BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

FOR A

PROPOSED INDUSTRIAL SUBDIVISION

AT

91 GARDINER STREET, RUTHERFORD NSW 2320 (LOT 2 DP 1197299)

Prepared by:

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Site Details:	91 Gardiner Street, Rutherford NSW 2320				
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Executive Summary

Introduction

Firebird ecoSultants Pty Ltd has been engaged by Machil Pty Ltd, to provide a Biodiversity Development Assessment Report (BDAR) for a proposed industrial subdivision ('the proposal') at 91 Gardiner Street, Rutherford NSW 2320 (Lot 2 DP 1197299) ('the site' or 'the subject site').

The site is located in the southern part of Rutherford and totals an area of ~34.25 ha. The site is zoned as IN1 General Industrial. The site is predominantly covered in exotic pasture grasses with two patches of native trees. One drainage canal occurs within the site that join into one another; this drainage canal drains through the site to toward the north and form part of Stony Creek which drains into Swamp Creek. This then drains into Wallis Creek followed by eventually draining into the Hunter River. This canal would be classed as a 1st order watercourse (in accordance with the Strahler stream ordering system in Appendix 3 of the BAM). The site is surrounded by similar rural land with large open areas of exotic pasture and patches of regenerating forest. A large industrial area also adjoins the site. The site does not contain important mapped areas for threatened species or any mapped biodiversity values.

Landscape features

Details	Response
IBRA Region and Subregion	Dominant landscape forms have been used to divide Australia into bioregions. The site is within the Sydney Basin IBRA bioregion and the Hunter IBRA subregion. See previous Figure 1-1 for the locations of IBRA regions/subregions within 1.5 km of the site.
Mitchell Landscape	Mitchell Landscapes are used to describe areas in NSW in a broad sense and group together areas with relatively homogenous geomorphology, soils and broad vegetation types and are mapped at a scale of 1:250000. The subject site is within the Newcastle Coastal Ramp landscape. This landscape region has an estimated cleared fraction of 0.54. See previous Figure 1-1 for the locations of Mitchell Landscapes within 1.5 km of the site.
Percent Native Vegetation Cover	All areas of native vegetation cover, within the site and within a 1,500 m buffer area surrounding the site, have been mapped; see Figure 2-1. It is estimated, from this mapping, that the native vegetation cover would be 26%.
Wetlands, Rivers, Streams and Estuaries	One drainage canal occurs within the site this will be retained as part of the proposal.
Connectivity Features	The site's native vegetation is one of many patches of regenerating vegetation in the Rutherford area. Rutherford and the surrounding areas have been extensively cleared for agricultural and industrial purposes. The nearest relatively large area of intact bushland occurs ~2 km to the south of the site.

Areas of Geological Significance and Soil Hazard Features	No karst, caves, crevices or cliffs were located on the site or within a 1,500 m buffer around the site. No soil hazards were identified on the site or within a 1,500 m buffer around the site.
Areas of Outstanding Biodiversity Value	Under the BC Act, the Minister for the Environment may declare Areas of Outstanding Biodiversity Value (AOBV). These are special areas that contain irreplaceable biodiversity values that are considered important to NSW, Australia or globally. No listed AOBV occur within the site or within a 1,500 m buffer around the site.

Patch Size

Although there are patches of native vegetation within 100 m of the site's native vegetation, these patches (including the site) are missing vegetation structural layers that are typical of the site's PCTs, such as the upper and lower mid stratums. Although shrubs/small trees do occur in the mid stratum within the site and the surrounding in the area. As such, no native shrub/small tree layer occurs within the site or within surrounding patches of native vegetation. This is likely due to the historic agricultural land practices in the Rutherford area. Therefore, it has been determined that the patch size for the site's impacted native vegetation is ≤3 ha.

Plant Community Types

Attribute	**Details**
1601 - Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	
Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter-Macleay Dry Sclerophyll Forests
TEC status	Part of the endangered BC Act and EPBC listing of 'Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
PCT Percent Cleared	71%
Justification for PCT Selection	Surveys undertaken by Firebird ecoSultants have confirmed the presence of several typical species associated with PCT 1601, including; *Eucalyptus moluccana* (Grey Box), *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia maculata* (Spotted Gum), although not observed within the site, was observed in adjoining properties. This PCT is also mapped as occurring within the area Rutherford on *Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855*.
Other PCTs considered	PCT 1691 – This PCT is similar to the chosen PCT 1604, but differs slightly in typical diagnostic species. *Brachychiton populneus* (Kurrajong) is one such diagnostic species associated with PCT 1691;

	this species does not occur within the site, despite the site's canopy stratum being relatively intact. Furthermore, as mentioned above, *Corymbia maculata* (Spotted Gum), although not observed within the site, was observed in adjoining properties; this species is typically associated with PCT 1604. PCT 623 – This PCT is more similar to PCT 1691, in that *Brachychiton populneus* (Kurrajong) is a diagnostic species associated with this PCT, but is absent from the site. This vegetation community is also typically found further to the west of Lochinvar in the Central and Upper Hunter regions.
Impacted by the proposal?	Yes – Directly and indirectly impacted by the proposal

Vegetation Integrity

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
Derived Grassland PCT 1601 –Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	Poor	49.4	21.7	3.1	14.9
PCT 1601 –Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter –	Moderate	53.8	22.5	26.5	31.8

Habitat Assessment

The following describes the habitat attributes of the study area;

- The study area provides open grassland habitat within the site's cleared exotic grassland area which may provide habitat for species adapted to open areas.
- The site's PCT 1602 corridor is located within the site could provide habitat for species adapted to forested areas.
- No Allocasuarinas or casuarinas occur within the study area which are a food source for species such as *Calyptorhynchus lathami* (Glossy Black-Cockatoo) – as such, the site provides limited habitat for these species.
- The site contains hollow-bearing trees with variable hollow sizes which would likely provide habitat for a wide range of species, including microbats, hollow-dependant arboreal mammals, woodland birds and in some cases owls; however, none occur within the development footprint.
- The study area contains fallen logs and timber which may provide habitat for reptiles and foraging birds.
- No caves, tunnels, mines or culverts occur within the study area or the site.
- No flying fox camps occur within or near the site.

Avoidance of Impacts to the site's biodiversity values

The site's two identified PCT, is considered to be associated with a threatened ecological community (TEC); PCT 1601 –Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter. The proposal largely avoids impacts to these communities by positioning the construction and operational development footprint within a large area of the site that has already been predominantly cleared of native vegetation and now consists of mostly exotic pasture grasses and weeds.

Abbreviations

Abbreviation	Meaning
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Methodology 2020
BC Act	*Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
DCP	Development Control Plan
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DEE	Department of Environment and Energy
DoE	Department of Environment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Ha	Hectare
LEP	Local Environmental Plan
LGA	Local Government Area
MU	Map Unit
NPWS	NSW National Parks and Wildlife Service
OEH	Office of Environment and Heritage
PCT	Plant Community Type
PFC	Projected Foliage Cover
SAII	Serious and Irreversible Impacts
TBCD	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community

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1 INTRODUCTION

Firebird ecoSultants Pty Ltd has been engaged by Machil Pty Ltd, to provide a Biodiversity Development Assessment Report (BDAR) for a proposed industrial subdivision ('the proposal') at 91 Gardiner Street, Rutherford NSW 2320 (Lot 2 DP 1197299) ('the site' or 'the subject site'). See Figure 1-1 for the Location Map and Figure 1-2 for the Site Map. This BDAR has been prepared to satisfy the requirements of the *Biodiversity Conservation Act 2016* (BC Act). This assessment has been undertaken in accordance with the Biodiversity Assessment Method 2020.

1.1 Description of the Proposal

The proposal includes a Torrens title subdivision (2 lots into 21 industrial lots) of 91 Gardiner Street, Rutherford (Lot 2 DP 1197299). Refer to Appendix A for Site Plans.

1.2 General Site Description

The site is located in a rural area in the southern part of Rutherford and totals an area of ~34.25 ha. The site is zoned as IN1 General Industrial. The site is predominantly covered in exotic pasture grasses with two patches of native trees. One drainage canal occurs within the site that join into one another; this drainage canal drains through the site to toward the north and form part of Stony Creek which drains into Swamp Creek. This then drains into Wallis Creek followed by eventually draining into the Hunter River. This canal would be classed as a 1st order watercourse (in accordance with the Strahler stream ordering system in Appendix 3 of the BAM). The site is surrounded by similar rural land with large open areas of exotic pasture and patches of regenerating forest. A large industrial area also adjoins the site. The site does not contain important mapped areas for threatened species or any mapped biodiversity values.

See Figure 1-1 for the site location.

1.3 The Study Area

The study area is the area of land within the site that has been assessed in this report, which is the area of vegetation within the site that is relevant to this BDAR i.e. the area of vegetation within or potentially impacted by the construction and operational footprint. Land within the site that is not considered to be impacted by the proposal (either directly or indirectly) is considered to be outside the study area. In this case however, the entire site was surveyed.

1.4 Information sources

1.4.1 Database Searches

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

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

1.4.2 Regional Vegetation Mapping

Regional scale vegetation mapping, previously undertaken in the area, was reviewed. This included a review of *Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855*.

1.4.3 Literature Review

Information sources reviewed included, but were not limited to:

- Aerial Photograph Interpretation (API)
- Relevant guidelines, including:
    - OEH *Biodiversity Assessment Method*, 2020
    - *NSW Guide to Surveying Threatened Plants* (OEH, 2016)
    - *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018)
    - *NSW Survey Guide for Threatened Frogs: A guide for the survey of frogs and their habitats for the Biodiversity Assessment Method (DPI&E, 2020)*
    - *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation (DEC), 2004)
- Environmental / planning reports relevant to the site / area, including:
    - *Maitland LEP 2011*;
    - *Maitland (DCP) 2011*;
- Any environmental / ecological reports relevant to the site or area, including vegetation mapping.
- Online tools and resources, including:
    - BAM Calculator (OEH, 2020)
    - BioNet Vegetation Classification (OEH, 2020)
    - BioNet Threatened Biodiversity Data Collection (OEH, 2020)
    - Directory of Important Wetlands in Australia (Department of Environment and Energy (DEE), 2010)
    - NSW Scientific Committee Final Determinations (NSW Scientific Committee various dates)
    - Commonwealth Threatened Species Scientific Committee (TSSC) Final Determinations for threatened species (TSSC Various Dates)
    - OEH Threatened Species, Populations and Ecological Communities website
    - Commonwealth DEE Species, Profile and Threats Database
    - PlantNET NSW (Botanic Gardens Trust, 2018).

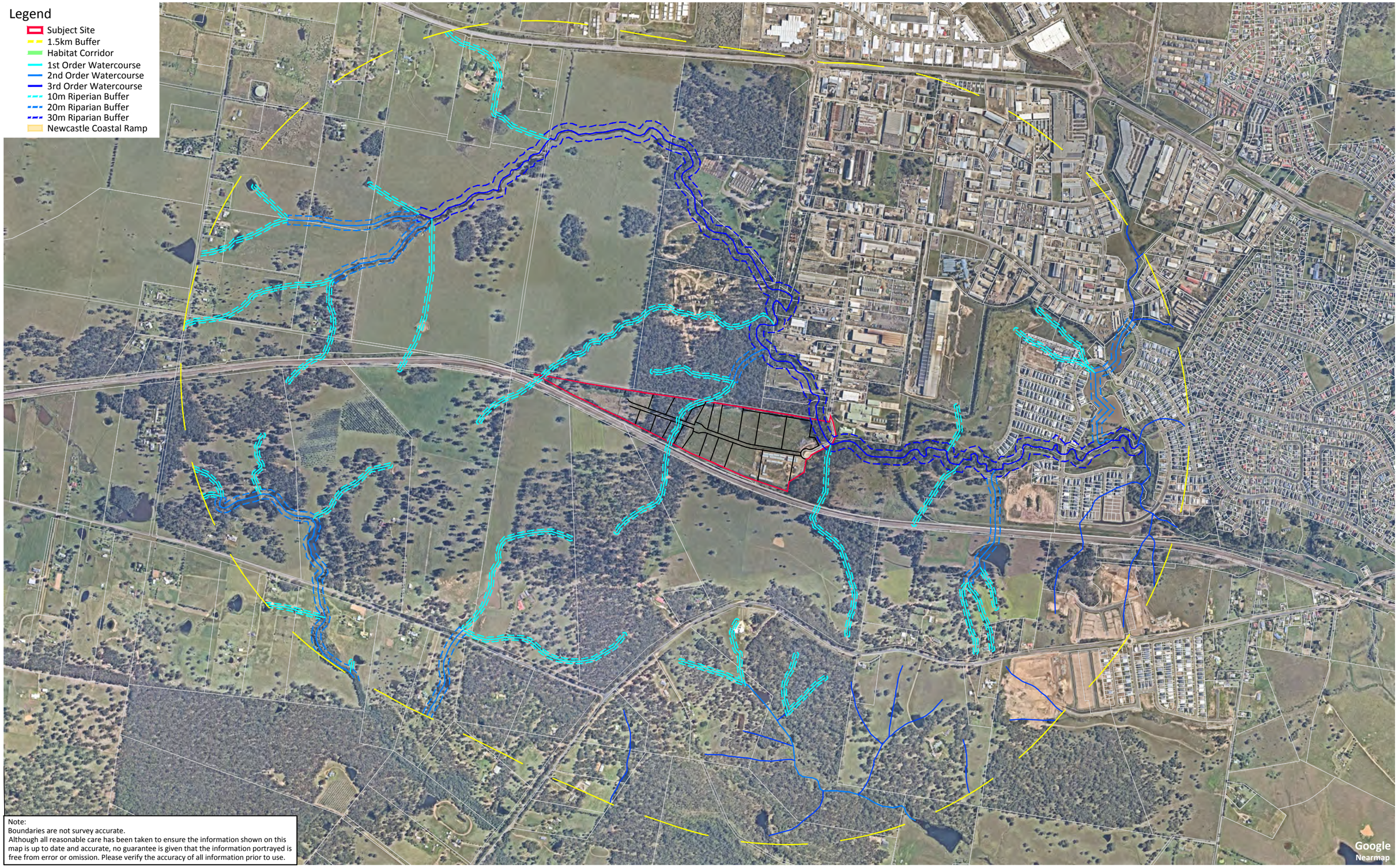

FIGURE 1-1: LOCALITY MAP

Ref No 3005 BDAR

SITE DETAILS Lot 2 Gardiner Street Rutherford
DATE 23 February 2022

NORTH

0 250 500 750

SCALE 15 000 @ A3

Firebird ecoSultants Pty Ltd
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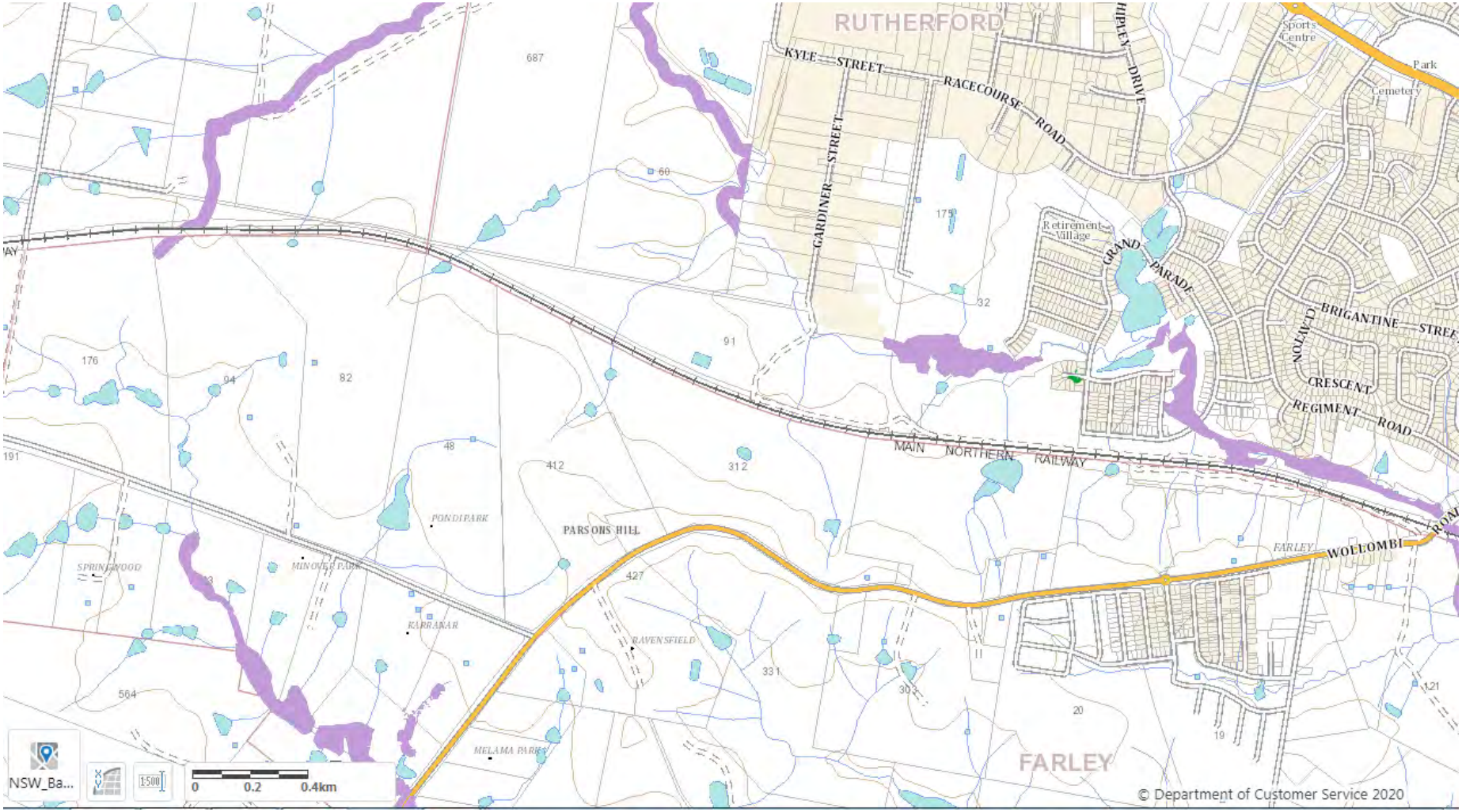
Level 1, 146 Hunter Street, Newcastle NSW 2300
P O Box 354 Newcastle NSW 2300

Figure 1-3: Biodiversity Values & Important Habitat Map



2 STAGE 1 – BIODIVERSITY ASSESSMENT

2.1 Landscape features

This section details the landscape features occurring on the Subject Land or within the assessment area (i.e. a 1.5 km buffer) surrounding the Subject Land; see Table 2-1.

Table 2-1: Landscape Features

Details	Response
IBRA Region and Subregion	Dominant landscape forms have been used to divide Australia into bioregions. The site is within the Sydney Basin IBRA bioregion and the Hunter IBRA subregion. See previous Figure 1-1 for the locations of IBRA regions/subregions within 1.5 km of the site.
Mitchell Landscape	Mitchell Landscapes are used to describe areas in NSW in a broad sense and group together areas with relatively homogenous geomorphology, soils and broad vegetation types and are mapped at a scale of 1:250000. The subject site is within the Newcastle Coastal Ramp landscape. This landscape region has an estimated cleared fraction of 0.54. See previous Figure 1-1 for the locations of Mitchell Landscapes within 1.5 km of the site.
Percent Native Vegetation Cover	All areas of native vegetation cover, within the site and within a 1,500 m buffer area surrounding the site, have been mapped; see Figure 2-1. It is estimated, from this mapping, that the native vegetation cover would be 26%.
Wetlands, Rivers, Streams and Estuaries	This drainage line would be classed as a 1st order watercourse (in accordance with the Strahler stream ordering system in Appendix 3 of the BAM).
Connectivity Features	The site's native vegetation is one of many patches of regenerating vegetation in the Rutherford area. Rutherford and the surrounding areas have been extensively cleared for agricultural and industrial purposes. The nearest relatively large area of intact bushland occurs ~2 km to the south of the site.
Areas of Geological Significance and Soil Hazard Features	No karst, caves, crevices or cliffs were located on the site or within a 1,500 m buffer around the site. No soil hazards were identified on the site or within a 1,500 m buffer around the site.
Areas of Outstanding Biodiversity Value	Under the BC Act, the Minister for the Environment may declare Areas of Outstanding Biodiversity Value (AOBV). These are special areas that contain irreplaceable biodiversity values that are considered important to NSW, Australia or globally. No listed AOBV occur within the site or within a 1,500 m buffer around the site.

2.2 Native vegetation

2.2.1 Native Vegetation Cover Within the Site

The site contains is 7.91 ha. The extent of native vegetation relevant to this BDAR (i.e. the area of native vegetation within or potentially impacted by the construction and operational footprint) is 6.2 ha; see Figure 2-2 for the native vegetation extent within the site.

2.2.2 Patch Size

A patch is defined in the BAM as an area of intact native vegetation that occurs on the subject land. The patch may extend onto adjoining land beyond the footprint of the subject land, and for woody ecosystems, includes native vegetation separated by ≤100 metres from the next area of intact native vegetation. For non-woody vegetation, this gap is reduced to ≤30 metres. Intact vegetation must contain all structural layers (strata) characteristic of the PCT. Plot data should not be solely relied upon when determining whether vegetation is intact. If all structural growth form groups expected to exist within the community are present within the vegetation zone and/or adjoining off-site native vegetation, then the vegetation meets the definition of intact. For example, if all structural growth form groups except the shrub layer are present in the plots but species that belong to the shrub growth form group occur elsewhere within the vegetation zone, then the shrub growth form group is present, and the vegetation is intact.

Although there are patches of native vegetation within 100 m of the site's native vegetation, these patches (including the site) are missing vegetation structural layers that are typical of the site's PCTs, such as the upper and lower mid stratums. Although shrubs/small trees do occur in the mid stratum within the site and the surrounding in the area. As such, no native shrub/small tree layer occurs within the site or within surrounding patches of native vegetation. This is likely due to the historic agricultural land practices in the Rutherford area. Therefore, it has been determined that the patch size for the site's impacted native vegetation is >100ha

Legend
- Subject Site
- 1.5km Buffer
- Native Vegetation

RUTHERFORD

GARDINER STREET

MAIN NORTHERN RAILWAY

FARLEY

Google
Nearmap

Note:
Boundaries are not survey accurate.
Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 2-1: NATIVE VEGETATION EXTENT

Ref No 3005 BDAR

SITE DETAILS Lot 2 Gardiner Street Rutherford
DATE 18 March 2022

NORTH

0 250 500 750

SCALE 15 000 @ A3

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Note:
Boundaries are not survey accurate.
Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 2-2: NATIVE VEGETATION WITHIN THE SITE

Ref No 3005 BDAR

SITE DETAILS Lot 2 Gardiner Street Rutherford
DATE 27 May 2022

NORTH

0 50 150 250
SCALE 5000 @ A3

Firebird ecoSultants Pty Ltd
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Level 1, 146 Hunter Street, Newcastle NSW 2300
P O Box 354 Newcastle NSW 2300

2.2.3 Identifying Plant Community Types

Review of Existing Information

Table 2-3 details the review on existing information on the site's PCTs/vegetation communities.

Table 2-2: Review of Existing Information on the Site's PCTs

Vegetation Mapping Project	Response
Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855	One PCT has been mapped within the site: • **1601** - Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter

2.2.3.1 Plot-based Floristic Surveys

Plot-based floristic vegetation surveys were undertaken within the study area in accordance with s.5.2.1.9 of the BAM, by one ecologist on 11th November 2021. The 20 m x 20 m plots were sampled for the presence of flora species; see Figure 2-3 for the plot locations undertaken within the impacted PCTs (the study area) and see Appendix I for photos. The plots were carefully examined to identify all flora species present. This search continued until it was confident that all flora species within the plots were detected. Data collected for each species included:

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

Plant Community Type/s (PCTs) on the site were identified according to the NSW PCT classification described in the BioNet Vegetation Classification. One native PCT have been identified within the site; this PCT are described below. The distribution of the PCTs in the development footprint is indicated in Figure 2-4. Plot data is provided in Appendix B. A full recorded species list is provided in Appendix C.

2.2.3.2 Plant Community Types

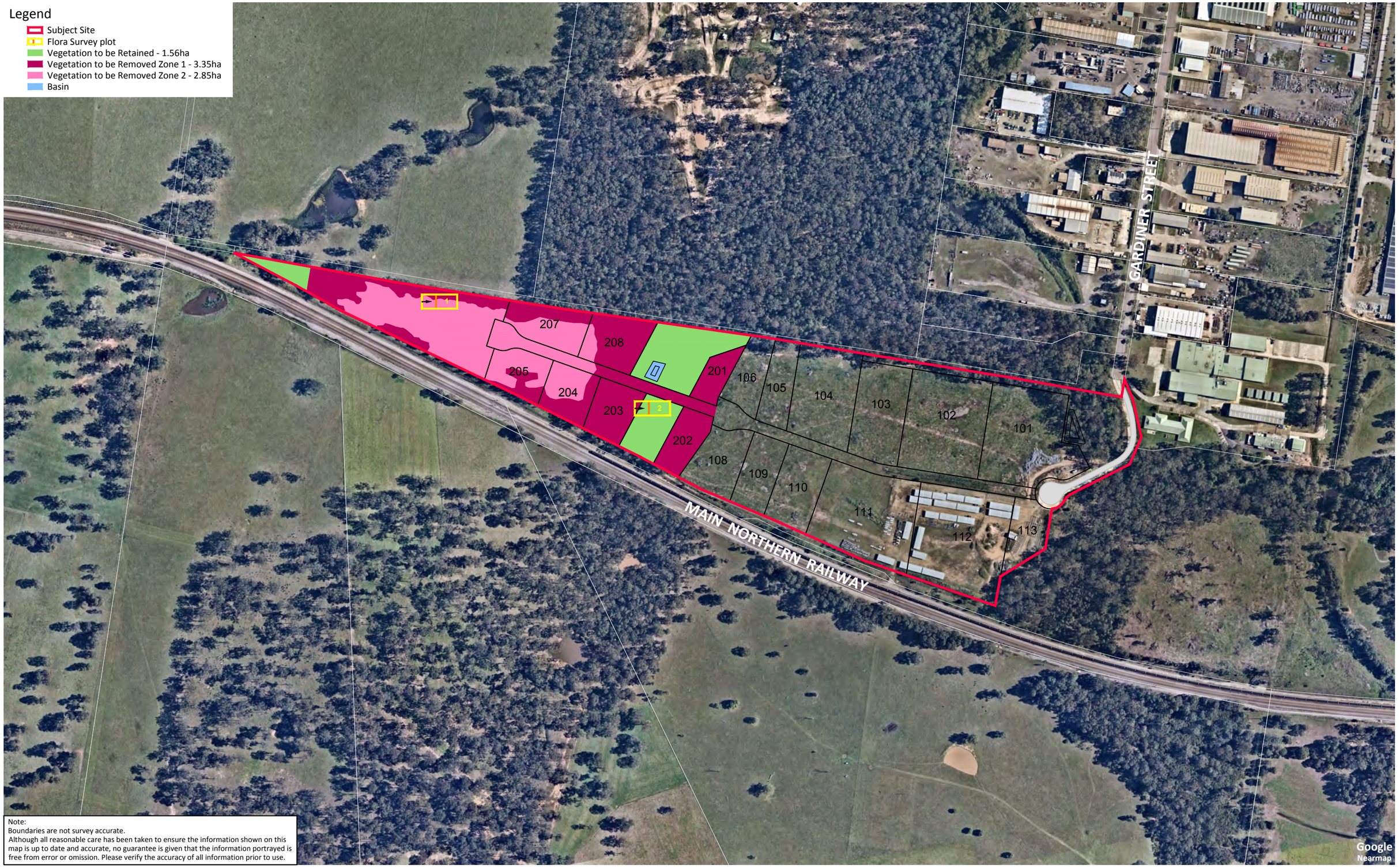
The PCT identified within the site were not found to be consistent with the PCT mapped on *Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855*. The distribution of the site's PCTs is indicated in Figure 2-4. See Appendix I for photos.

Table 2-3: Plant Community Types within the site that are impacted by the proposal

Attribute	Details
PCT 1601 - Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	
Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter-Macleay Dry Sclerophyll Forests
TEC status	Part of the endangered BC Act listing of 'Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregion'
PCT Percent Cleared	71%
Justification for PCT Selection	Surveys undertaken by Firebird ecoSultants have confirmed the presence of several typical species associated with PCT 1600, including; *Eucalyptus moluccana* (Grey Box), *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Corymbia maculate* (Spotted Gum), although not observed within the site, was observed in adjoining properties. This PCT is also mapped as occurring within the area Rutherford on *Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855*.
Other PCTs considered	PCT 1691 – This PCT is similar to the chosen PCT 1604, but differs slightly in typical diagnostic species. *Brachychiton populneus* (Kurrajong) is one such diagnostic species associated with PCT 1691; this species does not occur within the site, despite the site's canopy stratum being relatively intact. Furthermore, as mentioned above, *Corymbia maculata* (Spotted Gum), although not observed within the site, was observed in adjoining properties; this species is typically associated with PCT 1604. PCT 623 – This PCT is more similar to PCT 1691, in that *Brachychiton populneus* (Kurrajong) is a diagnostic species associated with this PCT, but is absent from the site. This vegetation community is also typically found further to the west of Lochinvar in the Central and Upper Hunter regions.
Impacted by the proposal?	Yes – Directly and indirectly impacted by the proposal

Legend

- Subject Site
- Flora Survey plot
- Vegetation to be Retained - 1.56ha
- Vegetation to be Removed Zone 1 - 3.35ha
- Vegetation to be Removed Zone 2 - 2.85ha
- Basin



Note:
Boundaries are not survey accurate.
Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 2-6: FLORA SPECIES SURVEY

Ref No 3005 BDAR

SITE DETAILS Lot 2 Gardiner Street Rutherford
DATE 27 May 2022

NORTH

0 50 150 250

SCALE 5000 @ A3

Firebird ecoSultants Pty Ltd
ABN - 16 105 985 993
Level 1, 146 Hunter Street, Newcastle NSW 2300
P O Box 354 Newcastle NSW 2300

Legend
Subject Site
PCT 1600

GARDINER STREET

MAIN NORTHERN RAILWAY

206 207 208 205 204 203 202 201 106 105 104 103 102 101 108 109 110 111 112 113

Note:
Boundaries are not survey accurate.
Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Google
Nearmap

FIGURE 2-4: PLANT COMMUNITY TYPE

Ref No 3005 BDAR

SITE DETAILS Lot 2 Gardiner Street Rutherford
DATE 11 March 2022

NORTH

0 50 150 250
SCALE 5000 @ A3

PIXELDRAFTING

Firebird ecoSultants Pty Ltd
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Level 1, 146 Hunter Street, Newcastle NSW 2300
P O Box 354 Newcastle NSW 2300

firebird

2.2.4 PCTs to be assessed in the BAM-C

Of the site's identified PCT, only one PCT is considered to be directly impacted by the proposal, this being PCT 1601 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter. This PCT may be indirectly impacted by changes in noise, light pollution and dust from construction phase activities and post-development activities. The following is a breakdown of the areas of PCT 1600 to be impacted by the proposal;

- 3.985 ha of moderate PCT 1601; and
- 2.85 of derived grassland

2.2.5 Vegetation Integrity Assessment

Vegetation Zones

For the purposes of the BAM, a vegetation zone is an area of native vegetation on the site that is the same PCT and has a similar broad condition state. The site's impacted PCTs have been divided into several vegetation zones (as detailed in Table 2-4) (see Appendix I for photos). A patch size area has been assigned to each vegetation zone, as a class (as detailed in Table 2-4). See Appendix I for photos of each vegetation zone.

Table 2-4: Vegetation Zones and Patch Size Classes

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
Derived Grassland PCT 1601 –Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	Poor	49.4	21.7	3.1	14.9
PCT 1601 –Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter –	Moderate	53.8	22.5	26.5	31.8

PCT	Vegetation Zone (VZ) Name	Vegetation Zone Description	Patch Size Class
PCT 1601 – Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter		This PCT occurs in only one vegetation state. It has several native species occurring around the periphery of the littoral zone. The creek bank is predominately dominated by exotic grasses and weeds.	≥100 ha

Vegetation Integrity Scores

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

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

Plot-based surveys were conducted, in accordance with s.5.3.4 of the BAM, by one ecologist on 22nd February 2021 and 1st April 2021. Survey plots were established around a central 50 m transect and included:

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

See previous Figure 2-3 for plot locations. Plot data is provided in Appendix B. Table 2-5 details the vegetation integrity score.

Table 2-5: Vegetation Integrity Scores

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
Derived Grassland PCT 1601 –Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	Poor	49.4	21.7	3.1	14.9
PCT 1601 –Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter –	Moderate	53.8	22.5	26.5	31.8

2.3 Threatened Species

The following has been undertaken in accordance with section 6 of the BAM.

Under the BAM, threatened species are separated into two classes, 'ecosystem' and 'species' credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified as 'ecosystem' credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identified as 'species' credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

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

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

2.3.1 Identify Threatened Species for Assessment

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

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

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

2.3.2 Ecosystem Credit Species

Ecosystem credit species are those where the likelihood of occurrence of the species or elements of the species' habitat, can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection. The Threatened Biodiversity Data Collection (TBCD) has identified several ecosystem credit species as requiring assessment, for the proposal; these are listed in Table 2-6.

Table 2-6: Ecosystem Credit Species Predicted to occur within the Study Area

Ecosystem Credit Species	Habitat Constraints	Veg Zone - Confirmed Predicted Species	Justification when not confirmed for a Veg Zone	BC Act listing	EPBC Act listing
Acacia bynoeana Bynoe's Wattle		PCT1600_Moderate= Yes	N/A	CE	CE
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	-
Calyptorhynchus lathami Glossy Black-Cockatoo (Foraging)	• Presence of Allocasuarina and casuarina species = no	PCT1600_Moderate= No	No Allocasuarina and casuarina species present in this PCT	V	-
Chthonicola sagittata Speckled Warbler	-	PCT1600_Moderate= Yes	N/A	V	-
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	-	PCT1600_Moderate= Yes	N/A	V	-
Daphoenositta chrysoptera Varied Sittella	-	PCT1600_Moderate= Yes	N/A	V	-
Dasyurus maculatus Spotted-tailed Quoll	-	PCT1600_Moderate= Yes	N/A	V	E
Falsistrellus tasmaniensis Eastern False Pipistrelle	-	PCT1600_Moderate= Yes	N/A	V	-
Glossopsitta pusilla Little Lorikeet	-	PCT1600_Moderate= Yes	N/A	V	-

Grantiella picta Painted Honeyeater	• Mistletoes present at a density of greater than five mistletoes per hectare	PCT1600_Moderate= No	No mistletoes present at a density of greater than five mistletoes per hectare	V	V
Haliaeetus leucogaster White-bellied Sea Eagle (Foraging)	• Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	PCT1600_Moderate= Yes	The site is within 1 km of rivers, lakes, large dams or creeks, wetlands and coastlines. Although there are dams in the local area, these are small farm dams only.	V	-
Hieraaetus morphnoides Little Eagle (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	-
Hirundapus caudacutus White-throated Needletail	-	PCT1600_Moderate= Yes	N/A	-	V
Lathamus discolor Swift Parrot (Foraging)	-	PCT1600_Moderate= Yes	N/A	E	CE
Lophoictinia isura Square-tailed Kite (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	-
Melanodryas cucullate cucullate Hooded Robin (South-eastern form)	-	PCT1600_Moderate= Yes	N/A	V	-
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	-	PCT1600_Moderate= Yes	N/A	V	-
Micronomus norfolkensis Eastern Coastal Free-tailed Bat	-	PCT1600_Moderate= Yes	N/A	V	-

Miniopterus australis Little Bentwing-bat (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	-
Miniopterus *orianae* ***oceanensis*** Large Bentwing-bat (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	-
Neophema pulchella Turquoise Parrot	-	PCT1600_Moderate= Yes	N/A	V	-
Ninox strenua Powerful Owl (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	-
Petaurus australis Yellow-bellied Glider	• Hollow bearing trees • Hollows >25cm diameter	PCT1600_Moderate= Yes	Hollow bearing trees are present on site.	V	-
Petroica boodang Scarlet Robin	-	PCT1600_Moderate= Yes	N/A	V	-
Phascolarctos cinereus Koala (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	V
Pomatostomus temporalis temporalis Grey-crowned Babbler (eastern subspecies)	-	PCT1600_Moderate= Yes	N/A	V	-
Pteropus poliocephalus Grey-headed Flying-fox (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	V
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	-	PCT1600_Moderate= Yes	N/A	V	-

Scoteanax rueppellii Greater Broad-nosed Bat	-	PCT1600_Moderate= Yes	N/A	V	-
Stagonopleura guttata Diamond Firetail	-	PCT1600_Moderate= Yes	N/A	V	-
Tyto novaehollandiae Masked Owl (Foraging)	-	PCT1600_Moderate= Yes	N/A	V	-

2.3.3 Species Credit Species (Candidate Species)

Species credit species (or candidate species) are those where the likelihood of occurrence of the species or elements of suitable habitat for the species, cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey. The TBDC has identified several candidate species as requiring assessment, for the proposal; these are listed in Table 2-7. Table 2-7 also provides an assessment of habitat suitability for the candidate species, in accordance with s.6.4 of the BAM.

Table 2-7: Candidate Species Assessment

Species Credit Species	Habitat Constraints / Geographic Limitations	Confirmed Candidate Species for Further Assessment	Justification
Acacia bynoeana Bynoe's Wattle	Nil	Yes	N/A
Anthochaera phrygia Regent Honeyeater (Breeding)	1. As per mapped area	No	**Habitat constraints not present:** The study area is not within or near a mapped area of important habitat for this species.
Aprasia parapulchella Pink-tailed Legless Lizard	1. Rocky areas 2. Or within 50m of rocky areas	No	**Habitat constraints not present:** The study area is not within or near rocky areas or within 50m of rocky areas.
Burhinus grallarius Bush Stone-curlew	1. Fallen/standing dead timber including logs	Yes	**Habitat constraints present:** This study area has Fallen/standing dead timber present. **This species will be further assessed in section 2.3.5**
Calidris ferruginea Curlew Sandpiper (Breeding)	Nil	Yes	N/A
Callistemon linearifolius Netted Bottle Brush	Nil	Yes	N/A
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	1. Hollow bearing trees 2. Eucalypt tree species with hollows greater than 9 cm in diameter	Yes	**Habitat constraints present:** This study area has Hollow bearing trees and eucalypt tree species with hollows greater than 9 cm in diameter present. **This species will be further assessed in section 2.3.5**
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	1. Hollow bearing trees 2. Living or dead tree with hollows greater than 15 cm diameter and	Yes	**Habitat constraints present:** This study area has hollow bearing trees and living or dead trees with hollows greater than 15 cm in diameter and greater than 5m above the ground present T**his species will be further assessed in section 2.3.5**

	greater than 5m above the ground		
Cercartetus nanus Eastern Pygmy-possum	Nil	Yes	N/A
Chalinolobus dwyeri Large-eared Pied Bat	1. Cliffs 2. Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	No	**Habitat constraints not present**: This study area is not within or near cliffs or within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.
Cryptostylis hunteriana Leafless Tongue Orchid	Nil	Yes	N/A
Cynanchum elegans *White-Flowered Wax Plant*	Nil	Yes	N/A
Delmar impar Striped Legless Lizard	Nil	Yes	N/A
Diuris praecox Rough Doubletail	Within Newcastle LGA	No	**Geographic limitation not present:** The site is not located within the Newcastle LGA
Diuris tricolor Pine Donkey Orchid	Nil	Yes	N/A
Eucalyptus castrensis Singleton Mallee	Nil	Yes	N/A
Eucalyptus Glaucina Salty Red Gum	Nil	Yes	N/A
Eucalyptus parramattensis subsp. Decadens Eucalyptus parramattensis subsp. Decadens	Nil	Yes	N/A

Eucalyptus pumila Pokolbin Mallee	Nil	Yes	N/A
Grevillea parviflora subsp. Small-flower grevillea	Nil	Yes	N/A
Haliaeetus leucogaster White-bellied Sea Eagle (Breeding)	1. Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	No	**Habitat constraints present:** This study area is within or near Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines. **This species will be further assessed in section 2.3.5**
Hieraaetus morphnoides Little Eagle (Breeding)	1. Nest trees - live (occasionally dead) large old trees within vegetation)	No	**Habitat constraints present:** This study area does contain Nest trees - live (occasionally dead) large old trees within vegetation) **This species will be further assessed in section 2.3.5**
Hoplocephalus bitorquatus Pale-headed Snake	Nil	Yes	N/A
Lathamus discolor Swift Parrot (Breeding)	1. As per mapped area	No	**Habitat constraints not present:** The study area is not within or near a mapped area of important habitat for this species.
Litoria aurea Green and Golden Bell Frog	1. Semi-permanent/ephemeral wet areas 2. Within 1km of wet areas|Swamps 3. Within 1km of swamp|Waterbodies 4. Within 1km of waterbody	Yes	**Habitat constraints present:** The study area is within 1km of a waterbody / wet area / swamp/semi-permanent/ephemeral wet areas. **This species will be further assessed in section 2.3.5**
Litoria brevipalmata Green-thighed Frog	Nil	Yes	N/A
Lophoictinia isura	1. Nest trees	Yes	**Habitat constraints present:** This study area does contain any nest trees.

Square-tailed Kite (Breeding)			**This species will be further assessed in section 2.3.5**
Miniopterus australis Little Bentwing-bat (Breeding)	1. Caves 2. Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' 3. observation type code 'E nest-roost' 4. with numbers of individuals >500 5. or from the scientific literature	No	**Habitat constraints not present:** This study area does not contain cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'. No observation type code 'E nest-roost'. **Refer to section 2.3.4 for the habitat assessment.**
Miniopterus orianae oceanensis Large Bent-winged Bat (Breeding)	1. Caves 2. Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' 3. observation type code 'E nest-roost' 4. with numbers of individuals >500	No	**Habitat constraints not present:** This study area does not contain cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'. No observation type code 'E nest-roost'. **Refer to section 2.3.4 for the habitat assessment.**
Monotaxis macrophylla	Nil	Yes	N/A

Large-leafed Monotaxis			
Myotis macropus Southern Myotis	1. Hollow bearing trees 2. Within 200 m of riparian zone 3. Bridges, caves or artificial structures within 200 m of riparian zone 4. This includes rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	Yes	**Habitat constraints present:** The study area does include a riparian zone and contains hollows, Bridges, caves or artificial structures within 200 m of riparian zone and This includes rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site. **This species will be further assessed in section 2.3.5**
Ninox connivens Barking Owl (Breeding)	1. Hollow bearing trees 2. Living or dead trees with hollows greater than 20cm diameter and greater than 4m above the ground		**Habitat constraints present:** The study area does include hollow-bearing trees. The study area also contains living or dead trees with hollows greater than 20cm diameter and greater than 4m above the ground. **This species will be further assessed in section 2.3.5**
Ninox strenua Powerful Owl (Breeding)	1. Hollow bearing trees 2. Living or dead trees with hollow greater than 20cm diameter	Yes	**Habitat constraints present:** The study area contains hollow bearing trees, although none are suitable for breeding. In any case, targeted surveys were undertaken for this species. **This species will be further assessed in section 2.3.5**
Ozothamnus tesselatus Ozothamnus tesselatus	Nil	Yes	N/A
Persoonia pauciflora North Rothbury Persoonia	1. Within 10km of North Rothbury	No	**Habitat constraints not present:** The study area is not within 10km of North Rothbury
Petauroides Volans Greater Glider	1. Hollow bearing trees	Yes	**Habitat constraints present:** The study area does include hollow-bearing trees **This species will be further assessed in section 2.3.5**
Petrogale penicillata Brush-tailed Rock-wallaby	1. Land within 1km of rocky escarpments, gorges, steep slopes,	No	**Habitat constraints not present:** The study area does not contain land with rocky escarpments, gorges, steep slopes, boulder piles, rock outlines or cliff lines.

	boulder piles, rock outcrops or clifflines		
Phascogale tapoatafa Brush-tailed Phascogale	Nil	Yes	N/A
Phascolarctos cinereus Koala (Breeding)	1. Areas identified via survey as important habitat*	Yes	**Habitat constraints present:** The study area is identified via survey as important habitat. **Refer to section 2.3.4 for the habitat assessment.**
Planigale maculata Common Planigale	Nil	Yes	N/A
Prostanthera cineolifera Singleton Mint Bush	Nil	Yes	N/A
Pteropus poliocephalus Grey-headed Flying-fox (Breeding)	1. Breeding camps	No	**Habitat constraints not present:** The study area does not contain any breeding camps. **Refer to section 2.3.4 for the habitat assessment.**
Pterostylis chaetophora Pterostylis chaeterophora	Nil	Yes	N/A
Rutidosis heterogams Heath Wrinklewort	Nil	Yes	N/A
Thesium austral Austral Toadflax	Nil	Yes	N/A
Tyto novaehollandiae Masked Owl (Breeding)	1. Hollow bearing trees 2. Living or dead trees with hollows greater than 20cm diameter	Yes	**Habitat constraints present:** The study area does hollow bearing trees, living or dead trees with hollows greater than 20cm diameter. **This species will be further assessed in section 2.3.5**
Vespadelus troughtoni Eastern Cave Bat	1. Caves 2. Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder	No	**Habitat constraints not present:** The study area is not within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds.

	piles, or within two kilometres of old mines, tunnels, old buildings or sheds		

2.3.4 Habitat Assessment

The following describes the habitat attributes of the study area;

- The study area provides open grassland habitat within the site's cleared exotic grassland area which may provide habitat for species adapted to open areas.
- The site's PCT 1601 corridor is located within the site could provide habitat for species adapted to forested areas.
- No Allocasuarinas or casuarinas occur within the study area which are a food source for species such as *Calyptorhynchus lathami* (Glossy Black-Cockatoo) – as such, the site provides limited habitat for these species.
- The site contains many hollow-bearing trees with variable hollow sizes which would likely provide habitat for a wide range of species, including microbats, hollow-dependant arboreal mammals, woodland birds and in some cases owls; however, none occur within the development footprint.
- The study area contains fallen logs and timber which may provide habitat for reptiles and foraging birds.
- No caves, tunnels, mines or culverts occur within the study area or the site.
- No stick nests occur within the study area or the site (at the time of surveys)
- No flying fox camps occur within or near the site.

See Appendix I for photos of the site's hollow-bearing trees and ground hollows.

2.3.4.1 Koala Habitat Protection SEPP 2021

A development proposal must be assessed under the development assessment process under the SEPP in LGAs where no approved Koala Plan of Management is in place. This includes all land;

a. with an area of at least 1 hectare, including adjoining land (meaning land the next cadastre over) within the same ownership, and

b. that is within an LGA to which the SEPP applies.

The site is greater than 1 hectare and Lochinvar occurs within the Maitland LGA which lies within the Central Coast Koala Management Area. There is no Koala Plan of Management for the Maitland LGA and so this development proposal must be assessed under the development assessment process under the Koala Habitat Protection SEPP 2021.

Because the proposal is likely to impact on koala habitat (i.e. koala feed trees) a suitably experienced and qualified person must undertake a survey for core koala habitat and prepare a Koala Assessment Report which must accompany the development application.

Firebird ecoSultants conducted the survey for core koala habitat and prepared a Koala Assessment Report. It was found that the site does not contain core koala habitat, no further provisions of the Koala Habitat Protection SEPP 2021 apply. Refer to Appendix G.

2.3.5 Targeted Threatened Flora & Fauna Surveys

Targeted species surveys have been undertaken for some of the candidate species credit species in accordance with section 5.3 of the BAM.

The following Table 2-8 identifies whether each of the confirmed candidate species are present or absent, based on the results of the targeted surveys (or assumed presence where targeted surveys have not been undertaken); species highlighted in yellow are confirmed to be present. The following sections 2.4.4.1 to 2.4.4.6 outline the survey effort and results for each species. Table 2-9 shows the weather conditions for each day during the survey effort.

Table 2-8: Presence or Absence of Candidate Species

Species Presence	Confirmed presence
Acacia bynoeana Bynoe's Wattle	No (Surveyed)
Burhinus grallarius Bush Stone-curlew	No (surveyed)
Callistemon linearifolius Netted Bottle Brush	No (Surveyed)
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	No (Surveyed)
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	No (Surveyed)
Cercartetus nanus Eastern Pygmy-possum	No (Surveyed)
Cryptostylis hunteriana Leafless Tongue Orchid	No (Surveyed)
Cynanchum elegans *White-Flowered Wax Plant*	No (Surveyed)
Eucalyptus castrensis Singleton Mallee	No (Surveyed)
Eucalyptus Glaucina Salty Red Gum	No (Surveyed)
Eucalyptus parramattensis subsp. Decadens	No (Surveyed)

Eucalyptus parramattensis subsp. Decadens	
Eucalyptus pumila Pokolbin Mallee	No (Surveyed)
Grevillea parviflora subsp. Small-flower grevillea	No (Surveyed)
Haliaeetus leucogaster White-bellied Sea Eagle (Breeding)	No (Surveyed)
Hieraaetus morphnoides Little Eagle (Breeding)	No (Surveyed)
Hoplocephalus bitorquatus Pale-headed Snake	No (Surveyed)
Litoria aurea Green and Golden Bell Frog	No (Surveyed)
Litoria brevipalmata Green-thighed Frog	No (Surveyed)
Lophoictinia isura Square-tailed Kite (Breeding)	No (Surveyed)
Monotaxis macrophylla Large-leafed Monotaxis	No (Surveyed)
Myotis macropus Southern Myotis	No (surveyed)
Ninox connivens Barking Owl (Breeding)	To be surveyed
Ninox strenua Powerful Owl (Breeding)	To be surveyed
Ozothamnus tesselatus Ozothamnus tesselatus	To be surveyed
Petauroides Volans Greater Glider	No (Surveyed)
Phascogale tapoatafa Brush-tailed Phascogale	No (Surveyed)
Phascolarctos cinereus Koala (Breeding)	No (surveyed)
Planigale maculata Common Planigale	To be surveyed
Pomaderris queenslandica Scant Pomaderris	No (surveyed)
Prostanthera cineolifera Singleton Mint Bush	No (surveyed)

Pteropus poliocephalus Grey-headed Flying-fox (Breeding)	No (surveyed)
Pterostylis chaetophora Pterostylis chaeterophora	To be sur=rveyes
Rutidosis heterogams Heath Wrinklewort	No (Surveyed)
Thesium austral Austral Toadflax	No (Surveyed)
Tyto novaehollandiae Masked Owl (Breeding)	To be surveyed

2.3.5.1 Targeted Flora Survey

Areas of Potential Habitat in the Site:

Table 2-10 details the areas of potential habitat on the site for the threatened flora species confirmed as candidate species.

Table 2-9: Potential Habitat on the Site for Threatened Flora Species

	Associated PCT	Survey Period	Surveyed
Species	**PCT 1600**		
Acacia bynoeana		All Year	Yes
Burhinus grallarius		All Year	
Callistemon linearifolius		October to January	Yes
Callocephalon fimbriatum		October to January	YEs
Calyptorhynchus lathami		September to January	Yes
Cercartetus nanus		October to March	Yes
Cryptostylis hunteriana		November to January	Yes
Cynanchum elegans		All year	Yes
Delmar impar		September to December	Yes
Diuris tricolor		September to October	
Eucalyptus castrensis		All year	Yes
Eucalyptus Glaucina		All year	Yes
Eucalyptus parramattensis subsp. Decadens		All year	Yes
Eucalyptus pumila		All year	Yes
Grevillea parviflora subsp.		August to November	Yes
Haliaeetus leucogaster		July to December	Yes
Hieraaetus morphnoides		August to October	Yes
Hoplocephalus bitorquatus		November to March	Yes
Litoria aurea		November to March	Yes
Litoria brevipalmata		September to April	Yes
Lophoictinia isura		September to January	Yes
Monotaxis macrophylla		August to February	Yes
Myotis macropus		October to March	To be surveyed
Ninox connivens		May to December	To be surveyed
Ninox strenua		May to August	To be surveyed

Ozothamnus tesselatus		September to October	To be surveyed
Petauroides Volans		All year	Yes
Phascogale tapoatafa		December to June	To be surveyed
Phascolarctos cinereus		All year	To be surveyed
Planigale maculata		All year	To be surveyed
Pomaderris queenslandica		All year	To be surveyed
Prostanthera cineolifera		September to October	To be surveyed
Pteropus poliocephalus		October to December	Yes
Pterostylis chaetophora		September to November	Yes
Rutidosis heterogams		All year	Yes
Thesium austral		November to February	Yes
Tyto novaehollandiae		May to August	To be surveyed

Survey Timing:

The TBCD specifies the appropriate times/months to survey for each flora species (See Table 2-11)

The targeted surveys were conducted over several dates to ensure appropriate timing for each species. The parallel field-transverse method was undertaken on the 4th March 2021 and all species with active survey periods were targeted. Species not able to be surveyed are assumed present (See Figure 2-5)

Some species were also surveyed outside of the survey periods, the names and justifications are listed below (see Table 2-11)

Survey Method and Effort:

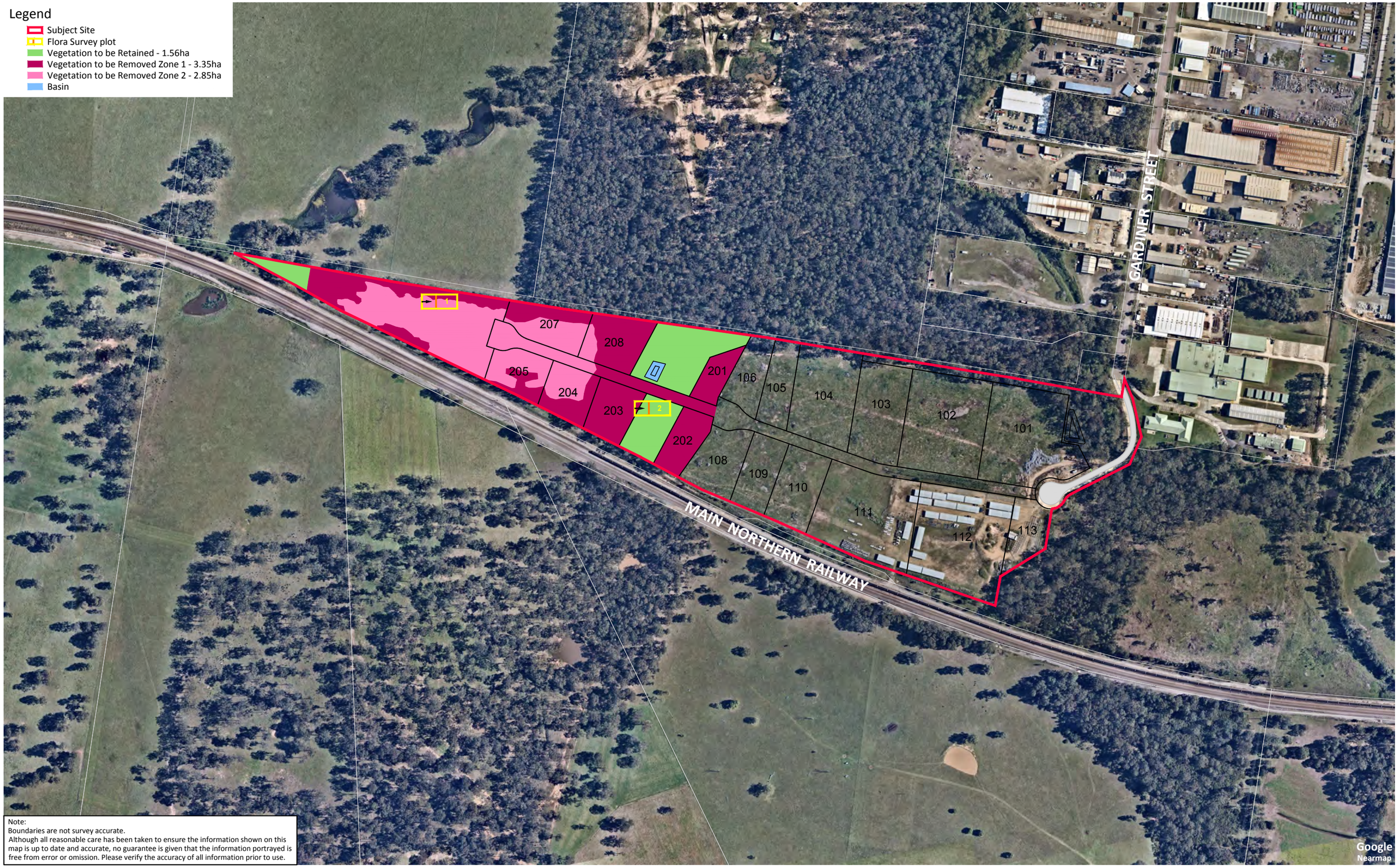
The parallel field-transverse method was used; this requires walking a series of parallel transects that are close enough to allow observation of the entire site and is recommended in the *NSW Guide to Surveying Threatened Plants* (OEH 2016). Detectability of threatened plants is considered to be high using the parallel field-traverse method, because it systematically covers the entire area of potential habitat within a site and can be applied to a diverse range of species, habitats and sites. GPS tracking was uundertaken (See Figure 2-6) showing the path walked. Additionally, the site was traversed on foot and surveyed with the random meander technique across all other days of survey on the site.

Results

No targeted species were recorded on site during any of the surveys despite an adequate survey effort.

Legend

- Subject Site
- Flora Survey plot
- Vegetation to be Retained - 1.56ha
- Vegetation to be Removed Zone 1 - 3.35ha
- Vegetation to be Removed Zone 2 - 2.85ha
- Basin



Note:
Boundaries are not survey accurate.
Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 2-6: FLORA SPECIES SURVEY

Ref No 3005 BDAR

SITE DETAILS Lot 2 Gardiner Street Rutherford
DATE 27 May 2022

NORTH

0 50 150 250

SCALE 5000 @ A3

Firebird ecoSultants Pty Ltd
ABN - 16 105 985 993
Level 1, 146 Hunter Street, Newcastle NSW 2300
P O Box 354 Newcastle NSW 2300

2.3.5.2 Targeted survey for Frog Species; *Litoria brevipalmata* (Green-thighed Frog), *Litoria aurea (Green and Golden Bell Frog), Crinia tinnula (Wallum Froglet) & Uperoleia mahonyi (Mahoney Toadlet)*

Two frog species were considered potential credits, these included; *Litoria brevipalmata* (Green-thighed Frog), and *Litoria aurea* (Green and Golden Bell Frog), Surveys were conducted in accordance with the DPIE (2020) *NSW Survey Guide for Threatened Frogs - A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method, 2020*

Areas of Potential Habitat in the Site:

The habitat present on site was deemed suitable for *L. brevipalmata* & *L. aurea*,

Table 2-12 details the areas of potential habitat on the site for *L. brevipalmata, L. aurea*, *C. tinnula*.

Table 2-10: Potential Habitat on the Site for *L. brevipalmata, and L. aurea*

PCT	Vegetation Zone (VZ)	Potential Habitat?
PCT 1601	VZ 1: Moderate	*L. brevipalmata* – YES
	Derived Grassland	*L. brevipalmata* – YES

Survey Timing:

The TBCD specifies the appropriate times/months to survey for –

L. brevipalmata: All months.

L. aurea: November to March

U. mahonyi: October to March

C. tinnula: All months.

The targeted surveys for *L. brevipalmata, L. aurea* and *C. tinnula* were conducted over a total of four nights in March.

Survey Effort:

- Frog Surveys – Active surveys were used to target these species. Four (4) survey nights were undertaken and involved walking slowly along the habitat and spotlighting with head torches to view eyeshine. Frog species recorded include *Limnodynastes peronii, Litoria fallax* and *Litoria peronii* and *Crinia signifera.*

  4th March – 1.5 person hours

  16th March – 1.5 person hours

  17th March – 1.5 person hours

  23rd March – 1.5 person hours

25th March – 3 person hours

Total of 9 person hours.

Results – No targeted frog species were seen despite targeted survey efforts.

- Call Surveys – During and prior to active surveys all frogs calling at the site were listened to identify species present. Frog species recorded include *Limnodynastes peronii*, *Crinia signifera* and *Litoria peronii*.

  Results – No targeted frog species were heard despite targeted survey efforts.

- Review of threatened species database records – a review of the Atlas of NSW Wildlife (BioNet) was undertaken to search for any previous records of *C. tinnula*, *L. brevipalmata and L. aurea* near the site.
  Results: There are two records of *L. aurea* from 4.5km to the south-west in the Farley area. These records are from 1999 and 2000.
  There are no records of *L. brevipalmata, C. tinnula & U. mahonyi* or near the site.
- See Figure 2-6 for survey location.

Conclusion

None of the targeted frog species were recorded on site during any of the surveys despite an adequate survey effort. There are no records of *L. brevipalmata, C. tinnula* & *U. mahonyi* in the area and the records of *L.aurea* are not recent and occur a fair distance from site.

These species are not considered to occur within the development site.

2.3.5.3 Targeted survey for *Myotis macropus* (Southern Myotis)

Targeted surveys for *M. macropus* (Southern Myotis) were conducted based on the OEH (2018) *'Species credit' threatened bats and their habitats, NSW survey guide for the Biodiversity Assessment Method*.

Areas of Potential Habitat in the Site:

Table 2-13 details the areas of potential habitat on the site for *M. macropus* (Southern Myotis).

Table 2-11: Potential Habitat on the Site for *Myotis macropus* (Southern Myotis)

PCT	Vegetation Zone (VZ)	Potential Habitat?
PCT 1600	VZ 1: Moderate	YES

Survey Timing:

The TBCD specifies the appropriate times/months to survey for *M. macropus* (Southern Myotis) is January, February, March, October, November and December.

The targeted surveys for *M. macropus* (Southern Myotis) were conducted over a total of five nights in March (11th to 16th).

Survey Effort:

- Bat call detection surveys – Bat echolocation calls were detected and recorded using an Anabat II Detector and CF ZCAIM, over a total of four nights (11^{h} – 15th March 2022). The Anabat recorder was placed by the edge of the forest overlooking the water way as it represents a potential hunting fly-way for this species. Weather conditions for this survey (heavy rainfall) limited bat activity however 4 bat species were still confidently recorded. Analysis of digital ultrasonic bat echolocation calls was undertaken by Amy Rowles of Corymbia Ecology.
- Review of threatened species database records – a review of the Atlas of NSW Wildlife (BioNet) was undertaken to search for any previous evidence of *M. macropus* (Southern Myotis) near the site. There are four records within 10x10 km search area. Records are as recent as 2016 and the nearest occurs Aproximately 1.5km to the east of the subject site.
- See Figure 2-6 for Anabat location.

Results & Conclusion

Analysis of the Anabat recordings detected a possible call that was either *Nyctophilus sp* or *Myotis Macropus*. Amy Rowles stated in her report that "Only a few short passes of only a few pulses. Not clear enough to determine if it was one of these species, may be part of a call from another species". Amy Rowles also confirmed with Firebird ecoSultants that it was only one call at 11:30 pm and that if *Myotis Macropus* was a candidate species within the site she would expect to see multiple clear calls throughout the survey period. Refer to the Bat Call Analysis Reports in Appendix F. See Appendix H for a photo of the Anabat placement within the site.

We have considered *Macropus myotis* unlikely to be present on site.

2.3.5.1 Targeted survey for *Burhinus grallarius* (Bush Stone-curlew)

Areas of Potential Habitat in the Site:

Table 2-14 details the areas of potential habitat on the site for *B. grallarius* (Bush Stone-curlew).

Table 2-12: Potential Habitat on the Site for *Burhinus grallarius* (Bush Stone-curlew)

PCT	Vegetation Zone (VZ)	Potential Habitat?
PCT 1601	VZ 1: Moderate	YES

Survey Timing:

The TSPD specifies the appropriate times/months to survey for breeding *B. grallarius* (Bush Stone-curlew) is any month of the year. The targeted surveys were conducted on the following dates

- Diurnal searches – 4th, 16th, 17th and 23rd March 2022

Survey Methods and Effort:

Survey methods were designed to comply with the survey methods described in the DEC (2006) *Recovery Plan for the Bush Stone-curlew Burhinus grallarius*. The main technique applied here was diurnal bird watching/systematically traversing the site. Calls were also listened for during all nocturnal surveying on site.

- Nocturnal surveys – no calls were heard whilst working on site

  Results: No evidence of presence on the site.

- Diurnal searches – The entire site was systematically traversed, to search for the *B. grallarius* (Bush Stone-curlew). Effort was made to listen for bird calls and to walk through suitable habitat to flush birds.

  Results: No evidence of *B. grallarius* (Bush Stone-curlew) was detected on the site.

- Review of threatened species database records – a review of the Atlas of NSW Wildlife (BioNet) was undertaken to search for any previous evidence of *B. grallarius* (Bush Stone-curlew) near the site.

  Results: There are no records within the search area.

Results

This species was not recorded on site during any of the surveys despite an adequate effort.

This species is not considered to occur within the development site.

2.3.6 Further Assessment of Candidate Species

14 species credit species are assumed to be present at this time because targeted surveys were not able to be undertaken due to optimal survey periods occurring later in the year or weather conditions were not optimal during surveys periods; the potential impacts that the proposal may have on these species will be assessed in section 3 of this report in accordance with Stage 2 of the BAM.

Note; targeted surveys for species that have been assumed present will be undertaken throughout the year.

3 STAGE 2 – IMPACT ASSESSMENT

3.1 Avoiding and Minimising Impacts

The following sections 3.1.1 to 3.1.2 describe efforts undertaken to avoid and minimise impacts on biodiversity values in accordance with Chapter 7 of the BAM.

3.1.1 Avoidance of Impacts to the site's biodiversity values

Of the site's identified PCT, it is considered to be associated with a threatened ecological community (TEC); PCT 1600 – Spotted Gum – Red Ironbark -Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter is considered to be associated with the BC Act TEC listing of 'Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions. The proposal largely avoids impacts to this community by positioning the construction and operational development footprint within a large area of the site that has already been predominantly cleared of native vegetation and now consists of mostly exotic pasture grasses and weeds.

PCT 1600 will be directly impacted by the proposal by vegetation clearing (2.68 ha) and may be indirectly impacted by changes in edge effects, noise, light pollution and dust from construction phase activities and post-development activities (0.81 ha).

Refer to Figure 3.1 for an overview of direct and indirect impact areas, as well as the area of native vegetation that the proposal has avoided.

3.1.2 Minimisation of Impacts

Mitigation measures are proposed to minimise potential impacts to the site's biodiversity values; these are summarised in Table 3-1. These include measures to be implemented in the pre-construction, construction and post-construction phases. It is considered that these measures would serve to minimise any potential direct or indirect impacts.

Table 3-1: Proposed Mitigation Measures

Action	Responsibility	Timing
Pre-construction Phase Measures		
The area of critically endangered PCT 1604 that occurs within the site but outside of the construction and operational development footprint should be protected in perpetuity through a positive / restrictive covenant, registered on title, under Section 88B or 88E of the *Conveyancing Act 1919*. It is recommended that this should be part of the conditions of consent for the proposal.	Landowner	Covenant to be established prior to commencement of any excavation or clearing works.
The proposed APZs are to be managed to the standards of an APZ as defined in *Planning for Bushfire Protection 2019*. No exotic trees or shrubs are to be planted within the proposed APZs. It is recommended that this should be protected in perpetuity through a positive / restrictive covenant, registered on title, under Section 88B or 88E of the Conveyancing Act 1919.	Landowner	Covenant to be established prior to commencement of any excavation or clearing works.
The boundaries of the development footprint will be delineated in the field using bunting / flagging tape to ensure inadvertent clearing / disturbance of the adjacent vegetation does not occur.	Project manager.	Prior to commencement of any excavation or clearing works.
Any site workers / contractors are to be inducted on the ecological sensitivities of the site, including, but not limited to, the importance of avoiding disturbance to the vegetation / habitat external to the development footprint.	Project manager in consultation with the project ecologist.	Prior to commencement of any excavation or clearing works.
Erosion and sediment control measures (e.g. silt fences, straw bales wrapped in geotextile etc) must be established before excavation or vegetation clearance begins and are to remain in place until all surfaces have been fully restored and stabilised.	Project manager.	Prior to commencement of any excavation or clearing works.
A pre-clearing survey will be conducted by a qualified ecologist and will include the following; ➢ Any habitat trees (hollow-bearing trees or nest trees) within the clearing footprint shall be clearly marked (with flagging tape or fluoro spray-paint). Any salvageable habitat features (such as ground timber), identified	Project Ecologist	Prior to commencement of any excavation or clearing works.

during the pre-clearing survey, shall be redistributed in the site's retained area of vegetation.		
Construction Phase Management Actions		
During the clearing of native vegetation, and only if habitat trees occur within the development footprint, a suitably qualified and experienced ecologist must: a) Ensure no vegetation clearing occurs outside of the approved clearing footprint. b) Ensure soft felling techniques are utilised for felling of any habitat/hollow-bearing trees. c) Supervise all habitat/hollow-bearing tree removal to capture and/or relocate any dispersed fauna. d) Transport any injured wildlife to appropriate veterinary care or transfer the animal to a local volunteer wildlife carer group. e) Provide post-clearing reporting back to Council should any threatened species be captured or encountered by clearing operations.	Project ecologist	During clearing.
Appropriate weed control measures must be implemented, including for instance: • All weeds removed from the site must be transported in a sealed container or bag and disposed at a waste management facility licenced to accept green waste. • Vehicles, machinery and equipment must be free from weed material (including seeds) before entering the construction corridor.	Project manager.	During excavation, clearing and construction works.
Any spoil storage areas or stockpiles will have appropriate erosion control devices installed to control runoff and prevent sedimentation.	Project manager.	During excavation, clearing and construction works.
Materials, plant and equipment are not to be stored within the drip-lines of any retained trees at the site or near the site.	Project manager.	During excavation, clearing and construction works.

Topsoil is to be removed from newly cleared areas and then stockpiled for later use in the rehabilitation and/or landscaping works.	Project manager.	During excavation, clearing and construction works.
Cleared vegetation will be mulched and stockpiled for later use in any vegetation restoration/landscaping activities (provided that it doesn't contain weed material). Where possible, any felled trees may be cut into manageable sections and redistributed in the site.	Project manager.	During excavation, clearing and construction works.
Sediment and erosion control devices will be inspected regularly, maintained to ensure effectiveness over the entire duration of the project, and cleaned out before 30% capacity is reached.	Project manager.	During excavation, clearing and construction works.
Post-construction Phase Management Actions		
All temporary erosion and sediment control devices such as silt-stop fencing will be removed from the site at the completion of the works, but not until the site is fully revegetated/stabilised.	Project manager.	After construction, but not until the site is fully revegetated/stabilised.

3.2 Assessment of Direct and Indirect Impacts

The following sections 3.2.1 to 3.2.3 provide an assessment of direct and indirect impacts which were unable to be avoided at the development site in accordance with Section 8 of the BAM.

3.2.1 Direct Impacts

The following describes direct impacts on native vegetation, including impacts on TECs and threatened species through the removal of potential habitat. Direct impacts of the development are detailed in the following Tables 3-2 to 3-3.

Table 3-2: Direct Impacts on Native Vegetation

PCT	BC Act Name / Listing Status	EPBC Act Name / Listing Status	Vegetation Zone (VZ) Name	Direct Impact
PCT 1600 Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	Not Listed	VZ2: Disturbed	2.68 ha

3.2.1.1 Assessment of Direct Impacts on the Site's TEC

PCT 1600covers an area of 3ha ha within the site and it has been separated into three vegetation zones;

- Vegetation zone 1 – Moderate: This vegetation zone occurs in a moderate condition, with an intact canopy stratum, numerous hollow-bearing trees and ground hollows, high density of native ground cover. This area also contains a moderate density of lantana in the shrub layer and some exotic grasses and forbs in the ground layer.

PCT 1604 will be directly impacted by the proposal by vegetation clearing (2.86 ha) and may be indirectly impacted by changes in edge effects, noise, light pollution and dust from construction phase activities and post-development activities.

It is recommended that the retained areas of PCT 1600 within the site are protected in perpetuity. See the recommendations in Section 3.1.2 of this BDAR for more information on these mitigation measures. Overall, the recommended mitigation measures would serve to minimise the net area of TEC loss and would ensure that the existing areas of retained TEC are protected.

3.2.1.2 Assessment of Direct Impacts on Confirmed Ecosystem Credit Species

As indicated in previous Table 2-7, several predicted ecosystem credit species have been confirmed for the site. The following provides an assessment of direct impacts on the confirmed ecosystem credit species, which have been grouped into guilds.

Open Forest / Woodland Birds – *Anthochaera phrygia* (Regent Honeyeater (Foraging)), *Callocephalon fimbriatum* (Gang-gang Cockatoo (Foraging)), *Climacteris picumnus victoriae* (Brown Treecreeper (eastern subspecies)), *Chthonicola sagittata* (Speckled Warbler), *Epthianura albifrons* (White-fronted Chat), *Neophema pulchella* (Turquoise Parrot), *Melanodryas cucullata cucullata* (Hooded Robin (south-eastern form)), *Daphoenositta chrysoptera* (Varied Sittella), *Glossopsitta pusilla* (Little Lorikeet), *Lathamus discolor* (Swift Parrot (Foraging)), *Petroica boodang* (Scarlet Robin), *Petroica phoenicea* (Flame Robin), *Ptilinopus magnificus* (Wompoo Fruit-Dove), *Pomatostomus temporalis temporalis* (Grey-crowned Babbler (eastern subspecies)) and *Stagonopleura guttata* (Diamond Firetail).

These are highly mobile species that are able to footage over large ranges. There is potential for any of these species to occur in the site (although some more than others). The area of habitat within the site that these species would most likely prefer is PCT

Overall, it is considered that the avoided habitat described in previous section 3.2.1, as well as the recommended mitigation measures described in previous section 3.1.2 would minimise the impacts on these wide-ranging species.

Birds of Prey – *Lophoictinia isura* (Square-tailed Kite (Foraging)), *Circus assimilis* (Spotted Harrier), *H. morphnoides* (Little Eagle) (Foraging) and *Pandion cristatus* (Eastern Osprey) (Foraging).

P. cristatus (Eastern Osprey) generally hunt over large areas of open water. The study area and nearby surrounding areas do not provide open water for foraging, as such it is considered unlikely that this species would occur within the site. However, the study area may serve as a brief resting area for. *P. cristatus* (Eastern Osprey).

H. morphnoides (Little Eagle), *Lophoictinia isura* (Square-tailed Kite) and *Circus assimilis* (Spotted Harrier) do hunt in terrestrial environments and are more likely to forage within in the site.

These are highly mobile species that are able to footage over large ranges. There is potential for any of these species to occur in the site (although some more than others).

Overall, it is considered that the avoided habitat described in previous section 3.2.1, as well as the recommended mitigation measures described in previous section 3.1.2 would minimise the impacts on these wide-ranging species.

Forest Owls – *Ninox strenua* (Powerful Owl (Foraging)) & *Tyto novaehollandiae* (Masked Owl (Foraging))

The site contains potential foraging habitat for these owls; although arboreal mammal activity was observed to be low for the site, with low sightings of prey species during spotlighting surveys. Nevertheless, it must be assumed that prey species may nest and forage within the site.

These are highly mobile species that are able to footage over large ranges. There is potential for any of these species to occur in the site (although some more than others).

Overall, it is considered that the avoided habitat described in previous section 3.2.1, as well as the recommended mitigation measures described in previous section 3.1.2 would minimise the impacts on these wide-ranging species.

Microbats – *Micronomus norfolkensis* (Eastern Coastal Freetail-bat), *Miniopterus australis* (Little Bentwing-bat) (Foraging) & *Miniopterus orianae oceanensis* (Large Bentwing-bat) (Foraging)

These species are highly mobile and are known to travel large distances to forage. They generally forage in structurally open and associated edge habitat and roost in trees containing hollows, or (in the case of *Miniopterus australis* (Little Bentwing-bat) and *Miniopterus orianae oceanensis* (Large Bentwing-bat), caves or similar structures).

Overall, it is considered that the avoided habitat described in previous section 3.2.1, as well as the recommended mitigation measures described in previous section 3.1.2 would minimise the impacts on these wide-ranging species.

***Dasyurus maculatus* (Spotted-tailed Quoll)**

D. maculatus (Spotted-tailed Quoll) is known to favour extensive tracts of undisturbed bushland away from human development, the chances of it occurring within the site is very small. Nevertheless, its presence must be assumed.

Overall, it is considered that the recommended mitigation measures would minimise the direct impacts and allow the directly impacted areas of the site to retain some of its habitat values for these species.

***Phascolarctos cinereus* (Koala) (Foraging)**

As discussed in previous section 2.3.4.1, Firebird ecoSultants conducted a survey for core koala habitat and prepared a Koala Assessment Report. It was found that the site does not contain core koala habitat, no further provisions of the Koala Habitat Protection SEPP 2021 apply. Refer to Appendix G.

Targeted field surveys (which included scat searches, area searches and searching for scratch marks on trees) found no evidence of *P. cinereus* (Koala) occurring in the site. It is concluded that the site would not constitute 'Core Koala Habitat' as defined by SEPP.

Overall, it is considered that the recommended mitigation measures would minimise the direct impacts and allow the directly impacted areas of the site to retain some of its habitat values for these species.

Megabats - *Pteropus poliocephalus* (Grey-headed Flying-fox) (Foraging)

These species were not recorded within the site during any of the spotlighting surveys undertaken in March 2021.

These species are highly mobile and are known to travel large distances to forage. The development footprint potential foraging habitat, however the majority of native vegetation within the site will be retained. Large areas of suitable habitat for these species also occurs within the wider Maitland locality, ensuring that any local scale impacts from vegetation removal would be unlikely to impact on populations of these wide-ranging species.

Overall, it is considered that the recommended mitigation measures would minimise the direct impacts and allow the directly impacted areas of the site to retain some of its habitat values for these species.

3.2.1.3 Assessment of Direct Impacts on Confirmed Species Credit Species (Candidate Species)

As indicated in previous Table 2-8 and section 2.3.5, 2 species credit species have been confirmed for the site. The following provides an assessment of direct impacts on the confirmed species credit species.

Threatened Flora

***Asperula asthenes* (Trailing Woodruff), *Cryptostylis hunteriana* (Leafless Tongue Orchid), *Diuris tricolor* (Pine Donkey Orchid), *Ozothamnus tesselatus* (Ozothamnus tesselatus) & *Pterostylis chaetophora* (Pterostylis chaetophora).**

Targeted flora surveys were undertaken for threatened flora; theses species do not occur within the site.

Threatened Fauna

Callocephalon fimbriatum **(Gang-gang Cockatoo),** ***Calyptorhynchus lathami*** **(Glossy Black-Cockatoo),** ***Cercartetus nanus*** **(Eastern Pygmy-possum),** ***Delma impar*** **(Striped Legless Lizard),** ***Hoplocephalus bitorquatus*** **(Pale-headed Snake),** ***Ninox strenua*** **(Powerful Owl),** ***Phascogale tapoatafa*** **(Brush-tailed Phascogale),** ***Planigale maculata*** **(Common Planigale) &** ***Tyto novaehollandiae*** **(Masked Owl)**

These threatened fauna species have all been grouped together because they all have potential habitat within PCT 1600. None of these species were recorded within the site during targeted surveys.

3.2.2 Indirect Impacts

The indirect impacts of the development have been identified and are outlined in Table 3-8. A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures have been applied. Likelihood criteria, consequence criteria and risk matrix are provided in Table 3-5, Table 3-6 and Table 3-7.

Table 3-3: Likelihood Criteria

Likelihood criteria	Description
Almost certain (Common)	Will occur, or is of a continuous nature, or the likelihood is unknown. There is likely to be an event at least once a year or greater (up to ten times per year). It often occurs in similar environments. The event is expected to occur in most circumstances.
Likely (Has occurred in recent history)	There is likely to be an event on average every one to five years. Likely to have been a similar incident occurring in similar environments. The event will probably occur in most circumstances.
Possible (Could happen, has occurred in the past, but not common)	The event could occur. There is likely to be an event on average every five to twenty years.
Unlikely (Not likely or uncommon)	The event could occur but is not expected. A rare occurrence (once per one hundred years).
Remote (Rare or practically impossible)	The event may occur only in exceptional circumstances. Very rare occurrence (once per one thousand years). Unlikely that it has occurred elsewhere; and, if it has occurred, it is regarded as unique.

Table 3-4: Consequence Criteria

Consequence category	Description
Critical (Severe, widespread long-term effect)	Destruction of sensitive environmental features. Severe impact on ecosystem. Impacts are irreversible and/or widespread. Regulatory and high-level government intervention/action. Community outrage expected. Prosecution likely.
Major (Wider spread, moderate to long term effect)	Long-term impact of regional significance on sensitive environmental features (e.g. wetlands). Likely to result in regulatory intervention/action. Environmental harm either temporary or permanent, requiring immediate attention. Community outrage possible. Prosecution possible.
Moderate (Localised, short-term to moderate effect)	Short term impact on sensitive environmental features. Triggers regulatory investigation. Significant changes that may be rehabilitated with difficulty. Repeated public concern.
Minor (Localised short-term effect)	Impact on fauna, flora and/or habitat but no negative effects on ecosystem. Easily rehabilitated. Requires immediate regulator notification.
Negligible (Minimal impact or no lasting effect)	Negligible impact on fauna/flora, habitat, aquatic ecosystem or water resources. Impacts are local, temporary and reversible. Incident reporting according to routine protocols.

Table 3-5: Risk Matrix

Consequence	Likelihood				
	Almost certain	**Likely**	**Possible**	**Unlikely**	**Remote**
Critical	Very High	Very High	High	High	Medium
Major	Very High	High	High	Medium	Medium
Moderate	High	Medium	Medium	Medium	Low
Minor	Medium	Medium	Low	Low	Very Low
Negligible	Medium	Low	Low	Very Low	Very Low

Table 3-6: Risk Assessment for all Identified Potential Indirect Impacts

Indirect Impact	Development Phase	Risk (pre-mitigation)	Risk (post-mitigation)	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	Construction and operation	Medium	Low	Potential damage to adjacent habitat or vegetation	Adjacent vegetation	Daily, during construction	During construction	Potentially long-term impacts
Sedimentation and contaminated and/or nutrient rich run-off	Construction and operation	Medium	Low	Potential runoff during construction works	Into downstream areas	During heavy rainfall or storm events	During rainfall events	Potentially long-term impacts
Noise, dust or light spill	Construction and operation	Medium	Low	Noise and dust created from machinery during construction. No night works during construction. Minor noise and light during operation from residents	Adjacent vegetation	Daily during construction and sporadically during operation	Daily during construction and sporadically during operation	Short-term impacts during construction phase, long-term impacts during operation
Transport of weeds and pathogens from the site to adjacent vegetation	Construction and operation	Medium	Low	Potential spread of weed and pathogens from incoming machinery and equipment, as well as from gardens established in new lots	Potential to spread into nearby habitat	During construction and operation	Ongoing for the life of the development	Potentially long-term impacts
Rubbish dumping	Construction and operation	Low	Low	Potential rubbish dumped by workers and/or residents	Potential for rubbish to spread into areas outside the development footprint	Anytime during construction and operation	Ongoing for the life of the development	Ongoing for the life of the development

Wood collection	Construction and operation	Low	Low	Potential removal of habitat by workers and/or residents	Potential habitat to be removed from areas outside the development footprint	Anytime during construction and operation	Ongoing for the life of the development	Ongoing for the life of the development
Bush rock removal and disturbance	Construction and operation	Low	Low	Potential removal of habitat by workers and/or residents	Potential habitat to be removed from areas outside the development footprint	Anytime during construction and operation	Ongoing for the life of the development	Ongoing for the life of the development
Vehicle strike	Construction and operation	Low	Very Low	Potential for native fauna to be struck by working machinery and moving vehicles	Within access roads and within development footprint	Daily, during construction and operational phases	Ongoing for the life of the development	Potential long-term impacts.
Increased risk of fire	Construction and operation	Medium	Low	Potential for fire to spark during construction and operation from any machinery or electrical works	Adjacent vegetation	Anytime during construction and operation	Anytime during construction and operation	Anytime during construction and operation

3.2.3 Potential Prescribed Biodiversity Impacts

No prescribed biodiversity impacts are anticipated from the proposed development. The site does not contain any habitat features identified in s.8.2.1.2 of the BAM. The proposal would not severe or significantly interfere with a habitat corridor.

3.3 Impact Summary

3.3.1 Serious and Irreversible Impacts

The OEH (2017) *Guidance to Assist a Decision-maker to Determine a Serious and Irreversible Impact* lists the ecological communities and species that are 'potential serious and irreversible impact (SAII) entities'. There are no series and irreversible impact (SAII) entities relevant to this assessment.

3.3.2 Impacts Which Require an Offset

Refer to Appendix E for BAM summary reports.

3.3.3 Impacts Not Requiring an Offset

N/A

3.3.4 Identification of Areas Not Requiring Assessment

N/A

4 BIODIVERSITY CREDIT REPORT

The Biodiversity Credit Report is provided in the following pages.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00032062/BAAS18020/22/00032063

Proposal Name
Industrial Subdivision - Rutherford

BAM data last updated *
24/11/2021

Assessor Name
Sarah Elizabeth Jones

Assessor Number
BAAS18020

BAM Data version *
50

Proponent Names

Report Created
27/05/2022

BAM Case Status
Open

Assessment Revision
0

Assessment Type
Part 4 Developments (General)

Date Finalised
To be finalised

BOS entry trigger
BOS Threshold: Area clearing threshold

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

Potential Serious and Irreversible Impacts

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

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Grantiella picta / Painted Honeyeater

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
1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	2.9	0	0	0
1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	Not a TEC	3.4	53	0	53

1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1600, 1601, 1604	-	1601_Poor	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.
1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 1178, 1589, 1600, 1601	Hunter-Macleay Dry Sclerophyll Forests >=70% and <90%	1601_Moderate	Yes	53	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.

1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Diuris tricolor / Pine Donkey Orchid	**1601_Moderate**	0.7	8.00
Hieraaetus morphnoides / Little Eagle	**1601_Poor, 1601_Moderate**	2.1	16.00
Lophoictinia isura / Square-tailed Kite	**1601_Poor, 1601_Moderate**	2.1	16.00
Ninox connivens / Barking Owl	**1601_Moderate**	0.7	11.00
Ninox strenua / Powerful Owl	**1601_Moderate**	0.7	11.00
Ozothamnus tesselatus / Ozothamnus tesselatus	**1601_Moderate**	0.7	8.00
Planigale maculata / Common Planigale	**1601_Moderate**	0.7	11.00
Prostanthera cineolifera / Singleton Mint Bush	**1601_Moderate**	0.7	11.00
Pterostylis chaetophora / Pterostylis chaetophora	**1601_Moderate**	0.7	11.00
Tyto novaehollandiae / Masked Owl	**1601_Poor**	1.4	10.00

Credit Retirement Options

Like-for-like credit retirement options

	Spp	IBRA subregion
Diuris tricolor / Pine Donkey Orchid	**Diuris tricolor /** Pine Donkey Orchid	Any in NSW

Hieraaetus morphnoides / Little Eagle	Spp	IBRA subregion
	Hieraaetus morphnoides / Little Eagle	Any in NSW
Lophoictinia isura / Square-tailed Kite	Spp	IBRA subregion
	Lophoictinia isura / Square-tailed Kite	Any in NSW
Ninox connivens / Barking Owl	Spp	IBRA subregion
	Ninox connivens / Barking Owl	Any in NSW
Ninox strenua / Powerful Owl	Spp	IBRA subregion
	Ninox strenua / Powerful Owl	Any in NSW
Ozothamnus tesselatus / Ozothamnus tesselatus	Spp	IBRA subregion
	Ozothamnus tesselatus / Ozothamnus tesselatus	Any in NSW
Planigale maculata / Common Planigale	Spp	IBRA subregion
	Planigale maculata / Common Planigale	Any in NSW
Prostanthera cineolifera / Singleton Mint Bush	Spp	IBRA subregion

	Prostanthera cineolifera / Singleton Mint Bush	Any in NSW
Pterostylis chaetophora / Pterostylis chaetophora	Spp	IBRA subregion
	Pterostylis chaetophora / Pterostylis chaetophora	Any in NSW
Tyto novaehollandiae / Masked Owl	Spp	IBRA subregion
	Tyto novaehollandiae / Masked Owl	Any in NSW

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APPENDIX A SITE PLANS

APPENDIX B PLOT FLORISTIC SURVEY DATA

APPENDIX D QUALIFICATIONS, LICENSING AND CERTIFICATION

Qualifications

Fieldwork for this project was undertaken by Ryan Herbert and Nick Weigner. Report writing for this project was undertaken by Ryan Herbert with editing and review by Sarah Jones. Qualifications are provided in the table below.

Sarah Jones	***Ecologist / Bushfire Planning Consultant*** B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas) *BAAS 18020 Accredited Assessor, as required by the Biodiversity Conservation Regulation 2017 and accredited to apply the BAM* Member of the Ecological Consultants Association of NSW
Nick Weigner	***Ecologist*** B.Sc. (Zoology & Ecology) (Hons)

Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL100533;
- Animal Research Authority (Trim File No: TRIM 11/5655) issued by NSW Department of Primary Industries; and
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: TRIM 11/5655) issued by Department of Primary Industries.

Certification

As the project certifier, I, Sarah Jones make the following certification:

- This Biodiversity Development Assessment Report has been prepared in accordance with the Biodiversity Assessment Method established under the NSW Biodiversity Conservation Act 2016.
- The results presented in the report are, in the opinion of the principal author and certifier, a true and accurate account of the species recorded, or considered likely to occur within the site;
- Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, or where the survey work has been

undertaken with specified departures from industry standard guidelines, details of which are discussed and justified in Section 2;

- All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the *Animal Research Act 1995, National Parks and Wildlife Act 1974* and the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*.

Signature of Certifier:

Sarah Jones
B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas)
Ecologist / Bushfire Planner

BAAS 18020 Accredited Assessor

APPENDIX E BAM SUMMARY REPORTS

BAM Candidate Species Report

Proposal Details

Assessment Id 00032062/BAAS18020/22/00032063	Proposal Name Industrial Subdivision - Rutherford	BAM data last updated * 24/11/2021
Assessor Name Sarah Elizabeth Jones	Report Created 27/05/2022	BAM Data version * 50
Assessor Number BAAS18020	Assessment Type Part 4 Developments (General)	BAM Case Status Open
Assessment Revision 0	Date Finalised To be finalised	BOS entry trigger BOS Threshold: Area clearing threshold

* 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 bynoeana Bynoe's Wattle	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?
Callistemon linearifolius Netted Bottle Brush	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Callocephalon fimbriatum Gang-gang Cockatoo	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Calyptorhynchus lathami Glossy Black-Cockatoo	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Cercartetus nanus Eastern Pygmy-possum	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Cryptostylis hunteriana Leafless Tongue Orchid	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Cynanchum elegans White-flowered Wax Plant	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Delma impar Striped Legless Lizard	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	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus castrensis Singleton Mallee	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?
Eucalyptus parramattensis subsp. decadens Eucalyptus parramattensis subsp. decadens	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Eucalyptus pumila Pokolbin Mallee	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Grevillea parviflora subsp. parviflora Small-flower Grevillea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Hoplocephalus bitorquatus Pale-headed Snake	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?
Litoria brevipalmata Green-thighed Frog	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Monotaxis macrophylla Large-leafed Monotaxis	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?
Ninox connivens Barking Owl	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox strenua Powerful Owl	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Ozothamnus tesselatus Ozothamnus tesselatus	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Persoonia pauciflora North Rothbury Persoonia	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Petauroides volans Greater Glider	No (surveyed)	☐ Jan ☐ Feb ☑ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascogale tapoatafa Brush-tailed Phascogale	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?
Planigale maculata Common Planigale	Yes (assumed present)	☐ 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?
Prostanthera cineolifera Singleton Mint Bush	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Pterostylis chaetophora Pterostylis chaetophora	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rutidosis heterogama Heath Wrinklewort	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Thesium australe Austral Toadflax	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Tyto novaehollandiae Masked Owl	Yes (assumed present)	☐ 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
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Eastern Cave Bat	Vespadelus troughtoni	Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints

Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Pink-tailed Legless Lizard	Aprasia parapulchella	Habitat constraints Geographic limitations
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Rough Doubletail	Diuris praecox	Refer to BAR
Swift Parrot	Lathamus discolor	Habitat constraints

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00032062/BAAS18020/22/00032063	Industrial Subdivision - Rutherford	24/11/2021
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	27/05/2022	50
Assessor Number	BAM Case Status	Date Finalised
BAAS18020	Open	To be finalised
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

* 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

Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter												
1	1601_Poor	Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions	14.9	14.9	2.8	PCT Cleared - 71%	High Sensitivity to Potential Gain	Endangered Ecological Community	Critically Endangered	2.00		0
											Subtotal	**0**
Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter												
2	1601_Moderate	Not a TEC	31.8	31.8	3.4	PCT Cleared - 71%	High Sensitivity to Potential Gain			2.00		53
											Subtotal	**53**
											Total	**53**

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

Diuris tricolor / Pine Donkey Orchid (Flora)									
1601_Moderate	31.8	31.8	0.67			Vulnerable	Not Listed	False	8
								Subtotal	**8**
Hieraaetus morphnoides / Little Eagle (Fauna)									
1601_Poor	14.9	14.9	1.4			Vulnerable	Not Listed	False	8
1601_Moderate	31.8	31.8	0.67			Vulnerable	Not Listed	False	8
								Subtotal	**16**
Lophoictinia isura / Square-tailed Kite (Fauna)									
1601_Poor	14.9	14.9	1.4			Vulnerable	Not Listed	False	8
1601_Moderate	31.8	31.8	0.67			Vulnerable	Not Listed	False	8
								Subtotal	**16**
Ninox connivens / Barking Owl (Fauna)									
1601_Moderate	31.8	31.8	0.67			Vulnerable	Not Listed	False	11
								Subtotal	**11**
Ninox strenua / Powerful Owl (Fauna)									
1601_Moderate	31.8	31.8	0.67			Vulnerable	Not Listed	False	11
								Subtotal	**11**
Ozothamnus tesselatus / Ozothamnus tesselatus (Flora)									
1601_Moderate	31.8	31.8	0.67			Vulnerable	Vulnerable	False	8
								Subtotal	**8**
Planigale maculata / Common Planigale (Fauna)									
1601_Moderate	31.8	31.8	0.67			Vulnerable	Not Listed	False	11
								Subtotal	**11**

Prostanthera cineolifera / Singleton Mint Bush (Flora)									
1601_Moderate	31.8	31.8	0.67			Vulnerable	Vulnerable	False	11
								Subtotal	**11**
Pterostylis chaetophora / Pterostylis chaetophora (Flora)									
1601_Moderate	31.8	31.8	0.67			Vulnerable	Not Listed	False	11
								Subtotal	**11**
Tyto novaehollandiae / Masked Owl (Fauna)									
1601_Poor	14.9	14.9	1.4			Vulnerable	Not Listed	False	10
								Subtotal	**10**

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00032062/BAAS18020/22/00032063	Industrial Subdivision - Rutherford	24/11/2021
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	27/05/2022	50
Assessor Number	Assessment Type	BAM Case Status
BAAS18020	Part 4 Developments (General)	Open
Assessment Revision	BOS entry trigger	Date Finalised
0	BOS Threshold: Area clearing threshold	To be finalised

* 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)
Barking Owl	Ninox connivens	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Black Falcon	Falco subniger	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Diamond Firetail	Stagonopleura guttata	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Eastern False Pipistrelle	Falsistrellus tasmaniensis	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Flame Robin	Petroica phoenicea	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Gang-gang Cockatoo	Callocephalon fimbriatum	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter

Glossy Black-Cockatoo	Calyptorhynchus lathami	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Greater Broad-nosed Bat	Scoteanax rueppellii	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Grey-headed Flying-fox	Pteropus poliocephalus	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Koala	Phascolarctos cinereus	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Large Bent-winged Bat	Miniopterus orianae oceanensis	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Little Bent-winged Bat	Miniopterus australis	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Little Eagle	Hieraaetus morphnoides	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Little Lorikeet	Glossopsitta pusilla	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Masked Owl	Tyto novaehollandiae	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Powerful Owl	Ninox strenua	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Regent Honeyeater	Anthochaera phrygia	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Scarlet Robin	Petroica boodang	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Speckled Warbler	Chthonicola sagittata	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Spotted-tailed Quoll	Dasyurus maculatus	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Square-tailed Kite	Lophoictinia isura	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Swift Parrot	Lathamus discolor	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Turquoise Parrot	Neophema pulchella	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter

Varied Sittella	Daphoenositta chrysoptera	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
White-bellied Sea-Eagle	Haliaeetus leucogaster	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
White-throated Needletail	Hirundapus caudacutus	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Yellow-bellied Glider	Petaurus australis	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter

Threatened species Manually Added

None added

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

Common Name	Scientific Name	Plant Community Type(s)
Painted Honeyeater	Grantiella picta	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter

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
Painted Honeyeater	Grantiella picta	Refer to BAR

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00032062/BAAS18020/22/00032063	Industrial Subdivision - Rutherford	24/11/2021
Assessor Name	**Report Created**	**BAM Data version ***
Sarah Elizabeth Jones	27/05/2022	50
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS18020	Part 4 Developments (General)	Open
Assessment Revision	**Date Finalised**	**BOS entry trigger**
0	To be finalised	BOS Threshold: Area clearing threshold

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Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones

1	1601_Poor	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	Poor	2.85	2	
2	1601_Moderate	1601-Spotted Gum - Narrow-leaved Ironbark-Red Ironbark shrub - grass open forest of the central and lower Hunter	Moderate	3.35	2	