Elizabeth Enterprise Precinct - Stage 1 Intersection upgrade

Biodiversity Assessment Report

prepared for

Mirvac Projects Pty Ltd

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Statement of Authorship

The author of the report is Kat Duchatel with over 25 years' experience and the following relevant qualifications:

+ BSc Env (Macquarie)
+ EIANZ Certified Environmental Practitioner
+ Ecological Consultants Association of NSW Practicing member

Revision Schedule

Rev No	Date	Description	Issued to
0	13.09.2024	Draft BDAR for review	Mirvac
1	26.09.2024	BDAR for submission	Mirvac

Summary

Mirvac Projects Pty Ltd (the Applicant) is proposing to develop the northern leg of the Elizabeth Drive and Martin Road intersection and construct a new section of road to provide an alternative connection from Elizabeth Drive to the existing access road to the Cleanaway Kemps Creek Resource Recovery Park.

The proposal is being assessed under Part 4 of the EP&A Act with Penrith City Council (Council) as the consent authority.

The proposal will require clearing of native vegetation from a small area identified on the Biodiversity Values Map (i.e., where the new road intersects with the Cleanaway access road). The Biodiversity Values Map is a threshold established under the *Biodiversity Conservation Regulation 2017* that determines entry into the NSW Biodiversity Offsets Scheme (BOS).

The proposal's potential impacts on biodiversity values has been assessed through application of the Biodiversity Assessment Method (BAM) and reported in this biodiversity development assessment report (BDAR).

The proposal will directly impact on a small patch (<0.03ha) of *Melaleuca decora,* a native large shrub. This vegetation has been allocated to Castlereagh Ironbark Forest (PCT 3448), which is a threatened ecological community listed under the *Biodiversity Conservation Act 2016*.

The remaining areas of the subject site that will be disturbed comprise cleared pasture that has been historically used for agriculture and is currently grazed.

The vegetation integrity score calculated in the BAM calculator is below the threshold level that incurs an offsetting obligation under the BOS.

No threatened species have been incidentally recorded or were detected within the subject area.

The proposal will not result in any prescribed impacts or indirect impacts that could significantly impact on biodiversity values, providing mitigation measures are implemented and maintained.

Declarations

I, Kat Duchatel, 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).

I, Kat Duchatel, also declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

Signature: 

Date: 13.09.2024

Shortened form

BAM	NSW Biodiversity Assessment Method
BAM-C	BAM calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BCS	Biodiversity Conservation and Science Group
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	NSW *Biodiversity Security Act 2015*
BOAMS	Biodiversity Offsets and Agreement Management System
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DBH	Diameter at breast height
DCP	Development Control Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPHI	NSW Department of Planning Housing and Infrastructure
EE	Endeavour Energy
EEP	Elizabeth Enterprise Precinct
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	Commonwealth *Environment Protection Biodiversity and Conservation Act 1999*
HTW	High threat weed
LEP	Local Environment Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	NSW State Environment Protection Policy
SSD	State Significant Development
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
ZS	Zone substation

Contents

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Figures

1. Introduction

1.1 Background

Mirvac is proposing to develop the northern leg of the Elizabeth Drive and Martin Road intersection and construct a new section of road to provide an alternative connection from Elizabeth Drive to the existing access road to the Cleanaway Kemps Creek Resource Recovery Park.

Key site details are provided in Table 1 and the Site's context is shown in Figure 2.

Table 1. Site details

Legal description	LOT 100 DP 1283398
Address	1669-1723 Elizabeth Drive, Badgerys Creek NSW 2555
Local Government Area (LGA)	Penrith City Council (PCC)
Site area	+ Approximately 4.9 ha (incl. basins and existing road upgrade areas)
Site surrounds	+ Approximately 1 kilometre (km) north-east of Western Sydney Airport + Approximately 1 km south of the future M12 motorway + Cleanaway Kemps Creek Resource Recovery Park to the
Zoning	Enterprise (ENT) and SP2 Northern Road under the SEPP Western Parkland City 2021
Development Control Plan (DCP)	Western Sydney Aerotropolis DCP 2022
Biodiversity Certification	LOT 100 DP 1283398: Excluded from Cumberland Plain Conservation Plain (CPCP) certification SP2 Northern Road: Biodiversity certified land under the State Environmental Planning Policy (Sydney Region Growth Centres) 2006

1.2 Project description

Mirvac is proposing to develop the northern leg of the Elizabeth Drive and Martin Road intersection and construct a new section of road to provide an alternative connection from Elizabeth Drive to the existing access road to the Cleanaway Kemps Creek Resource Recovery Park. Figure 3 illustrates the proposed layout.

The proposal involves upgrades to a 550m section of Elizabeth Drive to construct turning lanes to and from the new northern leg of the Martin Road intersection, and construction of 260m of new road within Lot 100 to connect with the Cleanaway access road.

The proposal includes closure of the existing intersection of the Cleanaway access road with Elizabeth Drive and a 160m section of the access road, and subdivision of Lot 100 and dedication of the new road to Council.

Associated activities include stormwater drainage infrastructure, landscaping and traffic controls including signals, signage and line marking.

1.3 Subject site

The section of Elizabeth Drive that will be disturbed is located on biodiversity certified land under the Schedule 7 Part 7 of the former Growth Centres SEPP[1].

As part of the biodiversity certification process, the impacts of vegetation removal and associated offsets have already been considered and do not require further assessment of impacts on threatened species, populations and ecological communities, or their habitats, that would normally be required by Part 4 or 5 of the EP&A Act.

The subject site assessed in this BDAR is shown in Figure 2, and is wholly located on land that is excluded from strategic certification under the CPCP or the Growth Centres SEPP.

[1] This Policy was repealed by State Environmental Planning Policy (Precincts—Central River City) 2021 and biodiversity certified carried over under the BC Act

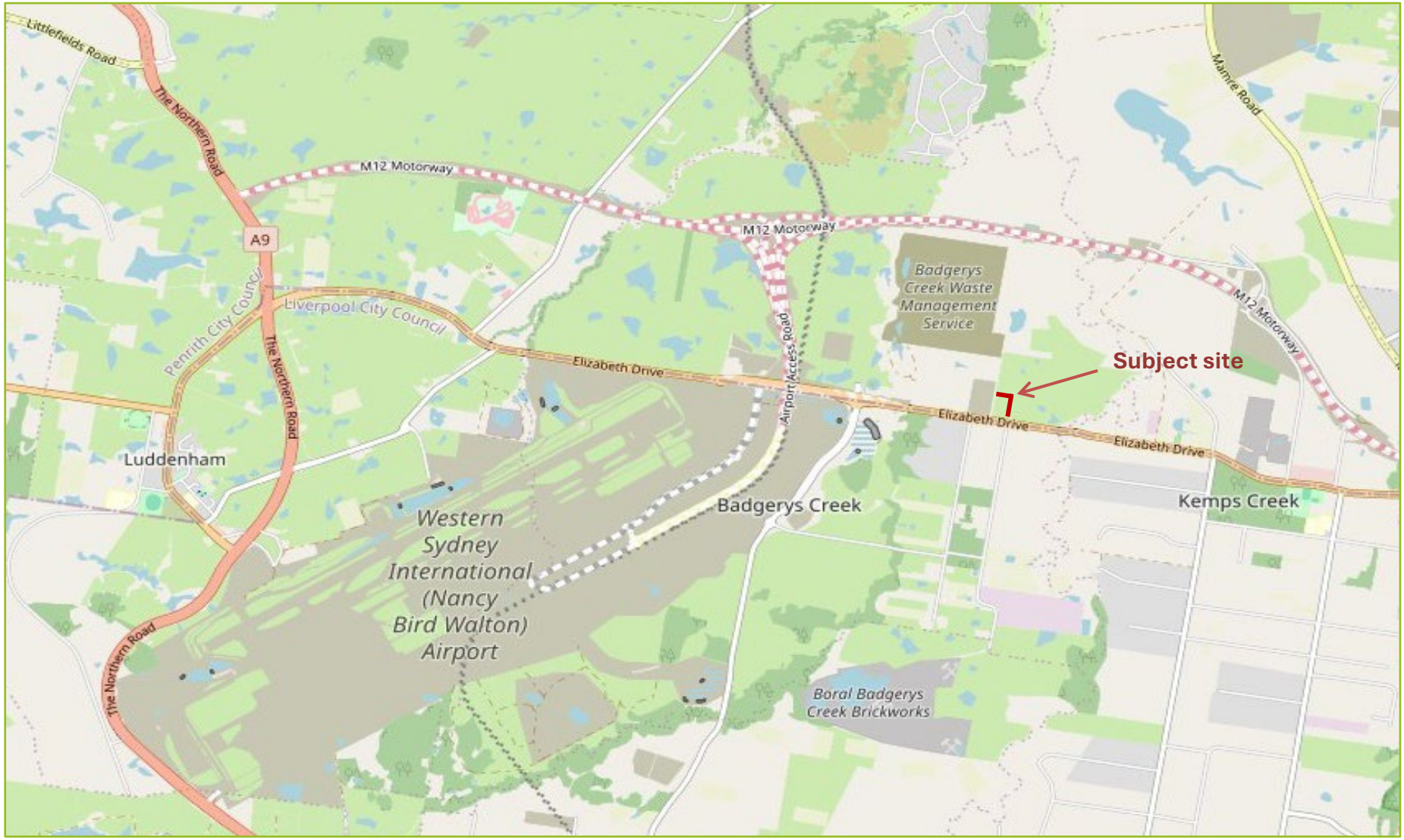
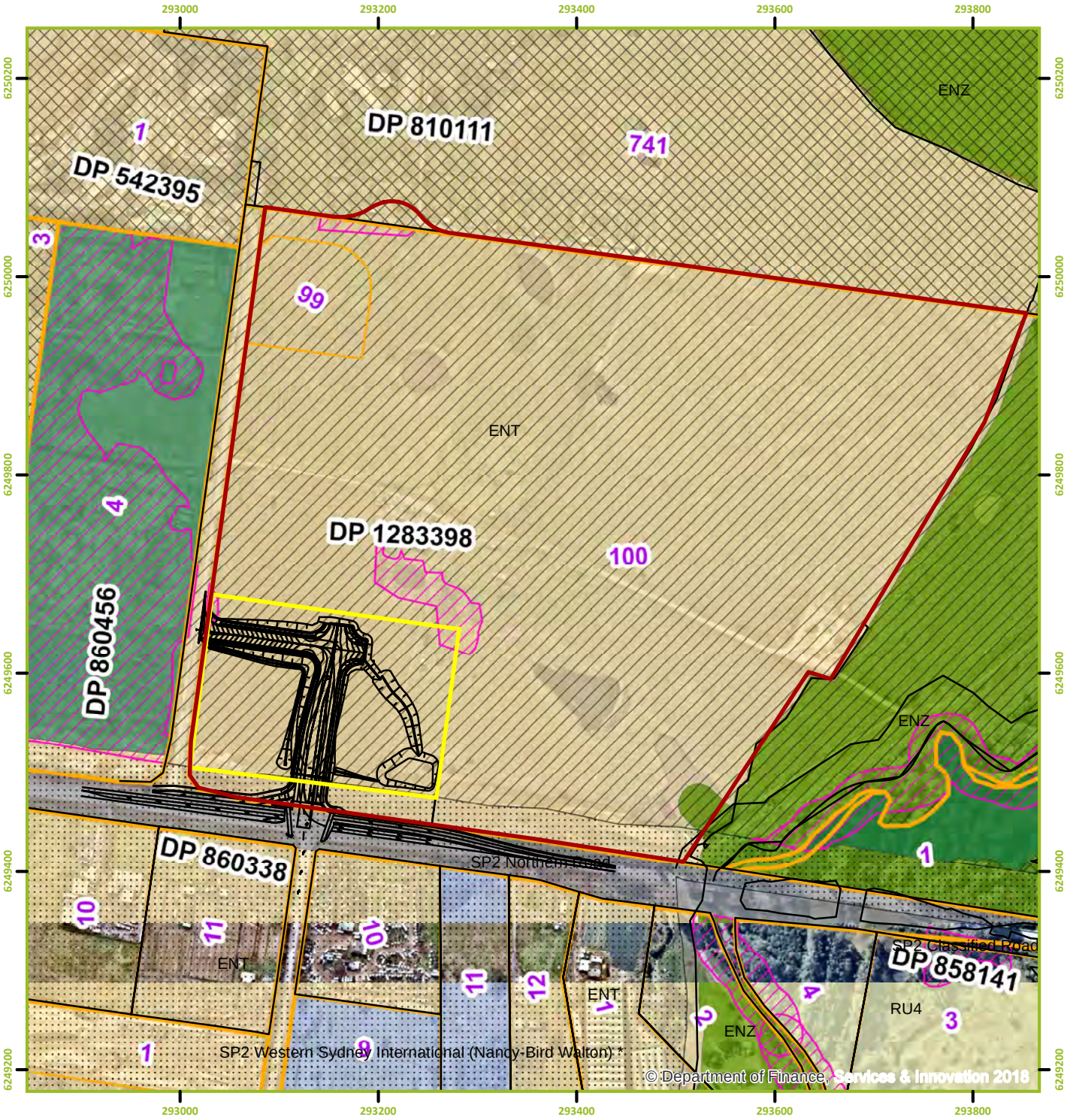


Figure 1. Location plan



0 105 210 420

m

Elizabeth Enterprise Precinct
Intersection DA

Figure 2. Site context

Legend

- EEP Stage_1_boundary
- Subject_site
- Roadworks
- Biodiversity Values

CPCP land category

- Excluded land
- Certified - urban capable land
- Avoided land

Growth Centre

- Existing Certified

EPI_Land_Zoning

- ENT
- ENZ
- RU4
- SP2 Northern Road
- SP2 Western Sydney Airport

N

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Coordinate system: MGA Zone 56 (GDA 2020) | Image source: Nearmap 29 May 2024
Data source: CPCP Land_Category (SEED) | GrowthCentreLandCertification(2006) | EPI_Land_Zoning (2024)

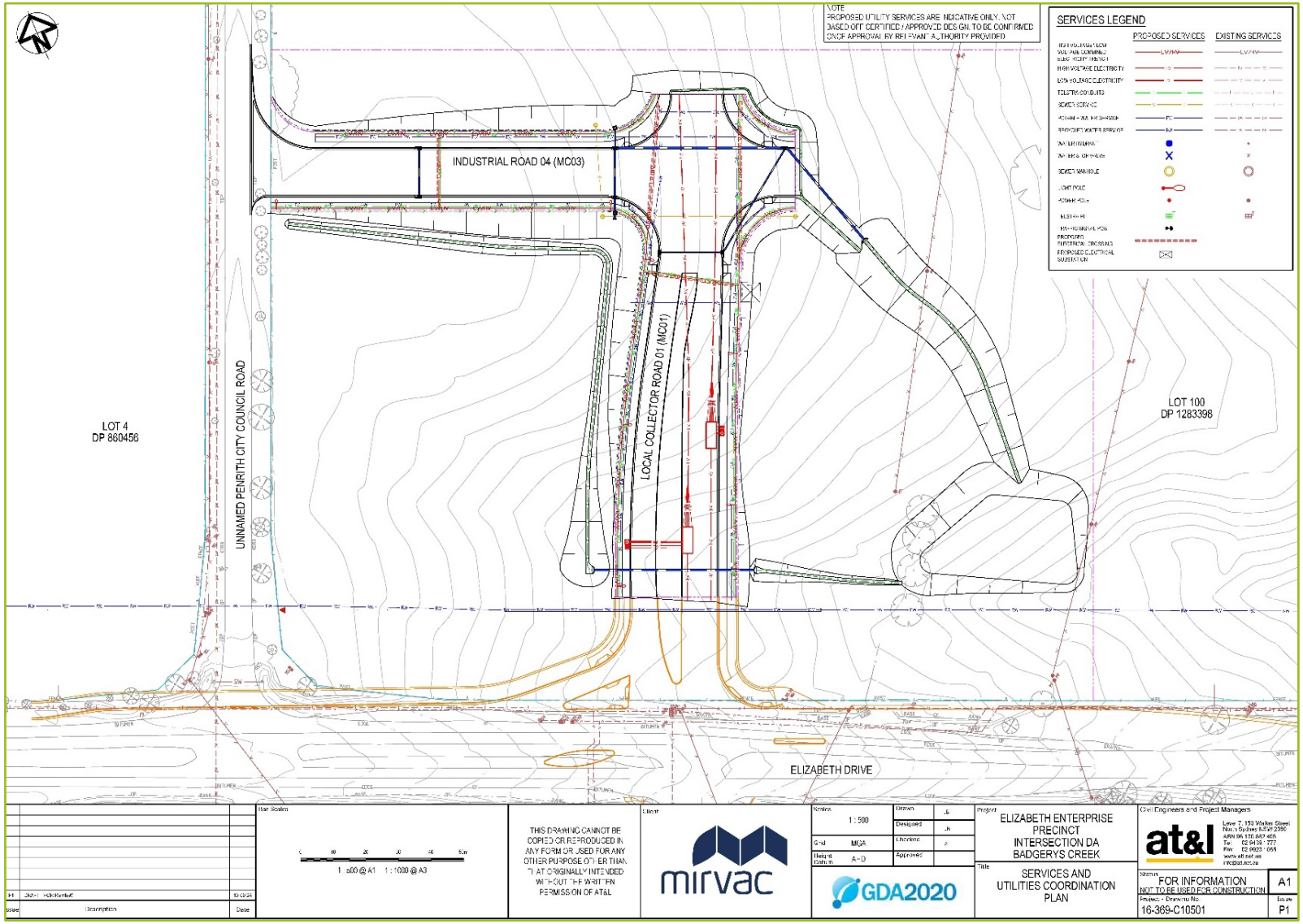


Figure 3. Proposed road layout

1.4 Biodiversity Offsets Scheme entry

The proposal is being assessed as local development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Biodiversity Offsets Scheme applies to local developments that meet certain thresholds, including but not limited to the clearing of native vegetation on land identified on the Biodiversity Values Map (under .

As shown on Figure 2, the proposal will require clearing of native vegetation from a small area identified on the Biodiversity Values Map (i.e., where the new road intersects with the Cleanaway access road).

1.5 Biodiversity Assessment Method (BAM)

The proposal has been assessed under the Streamlined assessment module – Small area in Appendix C of the BAM.

The streamlined assessment module for small area development can be used in the BAM calculator (BAM-C), where the following applies:

+ In accordance with the area clearing threshold shown in Table 12 in Appendix C of the BAM

  The proposal will require the clearing of a maximum of 275 m^2 (0.0275 ha), which is substantially less than the maximum clearing area of ≤1 ha for the minimum lot size (i.e., less than 1 ha) listed in Table 12 in Appendix C of the BAM.

+ On land that is located within an area on the Biodiversity Values Map, except where the biodiversity value included on the Biodiversity Values Map is core koala habitat.

  The Biodiversity Values mapped on the subject site are associated with the presence of a threatened ecological community and is not identified as core koala habitat.

2. Methods

2.1 Information sources

The following information sources were used in the preparation of this report:

+ Aerial Imagery: NearMap 11 July 2024
+ Australian Government Department of Climate Change, Energy, the Environment and Water
  - Interim Biogeographic Regionalisation for Australia (IBRA) version 7.0
  - Protected Matters Search Tool http://www.environment.gov.au/epbc/pmst/index.html
  - Species Profiles and Threats Database (SPRAT) http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
  - Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (Department of the Environment, Water, Heritage, and the Arts, 2013 EPBC Act Policy Statement)
+ NSW Department of Planning, Housing and Industry
  - Cumberland Plain Conservation Plan land category SEED (2018)
  - EPI Land Zoning (2024)
+ NSW Department of Climate Change, Energy, the Environment and Water
  - Biodiversity Values Map Edition 16.2 (DPE 2023)
  - BioNet Vegetation Classification Database (VCD) and Threatened Biodiversity Data Collection (TBDC)
  - NSW (Mitchell) Landscapes Version 3.1 (2017)
  - State Vegetation Type Mapping - SVTM_NSW_Extant_PCT_vC2_0_M2_0_106 (DPE 2023)
  - Vegetation_CumberlandPlainUpdate2013_4207 (OEH 2013)
+ Soil Landscapes of the Penrith 1:100 000 Sheet Map (Bannerman & Hazelton PA 1990)
+ Eco Logical Australia (2024) Elizabeth Enterprise Precinct Biodiversity and riparian assessment report, prepared for Mirvac Projects Pty Ltd

2.2 Site context methods

2.2.1 Landscape features

Under the small area development assessment module, the site context must be established by identifying the following:

+ IBRA subregion in which the development takes place, and
+ Relevant landscape features listed in Section 3.1 of the BAM

2.2.2 Native vegetation cover

In accordance with the with Section 3.2 and Subsection 4.3.2 of the BAM, the native vegetation cover and patch size must be determined.

Native vegetation cover was determined by:

+ Clipping the extent of NSW State Vegetation Type Map (SVTM) (DPE 2023) within an assessment area of 1500m surrounding the subject site using ESRI ArcMap v8

+ Creating a new 'Native vegetation cover' shapefile
+ In edit mode, deleting or decreasing areas of vegetation cleared or increasing areas of vegetation that have expanded in extent (since mapping undertaken)
+ Exporting data and removing non-native vegetation data and calculating the native vegetation cover in excel.

2.3 Native vegetation, threatened ecological communities and vegetation integrity methods

2.3.1 Existing information

The subject site and wider Elizabeth Enterprise Precinct (EEP) was investigated by Eco Logical Australia (ELA) and reported in a biodiversity and riparian assessment report in 2024 (for the EEP's planning proposal).

ELA mapped and assessed native vegetation via desktop and ground truthing in 2018.

Since this time, the NSW State Vegetation Type Mapping (SVTM) has replaced earlier mapping used by ELA (i.e., Cumberland Plain vegetation mapping v4207, OEH 2013) and introduced the revised plant community type (PCT) classification.

Consideration of the revised PCT classification was undertaken with reference to the Bionet Vegetation Classification database and data collected by ELA in 2018.

Site inspection conducted in May and September 2024 for this assessment

Table 2 lists the flora species observed within the project site and surrounds, which are predominantly introduced species.

2.3.2 Vegetation integrity assessment

Under the small area development assessment module, vegetation integrity of the PCT(s) on the subject site can be assessed by either:

+ qualitatively by observing values for the condition attributes (justification must be included as to how these values were determined), or
+ quantitatively by collecting field data for the condition attributes at a plot in accordance with Subsection 4.3.4 of the BAM.

The area of native vegetation being assessed is 275 m^2, which was not large enough to cover the standard plot sizes without avoiding areas of disturbance (i.e., the adjacent Cleanaway access road and surrounding heavily grazed pasture land).

Data collected was compliant with plot / transect methods specified in the BAM, although only a central 50 m midline was physically measured for the standard 20 x 50 m (1,000m^2) plot. This due to a lack of functional attributes outside of the 20 x 20 m (400m^2) plot (see Figure 7 in Section). All attribute data was otherwise collected compliantly with the BAM.

2.4 Threatened species methods

The suite of threatened species likely to occur on or use the development site was undertaken in accordance with Step 1 and Step 2 in Section 5.2 of the BAM.

This includes the predicted species assessed for ecosystem credits and the candidate species assessed for species credits.

All of the candidate species credit species identified for the proposal according to Step 1 and Step 2 that are at risk of an SAII were further assessed in accordance with Steps 3–5 in Section 5.2 of the

BAM. Candidate species credit species that are not at risk of an SAII and are not incidentally recorded on the subject site do not require further assessment.

2.4.1 Field surveys

Surveys undertaken by ELA in 2018 and 2019 and by ecologique in 2024 that are relevant to the subject area outlined in Table 2.

Table 2.Surveys conducted relevant to the subject site

Date	Location / known effort	Target species	Survey type
19/03/2018	Stage 1 extent: 2 x ecologists	Green & Golden Bell Frog	Habitat survey in farm dams Note: no farm dams located in subject dam)
19/03/2018	Stage 1 extent: 2 x ecologists	Cumberland Plain Land Snail	Not stated
19/03/2018	Stage 1 extent: 2 x ecologists	Threatened flora species *D. tenuifolia, G. juniperina subsp. juniperina, Grevillea parviflora* subsp. *parviflora, Persoonia nutans* and *Pultenaea parviflora*	Not stated
Jan – Feb 2019	Anabats x 4 nights beside dams and within the riparian corridors	Microbat species	BAM Threatened Bats survey guide for the (OEH, 2018).
12/09/2024	2.5 hours	Threatened flora species Cumberland Plain Land Snail Avifauna	Walking traverses Dedicated ground debris searches of 20 person minutes within vegetated area Point count method (DEC 2004). In addition, any evidence to suggest the presence of a bird (e.g., whitewash, crushed eucalypt fruit, nest site) were targeted and recorded if found. Opportunistic sightings of birds were also recorded throughout field survey.

2.5 Weather conditions

Table 3. Environmental conditions during threatened species surveys

Date	Time	Temperature (min. & max.)	Wind (direction/speed)	Rainfall (mm)	
12.09.2024	9.40-12.10pm	14.6-20.6 °C	SSE to S (15km/hr)	Nil	Nil preceding 27 days
19/03/2018	not stated	not stated	not stated	Nil	11mm preceding week 22.2mm preceding fortnight 46.8 mm on 26.02.2018

3. Site context

3.1 General description

The subject site is bound to the west by an unnamed access road (that leads to Cleanaway Kemps Creek Resource Recovery Park), pasture associated with the Kingsfield Stud and equestrian facility to the north and east, and Elizabeth Drive to the south.

The southern boundary of the subject site was recently an active construction site used by Sydney Water contractors undertaking pipeline installation as a component of the Upper South Creek Advanced Water Recycling (AWRC) facility.

The subject site is wholly located on the Blacktown soil landscape and is gently sloping with elevations between 62 and 58 m Australian height datum (AHD).

3.2 Landscape features

Landscape features relevant to the proposal have been assessed from within a 1500m buffer zone (the BDAR assessment area) around the subject site. Table 4 summarises the landscape features identified within the BDAR assessment area.

Table 4. Landscape features

Landscape features	
IBRA bioregion/subregion	Sydney Basin/Cumberland (see Figure 4).
NSW (Mitchell) landscapes	The subject site is wholly located within the Cumberland Mitchell landscape. The Hawkesbury-Nepean Channels and Floodplains landscape are located in the BDAR – associated with Badgerys Creek and South Creek to the west and east of the subject site respectively (see Figure 4).
Rivers and streams classified according to stream order	No watercourses or drainage lines occur within the subject site. The closest watercourses are South Creek approximately 500 m due east, and Badgerys Creek approximately 670 m due west of the subject site (see Figure 4).
Wetlands within, adjacent to and downstream of the site	The subject site does not have any wetlands.
Connectivity of different areas of habitat	The subject site does not provide habitat connectivity. Areas of continuous habitat within the BDAR assessment area are provided in the South Creek riparian corridor to the east. (see Figure 5).
Geological features such as karst, caves, crevices, cliffs, rocks, and other geological features of significance and for vegetation clearing proposals, soil hazard features	No karsts, caves, crevices, cliffs, or areas of geological significance have been identified within the BDAR assessment area.

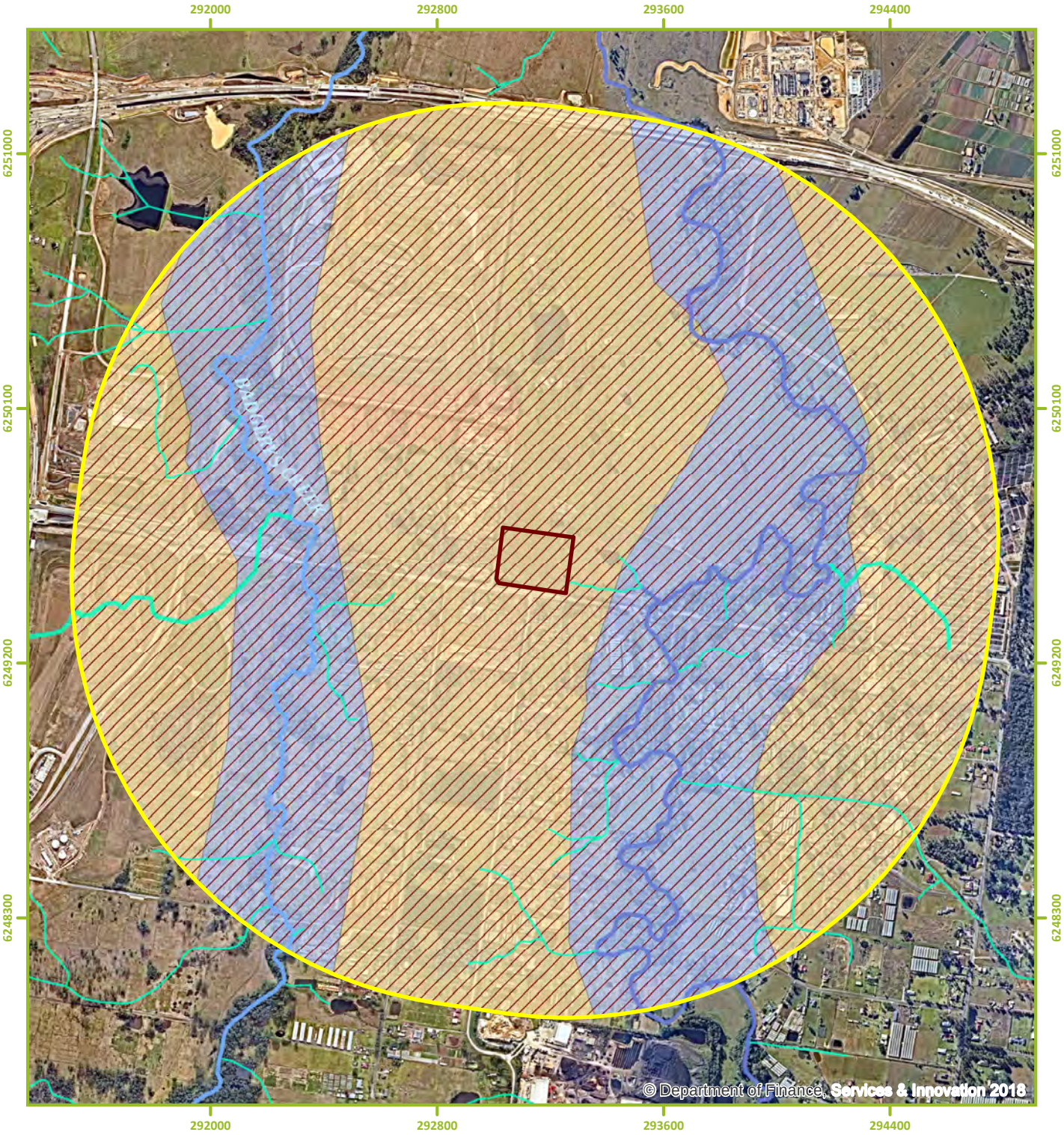
Landscape features	
Areas of outstanding biodiversity value occurring on the subject site and assessment area	No areas of outstanding biodiversity value occur within the BDAR assessment area.

3.3 Native vegetation cover

Table 5 summarises the extent of native vegetation cover within the BDAR assessment area. Figure 5 shows native vegetation cover within the assessment area.

Table 5. Native vegetation cover in the BDAR assessment area

BDAR assessment area (ha)	844.9
Total area of native vegetation cover (ha)	173.0
Percentage of native vegetation cover (%)	20.5
Class (0-10, >10-30, >30-70 or >70%)	>10-30



0 365 730 1,460

m

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Figure 4. Site context

Legend

- BDAR_assessment_area
- Subject_site
- IBRA Cumberland subregion

Mitchell landsape

- Cumberland Plain
- Hawkesbury - Nepean Channels and Floodplains

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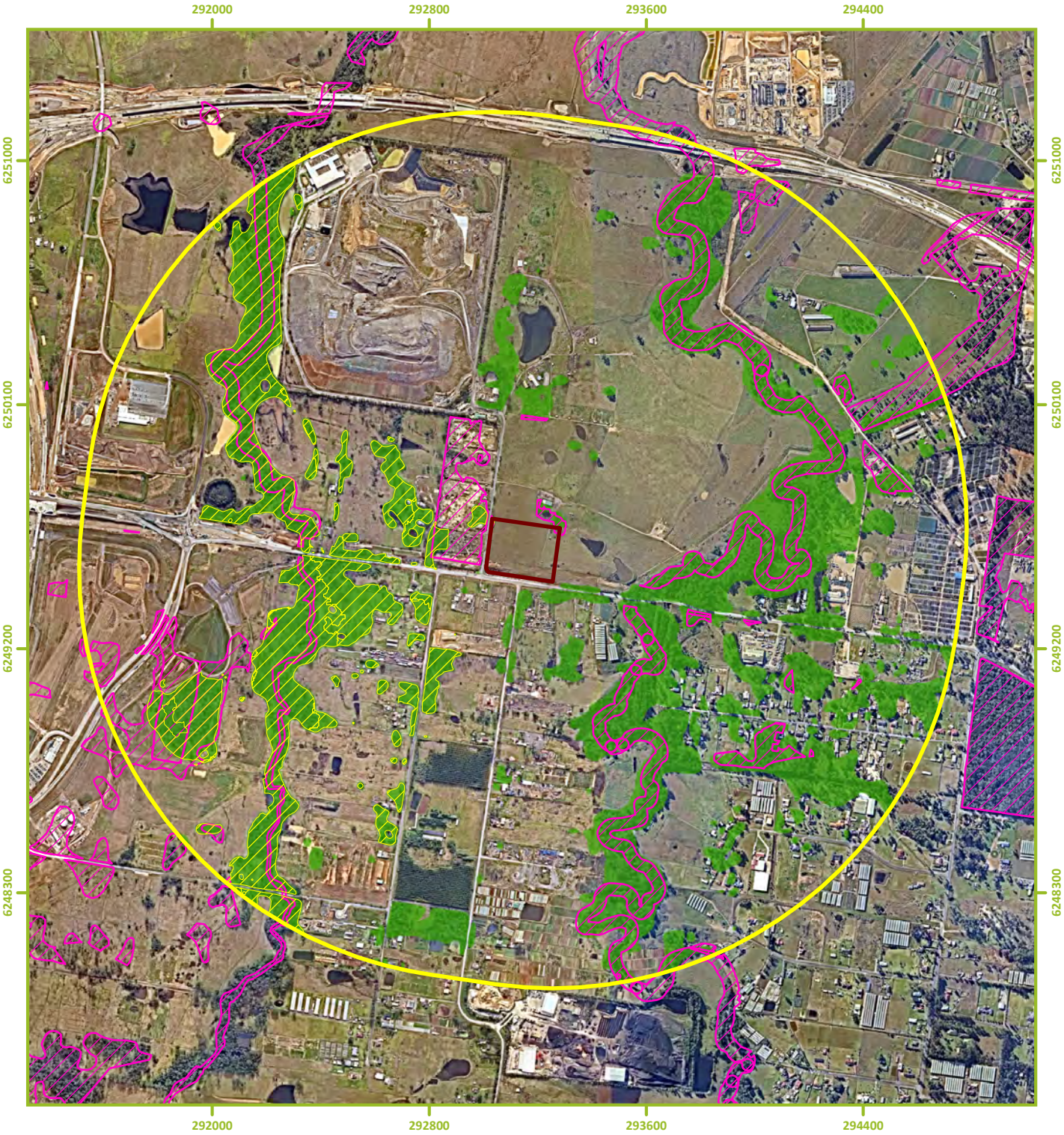
Coordinate system: MGA Zone 56 (GDA 2020) | Image source: Nearmap 11 July 2024
Data source: IBRA7 subregions; Mitchell (NSW) landscapes v3



0 385 770 1,540

m

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Figure 5. Native vegetation cover

Legend

- BDAR_assessment_area
- Subject_site
- NV_cover
- Incl. in patch sizes
- Biodiversity Values

N

Coordinate system: MGA Zone 56 (GDA 2020) | Image source: Nearmap 11 July 2024
Data source: BV162_Web.gdb; SVTM_NSW_Extant_PCT_vC2_0_M2_0_106

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4. Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation mapping

The SVTM (DPE 2023) identifies the subject site as 'not classified' (i.e., meaning no remnant native vegetation identified).

Earlier mapping by OEH in 2013 (Vegetation_CumberlandPlainUpdate2013_4207) identifies an area of PCT 724 (Castlereagh shale - gravel transition forest) where the small patch of approximately 275m^2 dominated by Melaleuca decora is located on the subject site. PCT 725 is also located alongside OEH's mapped PCT 724. Figure 6 shows vegetation mapping by OEH (2013) and SVTM (DPE 2023) on the subject site.

4.2 Plant community types

Ground truthing undertaken by ELA in 2018 validated the presence of PCT 724 on the subject site but how they justified the allocation of PCT 724 was not provided in their documentation. Figure 6 shows vegetation within the subject site and surrounding land that was validated by ELA.

Since this time a systematic ecological revision updated PCT classification was released (Eastern NSW PCT Classification version 1.1, 2023). This resulted in the following lineage changes:

+ PCT 724 was assigned to PCTs 3448 Castlereagh Ironbark Forest and 3320 Cumberland Shale Plains Woodland, with only a small residual of legacy member plots are resolved in other new PCTs.
+ PCT 725 was almost entirely included in the new PCT 3448 with a smaller proportion of legacy member plots resolved to other new PCTs including PCT 3321 (Cumberland Shale-Sandstone Ironbark Forest).

The presence of *Melaleuca decora* on its own is insufficient to discern between PCTs 3448, 3321 and 3320. Although the median cover score and frequency of *M.decora* from PCT benchmark data is the highest in PCT 3448 (see Table 6).

Table 6. Melaleuca decora cover and frequency in benchmark data

PCT	Median cover score	Frequency[2]
PCT 3448 Castlereagh Ironbark Forest	3	63
PCT 3320 Cumberland Shale Plains Woodland	2	14
PCT 3321 Cumberland Shale-Sandstone Ironbark Forest	1	2

Descriptive attributes provided in the Bionet Vegetation Classification Database (VCD) support the allocation of PCT 3448 as the best fit PCT due to the following:

+ A tall sclerophyll open forest with a dense mid-stratum of Melaleucas and a patchy ground layer of grasses and graminoids or a dense thicket of Melaleucas with emergent eucalypts that is found on the Cumberland Plain to the west of Sydney.

[2] The frequency that a species occurs in a community (based on plot data). Mapping reports generally record frequency as fidelity as proportion of 1.

+ The dense shrub to small tree layer almost always includes melaleuca species of which *M. decora* is most frequent.

Whereas Melaleucas are reported to be rare in PCT 3321 and PCT 3448 grades into PCT 3320 where a greater shale influence is present.

Table 7 summarises the soil landscapes mapped on the subject site, which provides additional information supporting the allocation of a suitable PCT to the small patch of native vegetation present.

In this instance, the subject site is located on the Rickabys Creek and Blacktown soil landscapes (see Figure 6 and Table 7). The patch of remnant M.decora is located within the Rickabys Creek soil landscape.

Table 7. Soil landscapes

Soil landscape	Description
Rickabys Creek	**Landscape** : Plain on Tertiary Alluvium Rickaby's Creek Gravel (alluvium, clay and gravel) in the Cumberland Plain, Blue Mountains Plateau and Wanganderry Tablelands. Local relief 10-100 m; altitude 10-160 m; slopes 0-10%; rock outcrop nil. **Soils** : Red and Grey Dermosols (Red Podzolic Soil) and Red Kurosols (Red Podzolic Soils). **Associated vegetation** : Partially cleared Castlereagh Scribbly Gum Woodland (PCT 3629) and Shale/Gravel Transitional Forest (PCT 3448 or PCT 3320).
Blacktown	**Landscape** : Low hills and rises on Wianamatta Group Shale (shale, sandstone-lithic and sandstone-quartz) in the Cumberland Plain, Hornsby Plateau and Picton Hills. Local relief 10-50 m; altitude 10-202 m; slopes 0-9%; rock outcrop nil. **Soils** : Red Kurosols (Red and Brown Podzolic Soils) Red and Yellow Sodosols (Soloths) and Yellow Chromosols (Yellow Podzolic Soils). Red Chromosols, Red Dermosols and Red Ferrosols (Krasnozems) on iron-rich parent material. **Associated vegetation** : Two distinct vegetation units. Closer to the coast the vegetation is dominated by wet sclerophyll forest (tall open forest) with this grading into dry sclerophyll forest (open woodland) to the west as rainfall declines. The dry sclerophyll forest is dominated by Shale Plains Woodland (PCT 3320) with minor occurrences of Shale Hills Woodland (PCT 3319).

Based on the information available PCT 3448 has been selected as the most appropriate PCT for the native vegetation within the subject site.

Note: there are additional native trees located proximal to PCT 3448 but located within the unnamed road reserve. Review of aerial historical imagery shows that these trees have been planted origins (see aerial photography from 2004 below).

Aerial photo plate 2004: small patch of M.decora evident – planted street trees (faintly) evident

4.3 Patch size

Patch size was determined through aerial photographic interpretation (Nearmap 11 July 2024) and the native vegetation cover shapefile (refer Section 2.2.2). In accordance with Section 4.3.2 of the BAM, the patch size was calculated by including all polygons that met the following criteria:

+ an area of native vegetation that occurs on the subject site, and
+ includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems), and
+ a patch may extend onto adjoining land.

The patch size was calculated as 61.5 ha and assigned to a 25–<100 ha class. The areas of native vegetation cover that contribute to the patch size are shown in

4.4 Vegetation integrity (vegetation condition)

Vegetation integrity is a metric-based assessment used to measure the condition of native vegetation against a benchmark, based on survey data collected by the assessor. Table 8 shows the vegetation integrity scores calculated in the BAM C for the composition, structure and relevant function attribute data collected from the plot / transect (shown in Figure 7).

Table 8. Vegetation integrity scores

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score	Hollow bearing trees present?
Zone 1 3448_Low condition	0.9	31.7	8.9	6.4	No

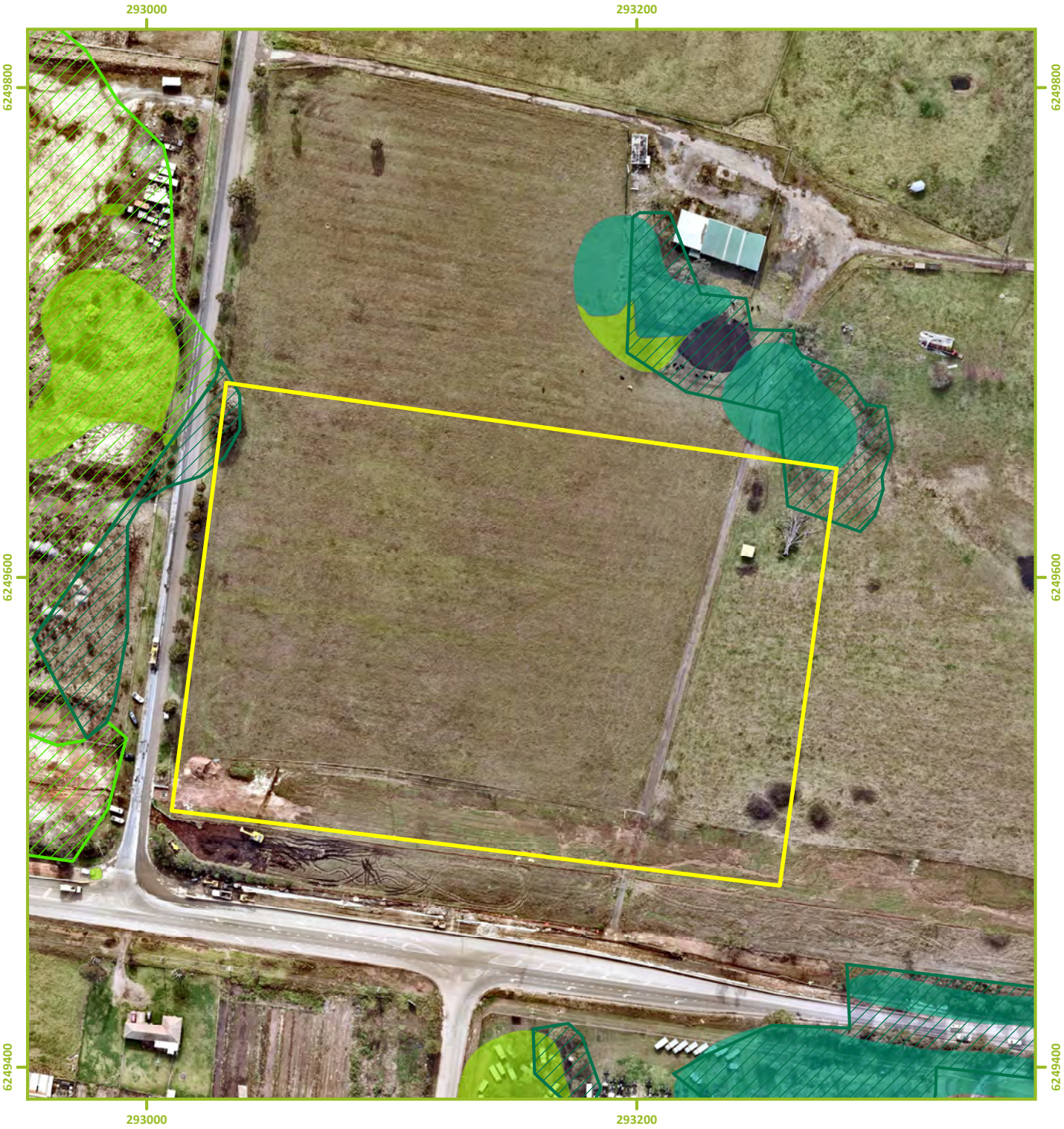

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Figure 6. Vegetation mapping

Legend

Subject_site

Cumberland Plain West_2013_E_4207

3448 Castlereach Ironbark Forest

3629 Castlereagh Scribbly Gum Woodland

SVTM_NSW_Extant_PCT_vC2_0_M2

3448 Castlereach Ironbark Forest

3629 Castlereagh Scribbly Gum Woodland

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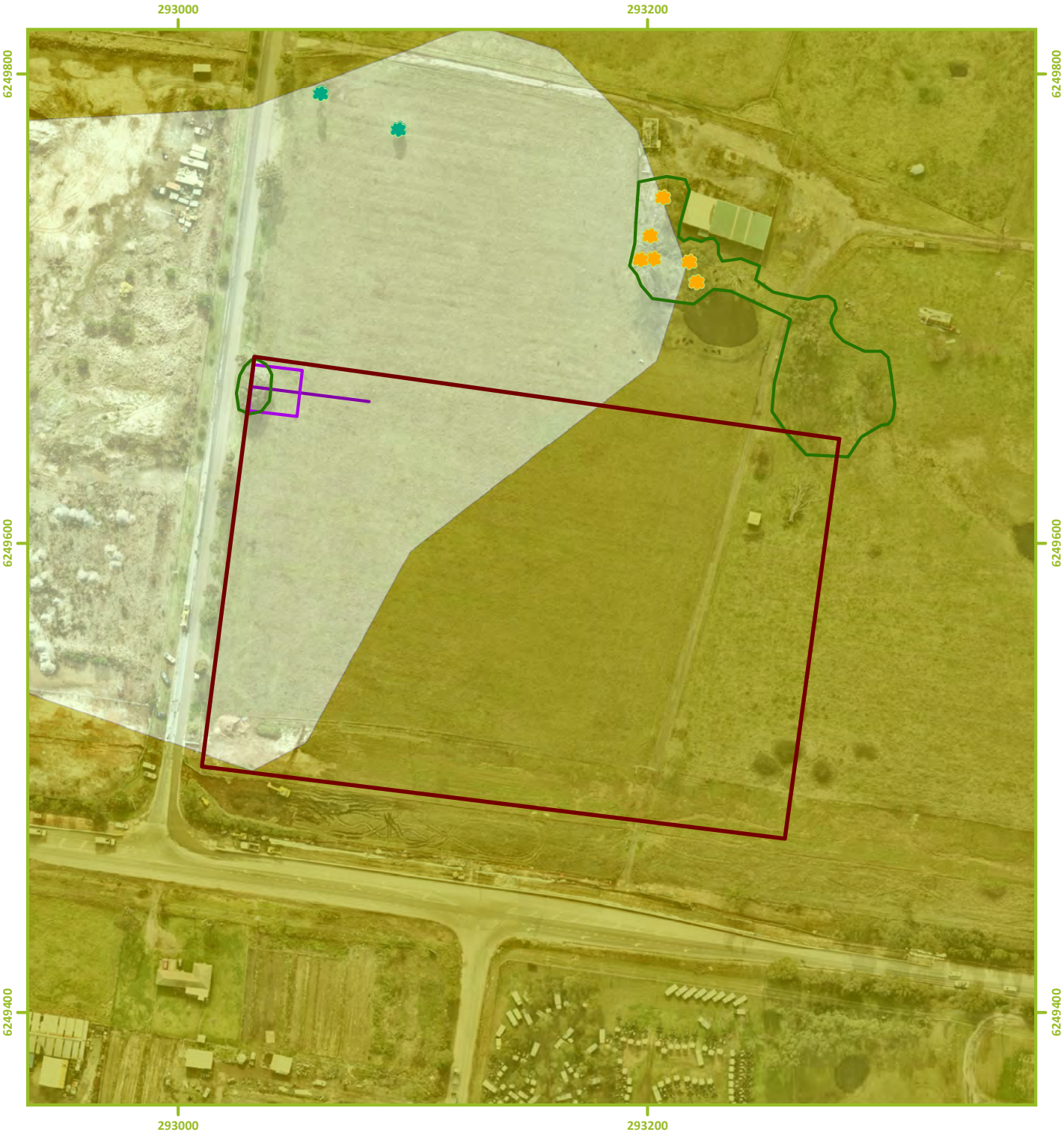
Coordinate system: MGA Zone 56 (GDA 2020) | Image source: Nearmap 11 July 2024
Data source: CumberlandPlainWest_2013_E_4207 | SVTM_NSW_Extant_PCT_vC2_0_M2



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Elizabeth Enterprise Precinct
Intersection DA

Figure 7. PCTs & soil landscapes

Legend

- Subject_site
- Castlereagh Ironbark Forest
- Plot
- Eucalyptus amplifolia
- Eucalyptus tereticornis
- Transect

Soil landscape

- Blacktown
- Rickabys Creek

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Coordinate system: MGA Zone 56 (GDA 2020) | Image source: Nearmap 11 July 2024
Data source: HNP_SLR100K_v1_1_GDA94_Clip

Photo 1: *Melaleuca decora* patch allocated to PCT 3448 viewed from the northeast

Photo 2: *Melaleuca decora* patch allocated to PCT 3448 viewed from the north

Photo 3: Understorey to *Melaleuca decora* patch allocated to PCT 3448

Photo 4: Understorey to *Melaleuca decora* patch allocated to PCT 3448

Photo 5: Understorey to *Melaleuca decora* patch allocated to PCT 3448

Photo 6: *Melaleuca decora* patch allocated to PCT 3448 viewed from the south

	
Photo 7: *Melaleuca decora* patch allocated to PCT 3448 in background, kikuyu, African love grass, fireweed in foreground	**Photo 8**: Understorey introduced grasses, fireweed, lambs tongue

The subject site is dominated by exotic pasture grasses and weeds as shown in photo plates 9 to 12.

	
Photo 9: Pasture looking west towards PCT 3448	**Photo 10**: Example of pasture
	
Photo 11: Example of pasture	**Photo 12**: Elizabeth Drive work zone in background, kikuyu, African love grass, fireweed dominant in foreground.

4.5 Threatened ecological communities

4.5.1 BC Act listed TECs

PCT 3448 Castlereagh Ironbark Forest relates to the following listed TECs:

+ Primarily to the endangered Cooks River/Castlereagh Ironbark Forest (CIF) in the Sydney Basin Bioregion
+ A component may relate to the endangered Shale Gravel Transition Forest (SGTF) in the Sydney Basin Bioregion

The VCD recommends the use of paragraphs 5 and 6 of the final determinations for both CIF and STGF Final to assist in distinguishing between the two TECs.

Paragraph 5 provides information on substrate and paragraph 6 refers to NPWS (2000a & 2000b) for diagnostic plant species and reference to mapped expressions of the two TECs.

Distribution mapping by the Commonwealth DCCEEW (2005) does not indicate the nationally listed SGTF as likely to occur in the locality of the subject site. This mapping relied on the Native vegetation mapping of the Cumberland Plain (NPWS 2002)[3].

The endangered Cooks River/Castlereagh Ironbark Forest (CIF) in the Sydney Basin Bioregion as selected in the BAM C.

4.5.2 EPBC Act listed TECs

As discussed above in Section 4.5.1, the vegetation within the subject site has been determined as commensurate with the NSW listed Cooks River Castlereagh Ironbark Forest TEC.

PCT 3448 Castlereagh Ironbark Forest primarily only relates to the EPBC Act listed community where it occurs in the Cumberland subregion of the Sydney Basin bioregion (IBRA Version 7.0) and satisfies condition thresholds as per Section 1.5.2 of the Conservation Advice.

Under Section 1.5.2 of the Conservation Advice, categories A and B are considered a moderate quality condition class and the minimum thresholds for a patch of the ecological community to be subject to the referral, assessment and compliance provisions of the EPBC Act.

As shown in Table 9, PCT 3448 on the subject site, at < 0.03 ha, is too small to meet the minimum thresholds to be considered under the EPBC Act.

Table 9. Moderate quality condition class and the minimum thresholds

Category A	Category B
Patch size ≥ 0.5 ha in area	Patch size ≥ 0.5 ha in area
AND	AND
≥30% of the perennial understorey vegetation cover is made up of native species	≥50% of the perennial understorey vegetation cover is made up of native species
AND	
the patch is contiguous with a native vegetation remnant (any nativee vegetation where cover in each layer present is dominated by native species) ≥ 1ha in area	

[3] Mapping referred to in the final determinations was not found.

Category A	Category B
OR The patch has at least one tree with hollows or at leastone large locally indigenous tree (>80cm dbh)	

5. Assessing the habitat suitability for threatened species

5.1 Threatened species

Threatened species that have the potential to occur on the subject site have been compiled from TBDC records searches from the locality and BAM-C generated predicted and candidate species lists.

5.1.1 Predicted (ecosystem credit) species

Table 10 lists predicted species generated in the BAM C for which ecosystem credits apply. These are threatened species reliably predicted to utilise the site and surveys are not required for these these species.

All predicted (ecosystem credit) species were maintained in the BAM C.

Table 10 identifies whether the species is a dual credit species. Dual credit species are identified in the TBDC as threatened species that require assessment for ecosystem credits and species credits.

For dual credit species, part of the habitat is assessed as a species credit (e.g. breeding habitat or land mapped on an important habitat map (IHM) for a species). The remaining habitat components for the species are assessed as an ecosystem credit (e.g. foraging habitat).

Table 10. Predicted (ecosystem credit) species

Scientific Name	Common Name	Dual credit species
Aves		
Anthochaera phrygia	Regent Honeyeater	IHM
Artamus cyanopterus cyanopterus	Dusky Woodswallow	No
Callocephalon fimbriatum	Gang-gang Cockatoo	Foraging
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	Foraging
Chthonicola sagittata	Speckled Warbler	No
Circus assimilis	Spotted Harrier	No
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	No
Daphoenositta chrysoptera	Varied Sittella	No
Ephippiorhynchus asiaticus	Black-necked Stork	No
Falco subniger	Black Falcon	No
Glossopsitta pusilla	Little Lorikeet	No
Haliaeetus leucogaster	White-bellied Sea- Eagle	Foraging
Hieraaetus morphnoides	Little Eagle	Foraging
Hirundapus caudacutus	White-throated Needletail	No
Ixobrychus flavicollis	Black Bittern	No
Lathamus discolor	Swift Parrot	IHM
Lophoictinia isura	Square-tailed Kite	No

Scientific Name	Common Name	Dual credit species
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	No
Pandion cristatus	Eastern Osprey	Foraging
Petroica boodang	Scarlet Robin	No
Petroica phoenicea	Flame Robin	No
Stagonopleura guttata	Diamond Firetail	No
Mammalia		
Dasyurus maculatus	Spotted-tailed Quoll	No
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Foraging
Miniopterus australis	Little Bent-winged Bat	Foraging
Miniopterus orianae oceanensis	Large Bent-winged Bat	Foraging
Pteropus poliocephalus	Grey-headed Flying- fox	Foraging
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	No
Reptilia		
Varanus rosenbergi	Rosenberg's Goanna	No

5.1.1 Candidate (species credit) species

Table 11 lists the suite of candidate (species credit) species generated in the BAM C.

Under the streamlined assessment module for small areas, candidate species credit species that are not at risk of an SAII and are not incidentally recorded on the subject site do not require further assessment.

Table 11 identifies species that are listed as potentially at risk of an SAII.

Table 11. Candidate (species credit) species at risk of SAII

Species name	Listing status		Sources	Retained for further assessment?	Reason for exclusion from further assessment
	BC Act	EPBC Act			
Anthochaera phrygia Regent Honeyeater	CE	CE	BAM C	NO	**BAM Habitat constraint:** As per Important Habitat Map
Lathamus discolor Swift Parrot	E	CE	BAM C	NO	
Chalinolobus dwyeri Large-eared Pied Bat	V	E	BAM C	NO	**BAM Habitat constraint:** Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels
Miniopterus australis Little Bent-winged Bat	V		BAM C	NO	**BAM Habitat constraint:** Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature
Miniopterus orianae oceanensis Large Bent-winged Bat	V		BAM C	NO	
Allocasuarina glareicola	E	E	BAM C	Refer Section 5.2	
Deyeuxia appressa	E	E	BAM C		
Hibbertia fumana	CE		BAM C		
Hibbertia sp. Bankstown	CE	CE	BAM C		
Micromyrtus minutiflora	E	V	BAM C		

5.2 Further assessment of threatened species at risk of an SAII

As summarised in Table 11, all fauna species at risk of an SAII do not require further assessment due to BAM identified habitat constraints.

The four flora species identified at risk of an SAII in Table 10 do not have any habitat constraints identified in the BAM. Table 12 summarises the habitat requirements for these species.

Table 12. Flora species identified at risk of an SAII

Species	Habitat requirements
Allocasuarina glareicola	*Allocasuarina glareicola* is an erect, often depauperate sheoak shrub to 1-2 m high. The species is primarily restricted to the Richmond (northwestern Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil. Found in open woodland with Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla and Melaleuca decora. *A. glareicola* can be surveyed all year round and the species was not detected on the subject site (see survey illustration in Figure 8).
Deyeuxia appressa	*Deyeuxia appressa* is an erect perennial grass to 0.9 m high, described in the TBDC as follows: + A highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. + First collected in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown. Was then collected in 1941 from Killara, near Hornsby. + Has not been collected since and may now be extinct in the wild due to the level of habitat loss and development that has occurred within these areas. + Given that D. appressa hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology. The species flowers spring to summer and is mesophytic (grows in moist conditions).
Hibbertia fumana	*Hibbertia fumana* is a low shrub or sub-shrub, endemic to NSW and was considered to be extinct when rediscovered in Moorebank, during flora surveys in October 2016. This site was re-surveyed in November 2016 when c. 100 individuals were located growing in the transition zone between Castlereagh Ironbark Forest and Castlereagh Scribbly Gum Woodland and with *H. pubula*. The population occupies an area of c. 5 ha (reference: Moorebank biobank site documents; Duretto et al Telopea 2017 Vol 20.). The TBDC indicates the species to occur in a variety of structural habitats including open areas, disturbed sites and also within thick ground cover dominated by a heavy cover of sedges, rushes and grasses. It is presumed these are the habitats that the species occurs in at Moorebank. Reproduction is primarily clonal (TBDC). Survey not within BAM specified period (i.e., Oct-Dec after rain pre-11am).

Species	Habitat requirements
Hibbertia sp. Bankstown	Hibbertia sp. Bankstown is described as a prostrate shrub, endemic to NSW and is currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs, in the Bankstown LGA. The remnant at the site and soil type are consistent with an inferred pre-settlement cover of Castlereagh Ironbark Forest although some remnant vegetation at and near the site (along the channel in particular) suggests Castlereagh Scribbly Gum Woodland is equally valid. Reproduction appears to be partially clonal. Survey within BAM specified period (i.e., Sept-Dec).
Micromyrtus minutiflora	A slender spreading shrub to 2 m high, described in the TBDC as follows: + Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments. + Sporadic flowering, June to March + Response to fire and mechanical disturbance is uncertain. Regeneration may be due to resprouting or germination of soil-stored seed. *M. minutiflora* can be surveyed all year round and the species was not detected on the subject site (see survey illustration in Figure 8).

Under Section 5.2.3 of the BAM, a candicate species credit species is considered unlikely to occur on the subject site (or specific vegetation zones) if the assessor determines that the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the subject site (or specific vegetation zones).

As shown in aerial photography from 1997 (below) the subject site has been highly modified from a former natural state. Prior to this,the land was cleared by 1950 and used for grazing. The subject site is currently used for grazing by cattle.

It is considered that the subject site is degraded such that any historical seed bank would have expired long ago and, if any species capable of clonal reproduction were present, these would be established to a conspicuous level.Especially as all SAII species listed in Table 12 are tree and shrub species.

Aerial photo plate 1997: substantial modification of subject site evident *(M.decora* patch along unnamed access road evident)

5.3 Migratory species

Four bird species listed under lateral migratory bird agreements with Japan (JAMBA), China (CAMBA) and the Republic of Korea (ROKAMBA) have been recorded from within a 10km radius of the project site (Table 12).

Table 13. Migratory bird species

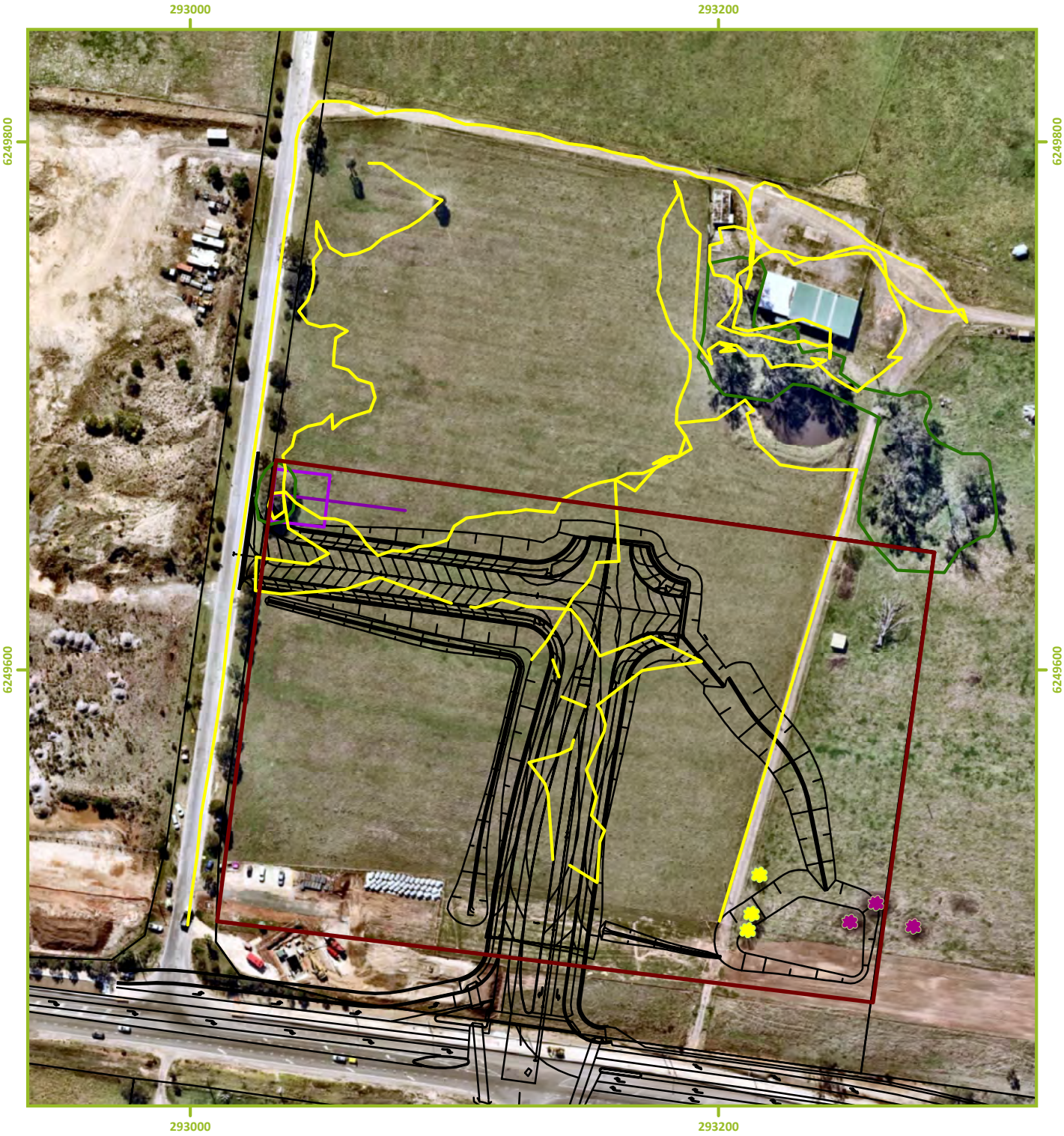
Scientific name	Common name	Agreement
Calidris acuminata	Sharp-tailed Sandpiper	C,J,K
Gallinago hardwickii	Latham's Snipe	J,K
Hirundo rustica	Barn Swallow	C,J,K
Tringa nebularia	Common Greenshank	C,J,K

Latham's Snipe, Sharp-tailed Sandpiper and the Common Greenshank are wader bird species and require wetland habitats with dense emergent vegetation for shelter.

The farms dams proximal to the proposed intersection lack suitable wading and shelter habitat.

The Barn Swallow usually occurs in northern Australia or on offshore islands and would only be expected as a vagrant as far south as Sydney.

Habitat requirements for these species are provided in Appendix A.



Elizabeth Enterprise Precinct
Intersection DA

Figure 8. Threatened species survey

Legend

- Subject_site
- Plot
- Transect
- Castlereagh Ironbark Forest
- Survey_track
- Roadworks
- Blackberry
- Exotic

N

écologique

Coordinate system: MGA Zone 56 (GDA 2020) | Image source: Nearmap 29 August 2024

6. Prescribed impacts

Prescribed impacts include those impacts on the habitat of threatened species or ecological communities from development that is not directly caused as a result of vegetation clearing.

Table 11 lists the prescribed impacts, which are identified in Clause 6.1 of the BC Reg and the relevance of each prescribed impact in relation to the project.

Table 14. Prescribed and Uncertain Impacts

Feature	Present	Description of feature characteristics and location
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	Not relevant. No geological areas of significance occur within the subject site and wider EEP.
Human-made structures	☐Yes / ☒No	Not relevant. No human made structures occur within the subject site.
Non-native vegetation	☒Yes / ☐No	Non-native vegetation occurring within the subject sitecomprises introduced pasture grasses and herbaceous weeds. This vegetation may provide some low-value habitat for native fauna species, including: + Introduced rabbits, rats and mice, which in turn may provide prey for threatened raptor bird species, and + Small passerine birds that feed on grass seeds and may also be prey species. Two threatened raptor species have been recorded from the locality: + *Haliaeetus leucogaster* (white-bellied sea-eagle), and + *Hieraaetus morphnoides* (little eagle) A test of significance for both species (provided in Appendix A) concluded that the project will not have a significant impact on these species and the project will not result in this prescribed impact.
Habitat connectivity	☐Yes / ☒No	Not relevant. The subject site does not contain any native or otherwise landscaped vegetation that provides habitat or habitat connectivity.
Waterbodies, water quality and hydrological processes	☐Yes / ☒No	Not relevant. The subject site does not contain any watercourses or other surface drainage lines.
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	Not relevant. The proposal does not involve wind farming.
Vehicle strikes	☒Yes / ☐No	Over the shorter term, operation of the proposed intersection will result in similar vehicle movements to that

Feature	Present	Description of feature characteristics and location
		which (i.e., will provide access for existing tenants and the Cleanaway facility. Over the longer term, the intersection will result in increased vehicle movements during both construction and operation of the EEP. Relevantly, traffic impact assessments will be provided with the EEP SSD application. In the context of the surrounding developed and developing environment, both short term and longer term operation of the intersection is not anticipated to result in vehicle strikes on threatened species. This due to the absence of threatened species or habitat for threatened species that would be at risk of vehicle risk in the locality (i.e., terrestrial mammals). The locality is substantially developed and substantial transport infrastructure already in place or being constructed in association with the Western Sydney International (Nancy Bird Walton) Airport. Threatened species records for the locality relate to highly mobile bat and bird species with no land-based threatened mammal species recorded.

7. Avoid and minimise impacts

7.1 Avoid and minimise direct and indirect impacts

The location of the proposed intersection cannot be avoided through alternative siting. The subject site is part of the larger EEP industrial development site.

The subject site is considerably degraded and contains only a very small and isolated area of remnant native vegetation (i.e., <0.03ha), which is situated alongside an existing access road and does not provide habitat for any threatened species.

7.2 Avoid and minimise prescribed impacts

Refer to Section 6. The proposal is not anticipated to result in any prescribed impacts.

7.3 Other measures considered

No alternative measures have been considered. The intersection is required to meet the future use of the land for industrial purposes as is the intention of the land's zoning.

8. Impact assessment

8.1 Direct impacts

8.1.1 Residual direct impacts

Table 15 document impacts that will occur on the subject site.

Table 15. Summary of residual direct impacts

Direct impact	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha)
PCT 3448 - Cooks River/Castlereagh Ironbark Forest (CIF) in the Sydney Basin Bioregion	Endangered	Not applicable	No	Construction & operation	0.027

8.1.2 Change in vegetation integrity score

Table 16 documents the change in vegetation integrity for residual direct impacts on native vegetation due to the clearing of PCT 3448 required.

Table 16. Impacts to vegetation integrity

Vegetation zone	PCT ID	Area (ha)	Before development			After development			Change		
			Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
Zone 1	3448	0.03	0.9	31.7	8.9	6.4	0	0	0	0	-6.4

8.2 Indirect impacts

Table 17 provides a summary of potential indirect impacts (likely to occur on native vegetation, threatened entities and their habitat beyond the development footprint).

Table 17. Summary of residual indirect impacts

Indirect impact	Nature	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
Increased sedimentation and contaminated or nutrient rich run-off	Runoff during construction and operation resulting in pollution and degradation of off subject site, downslope creek	During rainfall events	Short-term	Construction	Best practices erosion and sedimentation management are to be implemented in accordance with the project's Erosion and Sediment Control Plan (ESCP). With appropriate safeguards in place stop the spread of sedimentation outside of the subject site, the risk of this impact is low.
Dust generation	Retained vegetation within the subject site and surrounds may become smothered and photosynthesis reduced	Daily during construction	Short-term	Construction	The proposal is considered unlikely to reduce viability of retained native vegetation due to dust generation providing appropriate mitigation measures are implemented.
Transport and spread of weeds and pathogens	Spread of weed seed and pathogens from incoming machinery and equipment	Daily, during construction and operational phases	Potentially long-term impacts	During construction and operational phase of project	Construction activities have the potential to both spread existing weed infestations, introduce new weed species, and introduce or spread soil borne pathogens on machinery and equipment. Consequently, the condition (e.g., subject site integrity values) of retained and neighbouring vegetation could be decreased. Providing that the mitigation measures recommended are implemented the consequence of this impact is a low risk.
Noise	Construction and operational noise/vibration disturbing fauna activity in adjacent vegetation.	Daily, during construction and operational phases	Potentially long-term impacts	During construction and operational phase of project	The consequence of potential increased noise impacts is considered a minimal risk. + The proposal will not result in a significant increase in noise levels above that which already exists + Resident fauna within the vicinity of the proposed development would already be

Indirect impact	Nature	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
					accustomed to ambient noise levels from existing traffic.
Water bodies, water quality and hydrological processes	Stormwater entering the environment and downslope waterways creating degraded water quality	Daily, during construction and operational phases	Potentially long-term impacts	During construction and operational phase of project	During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff. The proposal's civil engineering strategy will provide a best practice solution within the constraints of the existing landform and proposed road layout. Within this strategy a stormwater quantity and quality management strategy will be developed to consider peak flows and reduce pollutant loads in stormwater leaving the subject site.

8.3 Mitigating residual impacts – management measures and implementation

Table 18 outlines proposed mitigation and management measures.

Table 18. Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

Mitigation measure	Risk before mitigation measure	Risk after mitigation measure	Threatened entity or biodiversity to which the mitigation measure applies	Proposed Action	Timing	Frequency	Outcome	Responsibility
Erosion and sediment controls	High	Moderate	Aquatic fauna in downstream environments to the subject site	Implementation of Erosion and Sediment Control Plan (ESCP) measures	Pre-construction and construction phase	Continual During Constriction and ongoing during operation	Sedimentation of native vegetation and downstream aquatic environment.	Project Manager / Contractor
Delineation of clearing limits	High	Low	Castlereagh Ironbark Forest	Clearing limits are delineated with high visibility tape, temporary fencing, or other appropriate boundary markers. Materials and methods of marking trees to be removed or retained and protected will be agreed to prior to their employment.	Pre-construction	Once per relevant construction stage	Mitigate any direct impact to a TEC from unauthorised clearing and/or damage to vegetation to be retained.	Contractor
Instigating clearing protocols including pre-clearing surveys, prior to tree removal with a trained ecological or licensed wildlife handler during clearing events	High	Medium	Any fauna threatened or non-threatened which may utilise trees within the subject site	Pre-clearing surveys will be undertaken by a suitably qualified ecologist ahead of clearing, to limit fauna injury and mortality and to identify habitat features to be relocated. Animals found to be occupying trees and habitat will be safely removed and relocated into nearby wooded habitat.	Pre-construction (maximum of 7 days pre-clearance)	Once per relevant construction stage	Mitigate direct and indirect impact to fauna	Project Ecologists, Project Manager

Mitigation measure	Risk before mitigation measure	Risk after mitigation measure	Threatened entity or biodiversity to which the mitigation measure applies	Proposed Action	Timing	Frequency	Outcome	Responsibility
Clearance staging	Moderate	Low	Threatened and non-threatened mammals with potential to move from adjacent vegetation through the subject site	The clearing will be conducted using a two-stage clearing process as follows: Stage 1: Clearing will commence following the identification of potential habitat features by a qualified ecologist. Habitat trees marked during pre-clearing will not be cleared during the first stage; however, all vegetation around these trees will be cleared to enable isolation of the feature. Identified habitat trees will be left at a minimum overnight after Stage 1 clearing to allow resident fauna to voluntarily move from the area. Stage 2: After habitat trees have been left overnight, the trees will be cleared using the following protocols: Trees marked as containing habitat will be shaken by machinery prior to clearing to encourage any animals remaining to leave the hollows and move on; Use a bulldozer or excavator to start pushing the tree over. Move the bulldozer over the roots and continue gently pushing the tree over; and	During clearance	Once per relevant construction stage	Harm / death of fauna	Contractor / Project Ecologist

Mitigation measure	Risk before mitigation measure	Risk after mitigation measure	Threatened entity or biodiversity to which the mitigation measure applies	Proposed Action	Timing	Frequency	Outcome	Responsibility
				All habitat trees will be investigated by an ecologist for the presence of fauna following felling of the tree. The felled habitat tree will be left overnight to allow any remaining fauna time to leave the hollows and move on. The two-stage clearing process enables fauna a chance to self-relocate upon nightfall, when foraging typically occurs.				
Biosecurity management/ Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Moderate	Low	Introduction and/or spread of pest species, pathogens, disease, and in turn harm death of adjacent flora and fauna	Implementation of hygiene measures to prevent the introduction and / or spread of introduced flora and fauna species, pathogens and / or disease.	Ongoing	Once per relevant construction stage	Mitigate indirect impacts such as weed spread into downstream environments such as South Creek	Contractor / Principal

9. Impact summary

9.1 Determine an offset requirement for impacts

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

Table 20 identifies impacts on native vegetation and TECs or ECs that do not require an offset (as per BAM Subsection 9.2.1(3.)).

Table 19. Impacts that do not require offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Entity at risk of an SAII?	Current VI score
Zone 1	PCT 3348 Castlereagh Ironbark Forest	Cooks River/Castlereagh Ironbark Forest (CIF) in the Sydney Basin Bioregion	0.03	No	6.4

Appendix A. BAM plot data

Survey Name: **Elizabeth Enterprise Precinc**

Zone ID: Intersection **Plot no:** 1

Location:	Zone	Easting	Northing	Bearing
Lot 100	56H	293031	6249666	105

Vegetation formation:	Vegetation class:	PCT (if known)
Dry sclerophyll (subshrub)	Cumberland dry sclerophyll forest	3448

CONDITION (400m^2 plot)

Composition:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Native Richness count:	1	0	0	0	0	0

Structure:	Tree	Shrub	Grass grasslike	Forb	Fern	Other
Cover of each group:	38	0	0	0	0	0

High Threat Weed cover: 56.6

FUNCTION (1,000m^2 plot)

Tree regeneration	Stem classes		No large trees (>50cm DBH)	No. of HBTs	Length of LWD (m):
~~Present~~	5-9	0	0	0	0
	10-19	4			
Absent	20-29	8			
	30-49	3			

FUNCTION (50m transect)

Litter cover	5m	15m	25m	35m	45m	Average
	0	0	0	0	0	0

Survey Name: Elizabeth Enterprise Precinct **Zone ID:** 3448 **Plot no:** 1

GF code	Scientific Name	Common Name	N, E or HTW	Cover	Abund	Stratum
SG	*Melaleuca decora*	-	N	38	2	OS
GG	*Juncus usitatus*	Common rush	N	out or plot		US
GG	*Cenchrus clandestinum*	African love grass	HTW	35	>100	US
GG	*Eragrostis curvula*	African love grass	HTW	10	20	US
GG	*Paspalum dilatatum*	Paspalum	HTW	5	10	US
GG	*Sporobolus fertilis*	Giant Parramatta grass	HTW	0.1	1	US
FG	*Bidens pilosa*	Cobblers pegs	HTW	0.5	5	US
FG	*Senecio madagascariensis*	Fire weed	HTW	6	>50	US
				56.6		
GG	*Briza minor*	Lesser quaking-grass	E	0.1	4	US
GG	*Bromus catharticus*	Prairie grass	E	5	20	US
GG	*Setaria spp.* *	Pigeon grass	E	5	20	US
FG	*Brassica rapa*	Field mustard	E	0.1	8	US
FG	*Lepidium didymum*	Lesser Swinecress	E	0.1	2	US
FG	*Lotus subbiflorus*	Hairy Birds-foot Trefoil	E	10	>100	US
FG	*Plantago lanceolatum*	Lambs tongue	E	1	20	US
FG	*Sida rhombifolia*	Paddy's lucerne	E	0.1	6	US
FG	*Solanum linnaeanum*	Apple of sodom	E	0.1	2	US
FG	*Verbena incompta*	Purpletop	E	0.2	10	US
FG	*Trifolium repens*	White clover	E	0.1	2	US
				21.8		

GF Code: Growth Form | N: native, E: exotic, HTE: high threat exotic

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 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

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

Appendix B. BAM summary reports

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00051402/BAAS17054/24/00051403	Elizabeth Enterprise Precinct Intersection	14/03/2024
Assessor Name	Report Created	BAM Data version *
Kat Duchatel	13/09/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS17054	Finalised	13/09/2024
Assessment Revision	Assessment Type	BOS entry trigger
0	Part 4 Developments (Small Area)	BOS Threshold: Biodiversity Values Map

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

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

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

Castlereagh Ironbark Forest												
1	3448_Low-moderate	Shale Gravel Transition Forest in the Sydney Basin Bioregion	6.4	6.4	0.03	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		0
											Subtotal	**0**
											Total	**0**

Species credits for threatened species

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

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00051402/BAAS17054/24/00051403

Proposal Name
Elizabeth Enterprise Precinct Intersection

BAM data last updated *
14/03/2024

Assessor Name
Kat Duchatel

Assessor Number
BAAS17054

BAM Data version *
67

Proponent Names

Report Created
13/09/2024

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
13/09/2024

BOS entry trigger
BOS Threshold: Biodiversity Values Map

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

Potential Serious and Irreversible Impacts

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

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3448-Castlereagh Ironbark Forest	Shale Gravel Transition Forest in the Sydney Basin Bioregion	0.0	0	0	0

BAM Biodiversity Credit Report (Like for like)

3448-Castlereagh Ironbark Forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Shale Gravel Transition Forest in the Sydney Basin Bioregion This includes PCT's: 3320, 3448	-	3448_Low-moderate	No	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

Appendix C. Likelihood of occurrence

Species name	Common name	Status		Habitat requirements	Presence/absence of habitat
		BC Act	EPBC Act		
Aves					
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris. Also recorded in shrublands, heathlands and very occasionally in moist forest or rainforest and in farmland (usually at the edges of forest or woodland). Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water.	Maintained as ecosystem credit species
Chthonicola sagittata	Speckled Warbler	V		Lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	Maintained as ecosystem credit species
Circus assimilis	Spotted Harrier	V		Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Preys on terrestrial mammals (e.g., bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.	Maintained as ecosystem credit species
Daphoenositta chrysoptera	Varied Sittella	V		Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. Generation length is estimated to be 5 years.	Maintained as ecosystem credit species
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or seashore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts' Nests are large structures built from sticks and lined with leaves or grass. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.	Maintained as ecosystem credit species

Species name	Common name	Status		Habitat requirements	Presence/absence of habitat
		BC Act	EPBC Act		
Hieraaetus morphnoides	Little Eagle	V		Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Maintained as ecosystem credit species
Oxyura australis	Blue-billed Duck	V		Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed but prefers to dive if approached. Feed by day far from the shore, particularly if dense cover is available in the central parts of the wetland. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. Usually also nest in trampled vegetation in Lignum, sedges or Spike-rushes, where a bowl-shaped nest is constructed.	Habitat absent in the project site.
Petroica phoenicea	Flame Robin	V		Potential non-breeding winter habitat which is in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. Birds forage from low perches, from which they sally or pounce onto small invertebrates they take from the ground or off tree trunks, logs and other coarse woody debris. Flying insects are often taken in the air and sometimes gleans for invertebrates from foliage and bark.	Maintained as ecosystem credit species
Stagonopleura guttata	Diamond Firetail	V	V	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Usually encountered in flocks of between 5 to 40 birds, occasionally more. Groups separate into small colonies to breed, between August and January. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting. Appears to be sedentary, though some populations move locally, especially those in the south. Has been recorded in some towns and near farm houses.	Maintained as ecosystem credit species

Species name	Common name	Status		Habitat requirements	Presence/absence of habitat
		BC Act	EPBC Act		
Stictonetta naevosa	Freckled Duck	V		Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally, rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates. Nesting usually occurs between October and December but can take place at other times when conditions are favourable. Nests are usually located in dense vegetation at or near water level.	Habitat absent in the project site.
Aves - Migratory					
Calidris acuminata	Sharp-tailed Sandpiper		C,J,K	Non-breeding visitor that prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. They forage at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water, feeding on seeds, worms, molluscs, crustaceans and insects. Roosting occurs at the edges of wetlands, on wet open mud or sand, in shallow water, or in short sparse vegetation, such as grass or saltmarsh.	Habitat absent in the project site. Proximal farm dams lack suitable wading habitat.
Gallinago hardwickii	Latham's Snipe		J,K	Non-breeding visitor to south-eastern Australia. Usually occur in open, freshwater wetlands that have some form of shelter (usually low and dense vegetation) nearby. Generally, occupy flooded meadows, seasonal or semi-permanent swamps, or open waters, but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains. The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat. As such, may be found in a variety of vegetation types or communities including tussock grasslands with rushes, reeds and sedges, coastal and alpine heathlands, lignum or tea-tree scrub, button-grass plains, alpine herbfields and open forest.	Habitat absent in the project site. Proximal farm dams lack shelter habitat.
Tringa nebularia	Common Greenshank		C,J,K	The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. The species is known to forage at edges of wetlands, in soft mud on mudflats, in channels, or in shallows around the edges of water often among pneumatophores of mangroves or other sparse, emergent or fringing vegetation, such as sedges or saltmarsh. Roosts and loafs round wetlands, in shallow pools and puddles, or slightly elevated on rocks, sandbanks or small muddy islets.	Habitat absent in the project site. Proximal farm dams lack suitable wading habitat.

Species name	Common name	Status		Habitat requirements	Presence/absence of habitat
		BC Act	EPBC Act		
Hirundo rustica	Barn Swallow		C,J,K	Usually occurs in northern Australia, on Cocos-Keeling Island, Christmas Island, Ashmore Reef, and patchily along the north coast of the mainland from the Pilbara region, Western Australia, to Fraser Island in Queensland. Vagrants have also been recorded as far south as Sydney. Recorded from open country in coastal lowlands, often near water, towns and cities. Birds are often sighted perched on overhead wires and also in or over freshwater wetlands, paperbark Melaleuca woodland, mesophyll shrub thickets and tussock grassland.	Unlikely vagrant.
Mammalia					
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		Prefers moist habitats with trees taller than 20m. Roosts in tree hollows but has also been found roosting in buildings or under loose bark.	Not detected
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V		Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	Not detected Maintained as ecosystem credit species
Miniopterus australis	Little Bent-winged Bat	V		Occur in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	Not detected Maintained as ecosystem credit species
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. At other times of the year, populations disperse within about 300 km range of maternity caves. Hunt in forested areas, catching moths and other flying insects above the tree tops.	Not detected Maintained as ecosystem credit species
Myotis macropus	Southern Myotis	V		Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, wharves, bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Detected
Phascolarctos cinereus	Koala	E	E	Associated with both wet and dry Eucalypt forest and woodland that contains a canopy cover of approximately 10 to 70%, with acceptable Eucalypt food trees.	Habitat absent in the project site.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas. Camps are often located in gullies, typically close to water, in vegetation with a dense canopy.	Maintained as ecosystem credit species
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Not detected Maintained as ecosystem credit species

Species name	Common name	Status		Habitat requirements	Presence/absence of habitat
		BC Act	EPBC Act		
Gastropoda					
Meridolum corneovirens	Cumberland Plain Land Snail	E		Associated with open eucalypt forests, particularly Cumberland Plain Woodland described in Benson (1992). Found under fallen logs, debris and in bark and leaf litter around the trunk of gum trees or burrowing in loose soil around clumps of grass. Urban waste may also form suitable habitat.	Not found during surveys

Appendix B. Significance of Impacts

Haliaeetus leucogaster - white-bellied sea-eagle

White-bellied sea-eagle habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. The species occurs at sites near the sea or seashore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.

Hieraaetus morphnoides - little eagle.

The little eagle occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.

In accordance with Section 7.3 of the BC Act, the following has been taken into account for the purposes of determining whether the project is likely to significantly affect the white-bellied sea-eagle and little eagle.

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposal is not considered to have an adverse effect on the life cycle of either the white-bellied sea-eagle or little eagle as breeding habitat is absent from the subject site.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

NOT APPLICABLE

(c) in relation to the habitat of a threatened species or ecological community—

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

The proposal will clear paddock that at best provides sub-optimal hunting habitat, which will not result in the removal, fragmentation or isolation of any habitat that is of importance for these species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

NOT APPLICABLE – no declared areas of outstanding biodiversity value occur within the project site or surrounding environment.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Key threatening processes (listed under the BC Act) relevant to the locality and type of development proposed include the following:

Threat Category	Threat	Relevance
Habitat loss – rural/residential/industrial development	Land clearing reduces the amount of suitable habitat available forcing birds to nest in sub-optimal habitats where breeding success is greatly reduced.	Not relevant – land already cleared
Disturbance – due to infrastructure	Sensitivity to disturbance when nesting, especially during the early stages of the breeding season, and may desert nests and young if confronted by humans or exposed to human activity.	Not relevant – nesting habitat not present
Direct take/mortality - poisoning	Increased mortality or reduced breeding success due to non-target poisoning during vertebrate pest control, exposure to industrial chemicals and pesticides used for agriculture (directly or indirectly through prey), and deliberate poisoning. Secondary poisoning from rabbit baiting	Mitigation measures to ensure exposure to chemicals

Conclusion: The proposal is considered unlikely to result in an adverse effect on either the white-bellied sea-eagle or the little eagle.