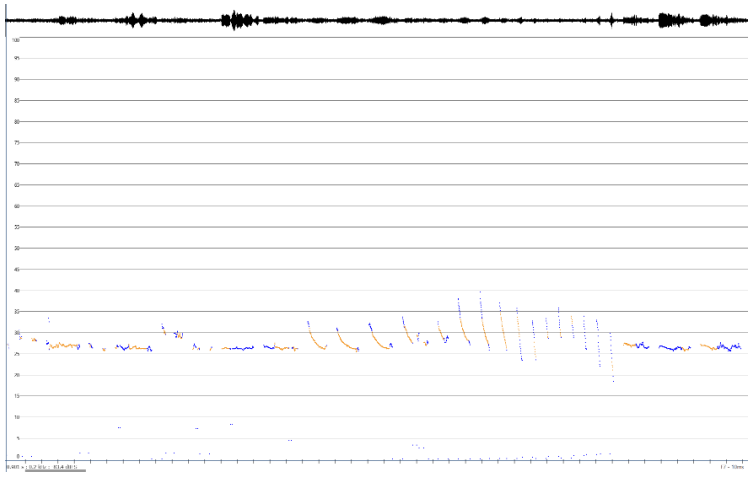
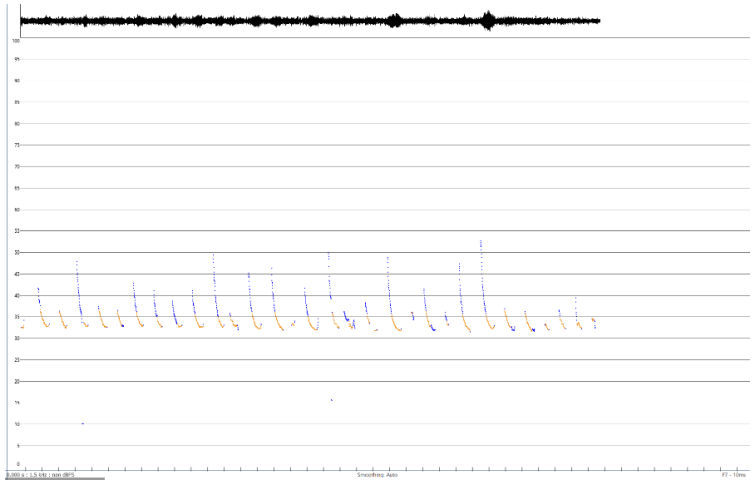
Anabat Location Map

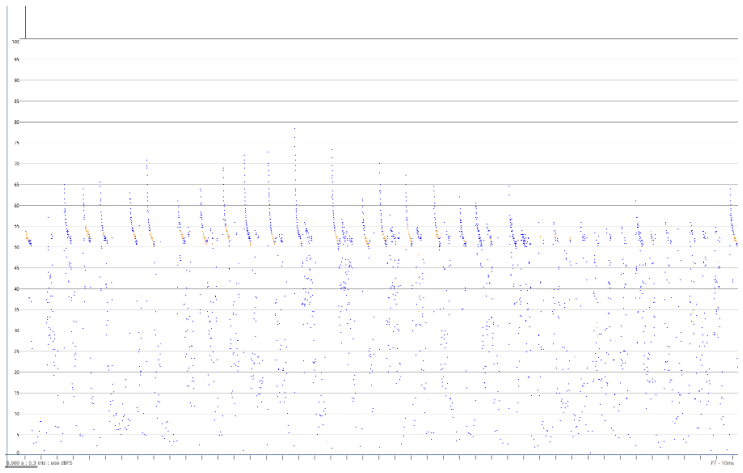
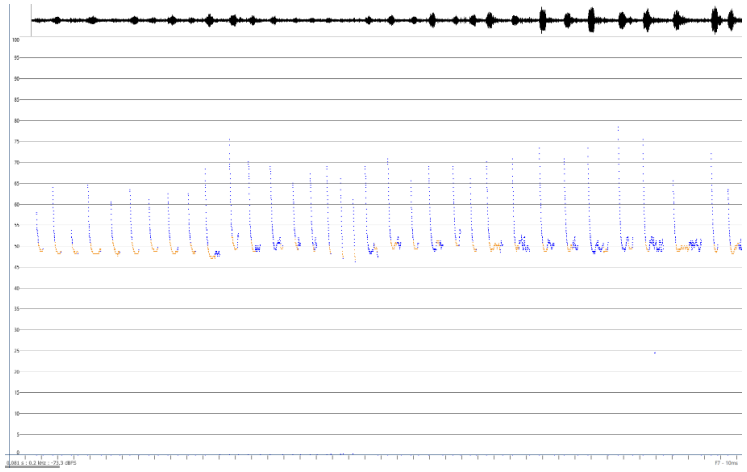
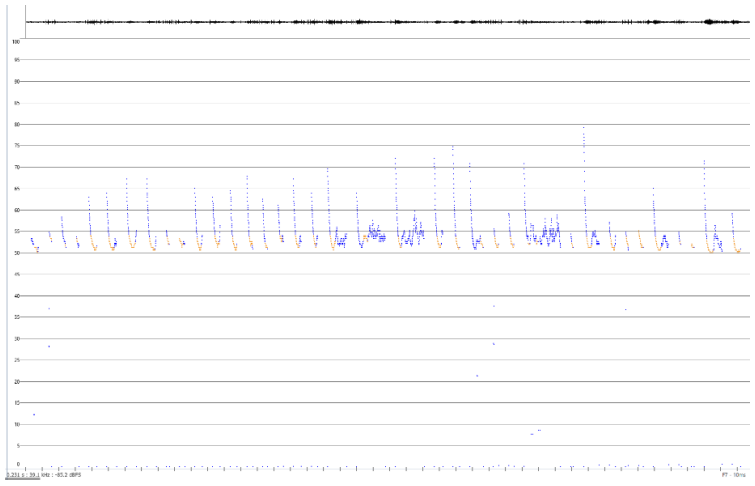
Figure 2 Anabat Location Map

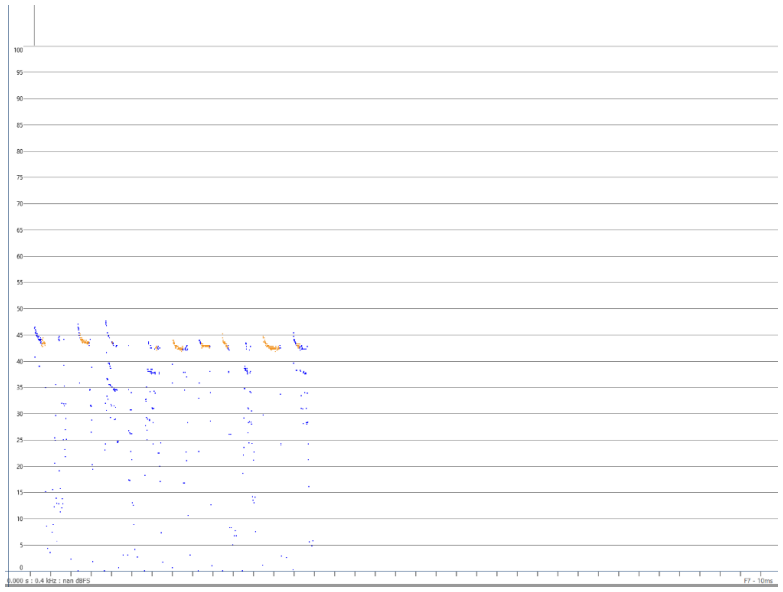
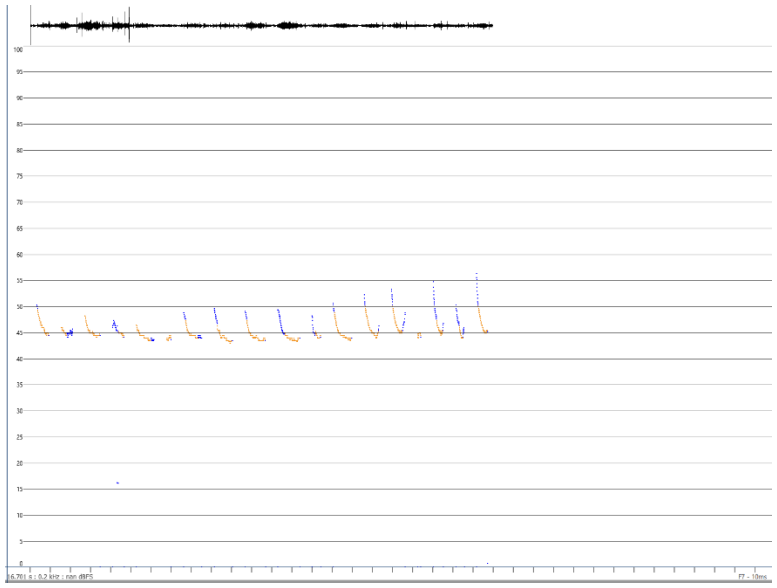
Appendix 1 Species call examples from the Muswellbrook dataset

(Calls have been edited and filtered for reporting purposes – displayed in a compressed form – 10 milliseconds per call pulse)

	**Definitely *Chalinolobus gouldii* with characteristic frequency between 25 and 34 kHz. Alternating calls (flip flopping) present is recording.**
	Definitely ***Chalinolobus dwyeri*** with characteristic frequency of 22 to 23.5 kHz. Alternating call and shape reliably separate it from other species around the same frequency.
	Definitely ***Austronomus australis***. Characteristic frequency 10 to 15 kHz.

	Definitely ***Ozimops ridei***. The characteristic frequency of this call is between 30 to 36 kHz.
	Definitely ***Ozimops planiceps*** *The* characteristic frequency 26 to 30.5 kHz.
	Definitely ***Scotorepens balstoni*** in frequency Characteristic frequency 31 to 35 kHz.

	Definitely ***Chalinolobus morio*.** This species has a characteristic frequency call ranging between 46.5 and 53 kHz. The species can be distinguished by a down sweeping tail.
	Definitely ***Vespadelus troughtoni*** Characteristic frequency of 48.5 to 55 kHz. End frequency lower than 51 kHz, allowing positive identification as *V. troughtoni.*
	A **Vespadelus species.** *V. vulturnus, V. pumilus and V. vulturnus* all overlap at this frequency. Characteristic frequency of 53 and end frequency between figures to allow for a more precious ID.

	*Definingly* ***Vespadelus darlingtoni.*** Characteristic frequency 38 to 46 kHz.
	*Definingly* ***Vespadelus regulus.*** Characteristic frequency 40 to 55 kHz. Overlaps with ***Vespadelus darlingtonia*** but sample calls above 46 can be identified as V. regulus.

References

Australian Bats Field Guide App – (*Bruce Thomson, Sue Churchill and Amanda Lo Cascio 2024 V 1*)

Australasian Bat Society - BatMap. (*http://ausbats.org.au/batmap*) Accessed 2025)

Baker, Andrew M., and Ian C. Gynther, editors, Strahan's Mammals of Australia 2023 (4th Edition), New Holland Publishers.

Churchill, S. (2008) Australian Bats, Allen and Unwin, Sydney.

Graftion, R, Echuca Bat Call Peer Review N. corbeni – Ecoaerial 2015

Milne, D.J, Key to The Bat Calls of The Top End of The Northern Territory 2002, Parks and Wildlife Commission of the Northern Territory

Pennay, M., B. Law & L. Reinhold (2004). Bat calls of New South Wales: Region based guide to the echolocation calls of Microchiropteran bats. Hurstville: NSW Department of Environment and Conservation.

Reinhold, L., Law, B., Ford, G. and Pennay, M. 2001, Key to the bat calls of southeast Queensland and north-east New South Wales. Forest Ecosystem Research and Assessment Technical paper 2001-07, Department of Natural Resources and Mines, Queensland.

Appendix 10 – BAM Credit Summary Report

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00053438/BAAS23019/24/00053439

Proposal Name
Residential subdivision Lot 1 DP995228 Hunter Street Muswellbrook

BAM data last updated *
28/10/2024

Assessor Name
Christina Kindermann

Assessor Number
BAAS23019

BAM Data version *
Current classification (live - default) (80)

Proponent Names

Report Created
12/06/2025

BAM Case Status
Finalised

Assessment Revision
5

BOS entry trigger
BOS Threshold: Area clearing threshold

Assessment Type
Part 4 Developments (General)

Date Finalised
12/06/2025

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

Potential Serious and Irreversible Impacts

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

Species
Nil

BAM Biodiversity Credit Report (Like for like)

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ephippiorhynchus asiaticus / Black-necked Stork
Ixobrychus flavicollis / Black Bittern

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
3431-Central Hunter Ironbark Grassy Woodland	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	4.7	0	0	0

BAM Biodiversity Credit Report (Like for like)

3431-Central Hunter Ironbark Grassy Woodland

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_DNG	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong 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 Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00053438/BAAS23019/24/00053439	Residential subdivision Lot 1 DP995228 Hunter Street Muswellbrook	28/10/2024
Assessor Name	Report Created	BAM Data version *
Christina Kindermann	12/06/2025	Current classification (live - default) (80)
Assessor Number	BAM Case Status	Date Finalised
BAAS23019	Finalised	12/06/2025
Assessment Revision	BOS entry trigger	Assessment Type
5	BOS Threshold: Area clearing threshold	Part 4 Developments (General)

* 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

Central Hunter Ironbark Grassy Woodland												
1	3431_DNG	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	6.7	6.7	4.7	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		0
											Subtotal	**0**
											Total	**0**

Species credits for threatened species

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