Department of Planning and Environment

Biodiversity Development Assessment Report,
100 Explorers Way, St Clair

Site photo: Looking from the eastern boundary across the site through *Melaleuca decora* to the north-west corner

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Final Report 30 June 2022 Version 2

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Document control

Version	Date	Author	Details
1	30Jun22	Dr Daniel McDonald	Final issued with development application

Summary

- **Development description:**

  The proposal is to construct an aged care residential complex with an Asset Protection Zone (APZ). It will require removal of existing structures and the clearing of native and exotic plant species.

- **Reason why a BDAR has been prepared (reason for entering the BOS):**

  A BDAR is required for this project as clearing of native vegetation that is included in the NSW Biodiversity Values mapping is proposed.

- **Measures to avoid and minimise:**

  Avoidance and minimisation of biodiversity impacts was included in the development of the proposal at two stages.

  The first consideration of avoidance occurred during the initial concept stage. The concept proposal included the retention of native vegetation in both the northern and southern parts of the site.

  The second consideration of avoidance occurred during development of the final proposal. The retention of tall native shrubs *Melaleuca decora* at the northern part of the site was increased.

  Plant community types (PCTs), threatened ecological communities (TECs) and ecological communities (ECs) listed under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act):

  The native vegetation on the site best matches PCT724 Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay-gravel soils of the Cumberland Plain, Sydney Basin Bioregion. PCT724 is associated with the following Threatened Ecological Community (TEC): the Endangered Ecological Community (EEC) Shale Gravel Transition Forest.

  The areas of the site where indigenous Eucalyptus species and Melaleuca decora are growing are identified as the NSW EEC Shale Gravel Transition Forest. PCT724 is also considered to be present on other parts of the site, but the grassland and exotics vegetation is too degraded to be identified as the NSW EEC.

  The areas of indigenous Eucalyptus species and Melaleuca decora do not meet the Commonwealth's condition thresholds. The Commonwealth Critically Endangered Ecological Community Shale Gravel Transition Forest is not present on the site.

- **Threatened species:**

  No threatened species listed by the NSW government or by the Commonwealth government were recorded during the site survey. The proponent has elected to assume presence of the following threatened species described in Table E1. This is because some seasonal surveys were not undertaken.

- **Impacts, including direct, indirect, prescribed, and serious and irreversible impacts (SAII):**

  Proposed impacts include the clearing of PCT724. The impact to an ecological community that requires an offset is shown in Table E1.

  Proposed impacts also include impacts on species that area assumed to be present. The impacts that generate an offset species credit requirement is shown in Table E2.

  No significant indirect or prescribed impacts are generated by the proposal.

  Two species (entities) that are assumed to be present are described as SAII species.

- **Final offset requirements (table format):**
  The final offset requirements for the proposal are displayed in Tables E1 and E2.

Table E1 Impacts that require an offset – ecosystem credits

Vegetation zone	PCT	TEC/EC	Impact area (ha)	Number of ecosystem credits required
1	PCT724	Shale Gravel Transition Forest in the Sydney Basin Bioregion	0.23	3

Table E2 Impacts that require an offset – species credits

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
Thick Lip Spider Orchid	*Caladenia tessellata*	Assumed presence 0.23 ha	5
Netted Bottle Brush	*Callistemon linearifolius*	Assumed presence 1 individual	2
Dillwynia tenuifolia	*Dillwynia tenuifolia*	Assumed presence 0.23 ha	3
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	Assumed presence 0.23 ha	3
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Assumed presence 0.92 ha	4
Hibbertia fumana	*Hibbertia fumana*	Assumed presence 0.23 ha	5
Green and Golden Bell Frog	*Litoria aurea*	Assumed presence 0.92 ha	1
Marsdenia viridiflora R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora* subsp. *viridiflora* - endangered population	Assumed presence 0.23 ha	3
Cumberland Plain Land Snail	*Meridolum corneovirens*	Assumed presence 0.23 ha	3

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
Southern Myotis	*Myotis macropus*	Assumed presence 0.22 ha	3
Squirrel Glider	*Petaurus norfolcensis*	Assumed presence 0.22 ha	3
Pimelea curviflora var. curviflora	*Pimelea curviflora var. curviflora*	Assumed presence 0.23 ha	3
Dural Land Snail	*Pommerhelix duralensis*	Assumed presence 0.23 ha	3
Pultenaea parviflora	*Pultenaea parviflora*	Assumed presence 0.23 ha	3
Matted Bush-pea	*Pultenaea pedunculata*	Assumed presence 0.23 ha	3

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Shortened forms

APZ	asset protection zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	critically endangered ecological community
DBH	diameter at breast height over bark
EC	ecological community listed under the EPBC Act
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EEC	endangered ecological community
HTW	high threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	*Local Land Services Act 2013* (NSW)
MNES	matters of national environmental significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
PCT	plant community type
SAII	serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
VEC	vulnerable ecological community
Vegetation SEPP	*State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (NSW)

Declarations

i. Certification under clause 6.15 *Biodiversity Conservation Act 2016*

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Signature: _ Daniel McDonald ___

Date: _30 June 2022_____

BAM Assessor Accreditation no: **BAAS17056**_____

This BDAR has been prepared to meet the requirements of BAM 2020. Appendix A provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix K.

The lead or responsible assessor for the project must certify in the BDAR that the report has been prepared on the basis of the requirements of, and information provided under the BAM as at a specified date, and that date is within 14 days of the date the report is submitted to the decision-maker.

The BAM Calculator (BAM-C) must also be finalised and submitted within the Biodiversity Offsets and Agreement Management System (BOAMS). The date the assessor certifies (signs) the BDAR does not need to match the date on the finalised credit report; however, to be considered valid, the BDAR must be submitted to the decision-maker within 14 days of the finalisation of the BAM-C.

ii. Details and experience of author/s and contributors

Authors and contributors

Name	BAM Assessor Accreditation no. (if relevant)	Position/Role	Tasks performed	Relevant qualifications
Daniel McDonald	BAAS17056	BAM Accredited Assessor	Field surveys, report preparation, use of the BAM-C.	BAM Accredited Assessor
Mark Sherring		Botanist	Field survey and BAM plot survey	Experienced botanist
Jesse Cass		Botanist	Field survey, BAM plot survey and GIS map preparation	botanist
Nathan Sharman		Botanist	Analysis of BAM plot data and preparation of data for entry into the BAM-C.	botanist
Danny Wotherspoon		Ecologist	Field survey	Experienced ecologist

iii. Conflict of interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest:

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature: __  _____

Date: _30 June 2022_____

BAM Assessor Accreditation no: **BAAS17056**_____

Stage 1: Biodiversity assessment

1. Introduction

1.1 Proposed development

1.1.1 Development overview

The proposed development is to construct an aged care residential complex with an Asset Protection Zone (APZ). It will require removal of existing structures and the clearing of native and exotic vegetation.

In detail, *the development application seeks consent for the construction of a two storey residential care facility comprising 154 aged care beds, associated facilities for the care of residents including kitchen and laundry facilities, dining rooms, lounge rooms, activity and exercise areas, an allied health area, nurse stations, utility rooms, staff facilities, café for residents and their visitors and associated site services including 37 car parking spaces, an ambulance space, waste management, stormwater management and landscaping* (BBC 2021).

The proposed development requires consent under Part 4 of the EP&A Act.

1.1.2 Location

The site is in western Sydney. The location is 94-100 Explorers Way, St. Clair (Lot 36 in DP 239502). Refer to Figure 1 Site Map and Figure 2 Location Map>

1.1.3 Proposed development and the subject land

- The proposal requires the clearing of both grassland dominated by exotic plant species and areas of native vegetation.
- The proposal includes associated infrastructure works required to support operations of the proposal. Driveways, footpaths, stormwater management, asset protection zones, and landscaping are all included in the proposal.
- It is assumed that temporary infrastructure will be required during the construction phase. This could include park up areas, stockpiles, waste or storage zones, temporary buildings.
- A recommendation of this report is the installation of tree protection/environmental zone fencing prior to any earthworks or vegetation clearing works. The fencing must remain until the completion of all construction works.

Subject land

The site is approximately 1.057 ha (10,570 m^2) in size. The size of the development footprint within the site is approximately 9719 m^2. The development footprint includes the footprint of the building, associated infrastructure as well as earthworks and landscaping.

General description of the site

The existing site is approximately 1.057 ha in size. It is defined as the lot boundaries of Lot 26 DP 239502.

A shallow drainage swale enters the site near the middle of the western boundary and then exits the site near the north-east corner. The highest elevation on the site is along Explorers Way at the south-west corner at approximately 56.6 m above sea level. The lowest elevation of 52.6 m on the site is near the north-east corner.

Geology and soils

General information about geology and soils are provided by eSpade for the locality including the site. The site is mapped as occurring within the Berkshire Park soil landscape.

https://www.environment.nsw.gov.au/Salisapp/resources/spade/reports/9030bp.pdf

The geology is described as:

> *The soils of this landscape are the result of three depositional phases of Tertiary alluvial/colluvial origin. The lowest deposit is the St Marys formation. This is overlain by the Rickabys Creek gravel formation, which is of varying thickness and in turn is topped by the Londonderry Clay formation.*
>
> *All of these formations are derived from sandstone and clay. Erosion of the surface has led to exposure of all three formations in different locations.*

General information about the Berkshire Park soil landscape is also provided by eSpade:

> *Soils—weakly pedal orange heavy clays and clayey sands, often mottled. Ironstone nodules common. Large (up to 20 cm) silcrete boulders occur in sand/clay matrix. Solods (Dy3.41), Yellow Podzolic Soils (Dy4.11, Dy2.11, Dy2.21, Dy2.22), Red Podzolic Soils (Dr4.11), Chocolate Soils (Dr4.11, Dr4.61), Structured Plastic Clays (Uf6.11, Uf6.12), Structured Clays (Uf5.23, Gn4.11 and Gn3.11).*

Alliance Geotechnical (28 April 2015) reported on the results of three test pits. The test pit (TP3) near the north-west corner identified soil that appears relatively undisturbed. Two other test pits, one near the drainage line (TP2) and a third (TP1) near the centre of the site, both identified fill at the top of the test pit profiles.

Martens Consulting Engineers (March 2021) undertook a geotechnical assessment of the site. The borehole and test pits were located approximately on the southern three-quarters of the site, generally away from the larger indigenous trees. Fill or topsoil was present in the upper profile of all boreholes and test pits.

In summary, fill appears to be common on parts of the site that are presently clear of large indigenous trees.

Additionally, Martens noted trace fine gravels or trace fine ironstone gravels near the original soil surface in all seven assessed boreholes.

Current and previous land use

Recent land use on the site is as a residential property. An historic air photo c. 1947 indicates that the site had been largely cleared.

1.1.4 Other documentation

Anonymous (undated) 200714 – Survey – 12605 – 1 Overall Plan

Alliance Geotechnical (18 April 2015) Preliminary Site Investigation 94-100 Explorers Way, St Clair, NSW (1842/ER-1-1)

BBC Consulting Planners (August 2021) Statement of Environmental Effects to accompany a development application for construction of a residential care facility, including demolition of an existing dwelling house, landscaping, drainage and associated works. Lot 36 in DP239502. Prepared for Opal HealthCare.

Bushfire Code and Bushfire Hazard Solutions Pty Limited (15 October 2020) Bush Fire Constraints and Opportunities Assessment At 94 – 100 Explorers Way, St Clair NSW. Reference Number 210370.

Henry and Hymas (Oct 2020) Bulk earthworks plan St Clair RACF 100 Explorers Way St Clair NSW (Drawing number: 19755_DA_BE01 Rev01).

Henry and Hymas (Oct 2020) General arrangements plan St Clair RACF 100 Explorers Way St Clair NSW (Drawing number: 19755_DA_C100 Rev05).

Henry and Hymas (Oct 2020) Sediment & erosion control plan St Clair RACF 100 Explorers Way St Clair NSW (Drawing number: 19755_DA_SE01 Rev05).

Martens consulting engineers (March 2021) Geotechnical Assessment: Proposed Opal Aged Care Facility 94-100 Explorers Way, St Clair, NSW (P2007910JR02V01)

treeiQ (30 March 2021) Arboricultural Impact Assessment (Project No: OPAL/STCLAIR/20 Report No: OPAL/STCLAIR/AIA/A) Revision A.

1.2 Biodiversity Offsets Scheme entry

The Biodiversity Offset Scheme (BOS) applies to the proposed development as part of the development footprint overlaps the Biodiversity Values Map. (Figure 4)

Conclusion

The proposed development/activity includes activities or clearing on land displayed on the biodiversity values map. A Biodiversity Development Assessment Report must be prepared for the proposal by an Accredited Assessor for the proposal to proceed.

1.3 Excluded impacts

There are no excluded impacts relevant to the site.

The site is within the Penrith LGA. All the Penrith LGA is defined as "*Land excluded from the Local Land Services Act 2013".* Category 1 – exempt land does not exist on land excluded from the Local land Services Act 2013.

1.4 Matters of national environmental significance

The Commonwealth government has published *Advice to the Minister for the Environment, Heritage and the Arts from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

The advice addresses the ecological community called *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.* The publication is undated. At the time of publication the Chair of the Commonwealth Threatened Species Scientific Committee was Associate Professor Robert J.S. Beeton AM FEIANZ.

The Advice provides "condition thresholds". Pages seven (7) to nine (9) of the advice provide the following information:

> "*Condition thresholds are intended to function as a set of criteria that assists in identifying when the EPBC Act is likely to apply to an ecological community."*

Table 1 from the *Advice* is reproduced below:

Table 1. ***Condition Thresholds for Patches[3] that meet the Description for the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community.***

Category and rationale	***Thresholds***
A*. Core thresholds that apply under most circumstances: patches with an understorey dominated by natives and a minimum size that is functional and consistent with the minimum mapping unit size applied in NSW.*	*Minimum patch[3] size is ≥0.5ha;* *AND* *≥50% of the perennial understorey vegetation cover[4] is made up of native species.*
OR	
B. *Larger patches which are inherently valuable due to their rarity.*	*The patch size is ≥5ha;* *AND* *≥30% of the perennial understorey vegetation cover is made up of native species.*
OR	
C. *Patches with connectivity to other large native vegetation remnants in the landscape.*	*The patch size is ≥0.5 ha;* ***AND*** *≥30% of the perennial understorey vegetation cover is made up of native species;* ***AND*** *The patch is contiguous[5] with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) that is ≥5ha in area.*
OR	
D. *Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain.*	*The patch size is ≥0.5 ha in size;* ***AND*** *≥30% of the perennial understorey vegetation cover is made up of native species;* ***AND*** *The patch has at least one tree with hollows per hectare or at least one large tree (≥80 cm dbh) per hectare from the upper tree layer species outlined in the Description and Appendix A.*

[3] A patch is defined as a discrete and continuous area that comprises the ecological community, outlined in the Description. Patches should be assessed at a scale of 0.04 ha or equivalent (e.g. 20 m x 20 m plot). The number of plots (or quadrats or survey transects) per patch must take into consideration the size, shape and condition across the site. Permanent man-made structures, such as roads and buildings, are typically excluded from a patch but a patch may include small-scale disturbances, such as tracks or breaks or other small-scale variations in native vegetation that do not significantly alter the overall functionality of the ecological community, for instance the easy movement of wildlife or dispersal of spores, seeds and other plant propagules.

[4] Perennial understorey vegetation cover includes vascular plant species of the ground and shrub layers (as outlined in the Description and Appendix A) with a life-cycle of more than two growing seasons (Australian Biological Resources Study, 2007). Measurements of perennial understorey vegetation cover exclude annuals, cryptogams, leaf litter or exposed soil (although these are included in a patch of the ecological community when they do no alter functionality as per footnote 3 and the Description and Condition Thresholds are met).

[5] Contiguous means the woodland patch is continuous with, or in close proximity (within 100 m), of another patch of vegetation that is dominated by native species in each vegetation layer present.

An assessment of the native vegetation on-site using the information in Table 1

Threshold A: *Minimum patch[3] size is ≥0.5ha; AND ≥50% of the perennial understorey vegetation cover[4] is made up of native species.*

Response:

The acceptable size of small-scale disturbances is not stated in the *Advice*. However, it states that "*Permanent man-made structures, such as roads and buildings, are typically excluded from a patch.* The site is part of a Shale-Gravel Transition Forest patch that extends east to Erskine Park Road. Based upon the *Cumberland Plain West 2013* Vegetation mapping the patch is at least 4.64 ha in size. This area (4.64 ha) is greater than the minimum size of 0.5 ha.

The percentage of perennial understorey vegetation cover was derived from BAM plot 2. The Commonwealth defines the understorey cover as both the ground and shrub layers. Two shrub species, *Melaleuca decora* and *Sigesbeckia orientalis* were recorded within BAM plot 2. However, in general smaller shrubs are rare on the site.

The indigenous ground (vegetation) cover within the BAM was approximately 20%. This is less than the required *perennial understorey vegetation cover of 50%.* As the required *perennial understorey vegetation cover is* less than 50%, threshold A is NOT achieved.

Threshold B: *The patch size is ≥5ha; AND ≥30% of the perennial understorey vegetation cover is made up of native species.*

Response:

The patch size is close to the threshold of five (5) hectares, but it is less than the threshold for patch size.

The percentage of perennial understorey vegetation cover was derived from BAM plot 2. The Commonwealth defines the understorey cover as both the ground and shrub layers. Two shrub species, *Melaleuca decora* and *Sigesbeckia orientalis* were recorded within BAM plot 2. However, in general smaller shrubs are rare on the site.

The indigenous ground (vegetation) cover within the BAM was approximately 20%. This is less than the required *perennial understorey vegetation cover of 30%* (*Threshold B part 2*).

As the required *perennial understorey vegetation cover is* less than 50%, threshold B is NOT achieved.

Threshold C: *The patch size is ≥0.5 ha; AND ≥30% of the perennial understorey vegetation cover is made up of native species; AND The patch is contiguous[5] with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) that is ≥5ha in area.*

Response:

Based upon the *Cumberland Plain West 2013* Vegetation mapping the patch is at least 4.64 ha in size. This area (4.64 ha) is greater than the minimum size of 0.5 ha.

The percentage of perennial understorey vegetation cover was derived from BAM plot 2. The Commonwealth defines the understorey cover as both the ground and shrub layers. Two shrub species, *Melaleuca decora* and *Sigesbeckia orientalis* were recorded within BAM plot 2. However, in general smaller shrubs are rare on the site.

The indigenous ground (vegetation) cover within the BAM was approximately 20%. This is less than the required *perennial understorey vegetation cover of 30%.*

A survey of nearby *native vegetation* that is contiguous with the vegetation was not undertaken. However, some of the nearby vegetation was viewed from the site. Small to medium sized shrubs also appeared rare in the nearby vegetation.

Threshold C is NOT achieved as the groundcover layer is less than the required *perennial understorey vegetation cover of 30%.*

Threshold D: *The patch size is ≥0.5 ha in size; AND ≥30% of the perennial understorey vegetation cover is made up of native species; AND The patch has at least one tree with hollows per hectare or at least one large tree (≥80 cm dbh) per hectare from the upper tree layer species outlined in the Description and Appendix A.*

Response:

Based upon the *Cumberland Plain West 2013* Vegetation mapping the patch is at least 4.64 ha in size. This area (4.64 ha) is greater than the minimum size of 0.5 ha.

The percentage of perennial understorey vegetation cover was derived from BAM plot 2. The Commonwealth defines the understorey cover as both the ground and shrub layers. Two shrub species, *Melaleuca decora* and *Sigesbeckia orientalis* were recorded within BAM plot 2. However, in general smaller shrubs are rare on the site.

The indigenous ground (vegetation) cover within the BAM was approximately 20%. This is less than the required *perennial understorey vegetation cover of 30%.*

A large *Eucalyptus fibrosa* is present in the north-west corner of the site with a dbh of approximately 110 cm. This tree is larger than the threshold of 80 cm.

Threshold D is NOT achieved as the groundcover layer is less than the required *perennial understorey vegetation cover of 30%.*

Conclusion:

None of the four thresholds published in the Commonwealth's advice are breached. The Commonwealth condition thresholds for Shale-Gravel Transition Forest are not achieved for the native vegetation on the site. Thus, it is likely that the EPBC Act does not apply to the ecological community on the site.

1.4.1 General consideration of the Commonwealth EPBC Act

Shale-Gravel Transition Forest is protected under Commonwealth legislation by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999) and is listed as Critically Endangered. The provisions of the EPBC Act potentially apply to this proposal. However, as noted above the Shale-Gravel Transition Forest that is present on the site does not meet the Commonwealth's condition thresholds.

There were no other Critically Endangered or Endangered species or communities, or Vulnerable species recorded on the site. The provisions of the EPBC Act are unlikely to apply to this proposal.

1.5 Information sources

- BAM 2020
- BioNet TBDC
- BioNet Vegetation Classification (formerly known as the NSW Vegetation Information System Classification Database)
- BioNet Vegetation Classification (formerly known as the NSW Vegetation Information System Classification Database)
- BioNet Atlas (formerly known as the NSW Wildlife Atlas).
- BioNet NSW (Mitchell) Landscapes – Version 3.1
- NSW Interim Biogeographic Regions of Australia (IBRA region and subregion) – Version 7.
- Remnant Vegetation of the western Cumberland subregion, 2013 Update VIS_ID 4207. It is available from: https://datasets.seed.nsw.gov.au/dataset/remnant-vegetation-of-the-western-cumberland-subregion-2013-update-vis_id-4207fd1f4.

2. Methods

2.1 Site context methods

2.1.1 Landscape features

Landscape features were investigated using a combination of desktop work and fieldwork.

The GIS was used to determine the Mitchell Landscape. The GIS dataset "*Remnant Vegetation of the western Cumberland subregion, 2013 Update"* was for the desktop assessment of mapped native vegetation on the site and in the locality.

The field assessment focused on the site, Nearby landscape features were checked as required.

2.1.2 Native vegetation cover

Native vegetation was derived from the GIS dataset "Cumberland Plain West native vegetation 2013. A comprehensive ground-based assessment of the accuracy of the GIS mapping was not undertaken during the preparation of this BDAR.

2.2 Native vegetation, threatened ecological communities and vegetation integrity methods

2.2.1 Existing information

Following the vegetation survey of the site, the plant species records were compared to BioNet VIS and the publication Tozer *et al.* (2010). The NSW SEED website was used to download local vegetation mapping. The GIS dataset Cumberland Plain West native vegetation 2013 was appropriate for the locality.

2.2.2 Mapping native vegetation extent

The vegetation zones were mapped using a combination of aerial imagery and groundwork. The remnant vegetation that included trees was patchy on the site. Some small areas of pasture were included in the vegetation zone "*PCT724 -good - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay:gravel soils of the Cumberland Plain, Sydney Basin Bioregion*". This was undertaken when individual trees or groups of trees were less than 50 m from other individual trees or clumps of trees.

2.2.3 Plot-based vegetation survey

Both the aerial photo investigation and the on-ground survey indicated that two vegetation zones are present on the site. The size of the site is approximately 1.057 ha. The BAM 2020 requires a minimum of one plot per vegetation zone. As there are two vegetation zones, a plot will be required for each zone. The site will require two plots in total to survey the society.

One plot was located within the open area of grassland. The second plot was located in the area of native shrubs and trees. The second plot was separated into two parts, see below.

It was difficult to randomly place to the two plots on the site. The size of the site and the configuration each vegetation zone limited the availability of plot locations.

2.2.4 Vegetation integrity survey

All vascular species that could be identified to genus or species within the two 20 x 20 m plots were recorded.

Within the 400 m^2 plot, the percentage of foliage cover for each species (live plants only) was estimated including canopy overhanging the plot, even if the plant's stem was rooted outside the plot.

The diameter at breast height over bark (dbh in centimetres) was measured from each tree with a diameter tape. For multi-stemmed trees, only the largest living stem was included in the dbh measurement. The presence of hollows and lengths of any fallen logs were recorded.

Litter (and other matter) cover was recorded from five 1 m x 1 m plots placed alternately approximately at right angles, approximately five (5) metres from the long axis centre line of each plot.

Figure 6 indicates the location of the plots.

Location, size and shape of Vegetation integrity survey plots

The grassland plot was in an area where the whole 20 x 50 m plot could be located contiguously.

There was no contiguous area of the forest zone where a single plot of 50 x 20 m could be placed. The plot was separated into two parts. One plot was a 20 m x 20 m plot, including a 20 m x 20 m subplot for recording structure and function attributes. The second subplot of 30 m x 20 m was in another appropriate part of the site to provide the required information to complete recording of structure and function attributes.

2.3 Threatened flora survey methods

2.3.1 Review of existing information

The following information provides guidance to the surveyors undertaking the flora survey.

The publication "*Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method*" provides relevant information.

Plantnet the website of the NSW Royal Botanic Gardens provides information about the habitat requirements of various threatened plant species.

The NSW government's online Threatened Biodiversity Data Collection.

Additionally, publication such as Alan Fairley's *Seldom Seen* and the Belinda Pellow and co-author's book *Flora of the Sydney Region* provide additional information.

The lead author of this BDAR and other staff at Abel Ecology have extensive field experience in the Sydney Basin and have observed many threatened plant species.

2.3.2 Habitat constraints assessment

There are broadly three microhabitats on the site:

1. Open grassland;

2. Shaded area beneath the trees and shrubs; and

3. Periodically wetter area along the shallow drainage swale.

Each of these microhabitats was surveyed.

2.3.3 Field surveys

A flora survey was conducted to collect the data required for the NSW Biodiversity Assessment Methodology.

This included vegetation integrity plots recording:

- Species present;
- foliage cover;
- the number of large trees;
- tree stem size diversity;
- tree regeneration;
- presence of hollows;
- length of fallen logs and litter cover.

2.4 Threatened fauna survey methods

2.4.1 Review of existing information

Habitat constraints and microhabitats for threatened species were identified from the field ecologist background as well as information found in the Threatened Biodiversity Data Collection.

2.4.2 Habitat constraints assessment

The site is relatively small (1 ha) and few constraints were encountered.

2.4.3 Field surveys

The fauna survey relied primarily upon incidental observations of the fauna as well as signs of their presence. Any calls identified during the site assessment were recorded.

2.5 Weather conditions and Abel Ecology staff involved in fieldwork

Abel Ecology staff have visited the site on four occasions (Table 2).

Table 2. Survey details from 2021 and 2022

Date	Times	Staff	Weather (°C)	Task	Hours (hrs x no. people)
20 Oct 20	10:05 – 12:00	Danny Wotherspoon		Flora and fauna survey	(1.92 x 1) = 1.92 hrs
1 Apr 22	9:00 – 15:58	Mark Sherring, Jesse Cass	17 – 19 °C, light rain	Flora and fauna survey, BAM plots	(6.97 x 2) = 13.94 hrs
2 Jun 22	11:15 – 14:20	Daniel McDonald	11 - 18 °C~~, fine~~	General flora and fauna survey, site inspection	(3.08 x 1) = 3.08 hrs
21 Jun 22	15:20 – 17:00	Daniel McDonald	15 – 17 °C, fine with occasional v. light rain.	BAM plot data recording	(1.66 x 1) = 1.66 hrs
				Total	**20.6 hrs**

Over the four days of fieldwork a total of 20.6 hours were spent undertaking survey work on the site and surrounding habitat areas.

2.6 Limitations

Surveys were not conducted during summer. Some fauna species that visit the site in summer, may be missed. Similarly, orchids that flower outside the site survey visits and that lose their aerial stems after fruiting may be missed.

The site was relatively small and open. The site was relatively easy to visually survey for multiple species simultaneously.

3. Site context

3.1 Assessment area

The site occurs in the suburb of St Clair within the Penrith local government area. Nearby land use is commonly residential. The M4 motorway is next to the northern boundary of the site.

The wider area also includes open areas, creeklines with remnant vegetation and commercial/industrial areas.

The total native vegetation within the 1500 m buffer is approximately 76.4 ha. The size of the 1500 m buffer is 772 ha. The native vegetation cover within 1500 m of the site is equal to: 76.4/772 = 9.9 % (10%).

Refer to Figure 2 Location Map

3.2 Landscape features

Landscape features identified within the subject land and assessment area are shown on Figure 1 Site Map and Figure 2 Location Map, respectively. A discussion of relevant landscape features is provided below.

3.2.1 IBRA bioregions and IBRA subregions

A desktop GIS was used to determine that the site is in the Sydney Basin IBRA bioregion and the Cumberland IBRA subregion.

3.2.2 Rivers, streams, estuaries and wetlands

Two major systems are present within the 1500 m buffer of the site. Ropes Creek is approximately 820 m to the east and Byrnes Creek (Strahler stream order 1) is approximately 890 m to the west.

Ropes Creek and its tributaries are present as both Strahler stream order watercourses 2 and 3 within 1500 m of the site.

Dams and other open water areas are also present within the 1500 m buffer. The closest larger area of open water is next to Loire Place in St Clair. It is approximately 400 m east of the site.

A shallow swale is present at the rear of the site. It is not shown as a Strahler stream on the 1:25,000 topographic map.

3.2.3 Habitat connectivity

The native trees and shrubs on the site are reasonably connected to remnant vegetation or plantings along the M4 motorway. The vegetation along the M4 connects to the remnant vegetation along Ropes Creek to the east.

3.2.4 Karst, caves, crevices, cliffs, rocks or other geological features of significance

No karst, caves, crevices, cliffs, naturally occurring rocks or other geological features of significance were observed on the site.

Small areas of dumped blue metal gravel and sandstone rocks were observed during the field survey.

3.2.5 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value, as identified under the BC Act are present within the subject land or within the 1500 m assessment area.

3.2.6 NSW (Mitchell) landscape

The site is part of the Cumberland Plain Mitchell Landscape.

3.2.7 Additional landscape features identified in SEARs

No Secretary's Environmental Assessment Requirements (SEARs) were received for the proposal.

3.2.8 Soil hazard features

This subsection only applies to vegetation clearing proposals (i.e. development that requires approval from the Native Vegetation Panel under Part 5A of the LLS Act, or the Vegetation SEPP).

The proposal is not a vegetation clearing proposal as defined above.

3.3 Native vegetation cover

Native vegetation cover was identified using the GIS dataset "Remnant Vegetation of the western Cumberland subregion, 2013 Update"'

Table 3 summarises the extent of native vegetation cover within the assessment area. Figure 7 shows native vegetation cover within the assessment area.

Table 3 Native vegetation cover in the assessment area

Assessment area (ha)	772.2744 ha
Total area of native vegetation cover (ha)	76.437 ha
Percentage of native vegetation cover (%)	9.8%
Class (0-10, >10-30, >30-70 or >70%)	0-10 % class

3.3.1 Patch size

The BAM 2020 operational manual stage 1 provides the following information about patch size:

> *The patch is allocated to a patch size class (<5 ha, 5–<25 ha, 25–<100 ha or ≥100 ha – see BAM Subsection 4.3.2) by the BAM-C. Patch size class is used as a filter to predict threatened species likely to occur in or use habitat on subject land (see Part 3 of this Manual).*

Native vegetation on the site is either within 100 m of other native vegetation or directly connected to native vegetation that extends off-site. The off-site vegetation extends to the east and is connected to native vegetation along Ropes Creek. The patch size class is larger than 101 ha. One hundred and one (101) ha will be used as the patch size class as it is the maximum size class.

4. Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation extent

Native vegetation is defined as any native NSW vascular plant species. On the site there were three broad vegetation types:

1. The remnant trees *Eucalyptus* spp. and *Melaleuca decora;*

2. The area of grassland;

3. The vegetation within the broad shallow swale.

All three broad vegetation types had at least occasional native species, although they were generally very rare in the grassland.

As all areas of vegetation on the site include at least scattered indigenous species, all vegetated parts of the site are classified as native vegetation.

Refer to Figure 7 Native vegetation extent.

4.1.1 Changes to the mapped native vegetation extent

Site conditions appear like the aerial photo. There are not obvious differences between the mapped vegetation extent and aerial imagery.

Refer to Figure 7 Native vegetation extent.

4.1.2 Areas that are not native vegetation

The current definition of native vegetation appears to be broad. Individual native vascular plant species were found in all three broad vegetation types. Thus, all three broad vegetation types are potentially native vegetation. Native vascular plant species are rare within the grassland.

Refer to Figure 7 Native vegetation extent.

4.2 Plant community types

4.2.1 Overview

The total extent of native vegetation on the site is approximately 10,206 m^2. This area includes the grassland areas where individual native plants are generally scattered. The amount of 10,206 m^2 includes all parts of the site where vegetation is present. The existing dwelling and associated hard surface areas were excluded.

Native vegetation on the site is identified as PCT724 Castlereagh shale – gravel transition forest (Table 4). Although the grassland area is a very disturbed form of PCT724 as the soil appears to be mostly fill within the grassland area. Additionally, native plants are scattered to rare.

Table 4 PCTs identified within the subject land

PCT ID	PCT name	Subject land area (ha)
PCT724	Castlereagh shale – gravel transition forest	1.0206 ha
	Total area	**1.0206 ha**

4.2.2 PCT724 Castlereagh shale – gravel transition forest

4.2.2.1 PCT overview

Table 5 provides more information about PCT724 Castlereagh shale – gravel transition forest.

Table 5 PCT Castlereagh shale – gravel transition forest

PCT ID	PCT724
PCT name	Castlereagh shale – gravel transition forest
Vegetation formation	Dry sclerophyll forests (shrub/grass sub-formation)
Vegetation class	Cumberland Dry Sclerophyll Forests
Per cent cleared value (%)	75.00
Extent within subject land (ha)	1.0206 ha*

**Note: the majority of the 1.0206 ha would not be identified as PCT724 in native vegetation mapping datasets, such as Remnant Vegetation of the western Cumberland subregion, 2013 Update"".*

Vegetation zone 1 - Trees and taller shrubs

The vegetation on the site has been identified as PCT724. The native tree and tall shrub areas of vegetation on the site clearly align with native vegetation. Section 4.2.2.2 provides additional information about the selection of PCT724

Vegetation zone 2 - grassland

The BAM 2020 requires the following:

> *Section 4.2.2*
>
> *2. The assessor must identify the most likely PCTs where vegetation on the subject land, or on part of the subject land:*
>
> *is missing structural layers,*

The grassland area is obviously missing the tree and taller shrub area. The majority of the local indigenous groundcover layer is also missing. Despite the absence of many indigenous species the grassland area is identified as an area of PCT724. It is identified as PCT724 as it is considered that the grassland areas of the site most likely historically (pre-1750 or prior to native vegetation clearing) supported PCT724.

4.2.2.2 Condition states

There are three broad vegetation types on the site. The area of tree and taller shrubs is included in the PCT724 moderate vegetation zone. The vegetation within the shallow swale that includes a *Melaleuca decora* is also allocated to the PCT724 moderate vegetation zone. The shallow swale vegetation zone is discussed in more detail in Section 4.4.1 below.

The second vegetation zone on the site is the PCT724 grassland management zone.

4.2.2.3 Justification of PCT selection

Local vegetation mapping, namely *Remnant Vegetation of the western Cumberland subregion, 2013 Update VIS_ID 420* was viewed. The vegetation mapping showed PCT724 Castlereagh shale-gravel transition forest on the site.

The name of PCT724 is Castlereagh shale-gravel transition forest. The scientific name of PCT724 is Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion.

The NSW Vegetation Information System (VIS) (BioNet Vegetation Classification) online database provides additional information about PCT724.

The Species upper stratum are listed as:
Eucalyptus fibrosa and
Melaleuca decora.

The Species middle stratum are listed as:
Daviesia ulicifolia,
Lissanthe strigosa and *Bursaria spinosa*.

The Species ground stratum are listed as:
Microlaena stipoides,
Opercularia diphylla,
Lomandra multiflora,
Chelianthes sieberi,
Aristida vagans,
Pratia purpurascens,
Themeda australis,
Wahlenbergia gracilis,
Poranthera microphylla,
Desmodium gunnii,
Dichelachne micrantha,
Goodenia hederacea,
Lomandra filiformis,
Dichondra repens,
Brunonia australis,
Dianella revoluta,
Hypericum gramineum,
Lepidosperma cf*. laterale,*
Oxalis perennans and
Panicum simile.

The site appears to have been significantly disturbed. However, some local indigenous species are present. The most common canopy species on the site is *Melaleuca decora.* The largest tree on the site is a *Eucalyptus fibrosa.* These two species are the upper stratum species for PCT724.

Mid-sized shrubs are generally absent from the site. One of the small number of shrub species present on the site is *Bursaria spinosa* it is a middle stratum species for PCT724.

The number of local indigenous groundcover species was generally low. Species described as PCT724 ground stratum species present on the site include: Microlaena stipoides, Pratia purpurascens (now *Lobelia purpurascens*), Dichondra repens, Poranthera microphylla. While there are a relatively small number of PCT724 ground cover species present on the site, this is most likely due to the disturbance history of the site. The number of indigenous groundcover species on the site is relatively low.

In conclusion, the native vegetation on the site is allocated to PCT724.

Other PCTs mapped nearby on the Remnant Vegetation of the western Cumberland subregion, 2013 Update VIS_ID 420 include:

> PCT835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.
>
> PCT849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion.
>
> PCT850 Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion.

None of these three PCTs include Eucalyptus fibrosa or Melaleuca decora in the scientific description of upper stratum or middle stratum species.

The PCTs 835, 849 and 850 were reviewed, these PCTs are a poorer match to the vegetation on the site when compared to PCT724.

4.2.2.4 Alignment with TECs

The BioNet Vegetation Classification Threatened Ecological Communities (TEC) listings for PCT724 are:

Shale gravel transition forest in the Sydney Basin Bioregion – listed in the NSW BC Act.

The areas of indigenous trees and taller shrubs are a reasonable match to the description in the NSW Scientific Committee final determination for Shale gravel transition forest in the Sydney Basin Bioregion.

The grassland vegetation zone is does not match the description in the the NSW Scientific Committee final determination for Shale gravel transition forest in the Sydney Basin Bioregion. Paragraph four (4) of the final determination states:

> *4. Shale Gravel Transition Forest is predominantly of open-forest structure, usually with trees of Eucalyptus fibrosa sometimes with E. moluccana and Eucalyptus tereticornis. Melaleuca decora is frequently present in a small tree stratum. A sparse shrub stratum is usually present with species such as Bursaria spinosa, Daviesia ulicifolia and Lissanthe strigosa. Ground-layer species include Microlaena stipoides subsp. stipoides, Cheilanthes sieberi subsp. sieberi, Themeda australis, Opercularia diphylla, Lomandra multiflora subsp. multiflora, Aristida vagans, Pratia purpurascens and Wahlenbergia gracilis.*

The grassland vegetation zone does not have an "*open-forest*" structure.

Paragraph eight (8) of the final determination states:

> *8. Disturbed Shale Gravel Transition Forest remnants are considered to form part of the community including where the vegetation would respond to assisted natural regeneration, such as where the natural soil and associated seedbank is still at least partially intact.*

Two geotechnical assessments for the site (Alliance Geotechnical (18 April 2015) and Martens Consulting Engineers (March 2021)) both indicate that filling on some parts of the site has occurred.

Within the areas that have been filled the natural soil and associated seedbank is not intact.

The grassland areas on the site do not meet two of paragraph descriptions in the final determination. The grassland areas are unlikely to be considered to be the ecological community Shale-gravel transition forest.

4.2.2.5 Alignment with EPBC Act listed ECs

Shale-gravel transition forest is included in the ecological community Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest – listed in the EPBC Act. However, as discussed in Section 1.4 the area of indigenous tree and taller shrub vegetation does not meet the condition thresholds for the Commonwealth listed ecological community.

4.3 Threatened ecological communities

TECs and where relevant, ECs identified within the subject land are listed in Table 6 and their extent is shown on Figure 9 Threatened ecological communities and ECs.

Table 6 TECs within the subject land

TEC name	Profile ID (from TBDC)	BC Act status	EPBC Act status	Associated vegetation zones within the subject land	Area within subject land (ha)
Shale gravel transition forest	10754	Endangered Ecological Community	Endangered Ecological Community*	PCT724 moderate	0.3045

** The areas of trees and taller shrubs do not meet the condition thresholds for the EPBC Act listed Shale gravel transition forest.*

4.4 Vegetation zones

Three broad vegetation groupings were identified on the site. The broad vegetation groups were simplified and allocated to two vegetation zones. The two vegetation zones are described below.

4.4.1 VZ1 - PCT724 - moderate - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay:gravel soils of the Cumberland Plain, Sydney Basin Bioregion

The majority of the area on site with indigenous trees and taller shrubs. The allocation of this area to PCT724 is described in Section 4.2.2.3.

Shallow drainage swale vegetation

A shallow drainage swale occurs towards the rear of the site. It appears that it is an original feature of the site. Figure 17 appears to show the same feature. Growing in the shallow drainage swale are plant species more typical of wetter areas were recorded, such as *Typha* sp., *Persicaria decipiens, Elatine gratioloides, Alternanthera denticulata and Juncus usitatus.* The total size of shallow drainage swale is approximately 170 m^2.

Section 4.2 of BAM 2020 states: "*The assessor must identify and map the distribution of PCTs, or the most likely PCTs, and all TECs on the subject land. The identification must be in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification."*

While it is relatively easy to identify the appropriate PCT for the areas of Melaleuca decora and indigenous Eucalyptus species, the appropriate PCT for the wetter area vegetation is less clear.

Within the drainage swale a large *Melaleuca decora* is growing. The other species with a relatively large amount of cover in the wetter parts of the drainage channel is *Typha. Typha* species are native, but they can also be weedy and invasive. It may not be indigenous to the site.

The Bionet Vegetation Classification online tool was used to decide if the area of plants that grow in wetter areas matched a PCT. Three PCT found in coastal areas included *Typha* as a stratum species. The coastal PCTs were: 781 Coastal freshwater wetland, 783 Coastal freshwater swamps of the Sydney Basin Bioregion and 1737 Typha rushland.

Each of the three PCTs (781, 783 and 1737) was checked in the BioNet Vegetation Classification online tool:

https://www.environment.nsw.gov.au/NSWVCA20PRapp/search/keysearch.aspx

Each of the three PCTs appeared to be characteristic of larger areas of wetland vegetation. Shrub and large tree species listed as upper and middle stratum species included:
Melaleuca ericifolia,
Casuarina glauca,
Banksia robur,
Callistemon citrinus,
Hakea teretifolia,
Leptospermum juniperinum,
Melaleuca linariifolia,
Melaleuca nodosa,

Melaleuca quinquinervia,
Melaleuca stypheloides,

Similarly, *Persicaria decipiens* was also used in the search tool to identify PCTs that included this species. *Persicaria decipiens* was the plant that had the highest cover after *Melaleuca decora* and *Typha* sp. within the shallow drainage swale. Coastal PCTs that included *Persicaria decipiens* are: 85 as well as others listed above. PCT1318 is a coastal PCT but it is it includes "riparian scrub of the Bega and Towamba valleys" within the PCT scientific name. It was excluded from the list of possible PCTs. The additional PCTs were checked and none were a reasonable match.

In consequence, the indigenous vegetation within the shallow swale was included in the PCT724 mapped on the site. The most prominent plant found within the swale is the *Melaleuca decora. Melaleuca decora* is included in the scientific name of PCT724 and it is also listed as one of the two upper stratum species for this community.

4.4.2 VZ2 - PCT724 -pasture and exotics - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay-gravel soils of the Cumberland Plain, Sydney Basin Bioregion

As stated above, the assessor "*must identify and map the distribution of PCTs, or the most likely PCTs, and all TECs on the subject land.* Large parts of the site have experienced significant disturbance. The aerial photos (c. 1947) indicates that the site has been at least partially cleared at that date. Additionally, the geotechnical reports (Alliance Geotechnical 2015 and Martens consulting engineers 2021) indicate that many parts of the site have been filled. Indigenous species within Vegetation Zone 2 (VZ2) are rare.

Only one possible indigenous species was recorded within the quadrat, an *Oxalis* sp. Exotic and indigenous *Oxalis* sp. are difficult to distinguish without flowers or fruit. The *Oxalis* sp. within the quadrat was listed as an indigenous species as a precautionary measure. Indigenous species elsewhere in this vegetation zone were generally rare but included *Sporobolus creber.* Floristically, it is difficult to align this vegetation zone with a PCT. However, historically it is likely that the PCT724 occurred probably over the whole site. Consequently, vegetation zone 2 is allocated to PCT724.

Table 7 Vegetation zones and patch sizes

Vegetation zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
PCT724 - mod	PCT724 Shale gravel transition forest	*Melaleuca decora* is common	0.305	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1 plot	1 plot	1 plot	Plot 1
PCT724 – pasture and exotics	PCT724 Shale gravel transition forest	Indigenous trees and taller shrubs are rare to absent	0.716	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1 plot	t plot	1 plot	Plot 2

The total site area is 1.057 ha. The site includes the two vegetation zones and an area (0.036 ha) of buildings and other hard surfaces. Note: areas are approximate.

4.5 Vegetation integrity (vegetation condition)

4.5.1 Vegetation integrity survey plots

One vegetation integrity plot has been sampled in each of the vegetation zones. This achieves the minimum number of plots required for the two vegetation zones.

4.5.2 Scores

Table 8 Vegetation integrity scores

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
VZ1 - PCT724 - mod	13.6	52.6	31.9	28.3	Yes
VZ2 - PCT724 – pasture and exotics	0.2	0.4	0	0.1	No

Only one possible hollow was observed on site in the large *Eucalyptus fibrosa* in the north-western corner. The possible hollow was small with a entrance diameter of less than 10 cm. The large *Eucalyptus fibrosa* is in VZ1.

4.5.3 Use of benchmark data

The benchmark data relied upon is published in the BioNet Vegetation Classification website. No local benchmark data was used in the preparation of this BDAR.

5. Habitat suitability for threatened species

5.1 Identification of threatened species for assessment

5.1.1 Ecosystem credit species

Table 9 Predicted ecosystem credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	Vul	-	No	☒ BAM-C	Yes			High
Diamond Firetail	*Stagonopleura guttata*	Vul	-	No	☒ BAM-C	Yes			Moderate
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	Vul	-	No	☒ BAM-C	Yes			Moderate
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	Vul	-	No	☒ BAM-C	Yes			High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Eastern Osprey	*Pandion cristatus*	Vul	-	Yes	☒ BAM-C	Yes			Moderate
Flame Robin	*Petroica phoenicea*	Vul	-	No	☒ BAM-C	Yes			Moderate
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vul	Vul	Yes	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1	Moderate
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	Vul	-	No	☒ BAM-C	Yes			Moderate
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	Vul	Vul	Yes	☒ BAM-C	Yes			High
Little Bent-winged Bat	*Miniopterus australis*	Vul	-	Yes	☒ BAM-C	Yes			High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Little Lorikeet	*Glossopsitta pusilla*	Vul	-	No	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1	High
Regent Honeyeater	*Anthochaera phrygia*	Crit End	Crit End	Yes	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1	High
Scarlet Robin	*Petroica boodang*	Vul	-	No	☒ BAM-C	Yes			Moderate
Speckled Warbler	*Chthonicola sagittata*	Vul	-	No	☒ BAM-C	Yes			High
Spotted-tailed Quoll	*Dasyurus maculatus*	Vul	End	No	☒ BAM-C	Yes			High
Swift Parrot	*Lathamus discolor*	End	Crit End	No	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Vul	-	Yes	☒ BAM-C	Yes			High
White-throated Needletail	*Hirundapus caudacutus*	-	Vul	No	☒ BAM-C	Yes			High
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Vul	-	Yes	☒ BAM-C	No	2. Habitat constraints	Habitat constraints are not present in any zone on the site.	High

Grey-headed Flying-fox – This species was excluded from the grassland zone as foraging resources are not present.

Koala – This species was excluded as suitable koala feed trees are rare on the site.

Little Lorikeet - – This species was excluded from the grassland zone as foraging resources are not present.

Regent Honeyeater - – This species was excluded from the grassland zone as foraging resources are not present.

Swift Parrot - This species was excluded from the grassland zone as foraging resources are not present.

Glossy Black-Cockatoo – This species was excluded from further assessment because there were no suitable feed trees (Casuarinaceae) on the site.

5.1.2 Species credit species

Table 10 Predicted flora species credit species

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Bynoe's Wattle	*Acacia bynoeana*	End	Vul	☒ BAM-C	Yes		
Downy Wattle	*Acacia pubescens*	Vul	Vul	☒ BAM-C	Yes		
Allocasuarina glareicola	*Allocasuarina glareicola*	End	End	☒ BAM-C	Yes		
Thick Lip Spider Orchid	*Caladenia tessellata*	End	Vul	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Netted Bottle Brush	*Callistemon linearifolius*	Vul	-	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Dillwynia tenuifolia	*Dillwynia tenuifolia*	Vul	-	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Juniper-leaved Grevillea	*Grevillea juniperina subsp. juniperina*	Vul	-	☒ BAM-C	Yes		

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	Vul	Vul	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Gyrostemon thesioides	*Gyrostemon thesioides*	End	-	☒ BAM-C	Yes		
Hibbertia fumana	*Hibbertia fumana*	Crit End	-	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora subsp. viridiflora - endangered population*	End	-	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Micromyrtus minutiflora	*Micromyrtus minutiflora*	End	Vul	☒ BAM-C	Yes		
Nodding Geebung	*Persoonia nutans*	End	End	☒ BAM-C	Yes		

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Pimelea curviflora var. curviflora	*Pimelea curviflora var. curviflora*	Vul	Vul	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Pultenaea parviflora	*Pultenaea parviflora*	End	Vul	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Matted Bush-pea	*Pultenaea pedunculata*	End	-	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Dillwynia tenuifolia, Kemps Creek	*Dillwynia tenuifolia - endangered population*	End Pop	-	☒ BAM-C	No	1. Geographic limitations	

Thick Lip Spider Orchid - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Netted Bottle Brush - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Dillwynia tenuifolia - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Small-flowered Grevillea - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Hibbertia fumana - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Marsdenia viridiflora subsp. *viridiflora* - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Pimelea curvilflora var. *curviflora* - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Pultenaea parviflora - – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Matted Bush-pea – This species was excluded from Zone 2. Zone 2 has experienced extensive disturbance including soil filling.

Dillwynia tenuifolia Kemps Creek. This species was excluded as it not within the geographic limitations for the endangered population of *Dillwynia tenuifolia.*

Table 11 Predicted fauna species credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Vul	-	Yes		No	2. Habitat constraints	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Vul	-	Yes	☒ BAM-C	Yes		
Green and Golden Bell Frog	*Litoria aurea*	End	Vul	No	☒ BAM-C	Yes		
Cumberland Plain Land Snail	*Meridolum corneovirens*	End	-	No	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Southern Myotis	*Myotis macropus*	Vul	-	No	☒ BAM-C	Partial (when a species is retained within one vegetation	2. Habitat constraints	Zone 1

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
						zone but not another)		
Squirrel Glider	*Petaurus norfolcensis*	Vul	-	No	☒ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Dural Land Snail	*Pommerhelix duralensis*	End	End	No	☐ BAM-C	Partial (when a species is retained within one vegetation zone but not another)	2. Habitat constraints	Zone 1
Eastern Osprey	*Pandion cristatus*	Vul	-	Yes	☒ BAM-C	No	2. Habitat constraints	Zone 1
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vul	Vul	Yes	☒ BAM-C	No	2. Habitat constraints	
Koala	*Phascolarctos cinereus*	End	End	Yes	☒ BAM-C	No	1. Geographic limitations	
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	Vul	-	Yes	☒ BAM-C	No	2. Habitat constraints	
Little Bent-winged Bat	*Miniopterus australis*	Vul	-	Yes	☒ BAM-C	No	2. Habitat constraints	

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Regent Honeyeater	*Anthochaera phrygia*			Yes	☒ BAM-C	No	1. Geographic limitations	
Swift Parrot	*Lathamus discolor*			Yes	☒ BAM-C	No	1. Geographic limitations	

Glossy Black-cockatoo – This species was excluded as there were no living or dead hollow bearing trees with hollows greater then 15 cm diameter and greater than 8 m above ground.

Cumberland Plain Land Snail – This species was excluded from assessment in Zone 2. Zone 2 is disturbed and the habitat features required by this species are not present.

Southern Myoits – This species was excluded from assessment in Zone 2. Key habitat features such as open bodies of water for foraging and hollows for roosting were not present in Zone 2.

Squirrel Glider – This species was excluded from assessment in Zone 2. This species is generally an arboreal species. No indigenous trees are present in Zone 2.

Dural Land Snail - This species was excluded from assessment in Zone 2. Zone 2 is disturbed and the habitat features required by this species are not present.

Eastern Osprey – No stick-nests in living, dead trees or artificial structures were present on the site.

Grey-headed Flying-fox – No Grey-headed Flying-fox breeding camps are present on the site.

Koala – The site is not included in the important area mapping for the Koala.

Large Bent winged Bat – No caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding is present on the site.

Little Bent winged Bat – No caves, tunnel, mine, culvert or other structure known or suspected to be used for breeding is present on the site.

Regent Honeyeater – The site is not included in the important area mapping for the Regent Honeyeater.

Swift Parrot – – The site is not included in the important area mapping for the Swift Parrot.

5.2 Presence of candidate species credit species

The remaining list of candidate species credit species was used to identify species determined to be present within the subject land based on:

- assumed presence within the subject land
- an important habitat map (for dual credit species)
- targeted threatened species surveys, or
- an expert report

in accordance with BAM Subsection 5.2.4.

Table 12 Determining the presence of candidate flora species credit species on the subject land

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Thick Lip Spider Orchid	*Caladenia tessellata*	End	Vul	Assumed present	Assumed present	Yes
Netted Bottle Brush	*Callistemon linearifolius*	Vul	-	Assumed present	Assumed present	Yes
Dillwynia tenuifolia	*Dillwynia tenuifolia*	Vul	-	Assumed present	Assumed present	Yes
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	Vul	Vul	Assumed present	Assumed present	Yes
Hibbertia fumana	*Hibbertia fumana*	Crit End	-	Assumed present	Assumed present	Yes
Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora subsp. viridiflora - endangered population*	End Pop.	-	Assumed present	Assumed present	Yes
Pimelea curviflora var. curviflora	*Pimelea curviflora var. curviflora*	Vul	Vul	Assumed present	Assumed present	Yes
Pultenaea parviflora	*Pultenaea parviflora*	End	Vul	Assumed present	Assumed present	Yes
Matted Bush-pea	*Pultenaea pedunculata*	End	-	Assumed present	Assumed present	Yes

Table 13 Determining the presence of candidate fauna species credit species on the subject land

Common name	Scientific name	Listing status		Method used to determine presence	Present ?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Vul	-	Assumed present	Assumed present	Yes
Green and Golden Bell Frog	*Litoria aurea*	End	Vul	Assumed present	Assumed present	Yes
Cumberland Plain Land Snail	*Meridolum corneovirens*	End	-	Assumed present	Assumed present	Yes
Southern Myotis	*Myotis macropus*	Vul	-	Assumed present	Assumed present	Yes
Squirrel Glider	*Petaurus norfolcensis*	Vul	-	Assumed present	Assumed present	Yes
Dural Land Snail	*Pommerhelix duralensis*	End	End	Assumed present	Assumed present	Yes

5.3 Threatened species surveys

The results of targeted threatened species surveys that were used to determine presence of the species are displayed in Table 14 and Table 15. Information about the dates and times of the surveys is provided in Table 2. Survey details from 2021 and 2022.

Table 14 Threatened species surveys for candidate flora species credit species on the subject land

Common name	Scientific name	Threatened flora species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	**Timing of survey – within recommended period?** (BAM-C / TBDC)		**Effort** (hours & no. people)		
Bynoe's Wattle	*Acacia bynoeana*	transects	☒ Yes Dates & times	☐ No Dates & times	Total = 20.6 hours	No	Yes
Downy Wattle	*Acacia pubescens*	transects	☒ Yes Dates & times	☐ No Dates & times	Total = 20.6 hours	No	Yes
Allocasuarina glareicola	*Allocasuarina glareicola*	transects	☒ Yes Dates & times	☐ No Dates & times	Total = 20.6 hours	No	Yes
Juniper-leaved Grevillea	*Grevillea juniperina subsp. juniperina*	transects	☒ Yes Dates & times	☐ No Dates & times	Total = 20.6 hours	No	Yes
Gyrostemon thesioides	*Gyrostemon thesioides*	transects	☒ Yes Dates & times	☐ No Dates & times	Total = 20.6 hours	No	Yes
Micromyrtus minutiflora	*Micromyrtus minutiflora*	transects	☒ Yes Dates & times	☐ No Dates & times	Total = 20.6 hours	No	Yes
Nodding Geebung	*Persoonia nutans*	transects	☒ Yes Dates & times	☐ No Dates & times	Total = 20.6 hours	No	Yes

Table 15 **Threatened species surveys for candidate fauna species credit species on the subject land**

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period?** (BAM-C / TBDC)		**Effort** (hours & no. people)		
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Visual observation for the bird, feeding signs and listening for calls.	☒ Yes Apr and Jun.	-	Total = 20.6 hours	No	No

5.4 Expert reports

No expert reports are provided to support this BDAR.

5.5 More appropriate local data (where relevant)

No local data has been used to assess habitat suitability in the preparation of this BDAR.

5.6 Area or count, and location of suitable habitat for a species credit species (a species polygon)

5.6.1 Area for species credit species

The following species were assumed to be present, and the suitable habitat was determined to be the size of vegetation zone 1.

Thick Lip Spider Orchid,

Dillwynia tenuifolia

Small-flower Grevillea

Hibbertia fumana

Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas

Pimelea curviflora var. *curviflora*

Pultenaea parviflora

Matted Bush-pea

Cumberland Plain Land Snail

Southern Myotis

Squirrel Glider

Dural Land Snail

The following species were assumed to be present, and the suitable habitat was determined to be the combined size of vegetation zone 1 and vegetation zone 2.

White-bellied Sea-Eagle

Green and Golden Bell Frog

5.6.2 Number of individuals for species credit species

No *Callistemon* species were recorded on the site. One individual of these species was assumed present to allow the BAM-C to function.

Table 16 Results for present species (recorded within the subject land)

Common name	**Scientific name**	**Biodiversity risk weighting** (BAM-C & TBDC*)	**SAII entity**** (BAM-C & TBDC)	**Habitat constraints / microhabitats present on the subject land / vegetation zone**	**Abundance – No. individual plants present on subject land** (flora with unit of measure of count)	**Extent (ha) of suitable habitat present on site** (flora or fauna with unit of measure of area)	**TBDC species specific recommendations e.g. buffers, general comments** (where relevant)	**Habitat condition** (vegetation integrity score for each vegetation zone in the polygon – area species only)
Thick Lip Spider Orchid	*Caladenia tessellata*	Very High (3)	Yes	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Netted Bottle Brush	*Callistemon linearifolius*	Moderate (1.5)	No	Assumed present	Assumed present – 1 individual	0.305 ha	Assumed present	28.3
Dillwynia tenuifolia	*Dillwynia tenuifolia*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Hibbertia fumana	*Hibbertia fumana*	Very High (3)	Yes	Assumed present	Assumed present	0.305 ha	Assumed present	28.3

Common name	**Scientific name**	**Biodiversity risk weighting** (BAM-C & TBDC*)	**SAII entity**** **(**BAM-C & TBDC)	**Habitat constraints / microhabitats present on the subject land / vegetation zone**	**Abundance – No. individual plants present on subject land** (flora with unit of measure of count)	**Extent (ha) of suitable habitat present on site** (flora or fauna with unit of measure of area)	**TBDC species specific recommendations e.g. buffers, general comments** (where relevant**)**	**Habitat condition** (vegetation integrity score for each vegetation zone in the polygon – area species only)
Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora subsp. viridiflora - endangered population*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Pimelea curviflora var. curviflora	*Pimelea curviflora var. curviflora*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Pultenaea parviflora	*Pultenaea parviflora*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Matted Bush-pea	*Pultenaea pedunculata*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3

Common name	**Scientific name**	**Biodiversity risk weighting** (BAM-C & TBDC*)	**SAII entity**** (BAM-C & TBDC)	**Habitat constraints / microhabitats present on the subject land / vegetation zone**	**Abundance – No. individual plants present on subject land** (flora with unit of measure of count)	**Extent (ha) of suitable habitat present on site** (flora or fauna with unit of measure of area)	**TBDC species specific recommendations e.g. buffers, general comments** (where relevant)	**Habitat condition** (vegetation integrity score for each vegetation zone in the polygon – area species only)
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	High (2)	No	Assumed present	Assumed present	1.021 ha	Assumed present	28.3, 0.1
Green and Golden Bell Frog	*Litoria aurea*	High (2)	No	Assumed present	Assumed present	1.021 ha	Assumed present	28.3, 0.1
Cumberland Plain Land Snail	*Meridolum corneovirens*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Southern Myotis	*Myotis macropus*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Squirrel Glider	*Petaurus norfolcensis*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3
Dural Land Snail	*Pommerhelix duralensis*	High (2)	No	Assumed present	Assumed present	0.305 ha	Assumed present	28.3

No EPBC Act listed species were recorded during the site visit.

6. Identifying prescribed impacts

No prescribed impacts that will or are likely to significantly impact on threatened species and their habitat were identified during the preparation of this BDAR.

Table 17 Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Example: Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	Not applicable.	Not applicable.
Human-made structures	☒Yes / ☐No	A dwelling is present on site. It is not known to provide roosting habitat for a threatened species. This is not considered a prescribed impact.	A dwelling is present on site. It is not known to provide roosting habitat for a threatened species. This is not considered a prescribed impact.
Non-native vegetation	☒Yes / ☐No	The site has exotic groundcovers, shrubs and trees. The removal of this vegetation is unlikely to be considered a prescribed impact.	The site has exotic groundcovers, shrubs and trees. Threatened species are unlikely to significantly use any of the exotic vegetation on the site. The removal of this vegetation is unlikely to be considered a prescribed impact.
Habitat connectivity	☐Yes / ☒No	Some habitat connectivity occurs along the trees adjacent to the M4. The removal of site vegetation is unlikely to impact the connectivity in the locality. The removal of the vegetation on site is unlikely to be considered a prescribed impact.	Threatened species on occasions may use the vegetation close to the M4. The removal of site vegetation is unlikely to impact the connectivity in the locality. This is not considered a prescribed impact.
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	An ephemeral shallow swale is present at the northern end of the site.	It is unknown if any threatened species use that part of the site. It appears that large bodies of open water are rarely, if ever present. The removal of modification of the swale is not considered a prescribed impact.
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	The proposal is not a wind farm development.	The proposal is not a wind farm development.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Vehicle strikes	☒Yes / ☐No	The site is in a suburban location. It is likely that vehicle strikes may occur on occasions. No significant increase in the likelihood of vehicle strike is likely to occur because of the proposal. This is not considered a prescribed impact.	The site is in a suburban location. It is likely that vehicle strikes may occur on occasions. No significant increase in the likelihood of vehicle strike is likely to occur because of the proposal. This is not considered a prescribed impact.

Stage 2: Impact assessment (biodiversity values and prescribed impacts)

7. Avoid and minimise impacts

7.1 Avoid and minimise direct and indirect impacts

7.1.1 Project location

The proposal is in a residential area. Surrounding land used includes other residential properties and a large road.

The Statement of Environmental Effects (BBC 2019) states:

> *The primary objectives of the proposed development are:*
>
> - *to meet growing needs for seniors housing in Penrith through the provision of a modern residential care facility with associated support services for the frail aged and people living with disabilities;*
> - *to provide a high-quality, high-amenity, well-designed, 24/7 residential care facility to meet contemporary seniors housing standards; and*
> - *to deliver a development that is compatible with the amenity of the locality and with the desired future character of adjoining uses and the surrounding area.*

7.1.2 Project design

Avoidance was achieved during two stages in the design of the project.

Concept design stage

Custance (28 July 2020) prepared a *Character and Mudmap Report - Phase 2* for the site. The principles discussed with the Urban Design Review Panel (UDRP) included *"Tree retention at the rear and front prepared".* The analysis included a map displaying the existing trees (page 10). The concept building footprint was located within the section of the site that generally contains less remnant indigenous trees (Page 13). The concept building footprint also noted the requirements for a 10 m setback at the front of the property adjacent to Explorers Way. A note highlighting the requirement for the rear of the site that is: *Bushfire and acoustic requirements* was included.

Amendments to the landscape plan and clarification of the proposed cut and fill works

An amended Landscape Master Plan was prepared by Taylor-Brammer (20 May 2022). Six additional indigenous trees were retained. The retention of the additional trees was considered acceptable by the bushfire consultant.

Moreover, during a review of the existing proposed cut and fill works, an inconsistency was noted. The proposed cut and fill works were redesigned to ensure that the proposed works are consistent with the proposed tree retention.

7.2 Avoid and minimise prescribed impacts

Changes to site characters, such as changes to the existing dwelling, exotic vegetation and vehicle use are unlikely to generate a prescribed impact.

7.3 Other measures considered

A significant reduction in the amount of vegetation clearing was briefly discussed. The existing proposal could not be achieved that was compliant with the requirements of bushfire hazard management if additional local native trees and shrubs were retained.

A single dwelling would allow the retention of more native vegetation. However, that type development is very different to the current proposal.

7.4 Summary of measures to avoid and minimise impacts

A summary of the measures undertaken to avoid and minimise impacts is provided in Table 18.

Table 18 Avoidance and minimisation measures for direct, indirect and prescribed impacts

Action	Outcome (Describe the outcome of implementing the measure, with reference to specific entities identified in Sections 4 and 5)	Timing	Responsibility
Concept design -focused on retention of better quality indigenous vegetation at the front and rear of the site.	Retention of better quality indigenous vegetation at the front and rear of the site.	Development of proposal – early stage.	Client and proposal development team.
Review of proposal – increase retention of better quality indigenous vegetation. Concurrence with bushfire consultant.	Increased amount of local indigenous vegetation, particularly *Melaleuca decora* retained by proposal.	Development of proposal – late stage.	Client and proposal development team.

8. Impact assessment

8.1 Direct impacts

The impacts and area of impact is described in Table 19

Table 19. Description of type of impact and area.

Site and surrounding features	Totals and subtotals	Within the site*	Outside the site
PCT724 – pasture and exotics to be removed		0.716	-
PCT724 – moderate - removed	0.223	0.219	0.004
PCT724 – moderate - retained	0.106	0.075	0.021
PCT724 – moderate – retained – understorey modified		0.011	-
Buildings and hard surfacing		0.036	
Total		**1.057**	

- *Areas are approximate (some rounding is present in the numbers in the table).*

Note The BAM calculator inputs exclude the small areas of PCT724 outside the site. This loss is only loss of canopy of trees and taller shrubs that extend beyond the site boundaries. No moderate condition PCT724 including native plants with stems rooted outside the site boundaries is proposed for removal.

8.1.1 Residual direct impacts

No significant residual impacts are expected from the proposal.

Table 20 Summary of residual direct impacts

Direct impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	**BC Act status**	**EPBC Act status**	**SAII entity**	**Project phase/timing of impact** (e.g. construction, operation, rehabilitation)	**Extent** (ha, number of individuals)
Native vegetation removal and disturbance potentially leading to weed incursion into adjacent retained native vegetation. The threatened ecological community on site is Shale-Gravel Transition Forest.	Endangered Ecological Community	Critically Endangered Ecological Community[1].	No	During site clearing works.	The weeds within the development footprint will be removed during site clearing works. An estimate of the total area of HTW within the PCT724 – mod vegetation zone is: 225 m^2.

[1]The form of Shale-Gravel Transition Forest on the site does not meet the condition thresholds that describe the EPBC listed ecological community.

The size of the PCT724 – mod vegetation zone to be retained with an unmodified groundcover is approximately 750 m^2. The HTW cover was approximately 30% within the PCT724 – mod vegetation zone. An estimate of the total area of HTW within the PCT724 – mod vegetation zone is: 225 m^2.

8.1.2 Change in vegetation integrity score

Table 23 documents the change in vegetation integrity for residual direct impacts on native vegetation, TECs, threatened species and their habitat that were identified on the subject land.

Table 21 Impacts to vegetation integrity

Vegetation zone	PCT ID	Management zone	Area (ha)	Before development			After development			Change		
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
Zone 1	724	MZ1 clear	0.22	13.6	52.6	31.9	28.3	0	0	0	0	-28.3
Zone 1	724	MZ2 gccle	0.01	13.6	52.6	31.9	16.2	4.6	40	23.4	16.2	-12.1
Zone 2	724	Not applicable	0.72	0.2	0.4	0	0.2	0	0	0	0	-0.2

Within Zone 1 MZ2 gccle (grouncover cleared) the trees and taller shrub layer will be retained as part of the proposed landscaping. The ground cover is proposed for removal.

It is recommended that a Vegetation Management Plan (VMP) for the site be included as a condition of consent. The VMP can describe and justify the proposed management actions to maintain the integrity of the remaining vegetation and prevent further decline.

The VMP must also describe weed management for the site.

8.2 Indirect impacts

No indirect impacts are anticipated by the proposal.

8.3 Prescribed impacts

No prescribed impacts that will or are likely to significantly impact on threatened species and their habitat were identified during the preparation of this BDAR.

Potential prescribed impacts are considered below.

8.3.1 Karst, caves, crevices, cliffs, rocks or other geological features of significance

Not present on the site.

8.3.2 Human-made structures

8.3.2.1 Nature

A residential dwelling is present on the site.

8.3.2.2 Extent

The footprint of the residential dwelling is approximately 288 m^2.

8.3.2.3 Duration

The residential dwelling will be completely removed if the proposal proceeds.

8.3.2.4 Consequences

No prescribed impacts that will or are likely to significantly impact on threatened entities and their habitat are expected.

8.3.3 Non-native vegetation

8.3.3.1 Nature

Currently, the BAM does not provide a clear test to separate native vegetation from non-native vegetation. The glossary of BAM2020 provides a broad definition of “native vegetation”.

Note it is important to separate the definition of NSW native plants from the definition of NSW native vegetation. A plant that is native to NSW is relatively easy to define.

Consequently, as all parts of the site include at least scattered NSW native plants they have been considered native vegetation. This report considers the vegetation zone “PCT724 – pasture and exotics” as native vegetation. However, as this vegetation zone is dominated by exotic species it is assessed as “non-native vegetation” in this section.

The non-native vegetation includes grassland dominated by exotic species and a large pine tree (*Pinus pinea*).

8.3.3.2 Extent

Approximately 7520 m^2 of non-native vegetation will be removed for the proposal.

8.3.3.3 Duration

The removal of the existing non-native vegetation will be permanent if the proposal proceeds.

8.3.3.4 Consequences

No prescribed impacts that will or are likely to significantly impact on threatened entities and their habitat are anticipated.

8.3.4 Habitat connectivity

Habitat connectivity is provided by the existing trees and shrubs next to the M4. No significant impact to habitat connectivity is expected from the proposal.

8.3.5 Waterbodies, water quality and hydrological processes

8.3.5.1 Nature

A shallow ephemeral swale is present at the northern part of the site.

8.3.5.2 Extent

The swale is approximately 170 m^2.

8.3.5.3 Duration

The swale will be permanently modified. An area similar in location and function to the swale is included as part of the proposal.

8.3.5.4 Consequences

No prescribed impacts that will or are likely to significantly impact on threatened entities and their habitat are anticipated.

The swale lacks the characteristics that would be typical foraging habitat of the Southern Myotis or the White-bellied Sea-eagle.

8.3.5.5 Maximum predicted offset liability

No longwall mining is included in the proposal. No calculation of the maximum predicted offset liability as per the *Addendum to the NSW Biodiversity Offsets Policy for Major Projects: upland swamps impacted by longwall mining subsidence* is provided.

8.3.6 Wind turbine strikes

A wind farm does not form part of the proposal.

8.3.7 Vehicle strikes

A site is an existing residential area. There may already be occasional vehicle strikes on threatened fauna and / or protected fauna that are part of a Threatened Ecological Community (TEC). No significant increase in vehicle strikes is expected from the proposal.

8.4 Mitigating residual impacts – management measures and implementation

No significant residual impacts are expected from the proposal

Table 22 Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

Mitigation measure (specify if none proposed and ensure an adaptive management strategy is developed and addressed in Section 8.5)	**Method/technique**	**Timing**	**Frequency**	**Responsibility**	**Likely efficacy** (including risk of failure)	**MNES** (when relevant)
Management of HTW within the retained Shale-Gravel Transition Forest on the site.	Weed control	Following construction works.	Annual	Site manager	High	Not relevant.

Table 23 Management of HTW and implementation

Measure/action	**Monitoring and evaluation strategy** (Data, frequency, timing and reporting)	**Performance criteria** (linked to monitoring and evaluation strategy)	**Adaptive management threshold** (trigger for adaptive management plan/actions)	**Adaptive management response** (when triggered)
Management of HTW within the retained Shale-Gravel Transition Forest on the site.	To be described in a VMP.	To be described in a VMP.	To be described in a VMP.	To be described in a VMP.

8.5 Adaptive management strategy for uncertain impacts (where relevant)

No adaptive management strategy is included in this proposal.

9. Serious and irreversible impacts

9.1 Assessment for serious and irreversible impacts on biodiversity values

Table 24 provides an outline of entities at risk of an SAII relevant to the proposed development.

Table 24 Entities at risk of an SAII

Common name	Scientific name	Reason for inclusion in assessment
Thick Lip Spider Orchid	*Caladenia tessellata*	It is considered highly unlikely this species is present on the site. As not appropriate seasonal survey was undertaken, this species is assumed to be present. The species is at risk of SAII.
Hibbertia fumana	*Hibbertia fumana*	It is considered highly unlikely this species is present on the site. As not appropriate seasonal survey was undertaken, this species is assumed to be present. The species is at risk of SAII.

9.1.1 Additional impact assessment provisions for TECs at risk of an SAII

No Threatened Ecological Community at risk of an SAII is on the site.

9.1.2 Additional impact assessment provisions for threatened species at risk of an SAII

9.1.2.1 Thick Lip Spider Orchid Caladenia tessellata

1. Actions to avoid and minimise direct and indirect impacts

Thick Lip Spider Orchid is included as a SAII as this BDAR assumes presence.

No direct actions are included to avoid or minimise direct or indirect impacts on this species are included in the proposal. An indirect action included in the proposal is the retention of some areas of the vegetation with higher integrity score on the site. The indirect action, that is avoidance is likely on average to assist in avoiding impacts on this species.

9.1.2.2 Hibbertia fumana

1. Actions to avoid and minimise direct and indirect impacts

Hibbertia fumana is included as a SAII as this BDAR assumes presence.

No direct actions are included to avoid or minimise direct or indirect impacts on this species are included in the proposal. An indirect action included in the proposal is the retention of some areas of the vegetation with higher integrity score on the site. The indirect action, that is avoidance is likely on average to assist in avoiding impacts on this species.

2. Current status of Thick Lip Spider Orchid Calladenia tessellata

Table 25 Current status – Thick Lip Spider Orchid Calladenia tessellata

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Unknown	Threatened Biodiversity Data Collection.	TBDC indicates data is unknown or deficient.
Evidence of small population size (Principle 2)			
Current population size in NSW	Approximately 120 plants	National Recovery Plan for the Thick-lip Spider-orchid *Caladenia tessellata.*	The data is not up to date. The National Recovery Plan was published in 2010.
Decline in species' population size in 3 years or one generation	Unknown	Threatened Biodiversity Data Collection.	TBDC indicates data is unknown or deficient.
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	Unknown	Threatened Biodiversity Data Collection.	TBDC indicates data is unknown or deficient.
Evidence of limited geographic range (Principle 3)			
Extent of occurrence (ha)	Approximately 26 ha in NSW and Victoria.	National Recovery Plan for the Thick-lip Spider-orchid *Caladenia tessellata.*	The data is not up to date. The National Recovery Plan was published in 2010.
Area of occupancy (ha)	Approximately 26 ha.	National Recovery Plan and Threatened Biodiversity Data Collection.	The data is not up to date. The National Recovery Plan was published in 2010.

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of threat-defined locations	One population is at risk of disturbance due to track and works associated with powerline maintenance. One site occurs on private land and whilst the current owners are very active in monitoring and protecting the species, there is a risk that future land owners may be less sympathetic to its protection.	Threatened Biodiversity Data Collection.	TBDC indicates data is unknown or deficient.
Whether the species' population is likely to undergo extreme fluctuations	*"There is no evidence of extreme fluctuations in the populations of C. tessellata. The numbers of flowering plants may vary greatly from year to year in response to environmental factors such as rainfall and time since fire, but the number of mature individuals could be relatively stable as many individuals would persist as non-flowering tubers beneath the soil. "*	NSW SCIENTIFIC COMMITTEE Caladenia tessellata Fitzg. (Orchidaceae) Review of Current Information in NSW May 2008	-

3. Impacts assessment for the Thick Lip Spider Orchid Caladenia tesselata

Table 26 Impacts assessment – Thick Lip Spider Orchid

Impact	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Number of individuals (mature and immature) to be impacted by the proposal	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Area of habitat to be impacted (ha) (for species measured by area only)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Area of the species' geographic range to be impacted by the proposal (ha)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Individuals impacted	No individuals will be directly impacted, some habitat will be impacted	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Viability of a fragmented population (see below)	It is unlikely that the proposal will create a fragmented population of this species.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.

4. Current status of the Hibbertia fumana

Table 27 Current status – *Hibbertia fumana*

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Evidence of rapid decline (Principle 1)			
Change in population size in NSW in the past 10 years or 3 generations (indicate whether as a direct estimate of the population or if indicated by an index or surrogate)	Unknown	TBDC	TBDC indicates data is unknown or deficient
Evidence of small population size (Principle 2)			
Current population size in NSW	*"At the beginning of the species rediscovery the only known extant population was found to occur in the Moorebank area. As a result of recent surveys populations of this species have been detected over a wider range within greater Sydney stretching from Richmond to Mittagong."*	TBDC	-
Decline in species' population size in 3 years or one generation	Unknown	TBDC	TBDC indicates data is unknown or deficient
Number or percentage of mature individuals in each subpopulation or whether the species is likely to undergo extreme fluctuations	In 2016 c. 100 individuals were recorded at Moorebank. The size of other populations is not published in the TBDC.	NSW SCIENTIFIC COMMITTEE Determination for provisional listing of a critically endangered species on an emergency basis (Proposed Gazettal date: 16/12/16).	No information was found online describing the results of surveys following the 2016 rediscovery.
Evidence of limited geographic range (Principle 3)			

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Extent of occurrence (ha)	Unknown	TBDC	TBDC indicates data is unknown or deficient
Area of occupancy (ha)	Unknown	TBDC	TBDC indicates data is unknown or deficient
Number of threat-defined locations	The population at the Moorebank Intermodal Terminal Precinct is potentially threatened by habitat loss and degradation	NSW SCIENTIFIC COMMITTEE Determination for provisional listing of a critically endangered species on an emergency basis (Proposed Gazettal date: 16/12/16).	-
Whether the species' population is likely to undergo extreme fluctuations	Unknown	TBDC	No information about potential population fluctuations is provided in the TBDC.

5. Impacts assessment for Hibbertia fumana

Table 28 Impacts assessment – Hibbertia fumana

Impact	Data / information	Data sources	Details of data deficiency, assumptions or reasons for low confidence in information (e.g. TBDC indicates data is unknown or deficient)
Number of individuals (mature and immature) present in the subpopulation on the subject land	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Number of individuals (mature and immature) present as a percentage of total NSW population (%)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Number of individuals (mature and immature) to be impacted by the proposal	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Individuals (mature and immature) to be impacted by the proposal as a percentage of total NSW population (%)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Area of habitat to be impacted (ha) (for species measured by area only)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Area of the species' geographic range to be impacted by the proposal (ha)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Area of the species' geographic range to be impacted as a percentage of the total area or extent of occupancy (%)	Unknown, but likely zero. This BDAR assumes presence.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Individuals impacted	No individuals will be directly impacted, some habitat will be impacted	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.
Viability of a fragmented population (see below)	It is unlikely that the proposal will create a fragmented population of this species.	No focused survey for this species has occurred on the site.	No focused survey for this species has occurred on the site.

10. Impact summary

10.1 Determine an offset requirement for impacts

10.1.1 Impacts on native vegetation and TECs or ECs (ecosystem credits)

Table 29 Impacts that do not require offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	TEC association	Entity at risk of an SAII?	Current VI score
724_pasture-exotics	Castlereagh shale - gravel transition forest	The characteristics of this area are unlikely to meet quality requirements of the NSW Scientific Committee Final Determination.	0.7	The characteristics of this area are unlikely to meet quality requirements of the NSW Scientific Committee Final Determination.	No	0.1

Table 30 Impacts that require an offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
724_moderate	Castlereagh shale - gravel transition forest	Shale Gravel Transition Forest in the Sydney Basin Bioregion	0.23	28.3	0, 16.2	-27.6	2	3
							Total credits	3

10.1.2 Impacts on threatened species and their habitat (species credits)

Table 31 provides information to identify impacts on threatened species (species credits) that require an offset.

Table 31 Impacts that require an offset – species credits

Common name	Scientific name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Thick Lip Spider Orchid	*Caladenia tessellata*	Endangered	Vulnerable	Assumed presence 0.23 ha	3	5
Netted Bottle Brush	*Callistemon linearifolius*	Vulnerable	Not listed	Assumed presence 1 individual	1.5	2
Dillwynia tenuifolia	*Dillwynia tenuifolia*	Vulnerable	Not listed	Assumed presence 0.23 ha	2	3
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	Vulnerable	Not listed	Assumed presence 0.23 ha	2	3
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Vulnerable	Not listed	Assumed presence 0.92 ha	2	4
Hibbertia fumana	*Hibbertia fumana*	Critically Endangered	Not listed	Assumed presence 0.23 ha	3	5
Green and Golden Bell Frog	*Litoria aurea*	Endangered	Vulnerable	Assumed presence 0.92 ha	2	1
Marsdenia viridiflora R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	*Marsdenia viridiflora* subsp. *viridiflora* - endangered population	Endangered	Not listed	Assumed presence 0.23 ha	2	3
Cumberland Plain Land Snail	*Meridolum corneovirens*	Endangered	Not listed	Assumed presence	2	3

Common name	Scientific name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
				0.23 ha		
Southern Myotis	*Myotis macropus*	Vulnerable	Not listed	Assumed presence 0.22 ha	2	3
Squirrel Glider	*Petaurus norfolcensis*	Vulnerable	Not listed	Assumed presence 0.22 ha	2	3
Pimelea curviflora var. curviflora	*Pimelea curviflora var. curviflora*	Vulnerable	Vulnerable	Assumed presence 0.23 ha	2	3
Dural Land Snail	*Pommerhelix duralensis*	Endangered	Endangered	Assumed presence 0.23 ha	2	3
Pultenaea parviflora	*Pultenaea parviflora*	Endangered	Vulnerable	Assumed presence 0.23 ha	2	3
Matted Bush-pea	*Pultenaea pedunculata*	Endangered	Not listed	Assumed presence 0.23 ha	2	3
					Total credits	47

10.1.3 Indirect and prescribed impacts

No significant residual impacts are expected from the proposal.

No prescribed impacts that will or are likely to significantly impact on threatened species and their habitat were identified during the preparation of this BDAR.

10.2 Impacts that do not need further assessment

Section 9.3 of the BAM 2020 states:

> *9.3 Impacts that do not need further assessment*
>
> *1. Areas within the subject land that do not contain native vegetation do not need to be assessed for ecosystem credits.*
>
> *2. Areas of land that do not contain native vegetation must still be assessed for threatened species habitat in accordance with Chapter 5 and prescribed biodiversity impacts in accordance with Chapter 6.*

Response:

All vegetated parts of the site contain at least scattered NSW native plants. They are considered native vegetation within this BDAR. The residential dwelling is not considered native vegetation. The residential dwelling has been assessed using the prescribed impacts criteria.

However, an alternate view is provided in Section 8.3.3. A summary is of the alternate view is provided below in Table 32.

Table 32 provides information about impacts that do not need further assessment for ecosystem credits.

Table 32 Impacts that do not need further assessment for ecosystem credits

Impact	Location within subject land	Justification why no further assessment is required
Proposed removal of the residential dwelling.	Near the southeast corner of the site.	The dwelling is relatively new, perhaps forty years old. It is unlikely that it provides significant habitat for any threatened species.
Removal of non-native vegetation (See Section 8.3.3 for more information).	On many areas within the site.	The removal of non-native vegetation is unlikely to significantly impact on threatened entities and / or their habitats.
Removal / modification to the shallow drainage swale on the site.	Near the northern boundary of the site.	The swale lacks the characteristics that would be typical foraging habitat of the Southern Myotis or the White-bellied Sea-eagle.

11. Biodiversity credit report

11.1 Ecosystem credits

Table 33 Ecosystem credit class and matching credit profile

Ecosystem credit	Attributes shared with matching credits						
	PCT name	**PCT vegetation class**	**PCT vegetation formation**	**Associated TEC or EC**	**Offset trading group** (BAM Section 10.2, Tables 4 & 5)	**Hollow bearing trees present?**	**IBRA subregion** (in which proposal is located)
3	724-Castlereagh shale - gravel transition forest	Cumberland Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Shale Gravel Transition Forest in the Sydney Basin Bioregion	Cumberland , Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	Yes Note: A “branch spout” that may provide a hollow was observed on the large *Eucalyptus fibrosa.* However, Tab 8 of the BAM-C states: 0 for “No HBT Cr”.	Cumberland

11.2 Species credits

Table 34 Species credit class and matching credit profile

Species credit	Attributes shared with matching credits				
	Name of threatened species	**Kingdom**	**BC Act status**	**EPBC Act status**	**IBRA region**
5	*Caladenia tessellata* / Thick Lip Spider Orchid	Flora	Endangered	Vulnerable	Any in NSW
2	*Callistemon linearifolius* / Netted Bottle Brush	Flora	Vulnerable	Not listed	Any in NSW
3	*Dillwynia tenuifolia* / Dillwynia tenuifolia	Flora	Vulnerable	Not listed	Any in NSW
3	*Grevillea parviflora* subsp. *parviflora* / Small-flower Grevillea	Flora	Vulnerable	Vulnerable	Any in NSW

Species credit	Attributes shared with matching credits				
	Name of threatened species	Kingdom	BC Act status	EPBC Act status	IBRA region
4	*Haliaeetus leucogaster* / White-bellied Sea-Eagle	Fauna	Vulnerable	Not listed	Any in NSW
5	Hibbertia fumana / Hibbertia fumana	Flora	Critically Endangered	Not listed	Any in NSW
4	Litoria aurea / Green and Golden Bell Frog	Fauna	Endangered	Vulnerable	Any in NSW
3	Marsdenia viridiflora subsp. viridiflora - endangered population / Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	Flora	Endangered	Not listed	Any in NSW
3	Meridolum corneovirens / Cumberland Plain Land Snail	Fauna	Endangered	Not listed	Any in NSW
3	Myotis macropus / Southern Myotis	Fauna	Vulnerable	Not listed	Any in NSW
3	Petaurus norfolcensis / Squirrel Glider	Fauna	Vulnerable	Not listed	Any in NSW
3	Pimelea curviflora var. curviflora / Pimelea curviflora var. curviflora	Flora	Vulnerable	Vulnerable	Any in NSW
3	Pommerhelix duralensis / Dural Land Snail	Fauna	Endangered	Endangered	Any in NSW
3	Pultenaea parviflora / Pultenaea parviflora	Flora	Endangered	Vulnerable	Any in NSW
3	Pultenaea pedunculata / Matted Bush-pea	Flora	Endangered	Not listed	Any in NSW

12. References

Note: this list only includes additional references not already included in Section 1.1.4. or elsewhere in this BDAR.

BBC Consulting Planners (August 2021) Statement of Environmental Effects to accompany a development application for construction of a residential care facility, including demolition of an existing dwelling house, landscaping, drainage and associated works. Lot 36 in DP 239502, 94-100 Explorers Way, St Clair.

Custance (28 July 2020) Character and Mudmap Report – Phase 2 – Opal St Clair.

Fairley, A. (2004) *Seldom Seen Rare Plants of Greater Sydney.* Reed New Holland.

NSW Government Department of Planning, Industry & Environment (2020) Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method. Published by: Environment, Energy and Science Department of Planning, Industry and Environment.

Pellow, B., Henwood, M,J. and Carolin, R. (2009) Flora of the Sydney Region. Sydney University Press.

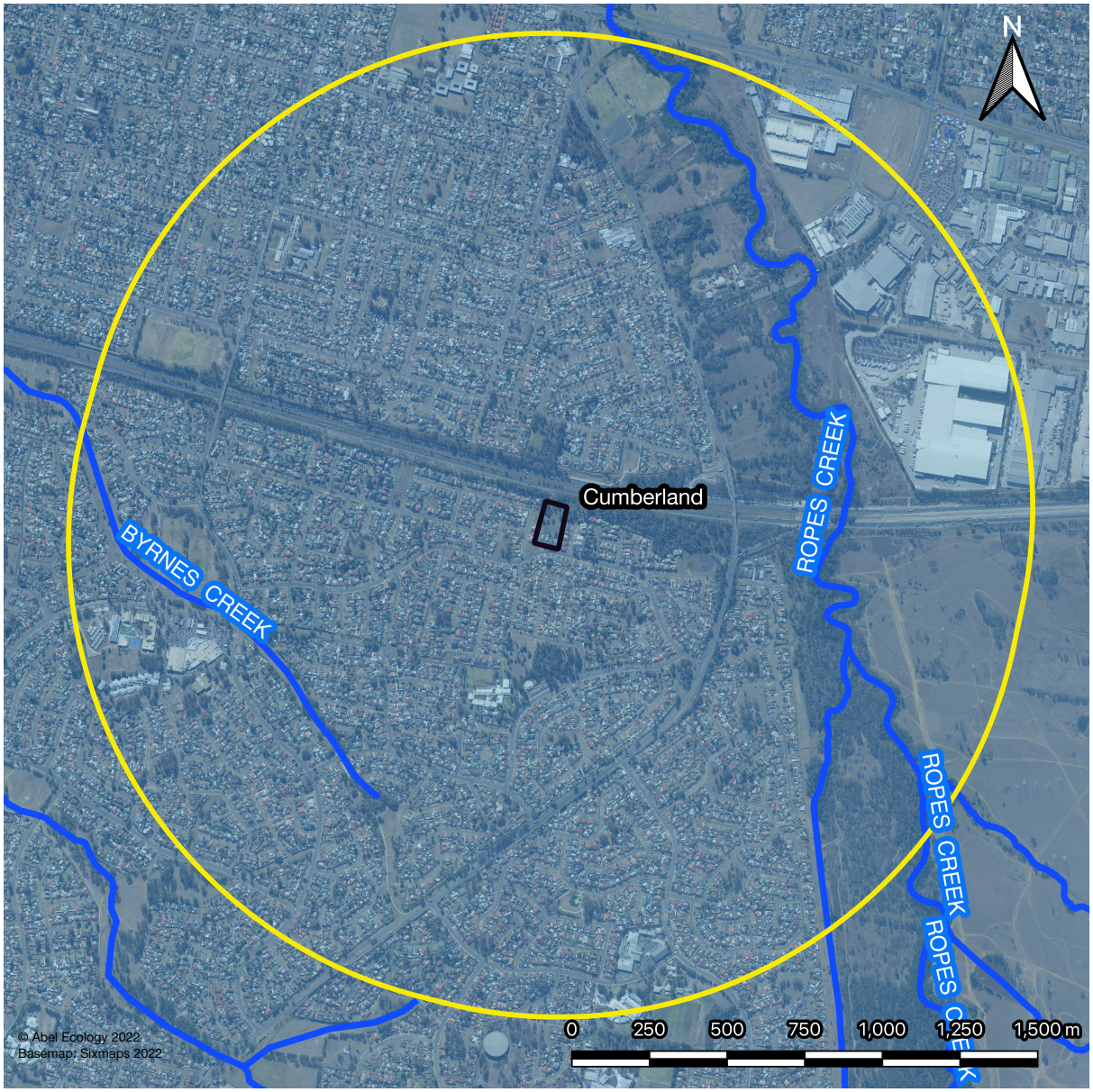
13. Figures

Figure 1 Site Map

The site is in the Sydney Basin IBRA bioregion and the Cumberland subregion

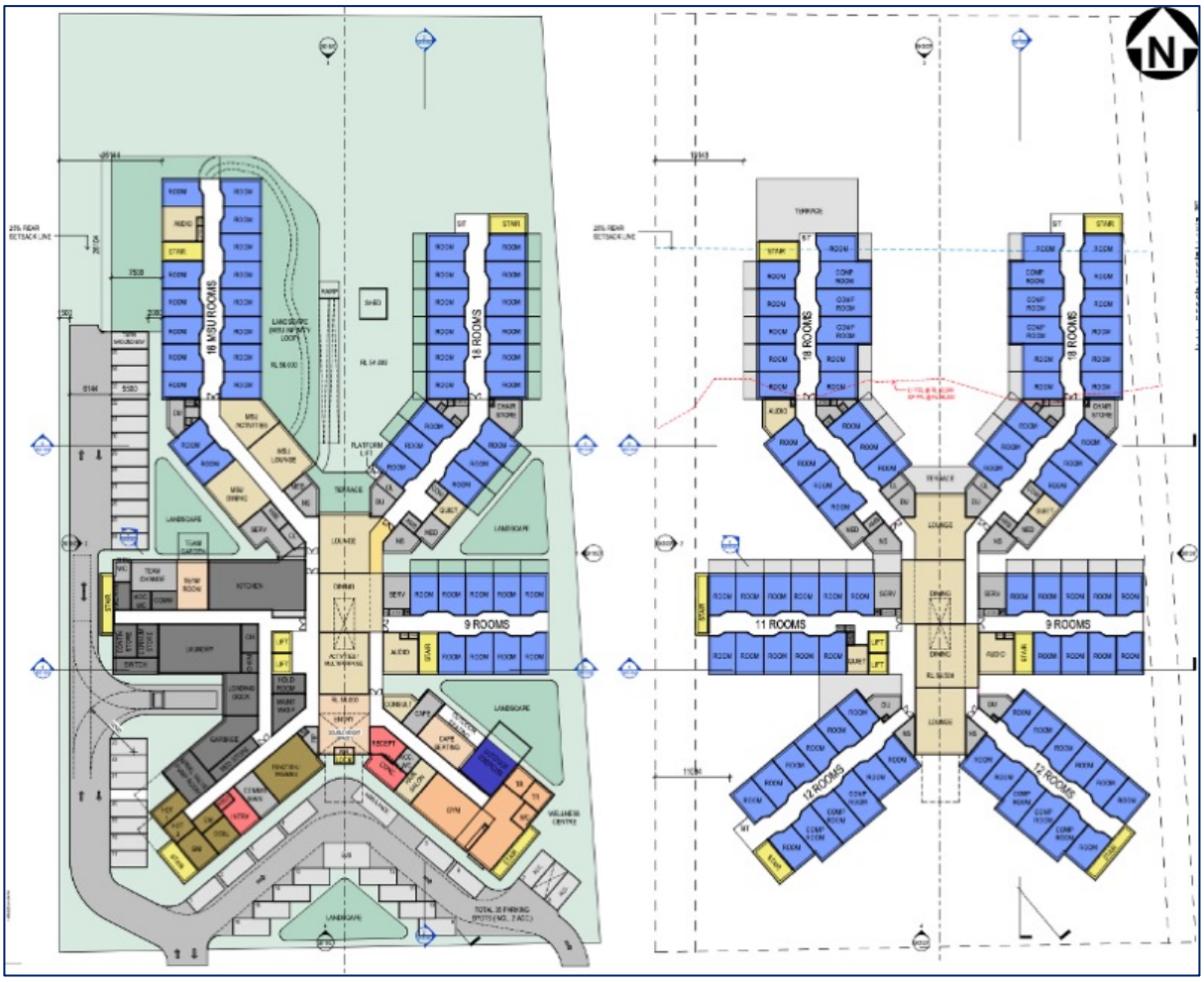
The site is within the Cumberland Plain Mitchell Landscape

Figure 2 Location Map



The site is within the Cumberland Plain, Mitchell landscape.

Figure 3 Development layout



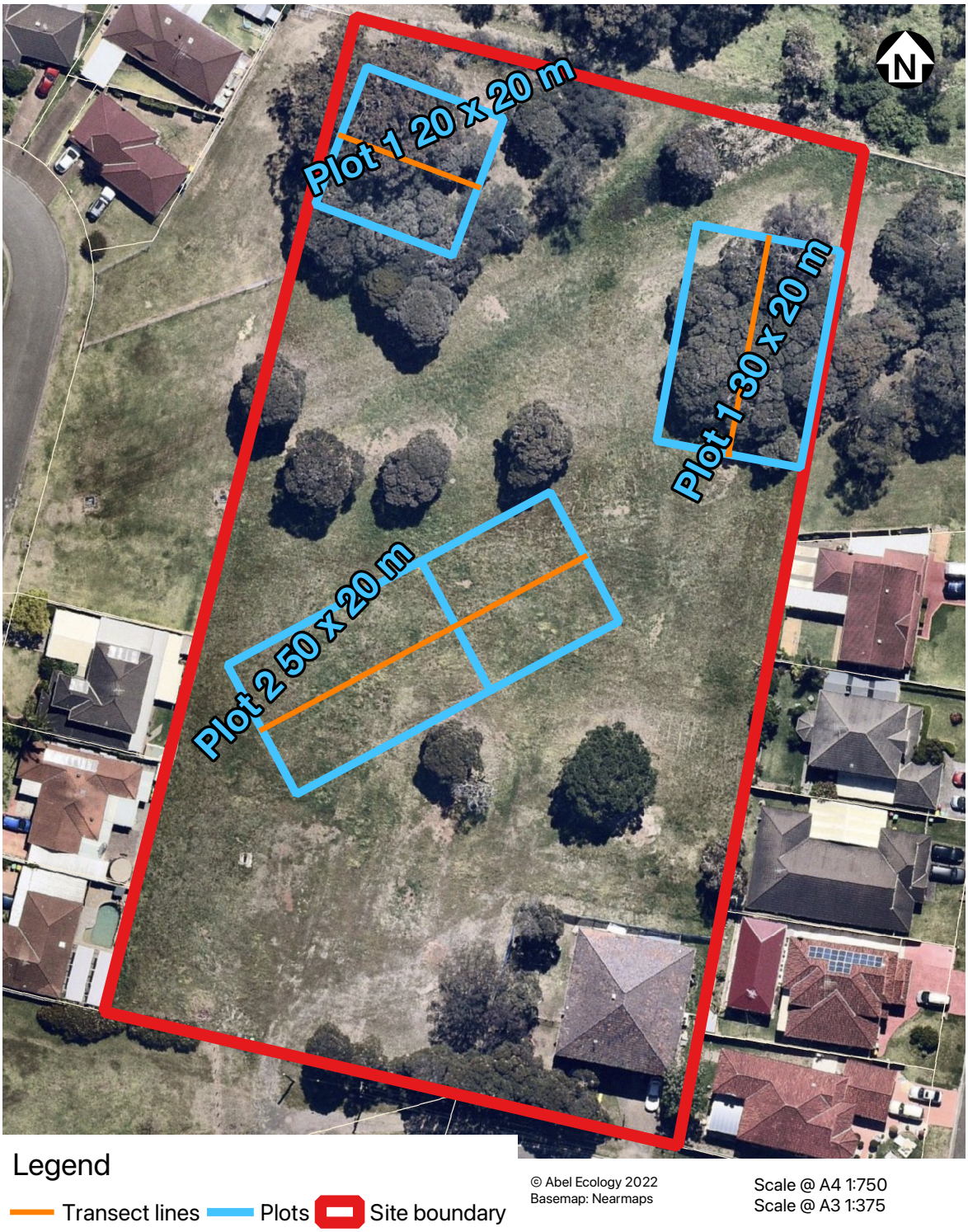
Proposal Diagram

Figure 4 Biodiversity Values Map

Figure 5 Excluded impacts

No excluded impacts are included in this BDAR. No Figure 5 is included in this BDAR.

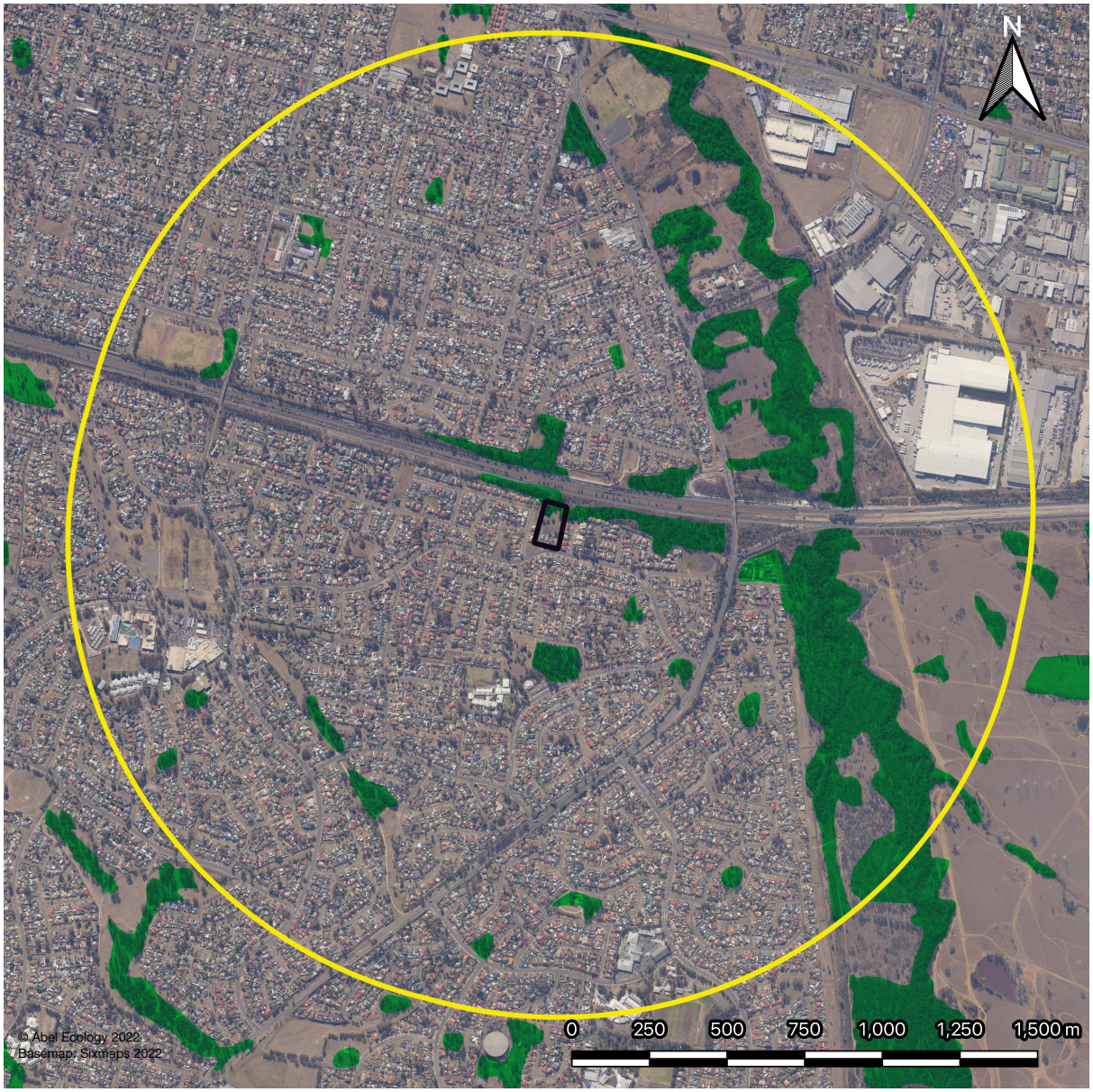
Figure 6 **Field survey locations**



The PCT of the vegetation on the site is PCT724

The site is relatively small (~ 1 ha) regular transects have surveyed the majority of the site.

Figure 7 Native vegetation extent

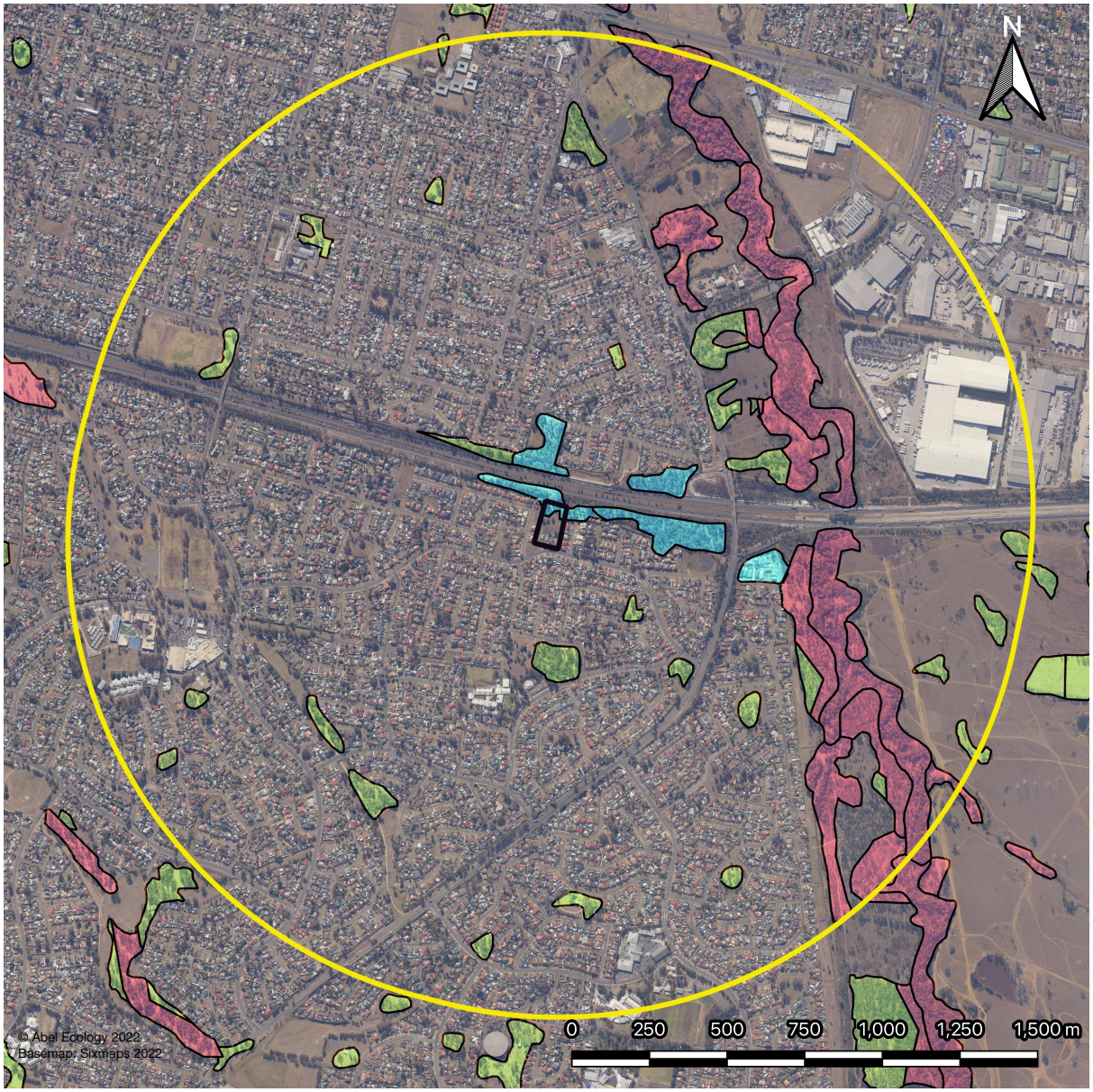


Scale @A4 1:20000
Scale @A3 1:10000

Legend

- Lot Boundary
- 1500m Buffer
- Native Vegetation of the Cumberland Subregion

Figure 8 Plant community types



Scale @A4 1:20000
Scale @A3 1:10000

Legend

Lot Boundary

1500m Buffer

Native Vegetation of the Cumberland Subregion

PCT 724 Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain,Sydney Basin Bioregion

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

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

Figure 9 and Figure 10 **Threatened ecological communities and ecological communities and Vegetation zones**

Basemap: Nearmaps

Scale @ A4 1:1000
Scale @ A3 1:500

Legend

- Shallow drainage swale
- Zone 1 PCT724 - moderate - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay-gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- Zone 2 PCT724 -pasture and exotics - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay-gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- Site boundary

Zone 1 is equivalent to the TEC Shale Gravel Transition Forest. Zone 2 is unlikely to meet the characteristics of the NSW listed TEC Shale Gravel Transition Forest.

The vegetation patch size includes the vegetation off site to the north next to the M4. The patch extends to the east and includes vegetation along Ropes Creek.

Figure 11 Candidate species credit species records and species polygons

"Zone 1 PCT724 – moderate – removed" is equal to the species polygon for the following species:

Caladenia tessellata, Callistemon linearifolius, Dillwynia tenuifolia, Grevillea parviflora subsp. *parviflora, Hibbertia fumana, Marsdenia viridiflora* subsp. *viridiflora - endangered population, Meridolum corneovirens, Myotis Macropus, Petaurus norfolcensis, Pimelea curviflora* var. *curviflora, Pommerhelix duralensis, Pultenaea parviflora* and *Pultenaea pedunculata.*

"Zone 1 PCT724 – moderate – removed" and "Zone 2 PCT724 - pasture and exotics – removed" is equal to the species polygon for: *Haliaeetus leucogaster* and *Litoria aurea*.

Note no threatened species were recorded on site during the site survey.

Figure 12 Final impacts likely to occur on the subject land

Basemap: Nearmaps

Scale @ A4 1:1000
Scale @ A3 1:500

Legend

- Zone 1 PCT724 - moderate - removed
- Zone 2 PCT724 -pasture and exotics - removed
- Site boundary

The proposal includes the removal of:

"Zone 1 PCT724 – moderate – removed" ; and

"Zone 2 PCT724 – pasture and exotics – removed"

Figure 13 Wind turbine disturbance zone

The proposal does not include a wind farm. No Figure 13 is provided in this BDAR.

Figure 14 Serious and irreversible impacts

Basemap: Nearmaps

Scale @ A4 1:1000
Scale @ A3 1:500

Legend

- Shallow drainage swale
- Zone 1 PCT724 - moderate - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay-gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- Zone 2 PCT724 -pasture and exotics - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay-gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- Site boundary

This BDAR has assumed presence of the following two species that are listed as SAII entities:

Thick Lip Spider Orchid *Caladenia tessellata*
Hibbertia fumana
The "hypothetical" extent of these two species is "Zone 1 PCT724 – moderate – Broad-leaved Ironbark – Grey Box – Melaleuca decora grassy open forest on clay-gravel soils of the Cumberland Plain, Sydney Basin Bioregion.

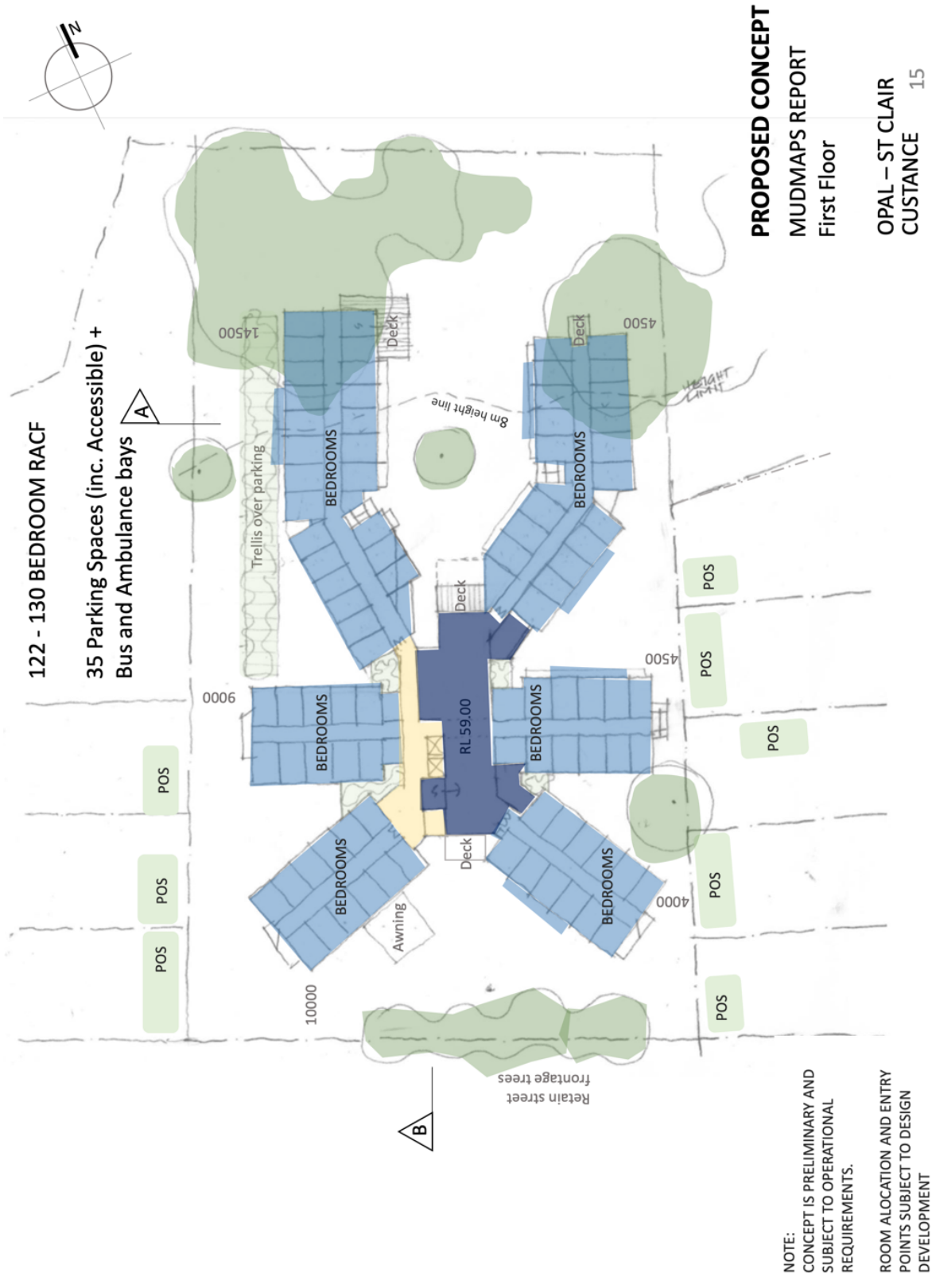
Figure 15 Thresholds for assessing and offsetting impacts

All areas of the site have been assessed. Only “Zone 1 PCT724 – moderate – removed” generates a direct requirement for ecosystem credits. The removal of this zone also generates the requirement for the majority of the species credits.

Zone 2 does not generate an offset credit requirement directly. Zone 2 generates credits for the Green and Golden Bell Frog and the White-bellied Sea-Eagle.

The residential dwelling, driveway and paths do not generate an offset requirement.

Figure 16. Demonstration of avoidance during the design phase - two figures



Figures 16a Extract of page 15 from the Mudmaps (Custance) report

Figure 16b The marked-up landscape plan. The blue arrow indicates the area where additional tall shrubs (Melaleuca decora) have been retained.

Figure 17 Historic aerial imagery (c. 1947) for the site and surrounding area

Appendix A: BDAR requirements compliance

Table 35 Assessment of compliance with BDAR minimum information requirements

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
Introduction	Chapters 2 and 3	**Information**	
		Introduction to the biodiversity assessment including:	–
		☒ brief description of the proposal	1.1.1
		☒ identification of subject land boundary, including: ☒ operational footprint ☒ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	1.1.3
		☒ general description of the subject land	1.1.3
		☒ sources of information used in the assessment, including reports and spatial data	1.5
		☒ identification and justification for entering the BOS	1.2
		Maps and tables	
		☒ Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	Figure 3

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
Landscape	Sections 3.1 and 3.2, Appendix E	**Information**	
		Identification of site context components and landscape features, including:	–
		☒ general description of subject land topographic and hydrological setting, geology and soils	1.1.3
		☒ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	–
		☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	3.2.1
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	3.2.2
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	3.2.2
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	3.2.3
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	3.2.4
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	3.2.5
		☐ any additional landscape features identified in any SEARs for the proposal – Not relevant	3.2.7
		☒ NSW (Mitchell) landscape on which the subject land occurs	3.2.6
		☒ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	2.1
		Maps and tables	
		☒ Site Map ☒ Property boundary ☒ Boundary of subject land ☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☒ Landscape features identified in BAM Subsection 3.1.3	Figure 1
		☒ Location Map ☒ Digital aerial photography at 1:1,000 scale or finer ☒ Boundary of subject land	Figure 2

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development) ☒ Landscape features identified in BAM Subsection 3.1.3 ☒ Additional detail (e.g. local government area boundaries) relevant at this scale	
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	–
		☒ IBRA bioregions and subregions ☒ rivers, streams and estuaries ☒ wetlands and important wetlands ☒ connectivity of different areas of habitat ☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features ☒ areas of outstanding biodiversity value occurring on the subject land and assessment area ☐ any additional landscape features identified in any SEARs for the proposal – Not relevant ☒ NSW (Mitchell) landscape on which the subject land occurs	Figure 1 & Figure 2
		Data	
		☐ All report maps as separate jpeg files	–
		Individual digital shape files of:	–
		☐ subject land boundary	–
		☐ assessment area (i.e. subject land and 1500 m buffer area) boundary	–
		☐ cadastral boundary of subject land	–
		☐ areas of native vegetation cover	–
		☐ landscape features	–

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
Native vegetation	Chapter 4, Appendix A and Appendix H	**Information**	
		☒ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	4.1 & Figure 7
		☒ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	4.1.2
		☒ Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	2.2.2
		☒ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	2.2.3
		☐ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A) Not relevant	Not applicable
		For each PCT within the subject land, describe:	–
		☒ PCT name and ID	4.1 & Figure 9
		☒ vegetation class	4.1.2
		☒ extent (ha) within subject land	2.2.2
		☒ evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.))	2.2.3
		☒ plant species relied upon for identification of the PCT and relative abundance of each species	Tozer et al. 2010.
		☒ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	4.1 & Figure 9
		☒ estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	4.1.2
		Describe the vegetation integrity assessment of the subject land, including:	–
		☒ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	Figure 10
		☒ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	Figure 10

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ area (ha) of each vegetation zone	–
		☒ assessment of patch size (as described in BAM Subsection 4.3.2)	–
		☒ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	4.5.1
		☐ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.)). Not relevant to this BDAR.	–
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A): Not relevant to this BDAR.	–
		☐ identify the PCT or vegetation class for which local benchmark data will be applied ☐ identify published sources of local benchmark data (if benchmarks obtained from published sources) ☐ describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	–
		☐ provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	–
		☐ provide written confirmation from the decision-maker that they support the use of local benchmark data	–
		Maps and tables	
		☒ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	Figure 9
		☒ Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 9
		☒ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Figure 9
		☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 6
		☒ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 9 & Table 6
		☒ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Figure 10 & Table 7
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	–

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ composition condition score ☒ structure condition score ☒ function condition score ☒ presence of hollow bearing trees	Table 8
		Data	
		☒ All report maps as separate jpeg files – The requirements described in this row and the following seven rows will be provided on or before 30 June 2022.	–
		☒ Plot field data (MS Excel format)	–
		☒ Plot field datasheets	Appendix F
		Digital shape files of:	–
		☒ PCT boundaries within subject land	–
		☒ TEC boundaries within subject land	–
		☒ vegetation zone boundaries within subject land	–
		☒ floristic vegetation survey and vegetation integrity plot locations	–
Threatened species	Chapter 5	**Information**	
		Identify ecosystem credit species likely to occur on the subject land, including:	–
		☒ list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.))	–
		☒ justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	5.1.1
		☒ justification for addition of any ecosystem credit species to the list	5.1.1
		Identify species credit species likely to occur on the subject land, including:	–
		☒ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	Table 10 & Table 11
		☒ justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	5.1.2

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2)	5.1.2
		☒ justification for addition of any species credit species to the list	5.1.2
		From the list of candidate species credit species, identify:	–
		☒ species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.)) ☒ species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.)) ☒ species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.)) ☐ species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.)). No expert report is included in this BDAR.	Table 12 & Table 13
		Present the outcomes of species credit species assessments from:	–
		☒ threatened species survey (as described in BAM Section 5.2.4)	Table 14 & Table 15
		☐ expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3). No expert report is included in this BDAR.	–
		Where survey has been undertaken include detailed information on:	–
		☒ survey method and effort (as described in BAM Section 5.3)	Table 14 & Table 15
		☒ justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the department's taxa-specific survey guides or where no relevant guideline has been published	–
		☒ timing of survey in relation to requirements in the TBDC or the department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys	Table 14 & Table 15 & 0
		☒ survey personnel and relevant experience	Declarations ii
		☒ describe any limitations to surveys and how these were addressed/overcome	–

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include: No expert report is included in this BDAR	–
		☐ justification of the use of an expert report ☐ identify the expert, provide evidence of their expert credentials and departmental approval of expert status ☐ all requirements of Box 3 have been addressed in the expert report	–
		Where use of local data is proposed (BAM Subsection 1.4.2): No local data was used in the preparation of this BDAR.	–
		☐ identify relevant species ☐ identify data to be amended ☐ identify source of information for local data, e.g. published literature, additional survey data, etc. ☐ justify use of local data in preference to VIS Classification or TBDC data	–
		☐ provide written confirmation from the decision-maker that they support the use of local data	–
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:	–
		☒ the unit of measure for each species is documented	Table 16
		for species assessed by area:	–
		☒ the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5)	Figure 11
		☒ a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied	5.6
		for species assessed by counts of individuals:	–
		☒ the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.))	5.6
		☒ the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken	5.6

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☐ the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land. No individual of a threatened species were recorded on the site.	–
		☒ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	Table 16
		Maps and tables	
		☒ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	–
		☒ the ecosystem credit species removed from the list	Table 9
		☒ the sensitivity to gain class of each species	Table 9
		☒ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	Table 10 & Table 11
		☒ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	Table 10 & Table 11
		☒ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 12 & Table 13
		☒ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	5.6 & Table 16
		☐ Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5). No individuals were recorded on the site.	–
		Data. – The requirements described in this row and the following six rows will be provided on or before 30 June 2022.	
		☒ Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		☒ Survey locations including GPS coordinates of any plots, transects, grids	–
		☐ Digital shape files of each species polygon including GPS coordinates of located individuals	–
		☐ Species polygon map in jpeg format	–
		☐ Expert reports and any supporting data used to support conclusions of the expert report. No expert reports were included in this BDAR.	–

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	–

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
Prescribed impacts	Chapter 6	**Information**	
		Identify potential prescribed biodiversity impacts on threatened entities, including:	–
		☐ karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) ☒ occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2) ☒ corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3) ☒ waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)	Table 17
		☐ protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	–
		☒ where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	Table 17
		☐ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	–
		☐ Describe the importance of habitat features to the species including, where relevant, impacts on life cycle or movement patterns (e.g. Subsection 6.1.3)	–
		Where the proposed development is for a wind farm: The proposal does not include a wind farm.	–
		☐ identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)	–
		☐ provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.).	–
		☐ predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	–

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		Where the proposal may result in vehicle strike:	–
		☐ identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal. No significant increase in the likelihood of vehicle strike is expected from the proposal.	–
		Maps and tables	
		☒ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Figure 1 & Figure 2
		☐ Map showing location of potential vehicle strike locations	–
		☐ Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	–
		Data	
		☐ Digital shape files of prescribed impact feature locations	–
		☐ Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	Chapter 7	**Information**	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	–
		☐ modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	–
		☐ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	–
		☐ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	–
		☒ alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	7.1.1
		☒ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	7.1.2

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	7
		☒ Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	–
		Maps and tables	
		☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 18
		☒ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	–
		☐ Maps demonstrating indirect impact zones where applicable	–
		Data	
		Digital shape files of:	–
		☐ alternative and final proposal footprint	–
		☐ direct and indirect impact zones	–
		☐ Maps in jpeg format	–
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	**Information**	
		☒ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	Table 20
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	–
		☐ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	–
		☒ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	8.2
		☒ reporting any limitations or assumptions, etc. made during the assessment	8.2
		☒ identification of the threatened entities and their habitat likely to be affected	–
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	–

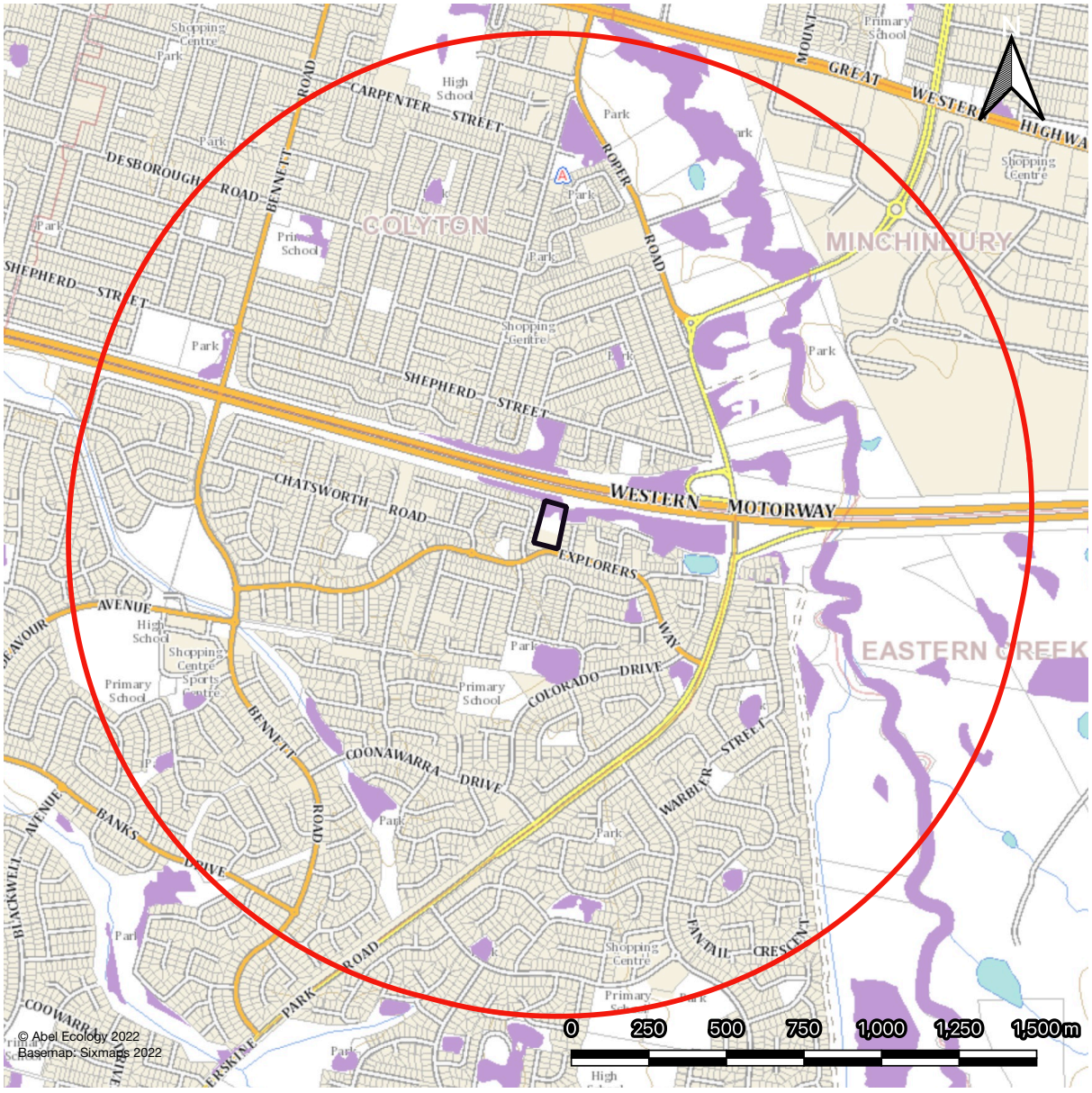
BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	–
		☐ karst, caves, crevices, cliffs, rocks and other features of geological significance	8.3.1
		☒ human-made structures	8.3.2
		☒ non-native vegetation	8.3.3
		☒ connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	8.3.4
		☐ movement of threatened species that maintains their life cycle	8.3.4
		☒ water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	8.3.5
		☐ assessment of the impacts of wind turbine strikes on protected animals	–
		☒ assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	8.3.7
		☐ evaluate the consequences of prescribed impacts	8.3
		☐ describe impacts that are uncertain	8.2 & 8.3
		☒ document limitations to data, assumptions and predictions	8.2 & 8.3
		Maps and tables	
		☒ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 21
		Data	
		N/A	–
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	**Information**	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	–
			Table 22

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ techniques, timing, frequency and responsibility	
		☐ identify measures for which there is risk of failure	
		☒ evaluate the risk and consequence of any residual impacts	
		☐ document any adaptive management strategy proposed	8.5
		Identification of measures for mitigating impacts related to:	–
		☐ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))	8.4
		☒ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	
		☐ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	
		☐ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	8.5
		Maps and tables	
		☒ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 22
		Data	
		N/A	–
Impact summary	Chapter 9	**Information**	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including: No TECs that are at risk of a SAII were recorded on the site.	–
		☐ addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land	–
		☐ for each TEC, report the extent of the TEC in NSW	–
		☒ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land	–
		☒ for each threatened species, report the population size in NSW	–
		☒ documenting assumptions made and/or limitations to information	–
		☒ documenting all sources of data, information, references used or consulted	
		☒ clearly justifying why any criteria could not be addressed	

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ Identification of impacts requiring offset in accordance with BAM Section 9.2	Table 30 & Table 31
		☒ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Table 29
		☒ Identification of areas not requiring assessment in accordance with BAM Section 9.3	Table 32
		Maps and tables	
		☐ Map showing the extent of TECs at risk of an SAII within the subject land	Figure 14
		☐ Map showing location of threatened species at risk of an SAII within the subject land	Figure 14
		Map showing location of:	–
		☐ impacts requiring offset	Figure 15
		☐ impacts not requiring offset	Figure 15
		☐ areas not requiring assessment	Figure 15
		Data. The requirements described in the following seven rows will be provided on or before 30 June 2022	
		Digital shape files of:	–
		☐ extent of TECs at risk of an SAII within the subject land	–
		☐ location of threatened species at risk of an SAII within the subject land	–
		☐ boundary of impacts requiring offset	–
		☐ boundary of impacts not requiring offset	–
		☐ boundary of areas not requiring assessment	–
		☐ Maps in jpeg format	–
Impact summary	Chapter 10	**Information**	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	–
		☒ future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H) ☒ change in vegetation integrity score (BAM Subsection 8.1.1) ☒ number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	Table 30

BDAR section	BAM ref.	BAM requirement	Page or section reference(s) in the BDAR
		☒ biodiversity risk weighting for each	Table 30 & Table 31
		☒ number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	Table 31
		Maps and tables	
		☒ Table of PCTs requiring offset and the number of ecosystem credits required	Table 30
		☒ Table of threatened species requiring offset and the number of species credits required	Table 31
		Data	
		☒ Submitted proposal in the BAM Calculator	–
Biodiversity credit report	Chapter 10	**Information**	
		☒ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	Table 33 & Table 34
		☒ BAM credit report in pdf format	Appendix H
		Maps and tables	
		☒ Table of credit class and matching credit profile	Table 34
		Data	
		☒ BAM credit report in pdf format	Appendix H

Appendix B: Biodiversity Values Map and Threshold tool report



Scale @A4 1:20000
Scale @A3 1:10000

Legend

- Lot Boundary
- 1500m Buffer
- Biodiveristy Value

Appendix C: Test of Significance

The proposal does not trigger the Test of Significance.

Appendix D: Determination of excluded impacts

No excluded impacts are described in this report.

Appendix E: Matters of national environmental significance

The proposal is not a controlled action.

Appendix F: Vegetation survey data

The vegetation survey data must include the following components:

- plot-based vegetation and vegetation integrity survey locations. It is provided below:
- field datasheets. They are provided below. The highlighting on the field datasheets was used for in-house discussions. The highlighting is of no particular importance.

Table 36 Vegetation survey data and locations

plot	pct	area	patchsize	condition class	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to19	funTreeStem20to29	funTreeStem30to49	funTreeStem50to79	funTreeRegen	funHighThreatExotic	Plot-based vegetation survey?	Vegetation integrity survey?
Plot1	724	0.23	101	moderate	56	296413	6258846.0	111	2	2	4	3	0	0	17.0	50.1	15.3	4.3	0.0	0.0	1	1	27.0	11.0	0	1	1	1	1	0	30.4	☒ Yes ☐ No	☒ Yes ☐ No
Plot2	724	0.72	101	pasture-[illegible]	56	296447	6258789.0	242	0	0	0	1	0	0	0.0	0.0	0.0	1.2	0.0	0.0	0	0	2.0	0.0	0	0	0	0	0	0	25.1	☒ Yes ☐ No	☒ Yes ☐ No

- vegetation integrity survey plot data – Plot 1

BAM Site - Field Survey Form				Site Sheet no:				
		Survey Name	Plot Identifier	Recorders				
Date	02/03/2022 & 21/06/2	Bate, St Clair	Plot 1	MS, JC, DM				
Zone	Datum	IBRA region		Photo #		Zone ID		
Easting	Northing	Dimensions			Orientation of midlinefrom the 0 m point	230		
Vegetation Class							Confidence: H M L	
Plant Community Type						EEC: yes - Castlereagh Ironbark Fore	Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values	BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
	Trees	2	dbh	Euc*	Non Euc	Hollows	
	Shrubs	2	large trees for Euc* & Non Euc - 80 + cm	1, 1		1	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.
Count of Native Richness	Grasses etc.	4	50-79 cm	1	1		
	Forbs	3	30 - 49 cm		18, 1, 1, 1,1,		*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*.
	Ferns	0	20 - 29 cm		8		
	Other	0	10 - 19 cm		12		†Record total number of stems by size class with hollows (including dead stems / trees)
Sum of Cover of native vascular plants by growth form group	Trees	17	5 - 9 cm			n/a	
	Shrubs	50.1	< 5 cm			n/a	
	Grasses etc.	15.3	**Length of logs (m)** (≥ 10 cm **diameter**, >50 cm in length)	11			total 11
	Forbs	4.3					
	Ferns	0	Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300. For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree wher the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.				
	Other	0					
High Threat Weed cover		30.4					

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)	
Subplot score (% in each)	a b c d e	a b c d e	a b c d e	a b c d e	
Average of the 5 subplots	20, 20, 5, 60, 30	0, 5, 0, 10, 0	0 0 0 0 0	5, 0, 0, 0, 10	A lot of the litter cover was dead mown grass clippings
	27	3	0	3	Rock cover = dumped gravel and dumped sandstone

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35 and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogram soil crusts. Collection of this data is optional - the data does not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

400 m² plot: Sheet ___ of ___		Survey Name	Plot Identifier	Recorders				
Date	2 Mar 22	Bate, St Clair	Plot 1	MS, JC				
GF Code	*Top 3 native species in each growth form group: Full species name mandatory*			N, E or H.T.E	Cover	Abund	stratum	voucher
	All other native and exotic species: Full species name wher practicable							
	On NW corner, 4m south of fence N fence, 1m E of W fence, with large Ironbark							
	Canopy dominated by Melaleuca decora and large E.fibrosa.							
	Dense exoticgrass groundcover throughout, with other weeds.							
	Dense patches of Bidens subalternans.							
	*Arauijia sericifera			E	0.1	5	0.1	0.1
	*Asparagus aethiopicus			HTE	0.1	1	0.1	0.1
	*Bidens pilosa			E	0.5	20	0.5	0.5
	*Bidens subalternans			E	10	>250	10	10
	*Cerastium glomeratum			E	0.1	1	0.1	0.1
	*Cyperus eragrostis			HTE	0.2	10	0.2	0.2
	*Digitaria sanguinalis			E	5	>200	5	5
	*Ehrharta erecta			HTE	25	>1000	25	25
	*Eragrostis curvula			HTE	5	100	5	5
	*Panicum maximum			E	20	>250	20	20
	*Senecio madagascariensis			HTE	0.1	10	0.1	0.1
	*Setaria parviflora			E	10	100	10	10
	*Sida rhombifolia			E	0.5	30	0.5	0.5
	*Sonchus oleraceus			E	0.1	10	0.1	0.1
FG	Commelina cyanea				4	50	4	
	* Conyza sumatrensis				0.1	4	0.1	0.1
FG	Einadia nutans nutans				0.2	20	0.2	
FG	Solanum americanum				0.1	3	0.1	
GG	Cyperus gracilis				0.1	20	0.1	
GG	Entolasia stricta				0.1	100	0.1	
GG	Microlaena stipoides				15	> 200	15	
GG	Paspalidium distans				0.1	50	0.1	
SG	Melaleuca decora				50	15		
SG	Sigesbeckia orientalis				0.1	20	0.1	
TG	Eucalyptus fibrosa				15	1		Exotic
TG	Eucalyptus globoidea - 2 trees in this area, 1 in plot.				2	1		GroundC
								76.8
							95.8	
	ADDITIONAL SPECIES- Ignore for BAM calculations							
SG	Acacia podalyriifolia - several senescent shrubs on N fence by plot.				80.7			
TG	Eucalyptus longifolia - 2 trees by NE plot corner, by fence.							
FG	Lobelia purpurascens - in drainage swale							

- vegetation integrity survey plot data – Plot 2

BAM Site - Field Survey Form				Site Sheet no:			
		Survey Name	Plot Identifier	Recorders			
Date	2 Mar 22	Bate, St Clair	Plot 2	MS, JC			
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions			Orientation of midlinefrom the 0 m point	230 (approximate)	
Vegetation Class							Confidence: H M L
Plant Community Type						EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated nib points along direction of midline.
Dimension (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magentic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Trees		0
Shrubs		0
Count of **Native Richness**	Grasses etc.	1
	Forbs	2
	Ferns	0
	Other	0
Sum of **Cover** of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0
	Forbs	1
	Ferns	0
	Other	0
High Threat Weed cover		25.1

BAM Attribute (20 x 50 m plot)	Euc*	# Tree Stems Count: Non Euc	Hollows
dbh			
large trees for Euc* & Non Euc - 80 + cm	0	0	
50-79 cm	0	0	
30 - 49 cm	0	0	
20 - 29 cm	0	0	
10 - 19 cm	0	0	
5 - 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥ 10 cm **diameter**, >50 cm in length)	0		

Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.

*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*.

†Record total number of stems by size class with hollows (including dead stems / trees)

total 0

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series 10, 20, 30..., 100, 200, 300.

For a multi-stemmed tree, only the largest living stem is included in the count / estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 12 stem per tree wher the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	a b c d e	a b c d e	a b c d e	a b c d e
Average of the 5 subplots	2 2 2 2 2	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0

400 m² plot: Sheet ___ of ___		Survey Name	Plot Identifier	Recorders				
Date	2 Mar 22	Bate, St Clair	Plot 2	MS, JC				
GF Code	*Top 3 native species in each growth form group: Full species name mandatory*			N, E or H.T.E	Cover	Abund	stratum	voucher
	All other native and exotic species: Full species name wher practicable							
	*Bidens subalternans			E	0.1	6		
	*Briza subaristata			HTW	0.1	5		
	*Cenchrus clandestinus			E	70	1		
	Commelina cyanea			E	0.1	2		
	Cynodon dactylon			N	1	1		
	*Digitaria sanguinalis			E	2	>100		
	*Eragrostis curvula			HTW	20	>500		
	*Gamochaeta americana			E	0.1	5		
	*Hypochaeris radicata			E	0.1	5		
	*Paspalum dilatatum			HTW	5	> 200		
	*Plantago lanceolata			E	0.2	100		
	*Setaria parviflora			E	10	>200		
	*Taraxacum officinale			E	0.1	1		
	*Verbena bonariensis			E	0.1	1		
	* Conyza sumatrensis			N	0.2	50		
FG	Oxalis sp.			N	1	>100		
	ADDITIONAL SPECIES (ignore for BAM calculations)							
	*Chloris virgata			E				
	*Panicum maximum			E	110.1			
	*Rumex crispus			E				
	*Sida rhombifolia			E				
	Ficus sp ?(cultivated Fig) - photo							
	Sporobolus creber			N				
	29							
	30							
	Dense Kikuyu cover, large patch Bidens pilosa, Photos.							
	32							
	33							
	34							
	35							
	36							
	37							
	38							
	39							
	40							
GF Code: see Growth Form definitions in Appendix			N: native, E: exotic, H.T.E: high threat exot	GF - circle code if 'top 3'.				
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3 ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or								
a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 m x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m								

Appendix G: Decision-maker authorisation to use more appropriate local data

No authorisation to use more appropriate local data in the BDAR was requested.

Appendix H: Credit reports

Copies (PDF format) of the following BAM-C credit reports with finalised status are provided below:

- Credits summary report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00033212/BAAS17056/22/00033213	Opal St Clair Explorers Way	16/06/2022
Assessor Name	**Report Created**	**BAM Data version ***
Daniel McDonald	29/06/2022	54
Assessor Number	**BAM Case Status**	**Date Finalised**
BAAS17056	Finalised	29/06/2022
Assessment Revision	**Assessment Type**	**BOS entry trigger**
1	Part 4 Developments (General)	BOS Threshold: Biodiversity Values Map

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Castlereagh shale - gravel transition forest												
1	724_moderate	Shale Gravel Transition Forest in the Sydney Basin Bioregion	28.3	27.6	0.23	PCT Cleared - 75%	High Sensitivity to Gain	Endangered Ecological Community	Critically Endangered	2.00		3

- Biodiversity credit report (Like-for-like)

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00033212/BAAS17056/22/00033213	Proposal Name Opal St Clair Explorers Way	BAM data last updated * 16/06/2022
Assessor Name Daniel McDonald	Assessor Number BAAS17056	BAM Data version * 54
Proponent Names	Report Created 29/06/2022	BAM Case Status Finalised
Assessment Revision 1	Assessment Type Part 4 Developments (General)	Date Finalised 29/06/2022
BOS entry trigger BOS Threshold: Biodiversity Values Map	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

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

Species
Caladenia tessellata / Thick Lip Spider Orchid
Hibbertia fumana / Hibbertia fumana

Additional Information for Approval

- Candidate threatened species report

BAM Candidate Species Report

Proposal Details

Assessment Id 00033212/BAAS17056/22/00033213	Proposal Name Opal St Clair Explorers Way	BAM data last updated * 16/06/2022
Assessor Name Daniel McDonald	Report Created 29/06/2022	BAM Data version * 54
Assessor Number BAAS17056	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
Assessment Revision 1	Date Finalised 29/06/2022	BOS entry trigger BOS Threshold: Biodiversity Values Map

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

List of Species Requiring Survey

Name	Presence	Survey Months
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?
Acacia pubescens Downy Wattle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☑ Apr ☐ May ☑ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Allocasuarina glareicola Allocasuarina glareicola	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☑ Apr ☐ May ☑ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

- Predicted species report.

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00033212/BAAS17056/22/00033213	Opal St Clair Explorers Way	16/06/2022
Assessor Name	**Report Created**	**BAM Data version ***
Daniel McDonald	29/06/2022	54
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS17056	Part 4 Developments (General)	Finalised
Assessment Revision	**BOS entry trigger**	**Date Finalised**
1	BOS Threshold: Biodiversity Values Map	29/06/2022

* 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)
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	724-Castlereagh shale - gravel transition forest
Diamond Firetail	Stagonopleura guttata	724-Castlereagh shale - gravel transition forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	724-Castlereagh shale - gravel transition forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	724-Castlereagh shale - gravel transition forest
Eastern Osprey	Pandion cristatus	724-Castlereagh shale - gravel transition forest
Flame Robin	Petroica phoenicea	724-Castlereagh shale - gravel transition forest
Grey-headed Flying-fox	Pteropus poliocephalus	724-Castlereagh shale - gravel transition forest
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	724-Castlereagh shale - gravel transition forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	724-Castlereagh shale - gravel transition forest
Little Bent-winged Bat	Miniopterus australis	724-Castlereagh shale - gravel transition forest