Transport
for NSW

Revised Biodiversity Assessment Report

Elizabeth Drive East Upgrade

October 2024

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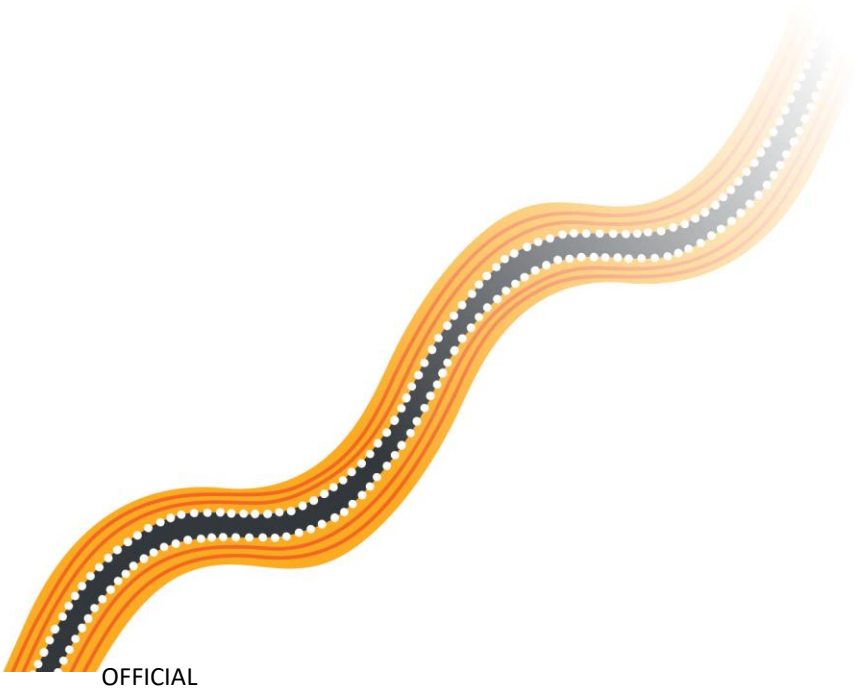

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Executive summary

Transport for NSW (Transport) proposes to upgrade about 7.8 kilometres of Elizabeth Drive between Badgerys Creek Road near the future M12 Motorway and about 600 metres east of Duff Road at Cecil Hills (the proposal). With the planned development of Western Sydney Airport, future growth is anticipated in this region of Western Sydney. Furthermore, to support the expected development of the Western Sydney Aerotropolis precincts, Elizabeth Drive would be upgraded to provide increased capacity from the M7 Westlink to Badgerys Creek. The proposal is located within Penrith, Liverpool and Fairfield Local Government Areas (LGAs).

On 17 August 2022, strategic biodiversity certification was conferred under Section 8.2 of the NSW *Biodiversity Conservation Act 2016* (BC Act) upon 11,165 hectares of land as 'Certified – Urban Capable Land' or 'Certified – Major Transport Corridor' under the *Order Conferring Strategic Biodiversity Certification - Cumberland Plain Conservation Plan* (NSW Government Gazette 2022). As a result, portions of the proposal within the Western Sydney Aerotropolis Growth Area (DPE 2022a) are designated as Certified – Urban Capable Land, Excluded Land and/or Avoided Land under *The Cumberland Plain Conservation Plan* (CPCP) (DPE 2022b) and the associated Biodiversity Certification Order.

In addition to lands biodiversity certified under the CPCP, portions of the proposal occur on land mapped as Existing Certified and Existing Non Certified as part of the South West Growth Area under the NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021 (which incorporates the former SEPP [Sydney Region Growth Centres] 2006) according to the *Order to confer biodiversity certification on the SEPP (Sydney Region Growth Centres) 2006* ('the BioCertification Order') (DECCW 2007). Listed threatened species and communities and listed migratory species (entities) have also been strategically assessed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the portion of the proposal mapped as 'Existing Certified' land.

Assessment under the BC Act is not required for areas mapped as 'Certified – Urban Capable Land' under the CPCP, or for areas mapped as 'Existing Certified' under the SEPP (Precincts – Western Parkland City) 2021. Assessment of impacts to EPBC Act listed threatened/migratory entities is not required for areas mapped as 'Existing Certified' under the SEPP (Precincts – Western Parkland City) 2021, however EPBC Act assessment is still required for impacts to listed entities that occur on areas mapped as 'Certified – Urban Capable Land' under the CPCP. Commonwealth approval of the strategic assessment component of the CPCP is still pending.

Assessment of impacts to BC Act and EPBC Act listed entities is required for land mapped as Excluded Land or Avoided Land under the CPCP, and for land mapped as 'Existing Non-Certified' under the SEPP (Precincts – Western Parkland City) 2021.

Areas within the study area mapped as Existing Native Vegetation (ENV) are subject to Relevant Biodiversity Measures (RBM in the BioCertification Order (DECCW 2007). Of these, RBM 11 states that infrastructure proposals that involve clearing of ENV in non-certified areas must be offset by applying the same requirements specified in RBM 8. Additionally, some areas within the study area are mapped within the BioCertification Order as being subject to RBM 12. RBM 12 states, that notwithstanding any other conditions of biodiversity certification, in the lands subject to RBM 12, vegetation must not be cleared unless it is in accordance with a plan of management or unless such clearance has been agreed to by the (former) Department of Environment and Climate Change. As of 2024, the applicable government agency would be the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW).

Biosis Pty Ltd (Biosis) was engaged by AECOM on behalf of Transport to prepare a Biodiversity Assessment Report (BAR) to support a Review of Environmental Factors (REF) being prepared for the proposal in accordance with Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

In June 2022, Biosis undertook vegetation and habitat mapping and identification, via habitat assessment, for threatened entities that may be impacted by the proposal. Field survey during the preparation of the REF and supporting BAR was largely limited (due to limited property access) to the road corridor of Elizabeth Drive for the proposal's length.

Following the display of the REF in September 2023, further land access was obtained and additional field surveys were undertaken in October / November 2023. The additional field surveys included more detailed vegetation and habitat mapping, as well as targeted surveys for select threatened species that are species credit species under the Biodiversity Assessment Method (BAM). Data from the additional surveys resulted in changes to the PCT and TEC mapping boundaries, which has changed the area of native vegetation and TECs within the project footprint. The PCTs/TECs located within the study area are unchanged, however, the previous assessment accounted for 45.93 ha of native vegetation, which has been reduced to 41.49 ha for the current assessment.

The BAR has since been revised to incorporate the results of the additional field surveys.

Through a combination of on-ground survey and use of data and mapping from the CPCP, the study area was determined to contain the following ecological values:

- Seven Plant Community Types (PCTs) covering 41.49 hectares (ha) and occurring in moderate-good condition.
- Seven BC Act and five EPBC Act listed Threatened Ecological Communities (TECs).

Following efforts to avoid and minimise, the proposal would result in the following residual impacts to native vegetation as well as NSW and nationally listed biodiversity values on non-certified lands:

- Clearing of up to 14.57 ha of native vegetation comprising the following TECs (note the same patch of vegetation may represent one or both of a BC Act and an EPBC Act TEC, each with different total areas impacted):
  - 1.37 ha of PCT 724, BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion
  - 0.75 ha of PCT 724, EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
  - 1.76 ha of PCT 725, BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion, and EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion
  - 0.10 ha of PCT 781, BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
  - 2.81 ha of PCT 835, BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
  - 1.86 ha of PCT 835 EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
  - 6.22 ha of PCT 849 BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion
  - 6.09 ha of PCT 849, EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
  - 0.82 ha of PCT 883: BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion, and EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion
  - 1.48 ha of PCT 1800, BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
  - 1.36 ha of PCT 1800 EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community
- The removal of 11.17 ha of vegetation likely used for foraging and roosting activity by Southern Myotis *Myotis macropus* (11.17 ha) (BC Act, Vulnerable)
- Presence of two ecosystem credit (BAM) threatened microbats, Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Vulnerable, BC Act) and Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act)
- The removal of 3.78 ha of habitat for the Cumberland Plain Land Snail *Meridolum corneovirens* (BC Act, Endangered)
- Removal of at least 17 hollow-bearing trees (HBTs) containing a range of small to medium hollows, decorticating bark and fissuring that may be used by smaller hollow-dependent fauna such as gliders, microbats and birds. Seventeen of these HBTs are on certified lands (34 HBTs within the subject land and 40 HBTs in the study area in total)
- Impacts to three waterways, that in lieu of detailed aquatic survey, are considered to constitute Key Fish Habitat
- Impacts to four bridges and numerous culverts that may provide habitat for threatened and non-threatened microbats
- Removal of 4.16 ha of ENV on 'Existing non-certified' lands, subject to RBM 8 and 11
- Removal of 3.56 ha of ENV on 'Existing non-certified' lands, subject to RBM 12
- Removal of at least 13 *Dillwynia tenuifolia* individuals and 2.58 ha of habitat
- Removal of 2.71 ha of habitat for an important population of *Pultenaea parviflora* (EPBC Act, Vulnerable)

- Removal of up to 14.57 ha of habitat for five threatened species considered to have a 'Moderate' or higher likelihood of occurring
- Impacts to three wildlife corridors within riparian vegetation by increasing the canopy gap across Elizabeth Drive from a minimum of about 10 m to over 100 m in some locations.

Appropriate significant impact assessments were undertaken for threatened species and ecological communities either recorded or considered as having a moderate or higher likelihood of occurring. These assessments concluded that the proposal is unlikely to have a significant impact on any NSW or nationally listed entities. This finding is underpinned on the effective application of mitigation measures, including preparation and implementation of a Microbat Management Plan, to avoid said impact. Therefore, Transport is not required to prepare a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR).

In accordance with Transport's No Net Loss Guideline (Transport 2022a), the proposal would trigger the consideration of offsets or conservation measures to offset impacts to the PCTs/TECs and BAM species credit species determined to be impacted by the proposal. Outside of the areas that would be otherwise offset via these PCTs and species credit species, the Tree and Hollow Replacement Guidelines (Transport 2022b) apply. A Tree and Hollow Replacement Plan would be developed for the proposal.

With the effective implementation of safeguards and mitigation measures identified in this BAR, risk of impacts to biodiversity values can be mitigated to an acceptable level.

1. Introduction

1.1 Proposal background

Biosis Pty Ltd was commissioned by AECOM to undertake a biodiversity assessment to describe the biodiversity values and constraints associated with the proposed Elizabeth Drive East Upgrade proposal located along Elizabeth Drive, New South Wales (NSW) as shown in Figure 1-1 and Figure 1-2 (subject land).

Transport for New South Wales (Transport) proposes to upgrade a 7.8 kilometre section of Elizabeth Drive between Badgerys Creek Road, near the future M12 Motorway, and approximately 600 metres east of Duff Road at Cecil Hills (the proposal). With the planned development of Western Sydney Airport, future growth is anticipated in this region of Western Sydney. Furthermore, to support the expected development of the Western Sydney Aerotropolis precincts, Elizabeth Drive would be upgraded to provide increased capacity from the M7 Westlink to Badgerys Creek.

The proposal is located within Penrith, Liverpool and Fairfield Local Government Areas (LGAs). The main land uses surrounding the proposal include residential and agricultural lots, infrastructure and business, two quarries and Bill Anderson Reserve.

1.1.1 Biodiversity certification

Cumberland Plain Conservation Plan

On 17 August 2022, strategic biodiversity certification was conferred under Section 8.2 of the NSW *Biodiversity Conservation Act 2016* (BC Act) upon 11,165 hectares of land as 'Certified – Urban Capable Land' or 'Certified – Major Transport Corridor' under the *Order Conferring Strategic Biodiversity Certification - Cumberland Plain Conservation Plan* (NSW Government Gazette 2022). As a result, portions of the subject land within the Western Sydney Aerotropolis Growth Area (DPE 2022a) are designated as Certified – Urban Capable Land, Excluded Land and/or Avoided Land under *The Cumberland Plain Conservation Plan* (CPCP) (DPE 2022b) and the associated Biodiversity Certification Order.

To be 'essential Infrastructure', the project must be required to service and support development within the Greater Macarthur Growth Area, Greater Penrith to Eastern Creek Investigation Area, Western Sydney Aerotropolis, Wilton Growth Area.

As per Section 1.6 of the 'Cumberland Plain Conservation Plan: Guidelines for Infrastructure Development' (the infrastructure guidelines) (August 2022), the CPCP would apply to the proposal.

The CPCP has identified land categories that would be certified for development under the *Biodiversity Conservation Act 2016* (BC Act), or where approval for development is to be sought under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act. The various CPCP land categories include the following provisions and assessment requirements (DPE 2022b):

- Certified – Urban Capable Land: land identified for future urban development. This land is biodiversity certified under Part 8 of the BC Act, and as such, development under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) does not require an assessment of likely impact of development on biodiversity to the extent that the development is carried out on biodiversity certified land (DPE 2022b). Therefore, development in these areas does not require further site by site biodiversity assessment or approval under the BC Act, if consistent with the CPCP and its approvals, which includes application of the CPCP's mitigation measures. Approval under Part 10 of the EPBC Act is yet to be issued by the Australian Commonwealth Department of Climate Change, Energy, the Environment and Water (Cth DCCEEW) and therefore assessment under the EPBC Act is still required. In addition, approvals may still be required under other legislation, including the EP&A Act, *Fisheries Management Act 1994* (FM Act) and *Water Management Act 2000* (WM Act).

  The portion of the study area that is Certified – Urban Capable Land is assessed herein against Section 3.3 of the infrastructure guidelines.

- Excluded Land: this category identifies land that has been excluded from the CPCP and for which NSW strategic biodiversity certification and approval through the federal strategic assessment process would not be sought. The subject land largely resides within this land category, within the existing Elizabeth Drive road corridor. The infrastructure guidelines do not apply to activities conducted on excluded land.

- Avoided Land: this category identifies land with high biodiversity values that are to be protected and therefore not certified for future urban development. The development is not considered 'essential infrastructure' as defined in the infrastructure guidelines (and therefore will not be accessing the CPCP Part 10 approval under the EPBC Act. Therefore, the proposal must be assessed against the BC Act, and approval sought under the EPBC Act, if required. The subject land intersects with the avoided land category in various locations, the most prominent being within the riparian vegetation zones of Badgerys Creek, South Creek and Kemps Creek. The assessment of impacts to EPBC Act listed Matters of National Environmental Significance within this Biodiversity Assessment Report (BAR) has included impacts to lands mapped within the CPCP boundary.

The EP&A Regulation section 201A requires notification to be provided to the Planning Secretary for activities impacting avoided land. This notification must conclude whether the project is consistent with the CPCP. The notification must be given within 30 days of determination.

Western Sydney Growth Areas – South West Growth Area

Part of the study area occurs on land mapped as Existing Certified and Existing Non Certified as part of the South West Growth Area under the NSW State Environmental Planning Policy (SEPP) (Precincts – Western Parkland City) 2021 (which incorporates the former SEPP [Sydney Region Growth Centres] 2006) according to the *Order to confer biodiversity certification on the SEPP (Sydney Region Growth Centres) 2006* (the Biocertification Order) (DECCW 2007). Actions associated with the development of the Western Sydney Growth Areas, as described in the Sydney Growth Centres Strategic Assessment Program Report 2010 (DECCW 2010a), have been assessed at the strategic level. The Sydney Growth Centres Strategic Assessment Program is approved both in NSW and at a federal level. Impacts to listed threatened species and communities, and listed migratory species have been strategically assessed, and no further assessment is required under the BC Act and/or EPBC Act for the portion of the study area mapped as 'Existing Certified' land. Assessment under both the BC Act and EPBC Act is however required on areas mapped as Existing Non Certified.

The Certification identifies "certified" (20,430 ha) and "non-certified" (7,329 ha) land. The non-certified areas include the flood plains of major creeks, transitional lands, the Western Sydney Parklands, land zoned public recreation (regional) and environmental conservation and areas where further investigation is required as part of the precinct planning process. The *Threatened Species Conservation Act 1995* (NSW) continues to apply to land within the non-certified areas and threatened species assessments are required to be undertaken in these areas where a significant impact on threatened species is likely.

Areas within the study area mapped as Existing Native Vegetation (ENV) are subject to Relevant Biodiversity Measures (RBM) 8 and 11 in the BioCertification Order (DECCW 2007). Areas mapped as subject to RBM 8 and 11 must be offset in accordance with the stipulations of the BioCertification Order (DECCW 2007) (Section 7.4). Areas of ENV subject to RBM 8 and 11 are located west of Bill Anderson Reserve and crossing of Kemp's Creek (Figure 1-2). These areas are also mapped as being subject to RBM 12 and must not be cleared unless it is in accordance with a plan of management or unless such clearance has been agreed to by the former DECC (now NSW DCCEEW). An assessment of the study area is still required for impacts to threatened fish and waterways under the FM Act and WM Act.

1.1.2 Scope of this assessment and purpose of this revision

The purpose of this BAR is to assess the impacts of the proposal on biodiversity, in line with Transport requirements and relevant aspects of the Biodiversity Assessment Method (BAM) such as plot data collection and detailed targeted threatened species survey.

This BAR was originally published in September 2023 alongside the Elizabeth Drive East Upgrade Review of Environmental Factors (REF), which was prepared for the proposal under Part 5 of the EP&A Act. Land access constraints during preparation of the REF meant that BAM compliant detailed targeted threatened species survey was unable to be undertaken. This revised BAR has since been prepared to provide further biodiversity assessment that incorporates the results of BAM compliant targeted surveys. This revised BAR forms part of the Elizabeth Drive East Upgrade Submissions Report and will inform the determination of the REF.

For the September 2023 revision of the BAR, BAM plot data and threatened species habitat modelling (species polygons) undertaken and prepared by Biosis for the CPCP were utilized with permission from the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW, formerly part of the Department of Planning and Environment). The intended purpose of habitat modelling for the CPCP was to create species polygons for the BAM Calculations which were used for the Biodiversity Certification Assessment Report (BCAR) component of the CPCP approval. Habitat was modelled based on a scientific method accepted by NSW DCCEEW, and as part of BAM species expert reports, which was also ground-truthed where land access was available.

For the purposes of this revised BAR, these species polygons were then subject to BAM compliant targeted surveys during October and November 2023, to the extent that approved access permitted. Areas of species polygons prepared for the CPCP, that were previously unable to be surveyed, have been used to inform the impact assessment of this BAR (Section 5).

Section 5.6 summarises the changes in assessment outcomes since the September 2023 revision of the BAR.

1.2 The proposal

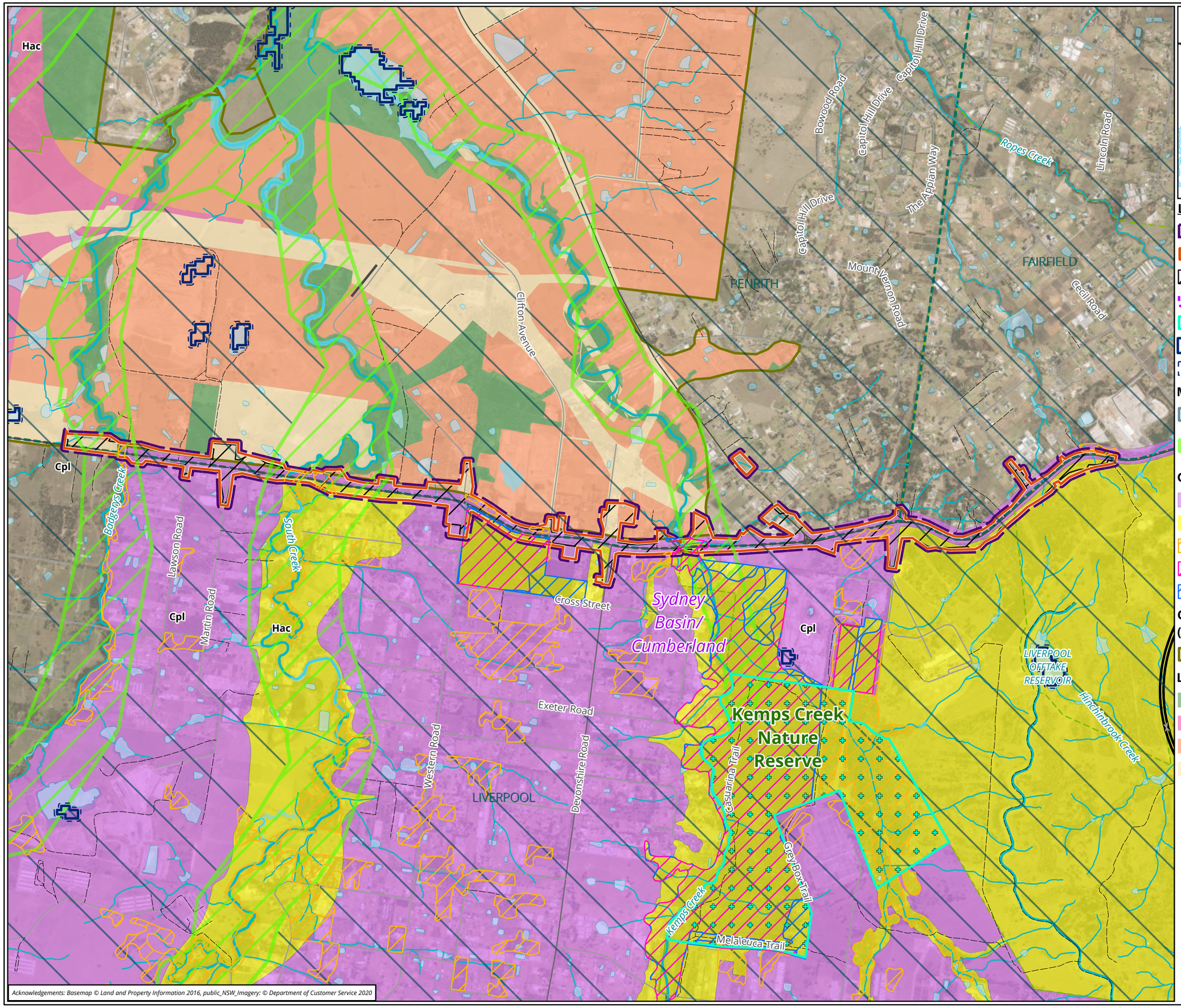
Key features of the proposal (subject to detailed design) include:

- Upgrade of Elizabeth Drive from a two-lane rural road, to a four-lane road (two lanes in each direction) with provision of a central median to allow for future upgrade to six lanes
- Signalisation of intersections along Elizabeth Drive: Luddenham Road, Martin Road, Western Road, Devonshire Road, Salisbury Ave, Mamre Road, Range Road and Duff Road
- Replacement of four twin bridges along Elizabeth Drive over Badgerys Creek, South Creek and Kemps Creek
- Active transport provision along the full corridor with the inclusion of shared paths along both sides of the Elizabeth Drive corridor
- Inclusion of public transport infrastructure with bus priority at intersection and bus stops facilities
- New stormwater drainage infrastructure
- Property acquisitions and adjustments on both sides of Elizabeth Drive and some side roads
- Relocation/adjustment of existing utilities.

1.2.1 Assessment terminology

The following key terms are used throughout this BAR:

- The proposal: As described in Section 1.2 above.
- Subject land: Equivalent to the construction footprint, or limit of works. This is the physical area equivalent to the proposal, including compounds and disturbance associated with the operational footprint as shown on Figure 1-2. This is the boundary used to calculate direct impacts. It assumed the subject land would be completely cleared of vegetation.
- Operational footprint: This is the design boundary, which sits inside the construction footprint as shown on Figure 1-2. This boundary has been used to assist in the assessment of potential indirect impacts from the operation of the proposal.
- Study area: The subject land plus a 20 m buffer to capture land which may be indirectly impacted. The area surveyed for the purposes of the biodiversity assessment as shown on Figure 1-2.
- Locality: the area covered by a 10 km buffer of the study area.



Legend

- Study area
- Subject land
- Operational footprint
- IBRA Region/Sub-region
- National Park/Reserve
- Local wetlands
- Riparian buffers - Local wetlands

Mitchell landscapes

- Cpl,Cumberland Plain
- Hac,Hawkesbury - Nepean Channels and Floodplains

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)
- ENV (subject to RBM 8, 11, & 12)
- Subject to RBM 12

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Avoided land
- Certified - major transport corridor
- Certified - urban capable land
- Excluded land

Figure 1-1 Proposal context

0 250 500 750 1,000 1,250

Metres
Scale: 1:25,000 @ A3
Coordinate System:
GDA2020 MGA Zone 56

N

biosis

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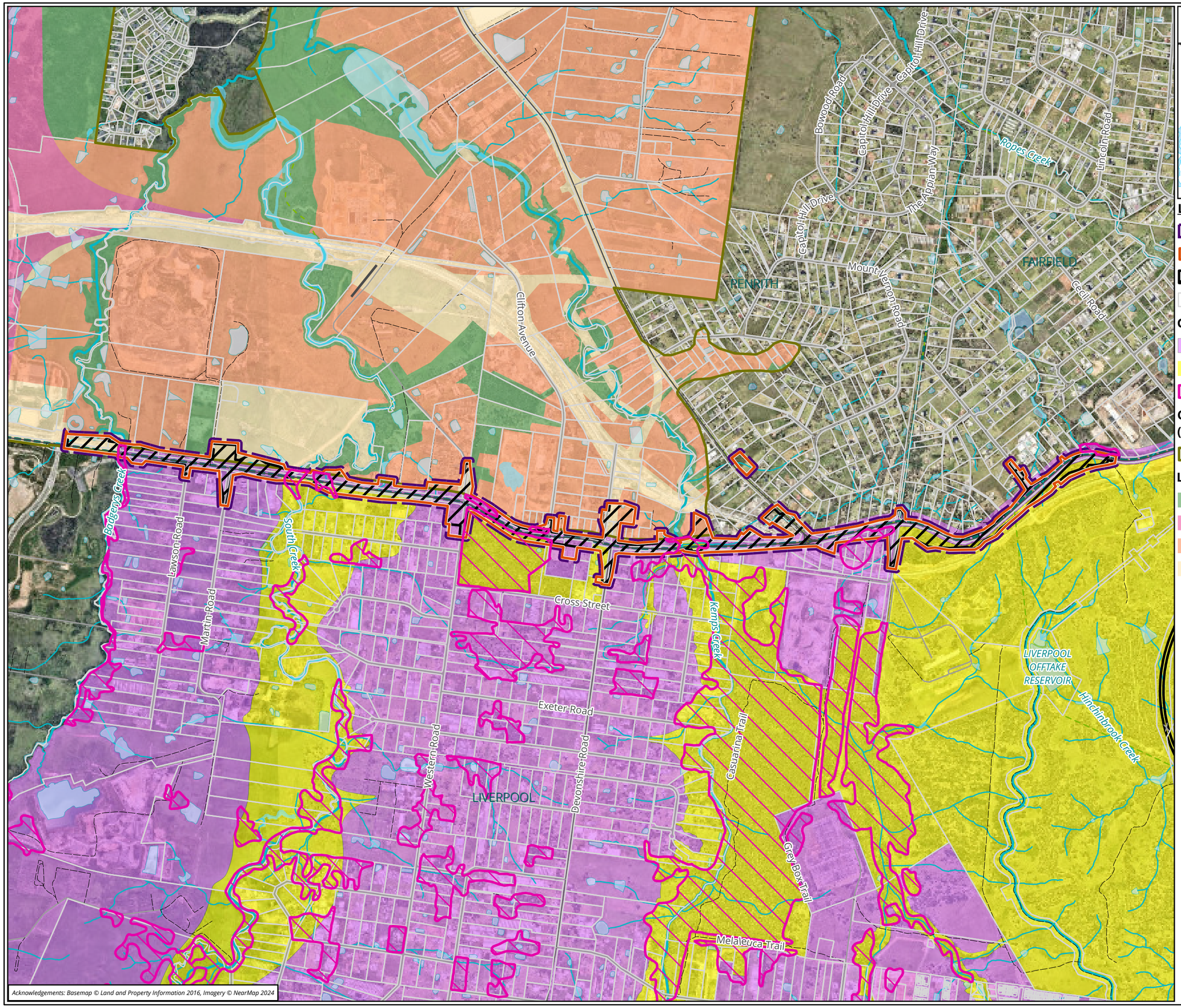
Acknowledgements: Basemap © Land and Property Information 2016, public_NSW_Imagery: © Department of Customer Service 2020



Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Avoided land
- Certified - major transport corridor
- Certified - urban capable land
- Excluded land

Figure 1-2 Overview
The proposal subject land (construction footprint)

0 250 500 750 1,000 1,250

Metres
Scale: 1:25,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

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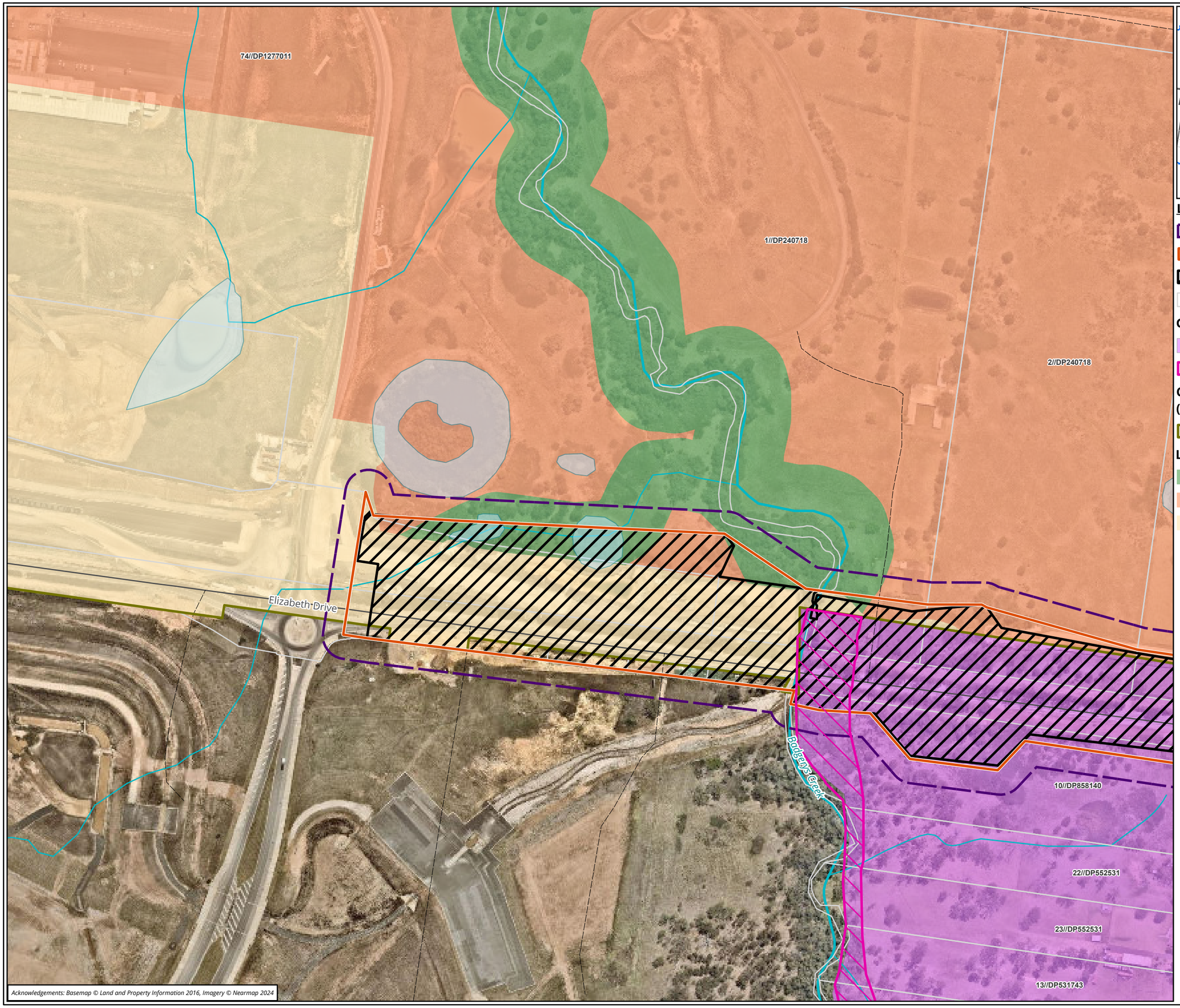

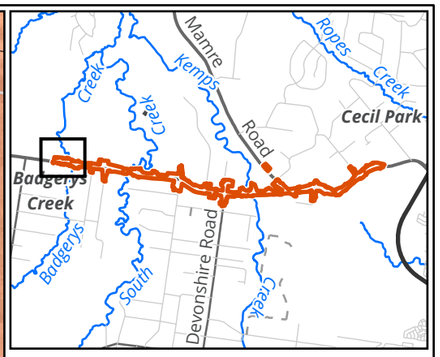

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 1-2 The proposal subject land (construction footprint)
Page 1

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 15 January 2024,
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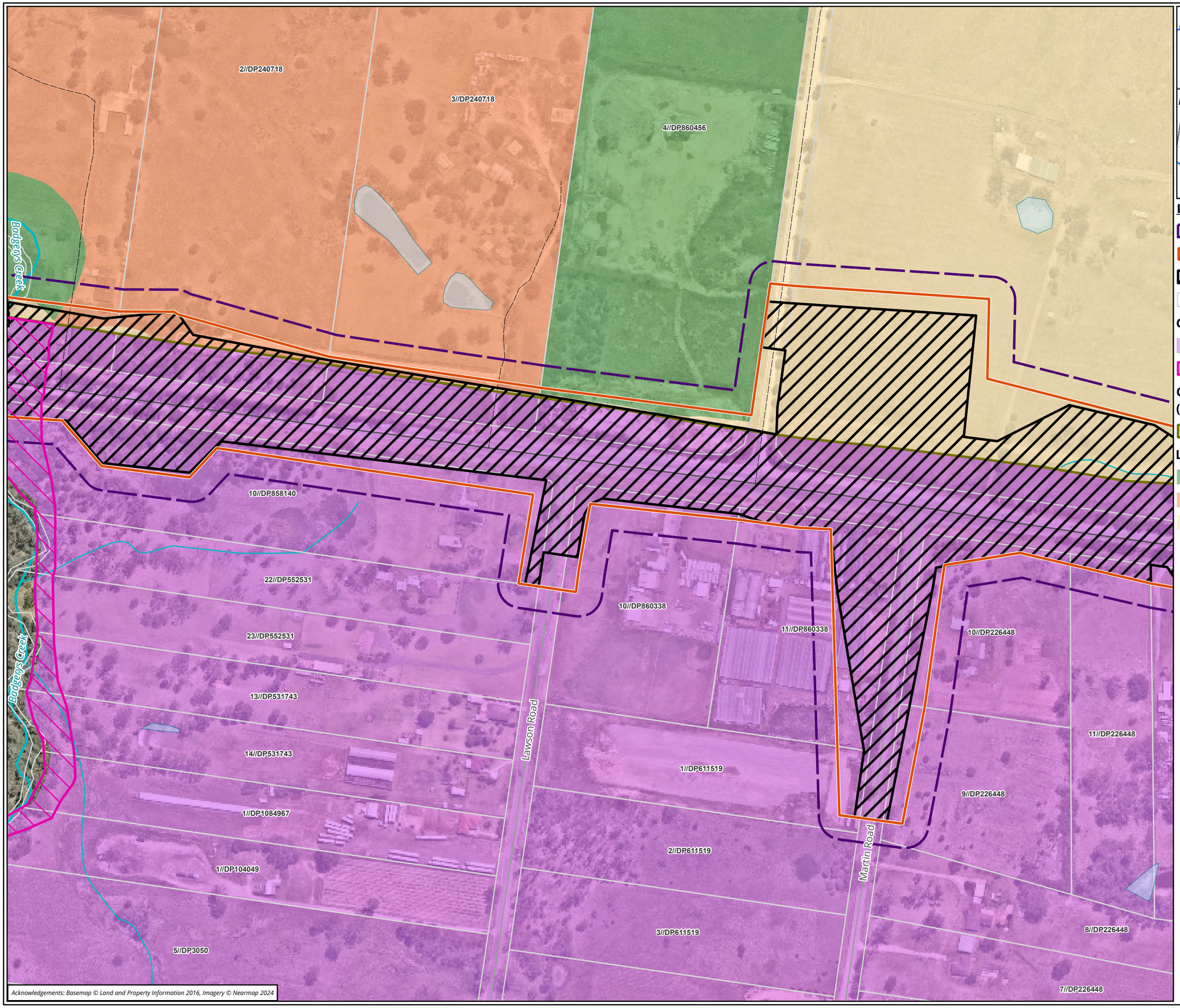

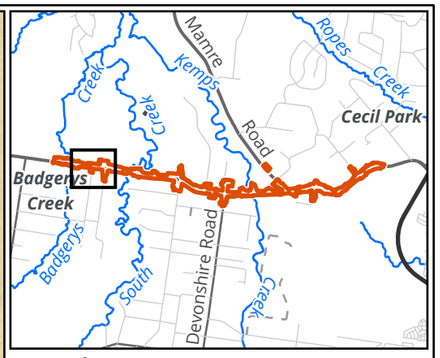

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 1-2 The proposal subject land (construction footprint)
Page 2

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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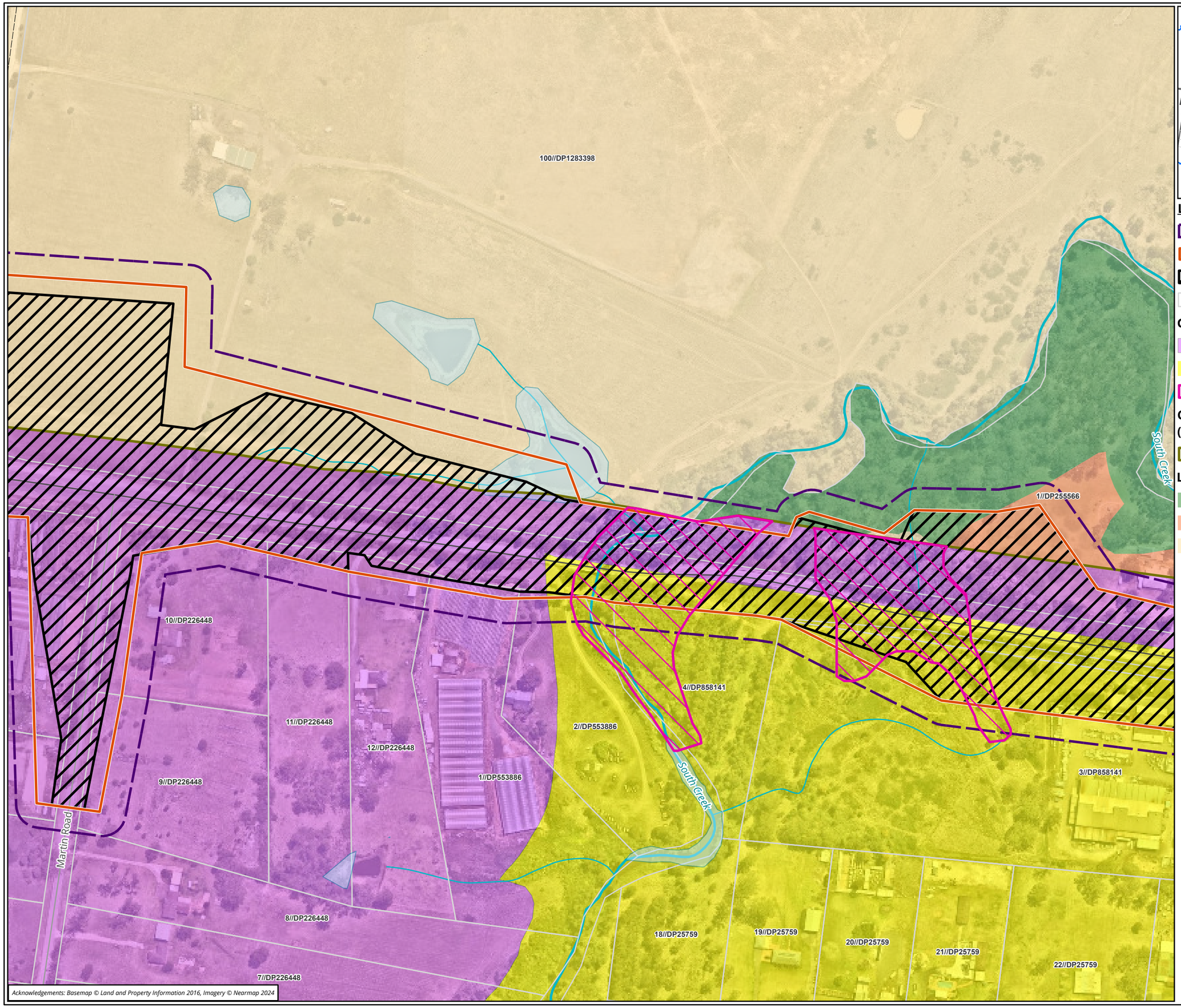

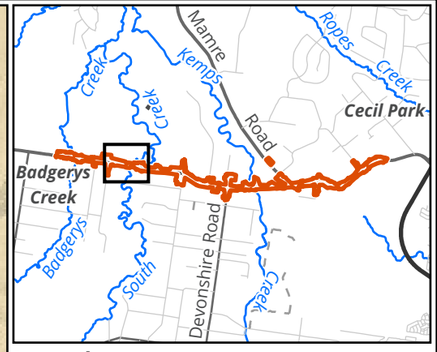

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 1-2 The proposal subject land (construction footprint)
Page 3

0 25 50 75 100 125
Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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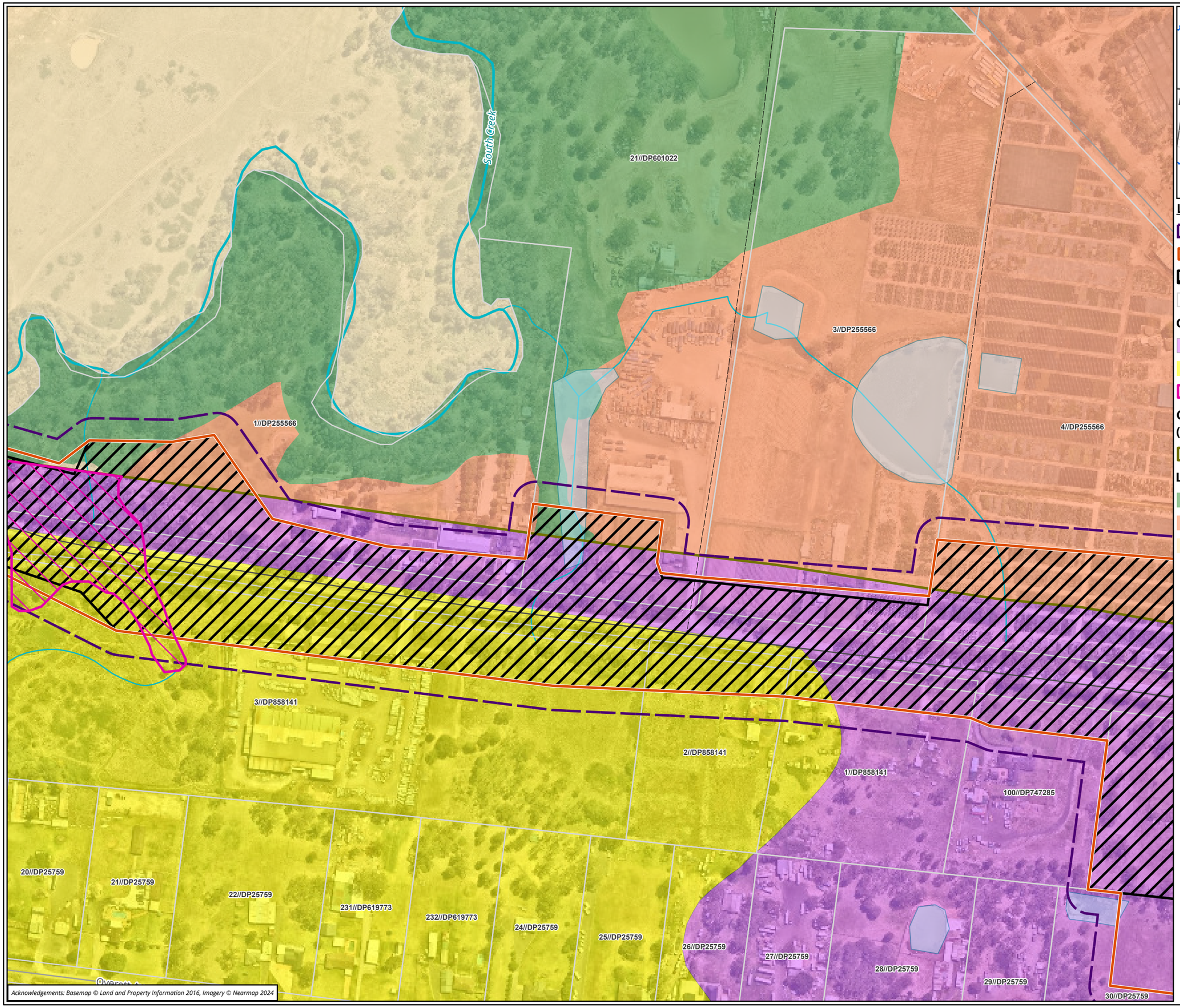

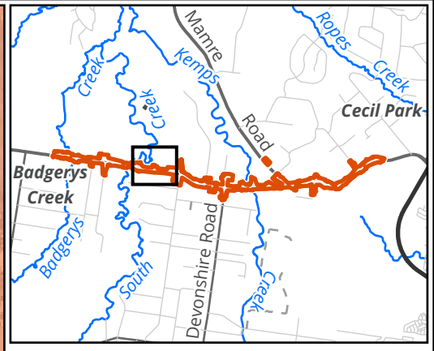

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 1-2 The proposal subject land (construction footprint)
Page 4

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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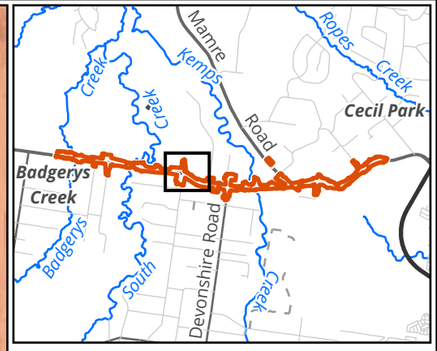

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 1-2 The proposal subject land (construction footprint)
Page 5

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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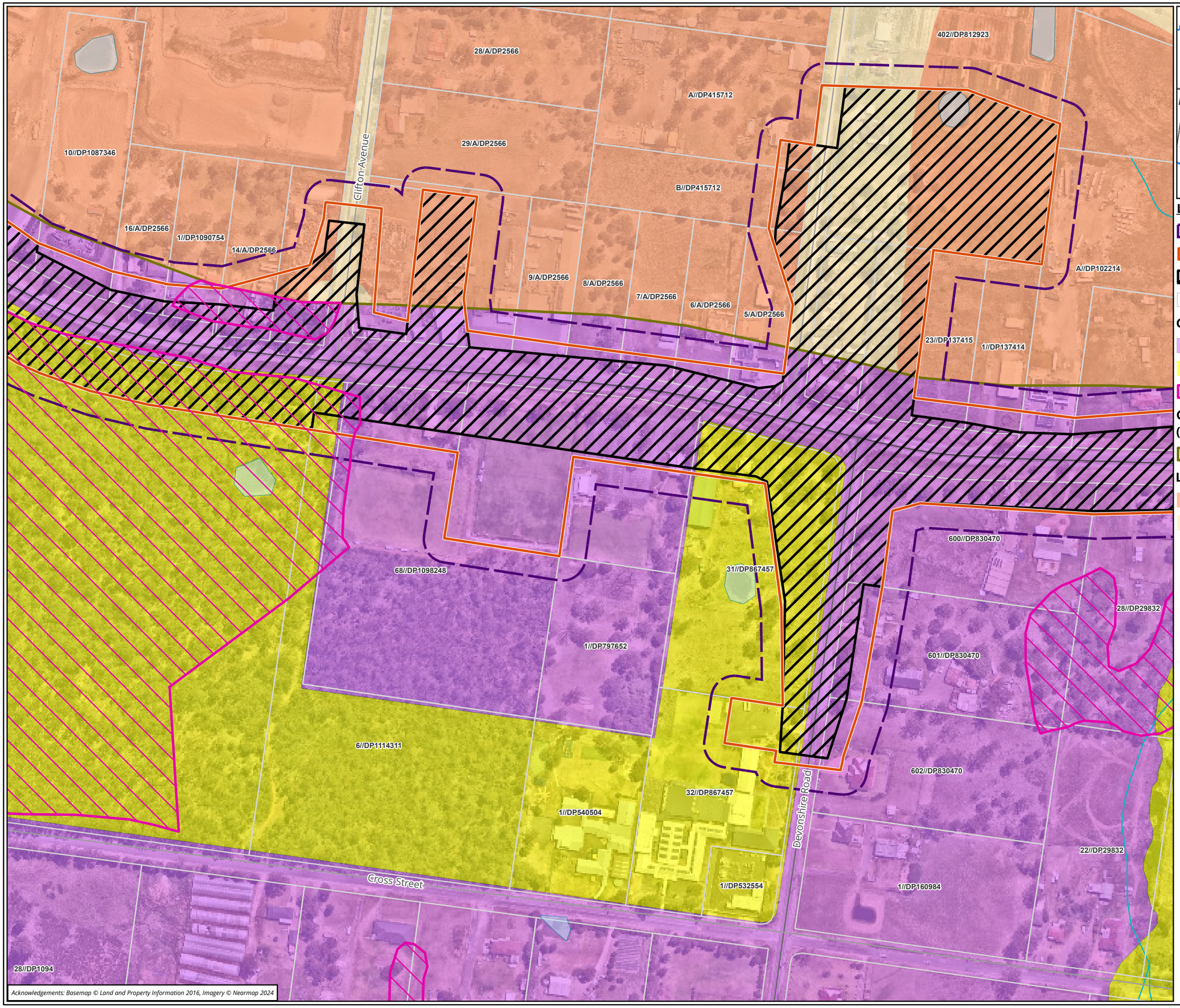

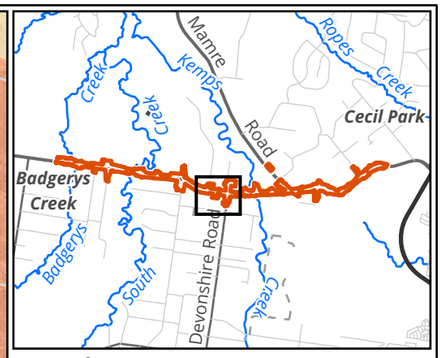

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Certified - urban capable land
- Excluded land

Figure 1-2 The proposal subject land (construction footprint)
Page 6

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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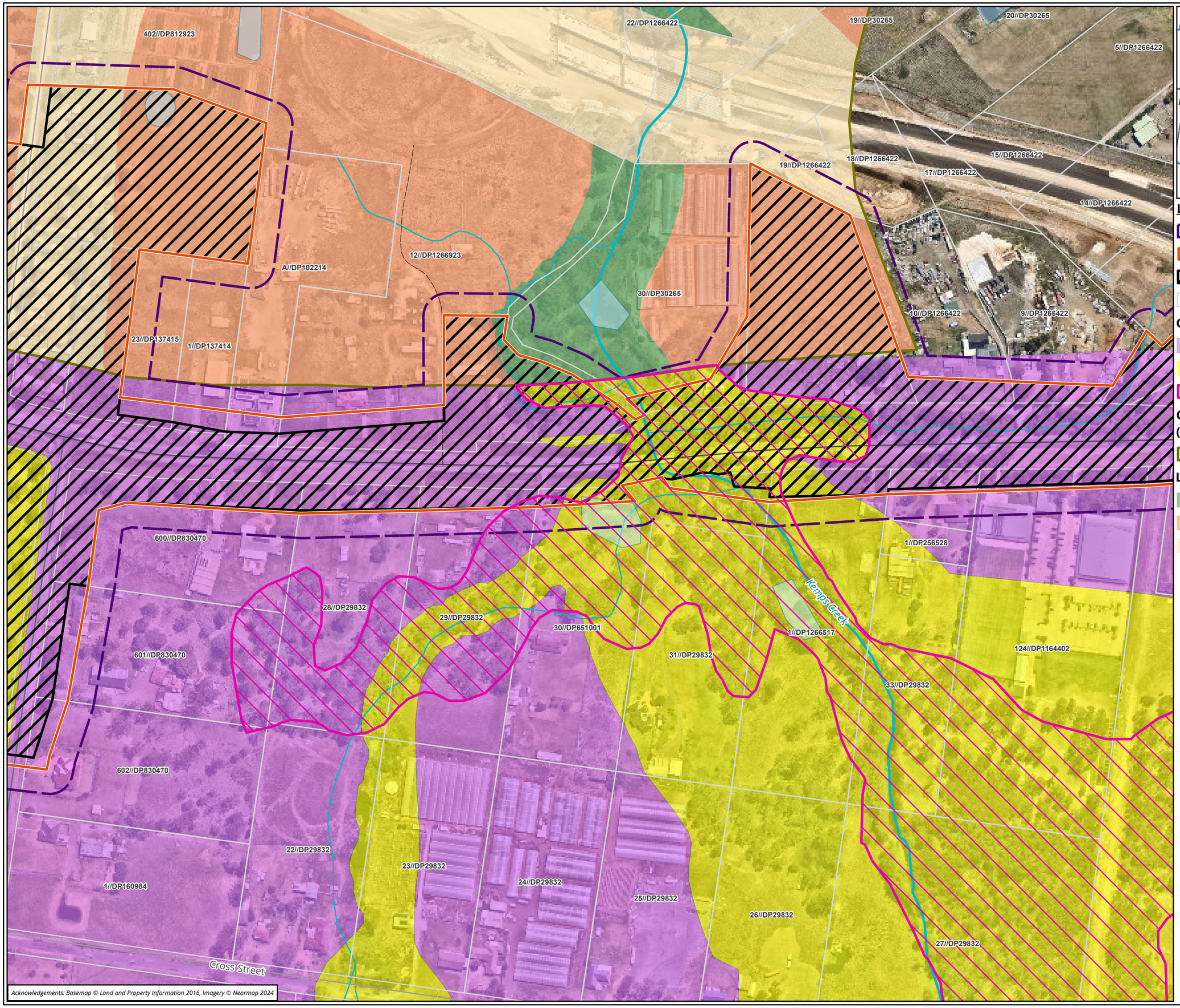

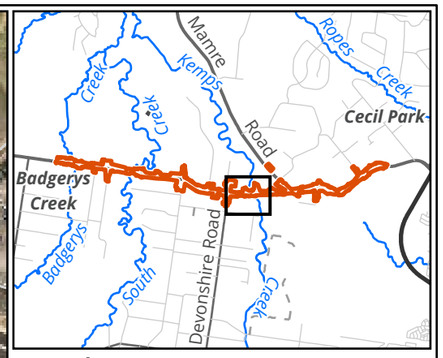

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 1-2 The proposal subject land (construction footprint)
Page 7

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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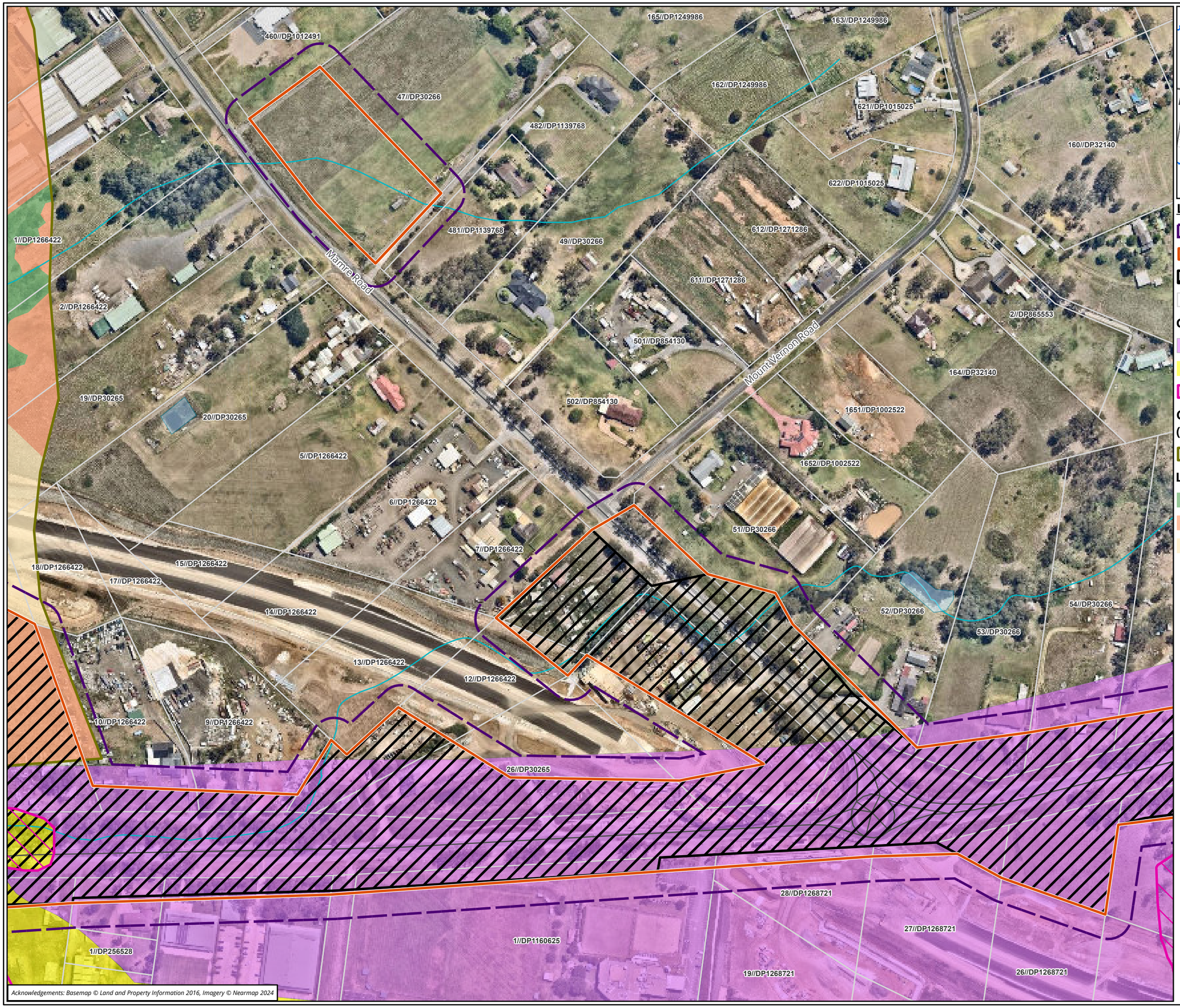

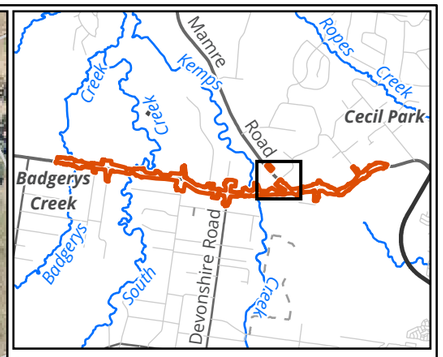

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 1-2 The proposal subject land (construction footprint)
Page 8

0 25 50 75 100 125
Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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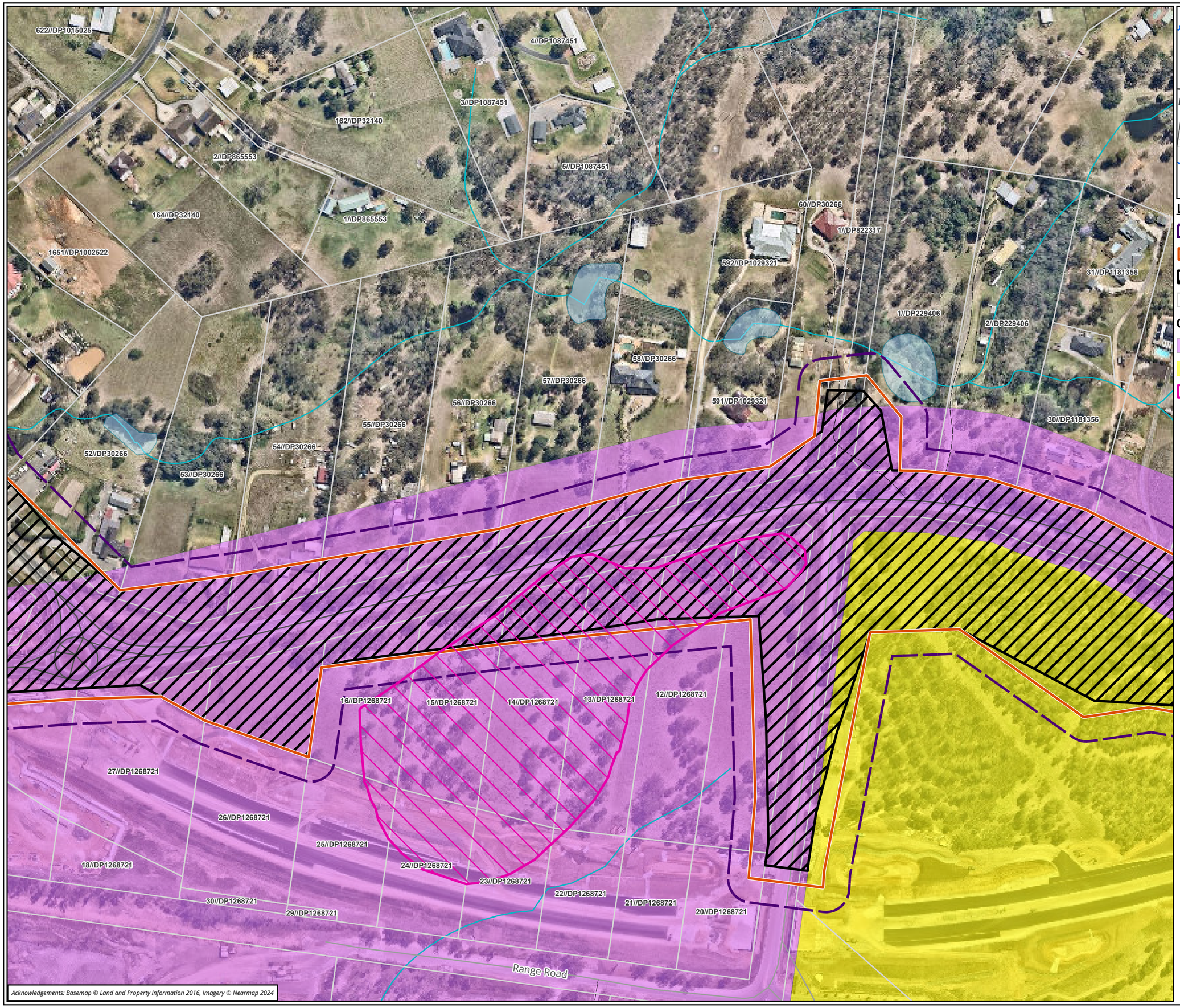

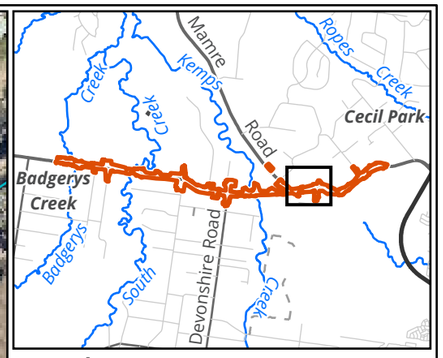

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 1-2 The proposal subject land (construction footprint)
Page 9

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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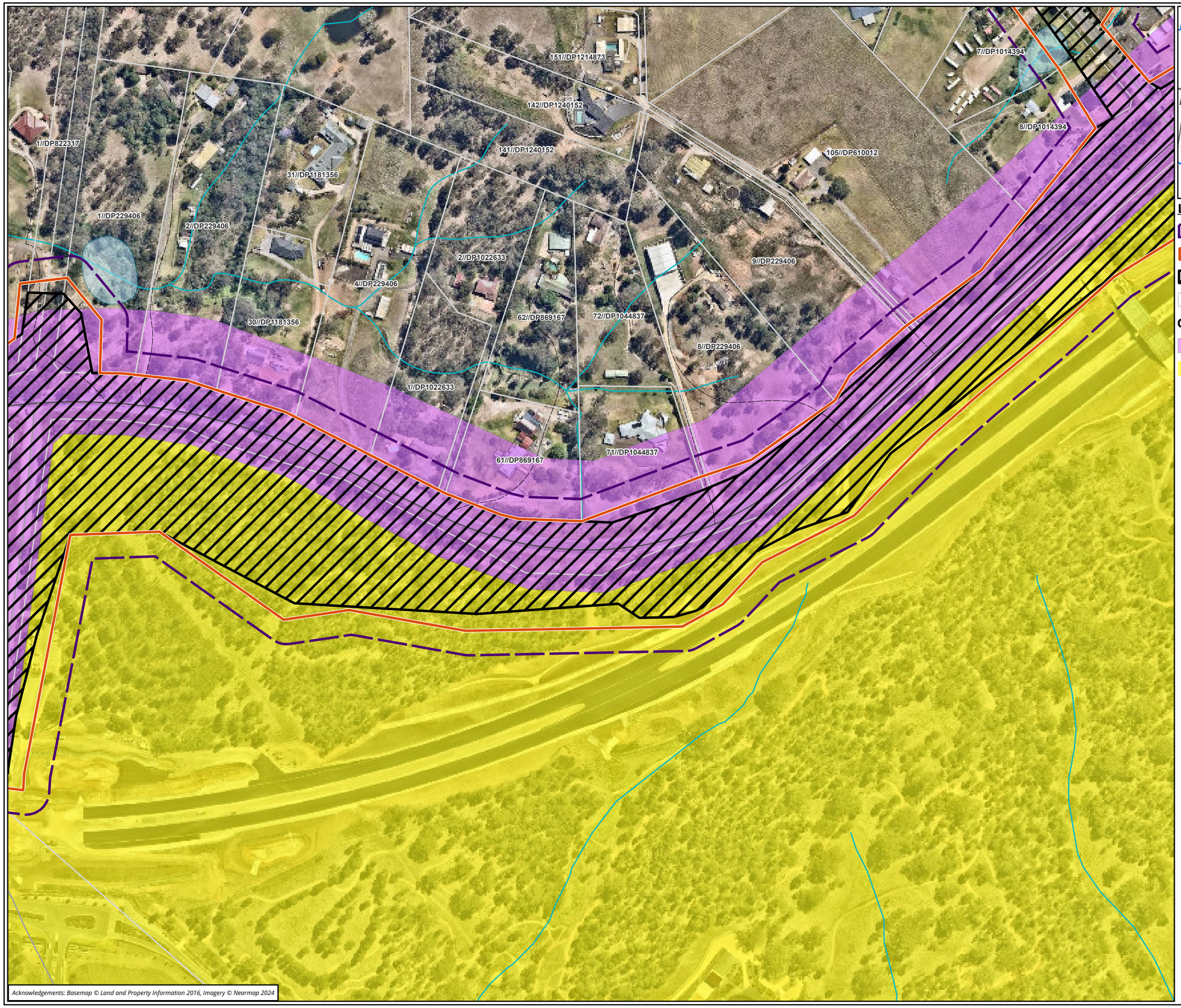

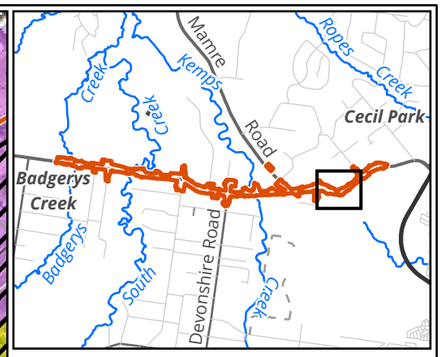

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified

Figure 1-2 The proposal subject land (construction footprint)
Page 10

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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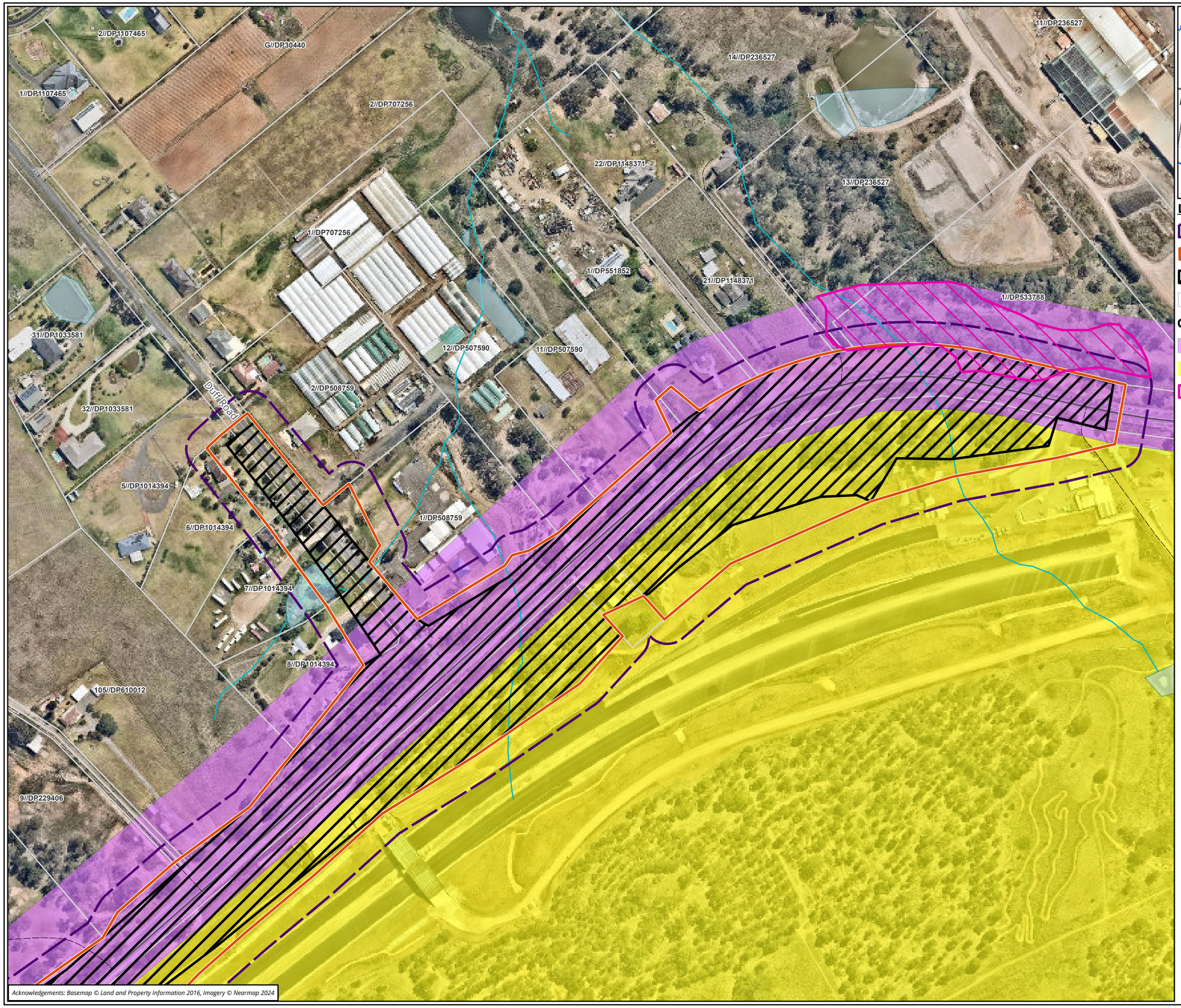

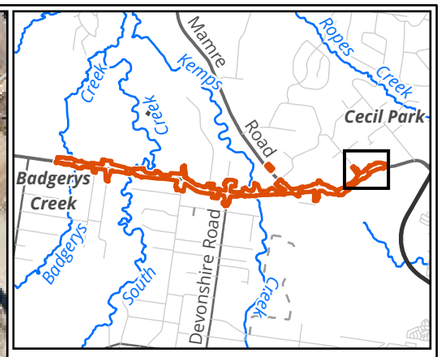

Legend

- Study area
- Subject land
- Operational footprint
- Lot

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 1-2 The proposal subject land (construction footprint)
Page 11

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

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1.3 Legislative context

A REF and accompanying Submissions Report (with additional biodiversity assessment) have been prepared to satisfy Transport obligations under Section 5.5 of the EP&A Act to "examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity," and Section 5.5 in making decisions on the likely significance of any environmental impacts. This biodiversity impact assessment forms part of the REF and Submissions Report for the proposal and assesses the biodiversity impacts of the proposal to meet the requirements of the EP&A Act.

The BC Act requires that the significance of the impact on threatened species, populations and threatened ecological communities is assessed using the test listed in Section 7.3 of the BC Act. Similarly, Part 7A of the FM Act requires that significance assessments are undertaken in accordance with Division 12 of the FM Act. Where a significant impact is likely to occur, a species impact statement (SIS) must be prepared in accordance with the NSW DCCEEW Secretary's requirements, or a Biodiversity Development Assessment Report (BDAR) may be prepared by an accredited assessor in accordance with the BAM (DPIE 2020), if Transport 'opts-in' to the NSW *Biodiversity Offsets Scheme* (BOS).

In September 2015, a 'strategic assessment' approval was granted by the Federal Minister in accordance with the EPBC Act. The approval applies to Transport' road activities being assessed under Division 5.1 (formerly Part 5) of the EP&A Act, with respect to potential impacts on nationally listed threatened species, ecological communities and migratory species. However, the EPBC Act strategic assessment approval for Transport Division 5.1 activities does not apply to road projects being undertaken within the Western Sydney Growth Centres. In those locations, the requirements of the *Western Sydney Growth Centres Strategic Assessment* (2011) will apply.

As a result, Transport' road proposals assessed via an REF:

- Must address and consider potential impacts on EPBC Act listed threatened species, populations, ecological communities and migratory species, including application of the "avoid, minimise, mitigate and offset" hierarchy.
- Do not require referral to the Cth DCCEEW for these matters, even if the activity is likely to have a significant impact.
- Must use the BAM to calculate credits that would offset significant impacts on EPBC Act listed threatened species, populations, ecological communities and migratory species.

Assessments of impact significance are required for all relevant biodiversity values in accordance with the *Matters of National Environmental Significance: Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia 2013).

2. Methods

2.1 Personnel

The personnel involved in the preparation of this BAR are listed in in Table 2-1.

Table 2-1: Personnel

Name	Role	Qualifications
Brendon True	Senior Botanist Project management Preparation of the BAR	BSc, M.Con.Bio, Accredited BAM Assessor (BAAS18155)
Caragh Heenan	Consultant Zoologist Preparation of the BAR	Phd(Sci), Bsc(Hons), DipAppSci(AnTech)
Jake Schwebel	Botanist Vegetation mapping Targeted flora survey	BSc (Zoology)
Sarah Allison	Zoologist Habitat mapping	BSc (Hons1)
Bret Stewart	Senior Zoologist Targeted fauna surveys Habitat mapping	Bachelor of Science, Evolution and Ecology, University of California Davis BAM Assessor (BAAS22033)
Rebecca Dwyer	Principal Botanist Targeted fauna surveys	Bachelor of Landscape Management & Conservation (Hons) BAM Assessor BAAS17067
Todd Horton	Ecologist Targeted flora and fauna surveys	Bachelor of Science (Environmental Science)
Kaisha Edwards	Botanist Targeted flora survey	Bachelor of Science (Hons)
Brae Lee Haddock	Botanist Targeted flora survey	Bachelor of Environmental Science and Management
Felicity Williams	Senior Zoologist (Bat Ecology) Bat analysis	Bachelor of Science (Hons) Titley Scientific Advanced call analysis workshop with Greg Ford (2023) Titley Scientific Advanced Anabat Techniques workshop (2022) Anabat Techniques Course (2010) Bats of Gluepot Reserve (2011)

2.2 Background research

The background research conducted for the preparation of this BAR is summarised in this section, with the online database tools and relevant additional sources utilised detailed in Table 2-2 below.

Table 2-2: Summary of online background research databases and tools conducted

Source	Search area	Date
Atlas of NSW Wildlife (BioNet)	Locality	22/11/2023
Threatened Biodiversity Data Collection (TBDC)	Locality	Ongoing during BAR preparation
BAM calculator (BAM-C)	Subject land	Ongoing during BAR preparation
BioNet Vegetation Classification Database	Cumberland IBRA sub-region	Ongoing during BAR preparation
Cth DCCEEW Protected Matters Search Tool (PMST)	Locality	22/11/2023
Cth DCCEEW Species Profile and Threats Database (SPRAT)	Locality	Ongoing during BAR preparation
NSW Department of Primary Industries Fisheries Spatial Data Portal	Study area	22/11/2023
Commonwealth Atlas of Groundwater Dependent Ecosystems (GDE): GDE Atlas Map: Water Information: Bureau of Meteorology (bom.gov.au)	Study area	22/11/2023
Cth DCCEEW National Flying-fox monitoring viewer	Locality	22/11/2023
SEPP Resilience and Hazards 2021 Chapter 2 (Coastal Management)	Study area	1/7/2022
Core Koala Habitat identified by the Biodiversity and Conservation SEPP 2022	Study area	1/7/2022
Cumberland Plain Conservation Plan report and associated data	CPCP area	Ongoing during BAR preparation
The preliminary and provisional determinations to list species and ecological communities as threatened under the BC Act were viewed on the NSW Threatened Species Scientific Committee website.	NA	22/11/2023
The annual Final Priority Assessment List of nominated species and ecological communities that have been approved for assessment by the Minister responsible for the EPBC Act were viewed on the Cth DCCEEW website.	NA	22/11/2023

2.3 Vegetation assessment

2.3.1 Vegetation mapping

For the purposes of this BAR, native vegetation is defined in accordance with section 1.6 of the BC Act and Part 5A 60B of the Local Land Services Act 2013, repeated here:

(1) For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:

(a) trees (including any sapling or shrub or any scrub),

(b) understorey plants,

(c) groundcover (being any type of herbaceous vegetation),

(d) plants occurring in a wetland.

(2) A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.

(3) For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if:

(a) the plant is situated on land that is shown on the native vegetation regulatory map as category 2-vulnerable regulated land, and

(b) it would be native vegetation for the purposes of this Part if it were native to New South Wales.

(4) For the purposes of this Part, native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). A declaration under Section 14.7 of the BC Act that specified vegetation is or is not marine vegetation also has effect for the purposes of this Part.

In this BAR, native vegetation has been mapped and classified in accordance with the Plant Community Type (PCT) classification system which is described in the BioNet Vegetation Classification Database. Areas of non-native vegetation have also been mapped and are described as containing vegetation that could not confidently be assigned a PCT due to higher disturbance levels, as they comprise exotic species, or non-indigenous species that would not naturally occur in the assemblage recorded.

Biosis undertook initial vegetation mapping in June 2022 (for the September 2023 revision of the BAR) which was further refined in November 2023 for the revised BAR. Access was limited to the road corridor and permitted private properties, focusing on land containing PCTs and threatened species habitat. A total area of 33.76 ha was accessed during the November 2023 surveys (consisting of Existing non-certified (SEPP), Avoided land and Excluded land). These surveys are considered sufficient to confirm the presence/absence of threatened species and provide an accurate impact assessment for the project. Vegetation mapping involved recording of dominant species, particularly canopy species, at regular intervals and then assigning PCTs to like sections of vegetation (Appendix A: Species recorded). This mapping was used as the basis of the vegetation mapping included in this BAR, which was further refined in consideration of the PCTs mapped by Biosis for the CPCP. No BAM plot data collection was undertaken as part of the current assessment.

In total, seven PCTs are mapped within the study area for this BAR, with further details provided below.

2.3.2 Vegetation survey and classification

Vegetation zones

Each of the seven PCTs mapped within the study area were stratified into vegetation zones reflecting variation in condition. As the vegetation mapping undertaken in June 2022 was not completed to the vegetation zone level, the condition classes of vegetation mapped as part of the CPCP, by Biosis, were used to delineate the PCTs mapped across the study area for the current assessment. The PCT mapping was further refined and validated during the November 2023 field surveys. Relevant PCTs mapped for the CPCP contain up to three condition classes, Intact, Thinned and Scattered Trees, described below:

Intact - Native woodland/forest that is in good condition. The woodland/forest displays a diversity of vegetation layers and habitat features (such as tree hollows, fallen timber, groundcover, leaf litter). Tree density is close to natural, and a range of ages is present including established mature trees.

Thinned - This vegetation zone is modified and likely to be highly variable. It may consist of:

- Woodlands/forests that have a partly cleared canopy resulting in a more open structure than intact vegetation.
- Vegetation that has been under-scrubbed (shrub layer removed).
- Some areas of regrowth intact woodland/forest, reflecting canopy cover and past clearing.

Scattered Trees - A single tree or small group of trees surrounded by native or exotic grassland, or areas of cultivation. One or more structural layers may be absent (e.g. shrubs and/or grasses/forbs).

These condition classes have been incorporated into the vegetation zone mapping for the current assessment. No fully cleared condition classes, such as derived native grassland, were mapped by Biosis as part of the CPCP within the study area. Therefore, no such zones have been mapped for this assessment.

Following application of the condition classes described above, the study area was deemed to contain 14 vegetation zones across the seven PCTs, as detailed in Table 2-4.

In addition to native vegetation zones, one non-native vegetation zone has been mapped, named Urban Native/Exotic vegetation. This zone accounts for highly disturbed or modified areas that are predominantly weedy and/or have insufficient native species (or comprise a non-natural assemblage of species) to be confidently assigned a PCT. It should be noted that, whilst not mapped, any cleared areas are deemed to contain non-native vegetation, as determined by Biosis' mapping for the CPCP.

Plot-based vegetation survey

As previously stated, no BAM plot data was collected for this assessment due to a lack of property access. Vegetation zone and condition mapping within the study area was considered to be consistent with the CPCP vegetation mapping, and as such, the associated BAM plot data collected as part of the CPCP was considered suitable for the purposes of determining a vegetation integrity (VI) score for this assessment. CPCP BAM plot data has therefore been used to satisfy the plot-based vegetation survey requirement under the BAM. Whilst every attempt was made to use plot data collected within the current study area, some CPCP BAM plot data used was collected from elsewhere in the CPCP project area. Preference was given to using CPCP BAM plot data as close as possible to the study area, in an attempt to use data that best fits the conditions within the study area, however this was not always possible. In all, 16 plots were required to satisfy the requirements of the BAM for the current assessment, all of which were collected within commensurate CPCP vegetation zones. Of these, one was located within the current study area and a further 10 located within 1.5 kilometres. The remaining five were located further afield (more than 5 kilometres) as no closer options were available (Figure 2-1). BAM Plots will be undertaken at the detailed design phase within the subject land to confirm the biodiversity credits required for the project (refer to B07 in Table 6-1).

Table 2-3 and Table 2-4 summarise the number of plots required as per the BAM and the number of plots from the CPCP used for each vegetation zone.

Table 2-3: Minimum number of plots required per zone area

Vegetation zone area (ha)	Minimum number of plots/midlines
<2	1 plot/midlines
>2-5	2 plots/midlines
>5-20	3 plots/midlines
>20-50	4 plots/midlines
> 50–100	5 plots/midlines
> 100–250	6 plots/midlines
> 250–1000	7 plots/midlines; more plots may be needed if the condition of the vegetation is variable across the zone.
> 1000	8 plots/midlines; more plots may be needed if the condition of the vegetation is variable across the zone.

Table 2-4: Minimum number of plots required and completed per vegetation zone

Veg zone	PCT	Condition	Subject land Area (ha)	No. plots required	No. plots completed (plot IDs)
724_Intact	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Intact	0.55	1	BAM003_WSA
724_Scattered Trees	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Scattered Trees	2.14	1	BAM006_WSA
724_Thinned	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Thinned	1.19	1	BAM007_WSA
725_Intact	725: Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	Intact	2.25	1	BAM012_WSA
781_Disturbed	781: Coastal freshwater wetland	Disturbed	0.10	1	BAM249_WSA
835_Intact	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Intact	2.02	1	BAM027_WSA
835_Scattered Trees	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Scattered Trees	3.90	1	BAM039_WSA
835_Thinned	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Thinned	1.44	1	BAM035_WSA
849_Intact	849: Grey Box - Forest Red Gum grassy woodland on flats of	Intact	2.79	2	BAM054_WSA, BAM055_WSA

Veg zone	PCT	Condition	Subject land Area (ha)	No. plots required	No. plots completed (plot IDs)
	the Cumberland Plain, Sydney Basin Bioregion				
849_Scattered Trees	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Scattered Trees	8.87	2	BAM086_WSA, BAM087_WSA
849_Thinned	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Thinned	4.14	1	BAM072_WSA
883_Intact	883: Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion	Intact	1.01	1	BAM148_GPC
1800_Intact	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Intact	1.49	1	BAM230_WSA
1800_Thinned	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Thinned	1.14	1	BAM237_WSA

2.3.3 Patch size

Patch sizes allocated to each vegetation zone were the same as for the CPCP, in that all zones have been allocated to the greater than 100 ha category.

2.3.4 Native vegetation cover

Native vegetation cover, in accordance with Section 3.2 of the BAM was not calculated for this assessment. Calculation of native vegetation cover for the purposes of the BAM-C acts as a filter for candidate species to be considered at a development site. As this assessment uses species polygons prepared for the CPCP, determining native vegetation cover was not required. To ensure all candidate species were captured by the BAM-C for the purposes of offset calculations, the highest category (> 70% native vegetation cover) was entered into the BAM-C.

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Figure 2-1 Vegetation plot-based survey locations

Matter: 38207, Date: 15 January 2024,
GIS: JB, Checked by: BT, Last edited by: jbeckius
Location: P:\38200s\38207\Mapping\38207_Elizabeth Dr East BAR.aprx
Layout: 38207_F2-1_VegPlot

2.4 Threatened species assessment

2.4.1 Habitat suitability assessment

A habitat suitability assessment was undertaken and is included in Appendix B. The likelihood of occurrence ratings for each threatened entity reflects the results of habitat assessment conducted in June 2022 and targeted threatened species surveys undertaken across October/November 2023.

Databases searches (BioNet and PMST) of the locality were the primary means of generating the list of threatened entities that should be considered for assessment. However, consideration was also given to any BAM species credit species considered candidate species for the CPCP that were not returned from database searches. This resulted in the following species being added to the habitat suitability assessment:

- *Hibbertia fumana* (BC Act, Critically Endangered)
- *Hibbertia puberula* (BC Act, Endangered)
- *Maundia triglochinoides* (BC Act, Vulnerable)
- *Micromyrtus minutiflora* (BC Act, Endangered and EPBC Act, Vulnerable)

In addition to the knowledge and experience of involved personnel, information utilised in the habitat assessment includes habitat feature mapping undertaken in June 2022 and October/November 2023, targeted threatened species survey results, as well as ecological information contained within BioNet, the TBDC and SPRAT as appropriate. The fieldwork undertaken included mapping of habitat features such as hollow-bearing trees and inspection of culverts and bridges where possible.

Where background information or detailed survey is lacking, the precautionary principle has been applied and a 'Moderate' likelihood of occurrence rating given to ensure that all threatened entities at risk of being impacted by the proposal have been adequately assessed. All BAM species credit species considered that have a CPCP species polygon that intersect the study area were given a 'Moderate' rating unless targeted surveys determined otherwise.

2.4.2 Targeted flora surveys

Due to property access restrictions, detailed assessment of vegetation could not be undertaken during the initial field investigation. Therefore, plot data collected as part of the CPCP was used throughout the assessment, as the vegetation within the study area was considered to be consistent with the CPCP. Likewise, as the vegetation was consistent, the species habitat polygons included in the CPCP were also considered suitable to determine the species with habitat within the study area. As such, the CPCP species polygons that intersect the study area were used to determine which species would require targeted survey based on the habitat present within the study area.

For all those threatened flora species with a CPCP species polygon intersecting the study area, targeted flora surveys were undertaken during October and / or November 2023. The methodology followed that of *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020), where by parallel field traverses of a maximum 10m width were walked. The coverage of each species' polygon was not absolute in all cases as a small number of properties were unable to be accessed. Generally, coverage was greater than 95% but in areas of a species' polygon that were not surveyed in detail, visual habitat assessment was undertaken from nearest vantage. Furthermore, due to recent development of the M12 Motorway (which is currently under construction), some portions of some species polygons have been cleared. This was noted in the field and survey was not undertaken.

Table 2-5: Targeted threatened flora survey details

Species name	Common name	Required survey period	Minimum survey requirements[1]	Survey completed?	Present?
Acacia bynoeana	Bynoe's Wattle	All year	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment

Species name	Common name	Required survey period	Minimum survey requirements[1]	Survey completed?	Present?
				November 2023.	
Acacia pubescens	Downy Wattle	All year	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Dillwynia tenuifolia	Dillwynia tenuifolia	August - October	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in October and November 2023.	**Recorded** (15 individuals) in bushland west of Bill Anderson Reserve. Habitat assessment provided in Appendix B: Habitat suitability assessment
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	All year	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	August – November	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Hibbertia puberula	Hibbertia puberula	October - December	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Hibbertia fumana	-	October - December	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment

Species name	Common name	Required survey period	Minimum survey requirements[1]	Survey completed?	Present?
Marsdenia viridiflora subsp. viridiflora	Native Pear	October - December	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Maundia triglochinoides	Maundia triglochinoides	November - March	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Micromyrtus minutiflora	Micromyrtus minutiflora	All year	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Persoonia nutans	Nodding Geebung	All year	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Pimelea spicata	Spiked Rice-flower	All year	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Pultenaea parviflora	Pultenaea parviflora	September - November	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species polygon in November 2023.	Not recorded during targeted survey. Habitat assessment provided in Appendix B: Habitat suitability assessment
Pultenaea pedunculata	Matted Bush-pea	September - November	5-10 m wide parallel field traverses in suitable habitat	Completed across accessible areas of the species	Not recorded during targeted survey. Habitat assessment provided in Appendix

Species name	Common name	Required survey period	Minimum survey requirements[1]	Survey completed?	Present?
				polygon in November 2023.	B: Habitat suitability assessment

2.4.3 Targeted fauna surveys

As previously stated, vegetation mapping within the study area was considered to be consistent with the CPCP and as such, species habitat polygons created as part of the CPCP were considered suitable for determining the species that require survey (candidate species credit species) within the study area. Three threatened fauna species credit species have CPCP species polygons that intersect the study area (Table 2-6). Each species was subject to targeted surveys compliant with the BAM as detailed below.

Targeted survey adhered to the following NSW guidelines:

- *Species credit threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH 2018).
- T*hreatened biodiversity survey and assessment - Guidelines for developments and activities (2004 working draft)* (DEC 2004).

For BAM ecosystem credit species, the habitat suitability assessment method has been used to account for the lack of targeted fauna survey for these species.

Table 2-6: Targeted threatened fauna survey details

Species name	Common name	Required survey period	Minimum survey requirements[1]	Survey completed	Present?
Hieraaetus morphnoides	Little Eagle	August - October	Survey for nests during breeding season.	Diurnal bird survey and nest searches in October 2023 covering all accessible areas, not only the CPCP species polygon, as shown in Figure 2-2.	No – suitable breeding habitat (stick nests) not identified.
Meridolum corneovirens	Cumberland Plain Land Snail	All year	Snail survey methods not defined. Biosis utilise a method developed from Koala Spot Assessment Technique (SAT) survey to conduct standardised repeatable survey units.	Snail survey points conducted in accessible parts of the species polygon in November 2023 across the study area. Snail surveys were undertaken as a modified SAT survey and involved the allocation and search of a focal habitat feature (i.e., logs, trees with leaf litter) for living snails or shells, and the subsequent search of 29 additional habitat features surrounding the focal point.	**Yes**- species was recorded in five locations totaling 10 shells.

Species name	Common name	Required survey period	Minimum survey requirements[1]	Survey completed	Present?
Myotis macropus	Southern Myotis	October - March	Minimum 16 trap nights for acoustic detectors, requiring minimum deployment of four nights.	Four acoustic detectors deployed for a total of 16 trap nights in November 2023. The call analysis was undertaken by Felicity Williams, Senior Zoologist and Bat Specialist.	**Yes** – Species was recorded via acoustic detection and a roost was detected in the South Creek east bridge.

2.5 Aquatic surveys

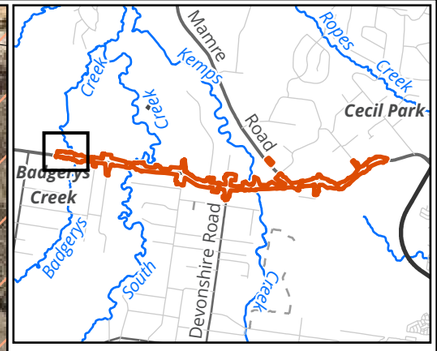
Waterways and aquatic habitat values, defined by Strahler order (Strahler 1964), within the study area include:

- Badgerys Creek: A fourth order waterway and one non-perennial unnamed third order tributary associated with Badgerys Creek.
- South Creek: A sixth order waterway, with one non-perennial unnamed second order and four non-perennial unnamed first order tributaries associated with South Creek.
- Kemps Creek: A fourth order waterway, with one non-perennial unnamed third order, one non-perennial unnamed second order and one non-perennial unnamed first order tributary associated with Kemps Creek.
- Ropes Creek: Three non-perennial unnamed waterways associated with Ropes Creek.
- Several dams associated with the above mapped waterways.

No detailed aquatic surveys were undertaken for this BAR such that the above waterways cannot be classified in accordance with *Policy and Guidelines for Fish Habitat Conservation and Management (2013 update)*. However, general assessment of the nature and condition of the above waterways was undertaken in June 2022. Results of that assessment, as well as background research are detailed in Section 3.5.

2.6 Limitations

With regard to targeted surveys for threatened flora and fauna, access constraints prevented some small areas of species polygons from being surveyed in detail. However, a total area of 33.76 ha was accessed during the November 2023 surveys (consisting of Existing non-certified (SEPP), Avoided land and Excluded land). These surveys are considered sufficient to confirm the presence/absence of threatened species and provide an accurate impact assessment for the project.



Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points
- Ultrasonic detector

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 5_781_Degraded
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 13_1800_Intact
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Elizabeth Drive

Badgerys Creek

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Figure 2-2 Threatened species survey locations Page 1

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 12 February 2024,
GIS: JB, Checked by: BT, Last edited by: jbeckius
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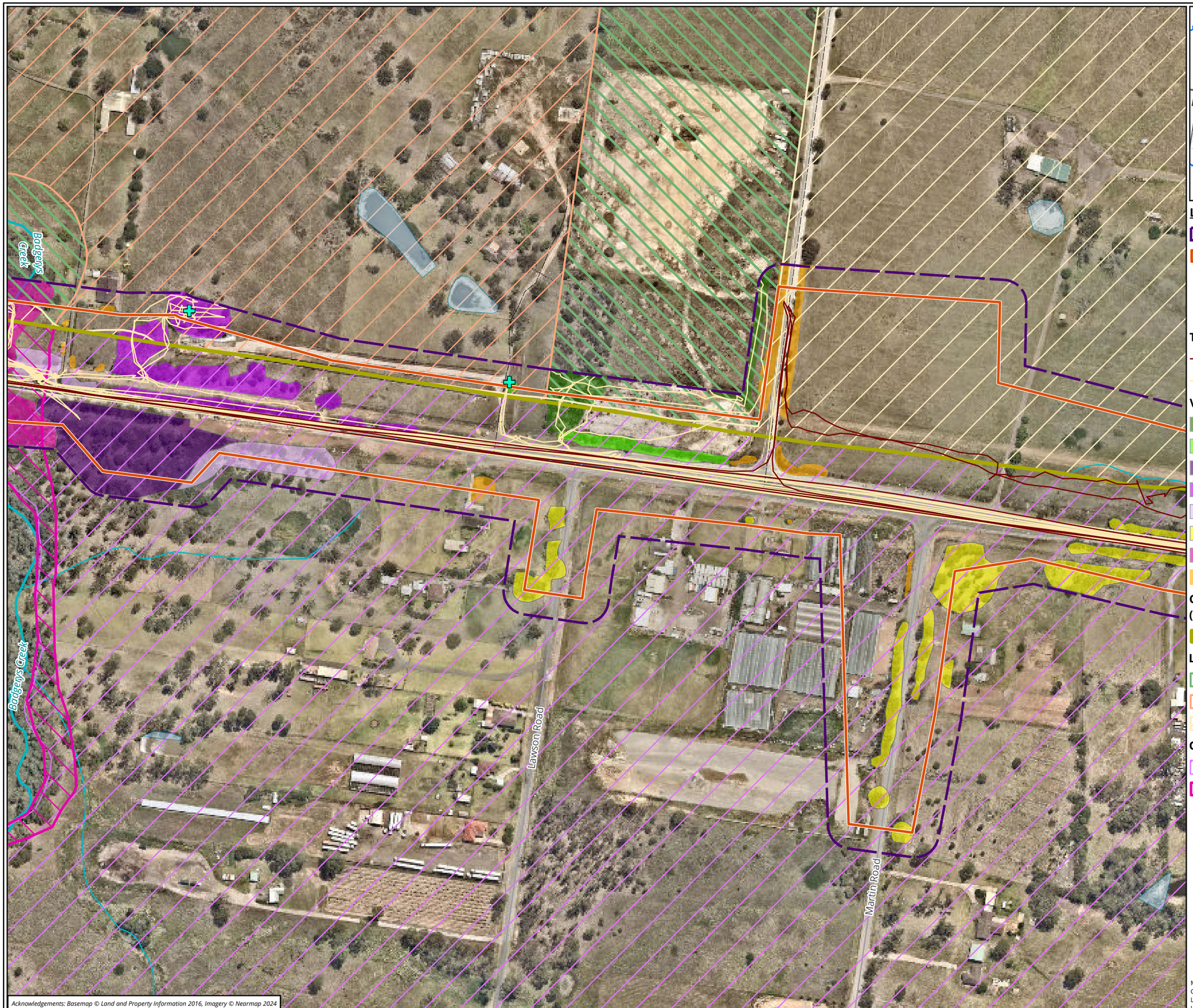

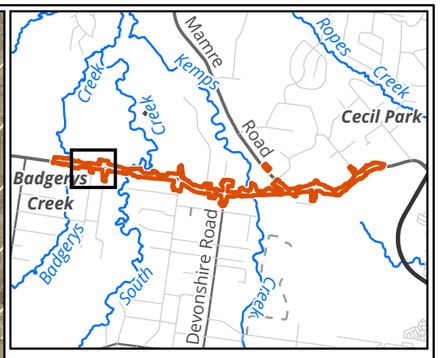

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points
- Ultrasonic detector

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Figure 2-2 Threatened species survey locations Page 2

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

biosis

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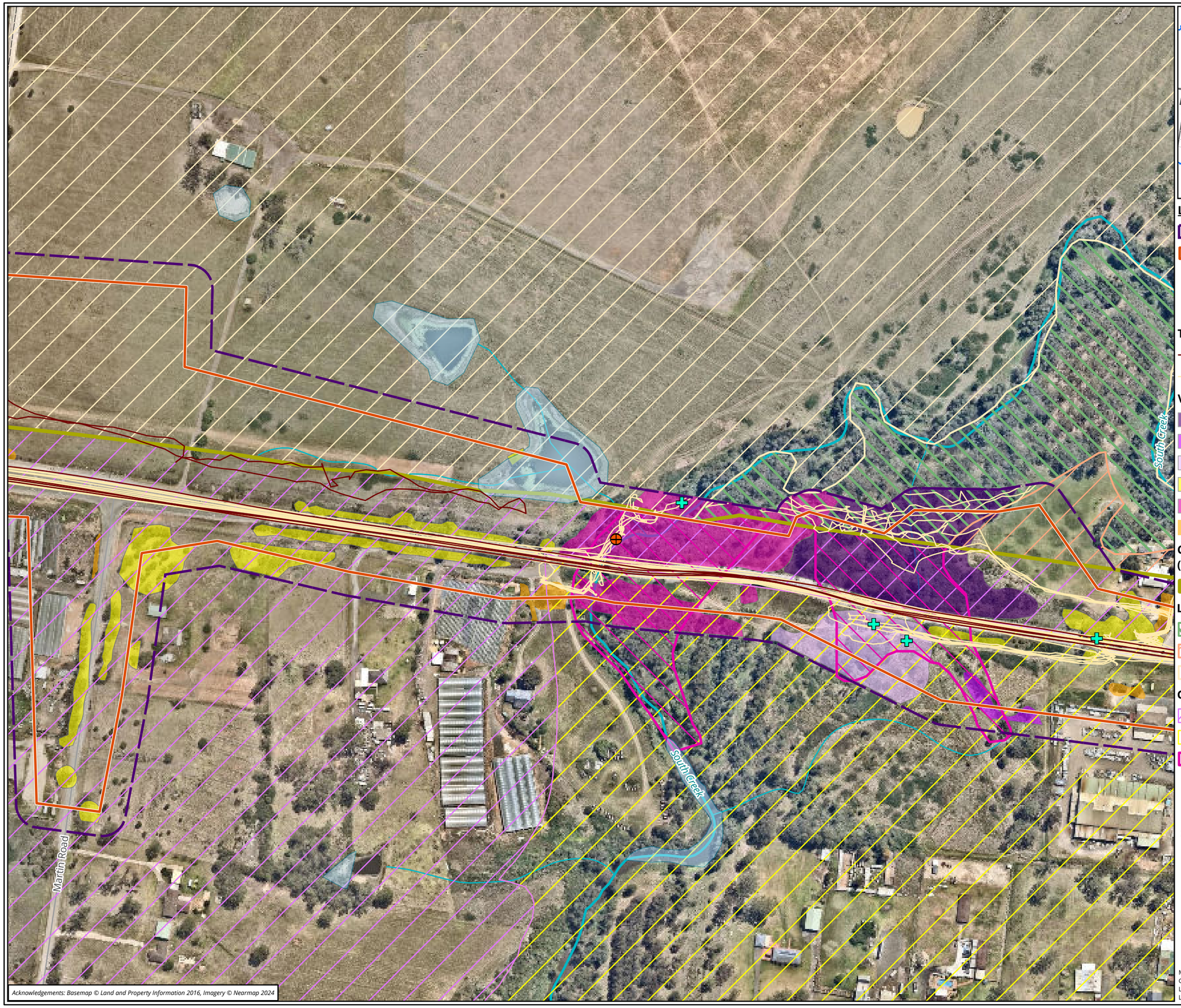

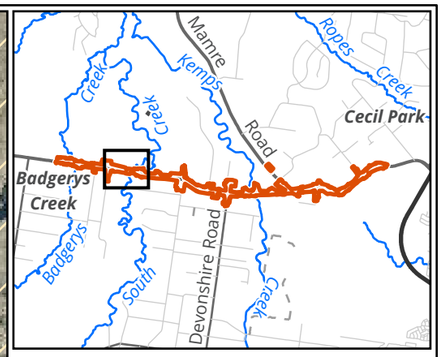

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points
- Ultrasonic detector

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 2-2 Threatened species survey locations Page 3

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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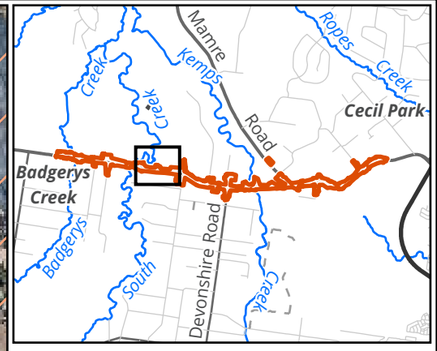

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points
- Ultrasonic detector

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 2_724_Scattered Trees
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 2-2 Threatened species survey locations Page 4

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

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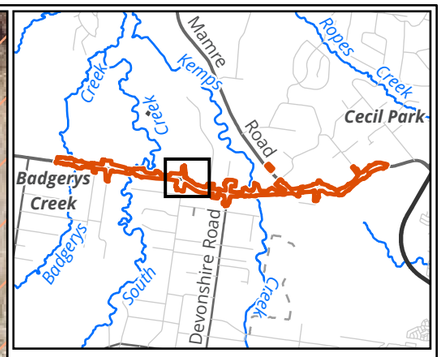

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points
- Bird survey transect

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 3_724_Thinned
- Zone 4_725_Intact
- Zone 10_849_Scattered Trees
- Zone 12_883_Intact
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 2-2 Threatened species survey locations Page 5

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

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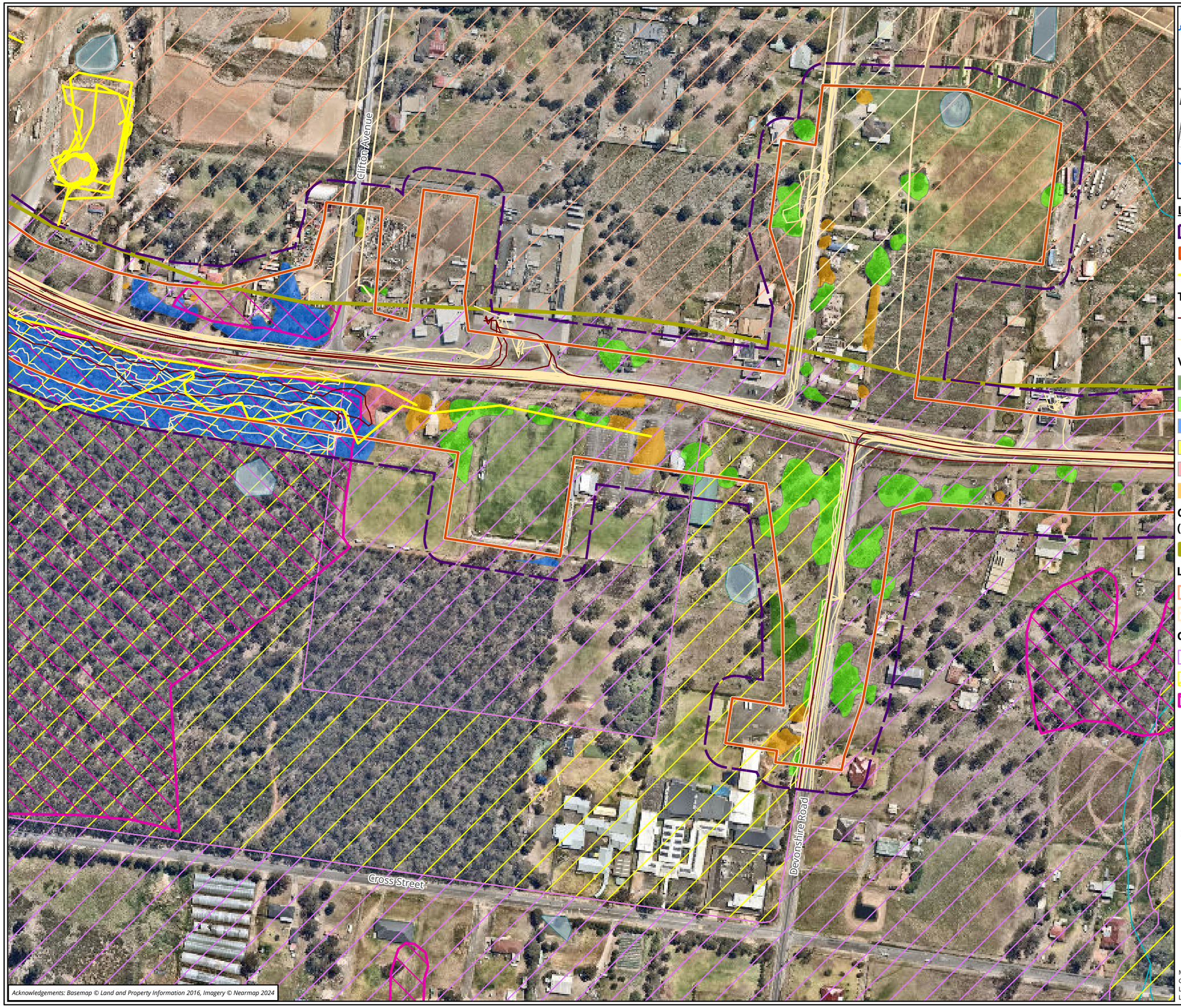

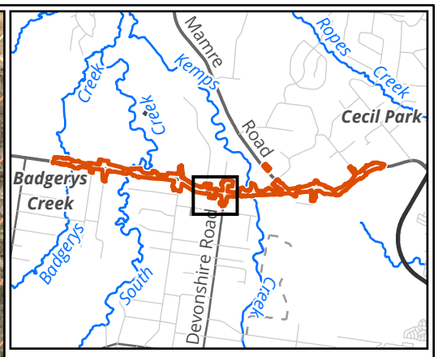

Legend

- Study area
- Subject land
- Bird survey transect

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 4_725_Intact
- Zone 10_849_Scattered Trees
- Zone 12_883_Intact
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Certified - urban capable land
- Excluded land

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 2-2 Threatened species survey locations Page 6

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 12 February 2024,
GIS: JB, Checked by: BT, Last edited by: jbeckius
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Layout: 38207_F2-2_ThrSpecSurveyLoc

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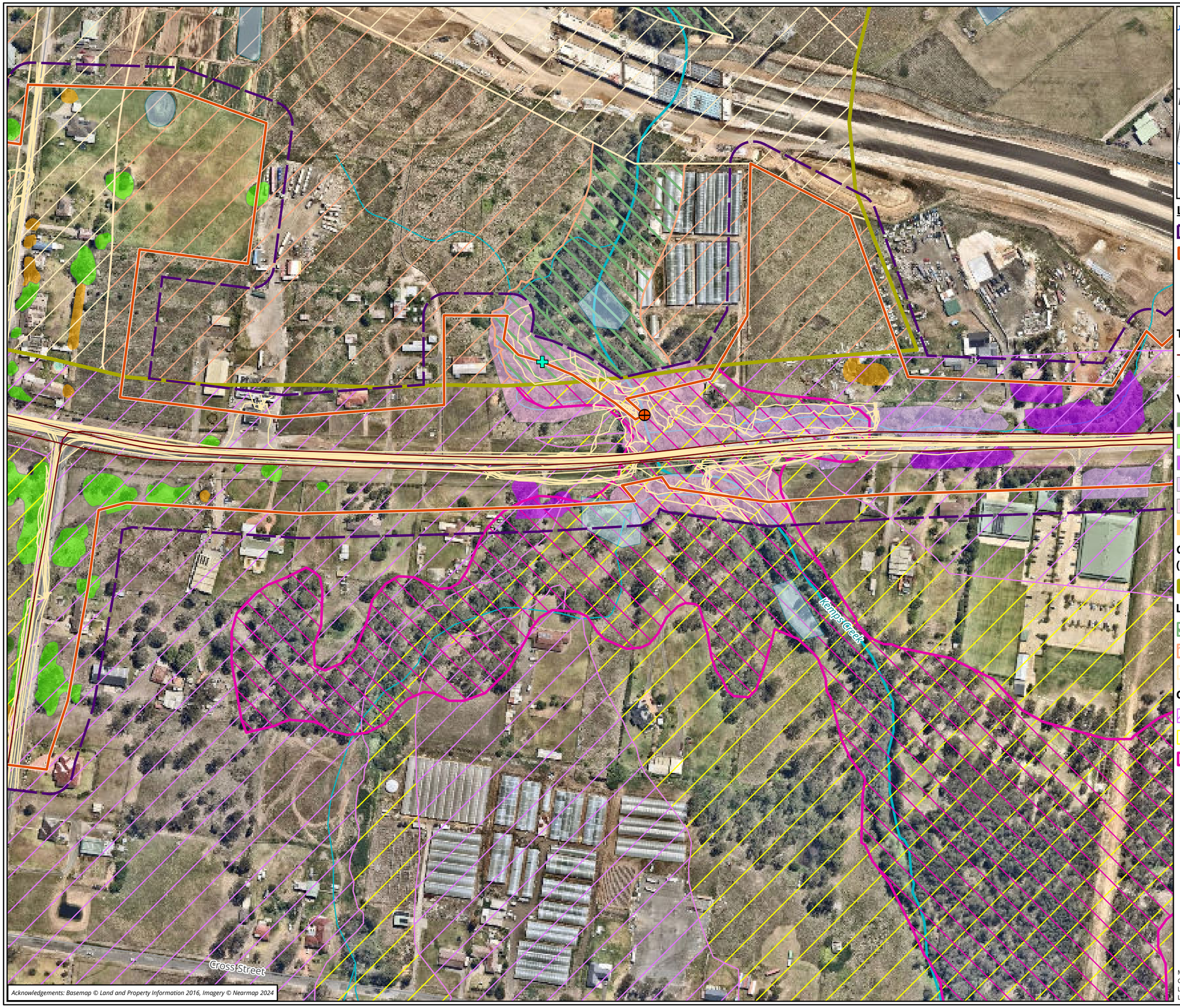

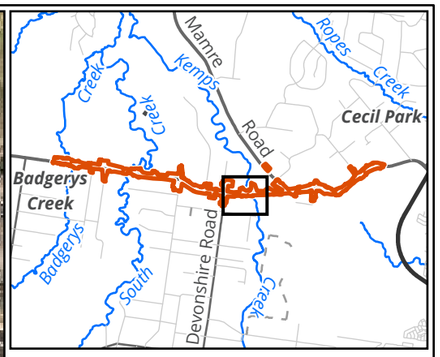

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points
- Ultrasonic detector

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 14_1800_Thinned
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 2-2 Threatened species survey locations Page 7

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 12 February 2024,
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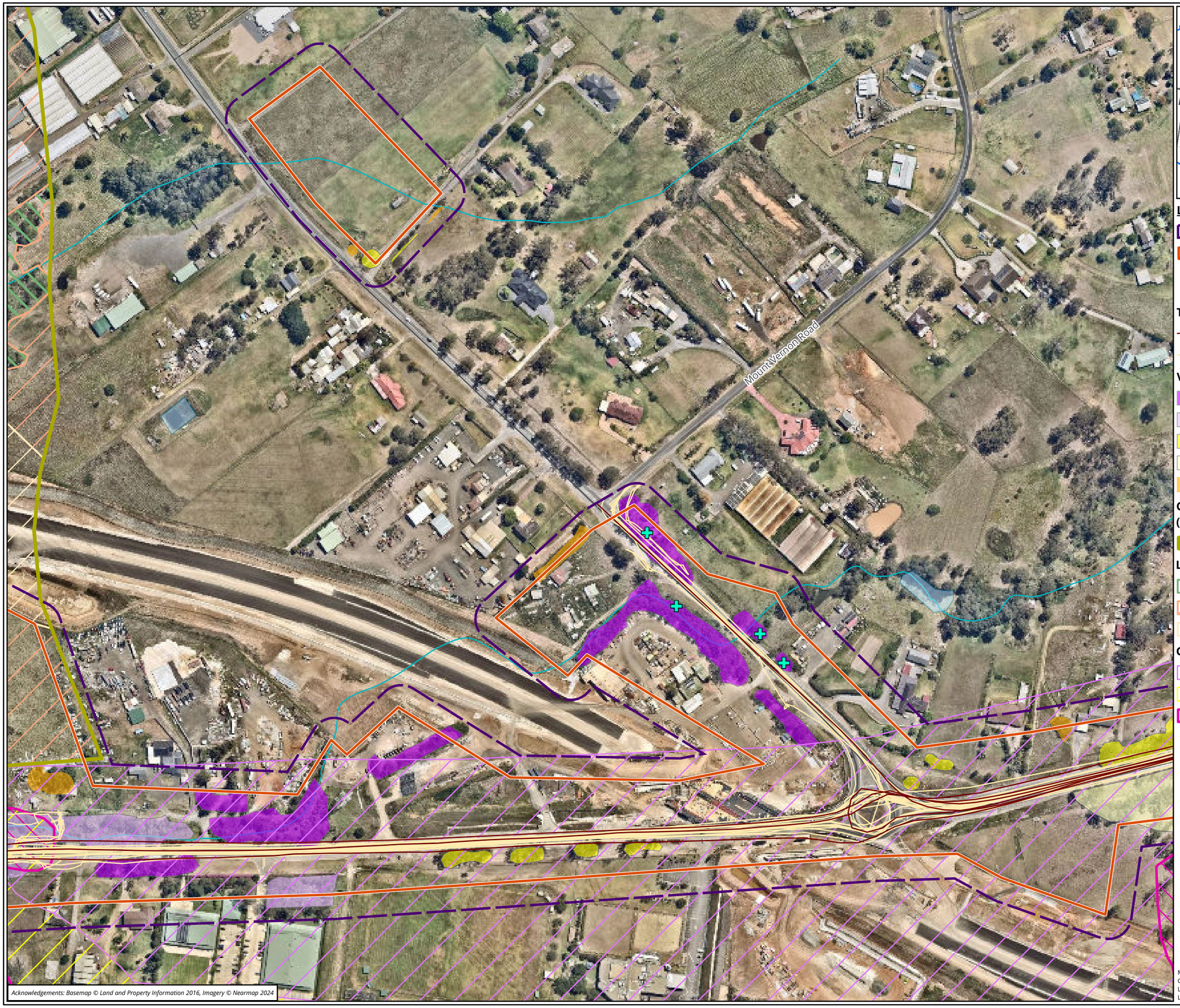

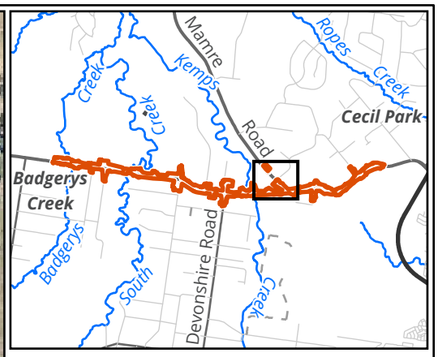

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned
- Urban Native/Exotic

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © Nearmap 2024

Figure 2-2 Threatened species survey locations Page 8

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 12 February 2024,
GIS: JB, Checked by: BT, Last edited by: jbeckius
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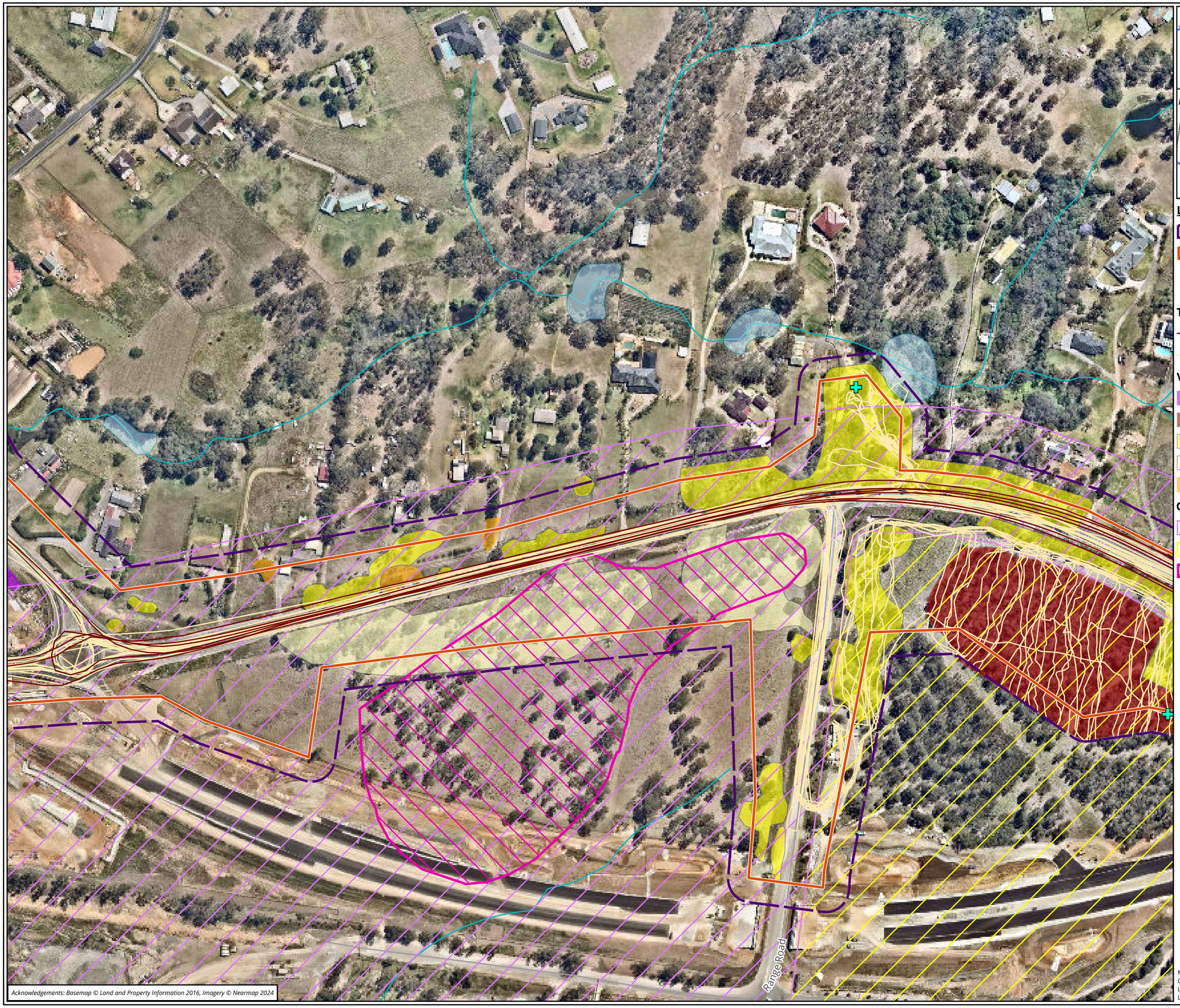

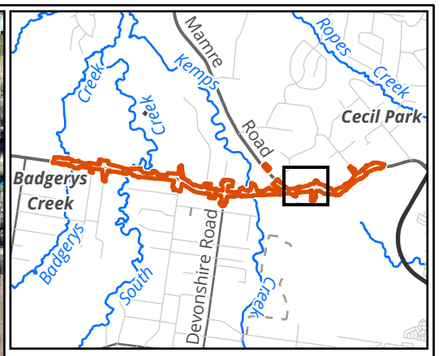

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 7_835_Scattered Trees
- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © Nearmap 2024

Figure 2-2 Threatened species survey locations
Page 9

0 25 50 75 100 125
Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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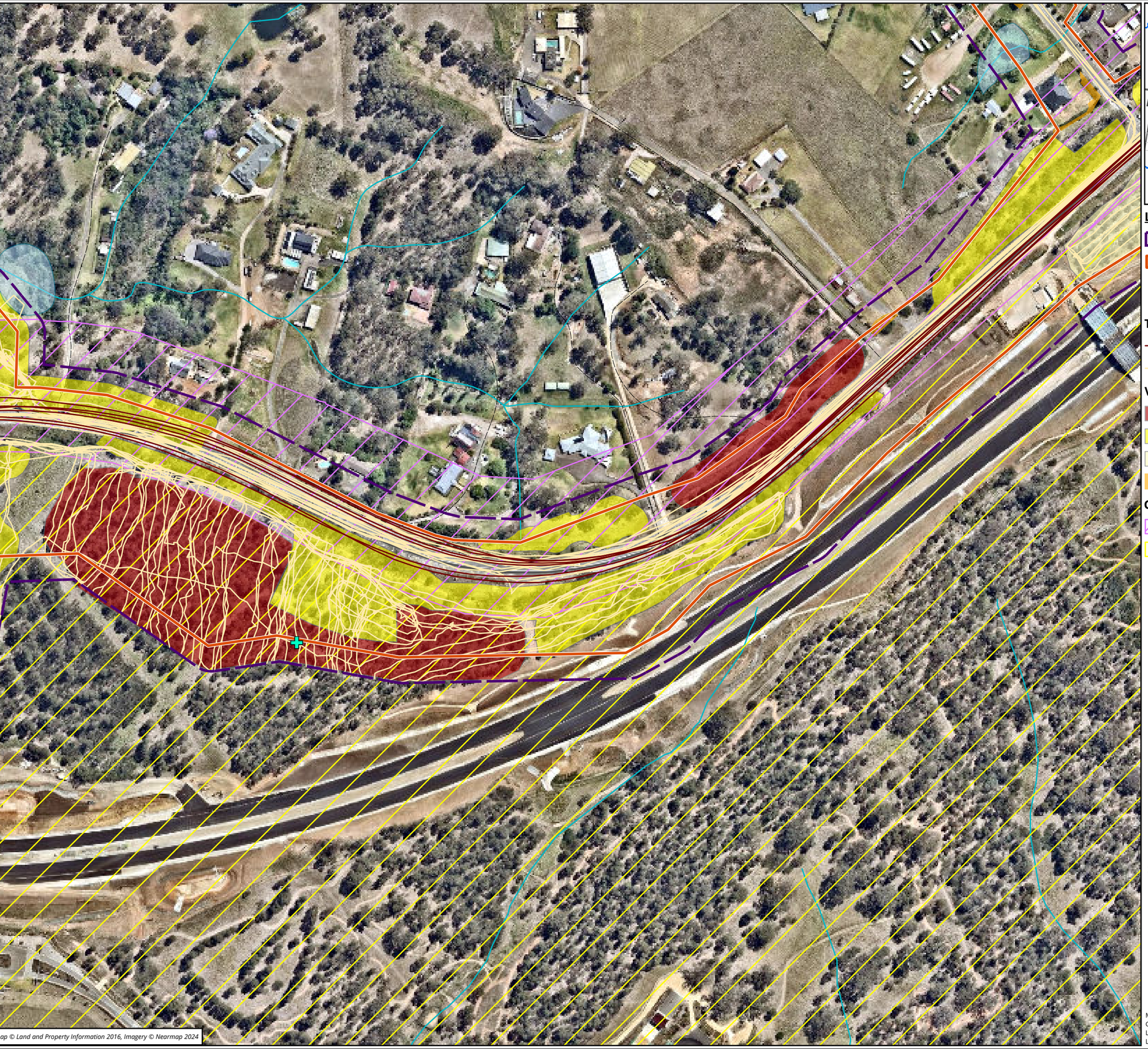

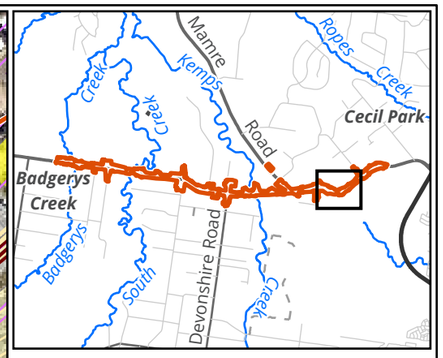

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified

Figure 2-2 Threatened species survey locations
Page 10

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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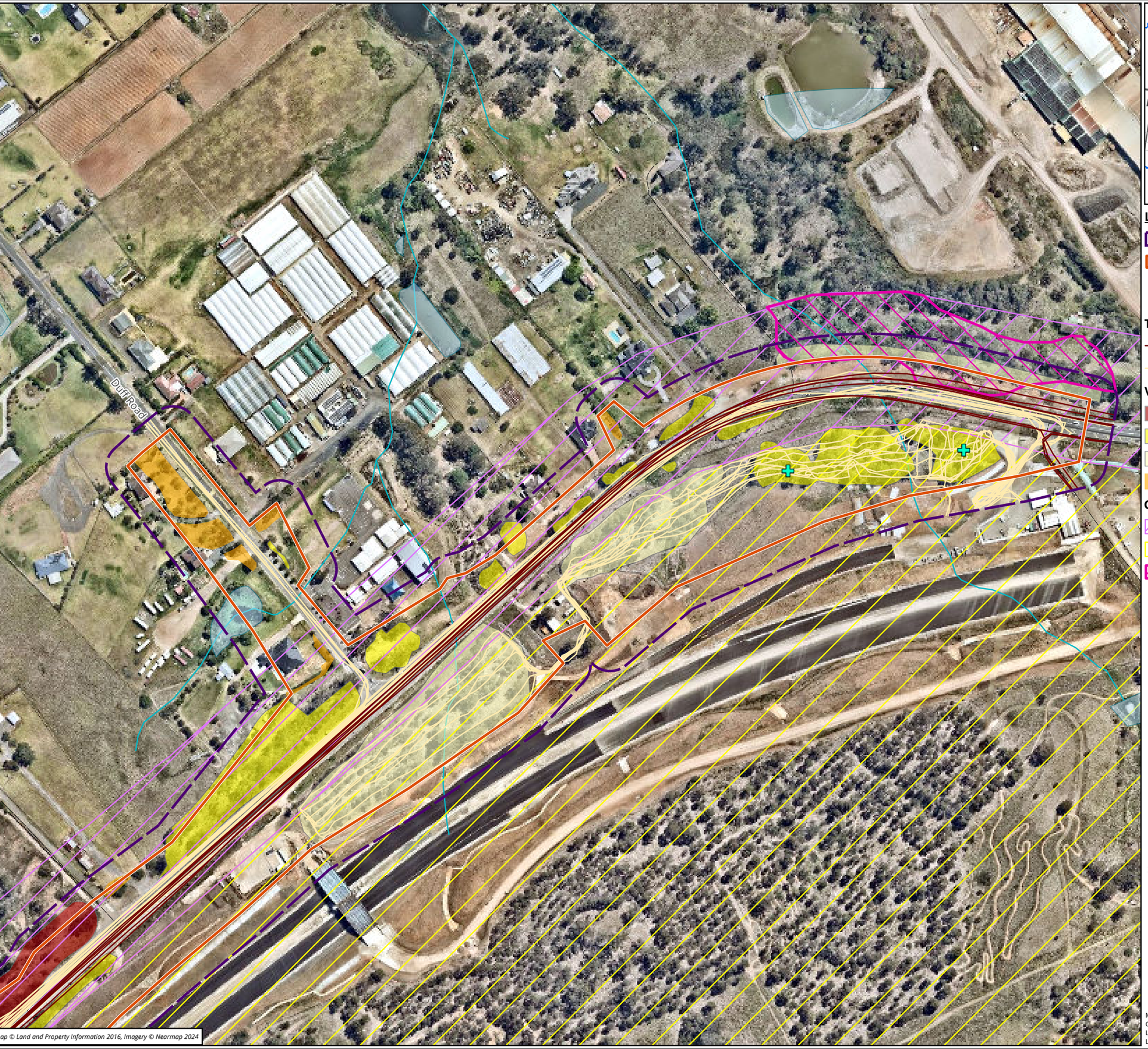

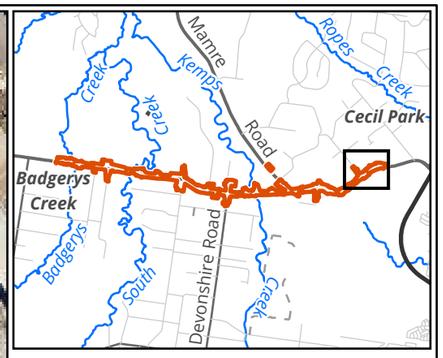

Legend

- Study area
- Subject land
- Cumberland Plain Land Snail survey points

Targeted flora survey tracks

- October 2023
- November 2023

Vegetation zone

- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 2-2 Threatened species survey locations
Page 11

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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Layout: 38207_F2-2_ThrSpecSurveyLoc

3. Existing environment

The study area is located within the suburbs of Badgerys Creek, Kemps Creek, Mount Vernon and Cecil Park, and is approximately 40 kilometres west of the Sydney Central Business District (CBD). The study area has been subjected to modification through urban, agricultural and infrastructure development. The study area is located with the Sydney Basin Interim Biogeographic Regionalisation of Australia (IBRA) bioregion and Cumberland IBRA subregion.

Regional soil landscape mapping indicates that the study area occurs on the Blacktown, South Creek, Luddenham and Berkshire Park landscapes of the Cumberland Lowlands and Cumberland Plain. These landscapes are characterised by the Wianamatta Group, Ashfield Shale, Bringelly Shale, Hawkesbury sandstone and Tertiary alluvial/colluvial formations. The topography of these landscapes varies from flat terrace tops on Berkshire Park to low rolling to steep low hills on Luddenham landscapes to gently undulating rises on the Blacktown landscape to flat or gently sloping alluvial plains in the South Creek landscape. The vegetation of these landscapes consists of extensively cleared open-forest and open-woodland, with land used primarily for intensive residential, agricultural, industrial and recreational purposes (Bannerman & Hazelton 1990).

The study area consists of a multilane roadway comprising Elizabeth Drive, and is surrounded by extensively cleared land, which is predominantly used for residential, recreational, industrial and agricultural purposes. Vegetation consists of highly fragmented remnant patches occurring along the road verges of Elizabeth Drive and within private properties within and adjacent to the study area. Some intact vegetation exists along the riparian corridors of Badgerys Creek, South Creek and Kemps Creek, which extend south to north through the study area, as well as within Bill Anderson Reserve and Western Sydney Parklands to the south and eastern most extents of the study area. The majority of roadside vegetation observed in June 2022 is subject to edge effects and disturbance including weed ingress, however higher condition patches are present and consisted of high floristic and structural diversity. Several threatened ecological communities (TECs) are present within the study area and are detailed in Section 3.2 below.

The study area intersects several waterways and aquatic environments, as defined in Section 2.5.

3.1 Plant community types and vegetation zones

As detailed in Section 2.3.2, the PCTs mapped in June 2022 and condition classes mapped for the CPCP have been utilised in this BAR. Seven PCTs are considered present within the study area which have been stratified into 14 vegetation zones. As no BAM plot data was collected specifically for this BAR, data collected for the CPCP has been entered into the BAM-C to calculate a vegetation integrity (VI) score for each vegetation zone.

The attributes of each vegetation zone within the study area are summarised Table 3-1 below.

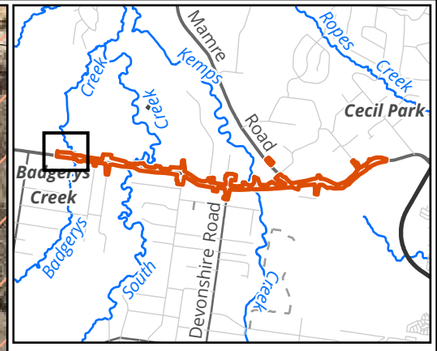
Table 3-1: Plant community types and vegetation zones including patch size and vegetation integrity (VI) score

Veg. zone	Plant community type (PCT)	Threatened ecological community	Area (ha)		Patch size class	VI score
			Subject land	Study area		
Zone 1_Intact	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	0.55	0.82	>100 ha	48.7
Zone 2_Scattered Trees	724: Broad-leaved Ironbark - Grey Box -	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion.	2.14	2.39	>100 ha	36.3

Veg. zone	Plant community type (PCT)	Threatened ecological community	Area (ha)		Patch size class	VI score
			Subject land	Study area		
	Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest				
Zone 3_Thinned	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	1.19	1.20	>100 ha	24.8
Zone 4_Intact	725: Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	2.25	3.33	>100 ha	69.9
Zone 5_Disturbed	781: Coastal freshwater wetland	BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.10	0.13	>100 ha	77.3
Zone 6_Intact	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	2.02	2.73	>100 ha	70
Zone 7_Scattered Trees	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act,	3.90	4.31	>100 ha	40.8

Veg. zone	Plant community type (PCT)	Threatened ecological community	Area (ha)		Patch size class	VI score
			Subject land	Study area		
	Plain, Sydney Basin Bioregion	Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria				
Zone 8_Thinned	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	1.44	1.86	>100 ha	58.5
Zone 9_Intact	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	2.79	3.76	>100 ha	41.2
Zone 10_Scattered Trees	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	8.87	9.99	>100 ha	17.5
Zone 11_Thinned	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	4.14	4.79	>100 ha	26.7
Zone 12_Intact	883: Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands	1.01	1.63	>100 ha	53.4

Veg. zone	Plant community type (PCT)	Threatened ecological community	Area (ha)		Patch size class	VI score
			Subject land	Study area		
		of the Sydney Basin Bioregion				
Zone 13_Intact	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.	1.49	2.60	>100 ha	27.2
Zone 14_Thinned	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.	1.14	1.93	>100 ha	27.5



Legend

- Study area
- Subject land

Vegetation zone

- Zone 5_781_Degraded
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 13_1800_Intact
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Elizabeth Drive

Badgerys Creek

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Figure 3-1 Plant community types and vegetation zones Page 1

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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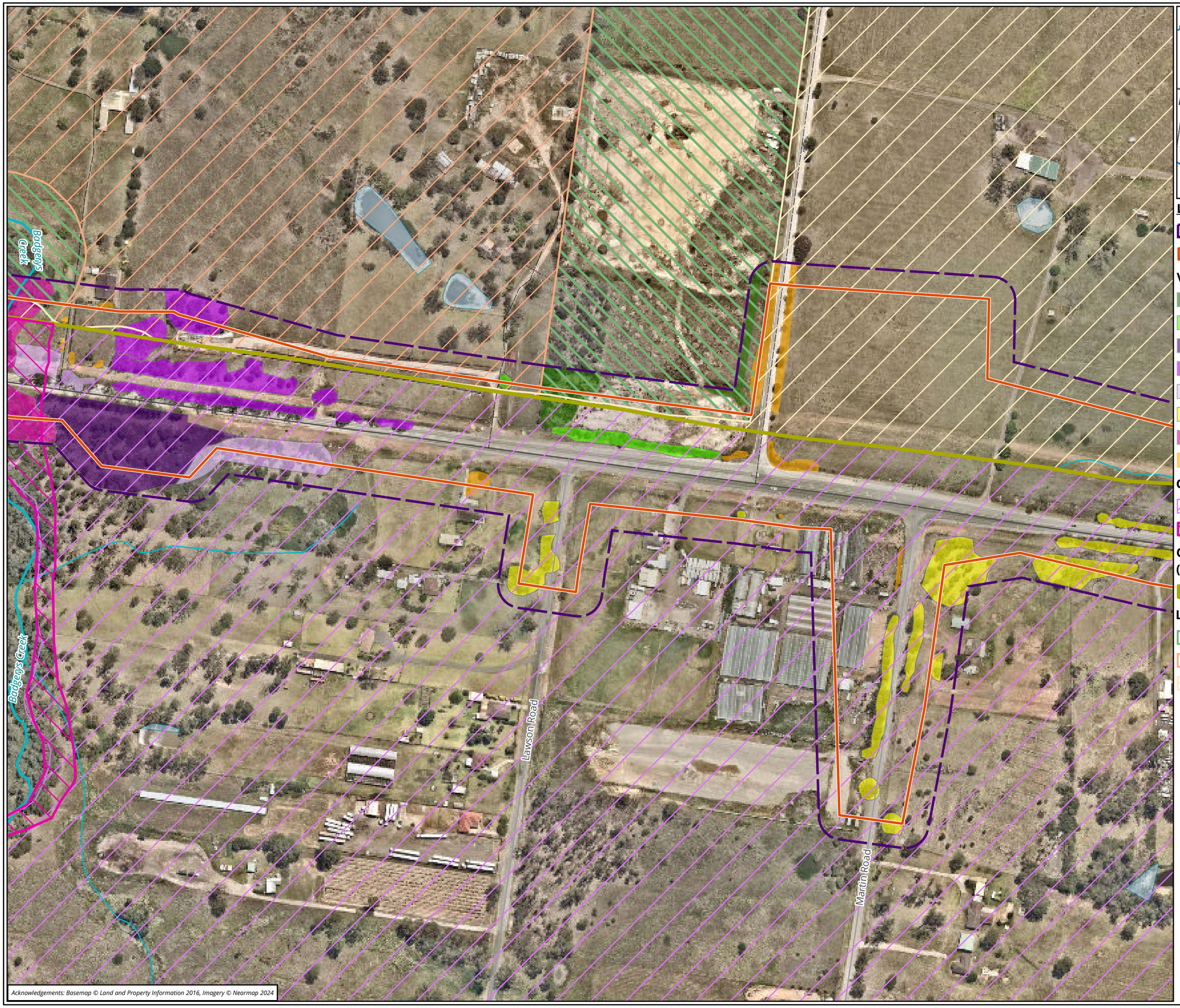

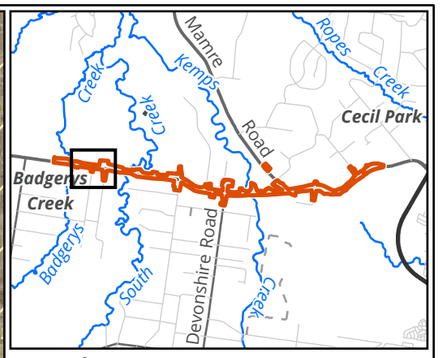

Legend

- Study area
- Subject land

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-1 Plant community types and vegetation zones Page 2

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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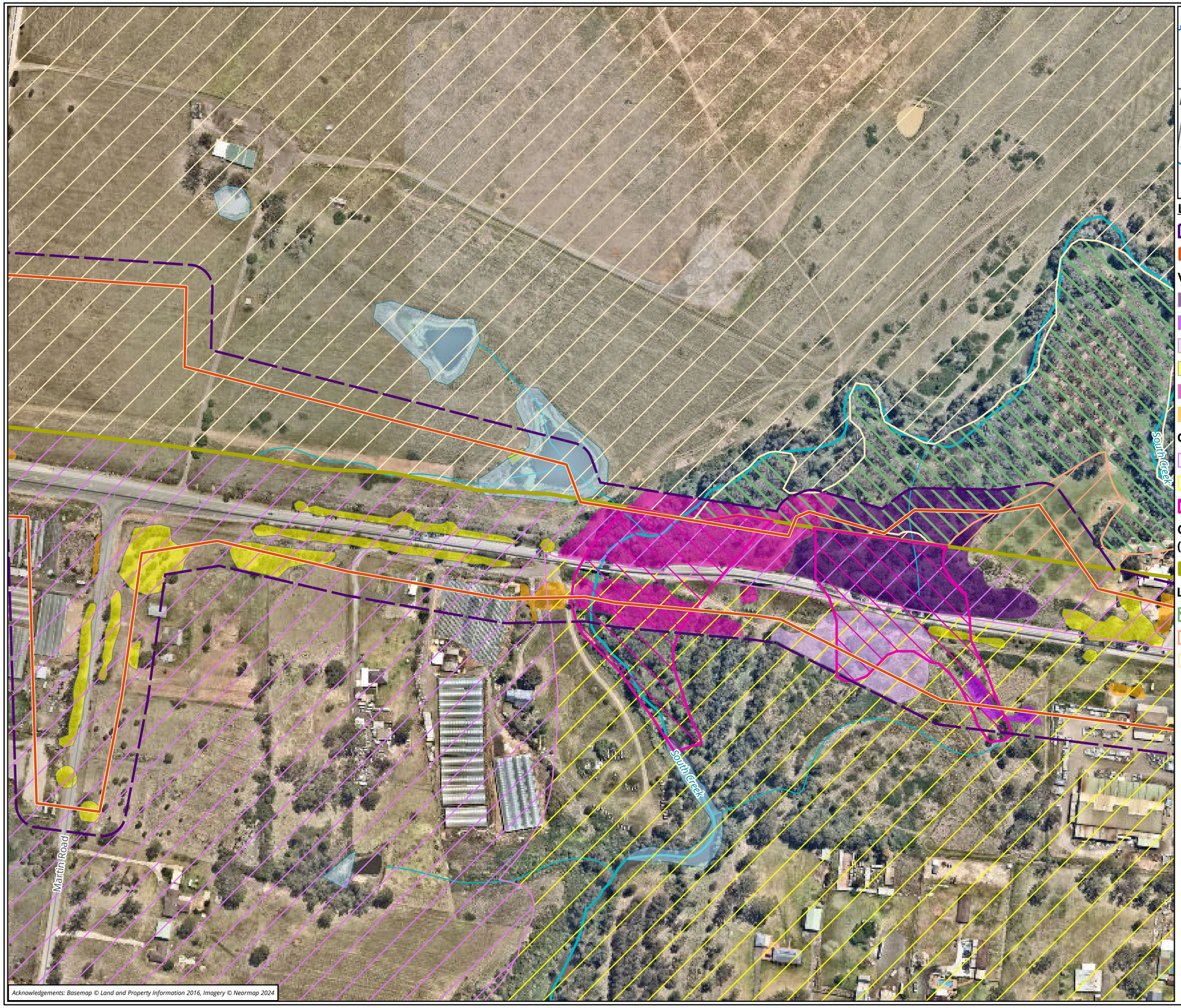

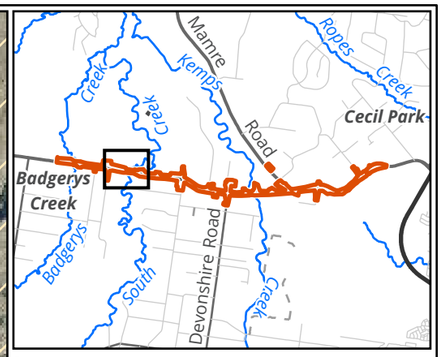

Legend

- Study area
- Subject land

Vegetation zone

- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-1 Plant community types and vegetation zones Page 3

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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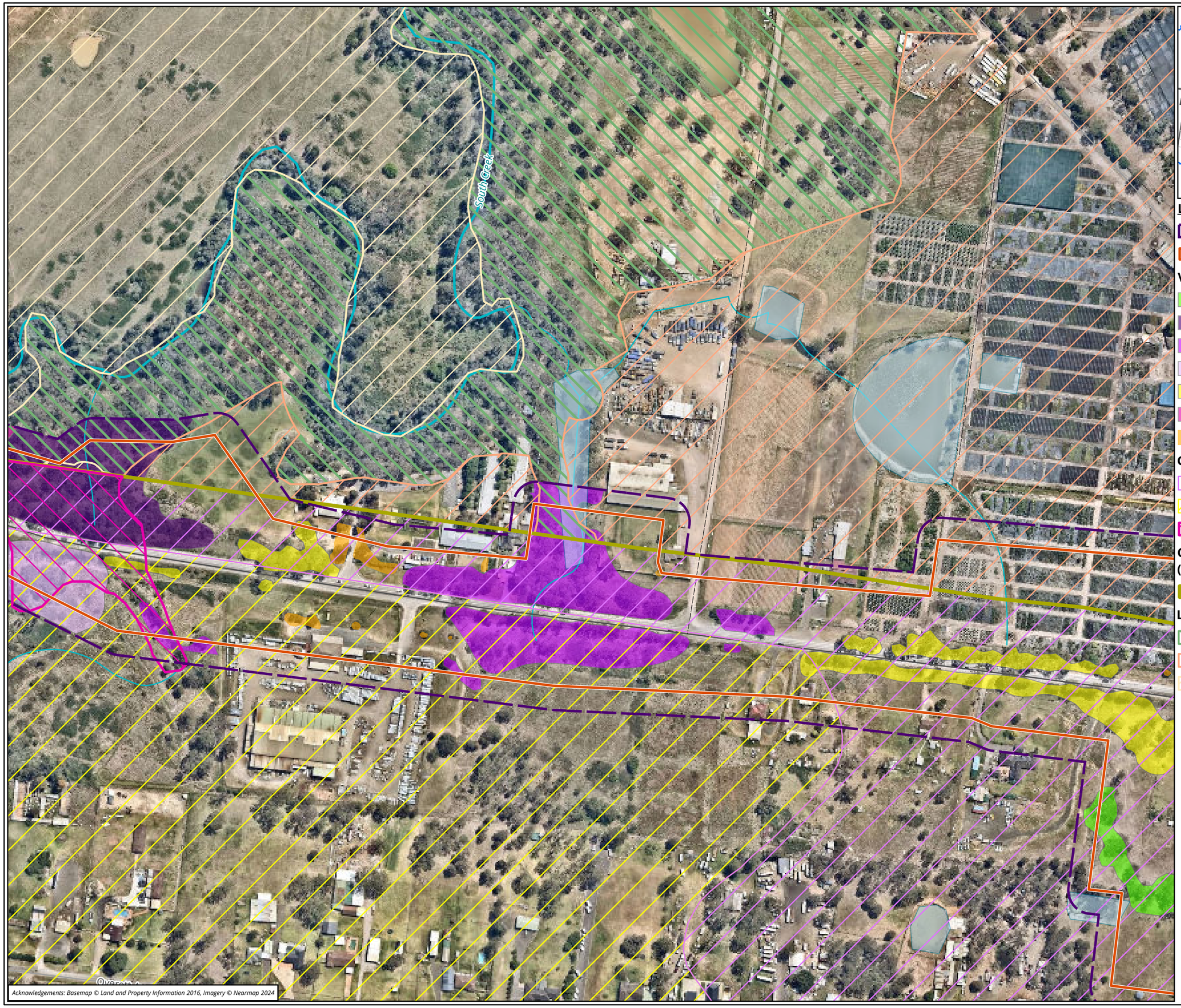

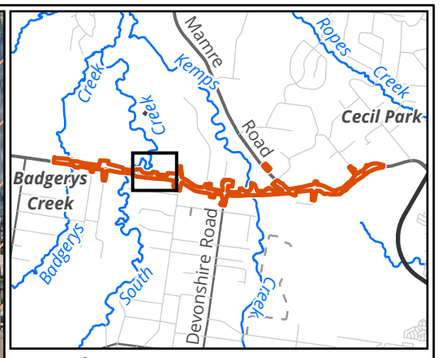

Legend

- Study area
- Subject land

Vegetation zone

- Zone 2_724_Scattered Trees
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

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Figure 3-1 Plant community types and vegetation zones Page 4

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

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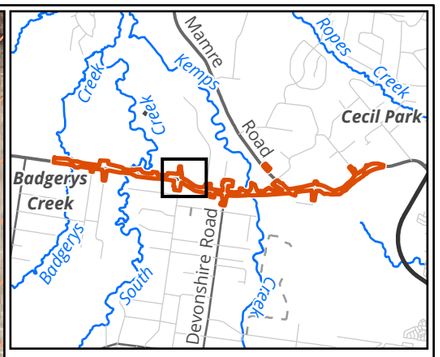

Legend

- Study area
- Subject land

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 3_724_Thinned
- Zone 4_725_Intact
- Zone 10_849_Scattered Trees
- Zone 12_883_Intact
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Overett Avenue

Western Road

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Figure 3-1 Plant community types and vegetation zones Page 5

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

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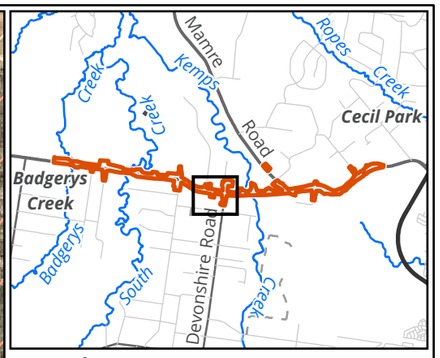

Legend

Study area

Subject land

Vegetation zone

Zone 1_724_Intact

Zone 2_724_Scattered Trees

Zone 4_725_Intact

Zone 10_849_Scattered Trees

Zone 12_883_Intact

Urban Native/Exotic

Growth Centre Land Certification

Existing Certified

Existing Non Certified

ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

Western Sydney Aerotropolis

Land Category

Certified - urban capable land

Excluded land

Figure 3-1 Plant community types and vegetation zones Page 6

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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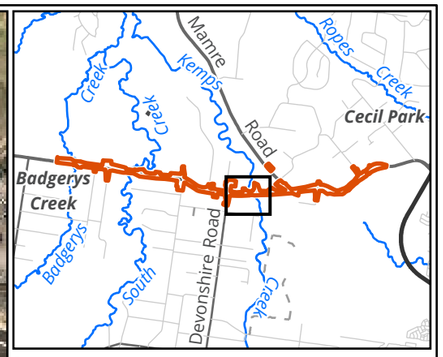

Legend

- Study area
- Subject land

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 14_1800_Thinned
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Kemps Creek

Cross Street

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Figure 3-1 Plant community types and vegetation zones Page 7

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

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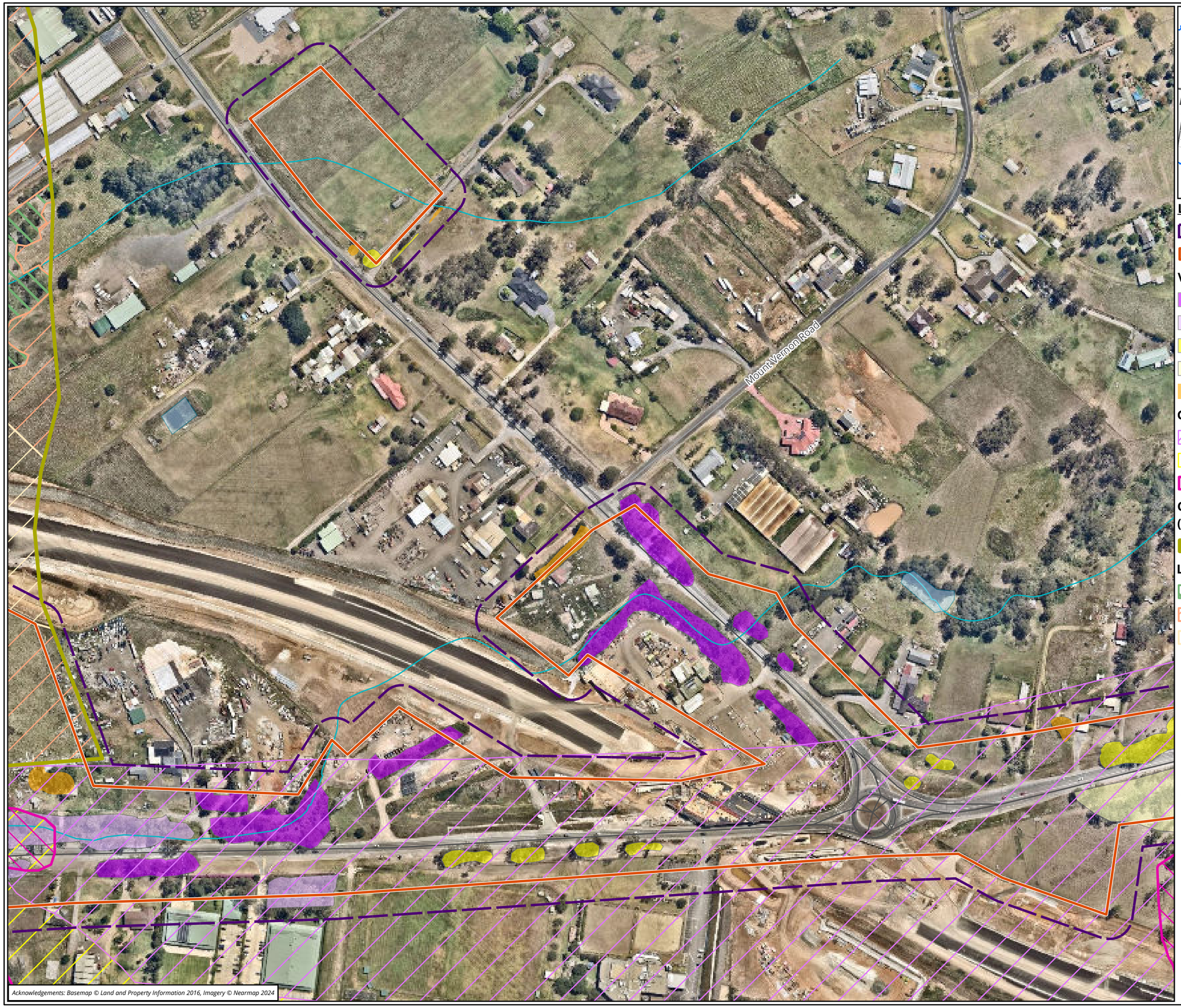

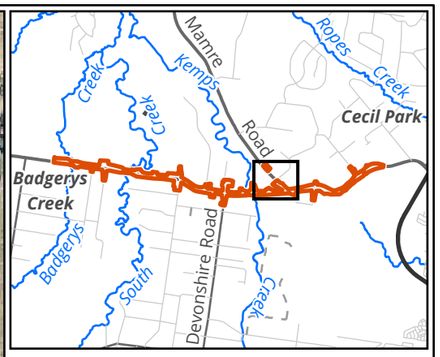

Legend

Study area

Subject land

Vegetation zone

Zone 7_835_Scattered Trees

Zone 8_835_Thinned

Zone 10_849_Scattered Trees

Zone 11_849_Thinned

Urban Native/Exotic

Growth Centre Land Certification

Existing Certified

Existing Non Certified

ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

Western Sydney Aerotropolis

Land Category

Avoided land

Certified - urban capable land

Excluded land

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Figure 3-1 Plant community types and vegetation zones
Page 8

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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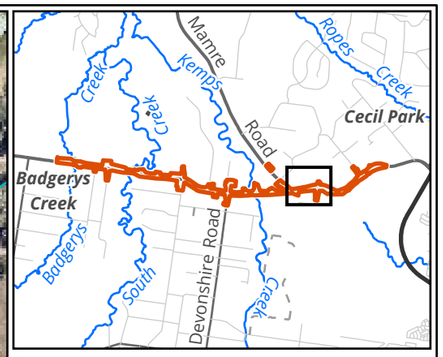

Legend

- Study area
- Subject land

Vegetation zone

- Zone 7_835_Scattered Trees
- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Range Road

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Figure 3-1 Plant community types and vegetation zones
Page 9

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

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biosis

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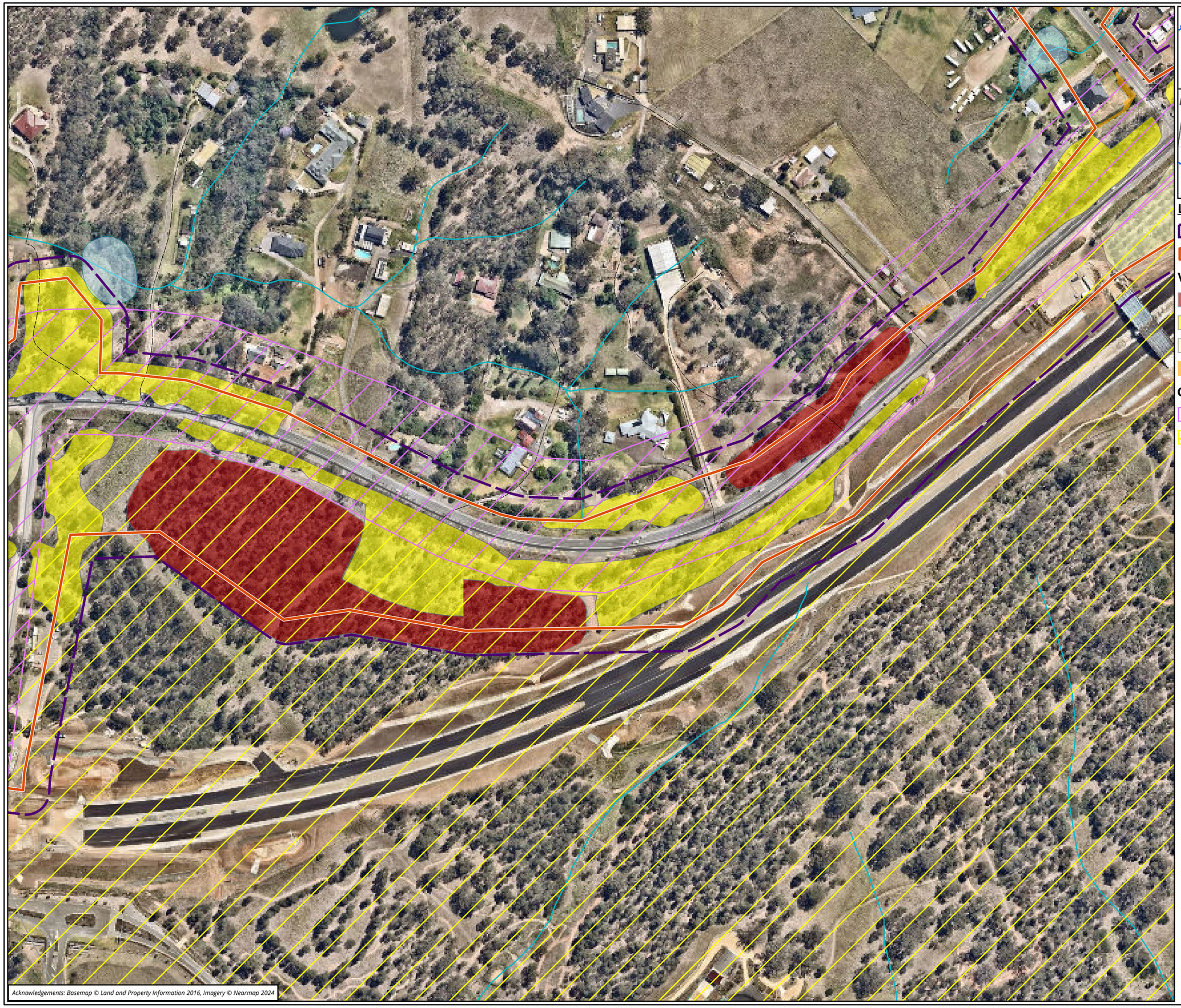

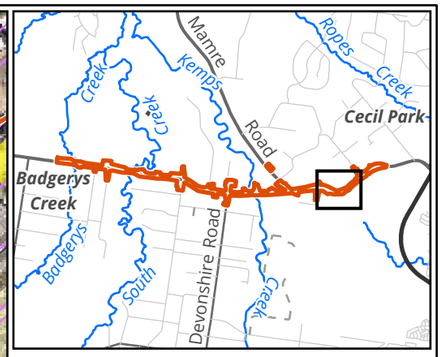

Legend

- Study area
- Subject land

Vegetation zone

- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified

Figure 3-1 Plant community types and vegetation zones
Page 10

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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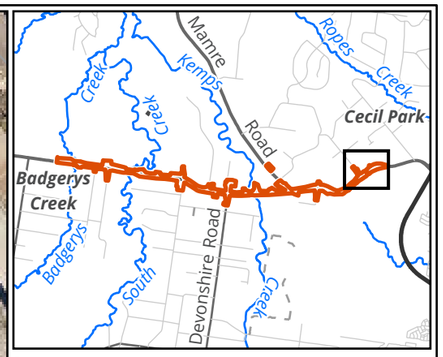

Legend

- Study area
- Subject land

Vegetation zone

- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned
- Urban Native/Exotic

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 3-1 Plant community types and vegetation zones
Page 11

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

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Layout: 38207_F3-1_PCT_VZ

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

Description

This community contains dominant canopy species Broad-leaved Ironbark *Eucalyptus fibrosa*, Forest Red Gum *E. tereticornis* and Grey Box *E. moluccana*, with an upper mid-storey layer dominated by White-feather Honey-myrtle *Melaleuca decora.* The midstory consisted predominantly of Native Blackthorn *Bursaria spinosa*, Rice Flower *Ozothamnus diosmifolius*, Parrot Peas Dillwynia parvifolia and Broadleaf Hopbush *Dodonaea viscosa.* Native groundcovers consisted of Threeawn Speargrass *Aristida vagans,* Berry Saltbush *Einadia hastata,* Wiry Panic *Entolasia stricta,* Spiny-head Mat-rush *Lomandra longifolia,* Weeping Lovegrass *Eragrostis curvula,* White Root *Pratia purparescens* and Thyme Spurge *Phyllanthus hirtellus.* PCT 724 occurs along the road verges of Elizabeth Drive and a small number of larger patches with a degraded understorey. All areas were mostly devoid of a lower strata and contained a high level of weed ingress.

Exotic species recorded within the vegetation type primarily included; Paddys Lucerne *Sida rhombifolia*, Wild Oats *Avena fatua*, Mother of Millions *Bryophyllum delagoense*, White Flatweed *Hypochaeris albiflora*, Rhodes Grass *Chloris gayana*, Paspalum *Paspalum dilatatum* and Cobbler's Pegs *Bidens pilosa*.

PCT ID	724
PCT name	Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion
Vegetation class	Cumberland Dry Sclerophyll Forests
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Estimate of per cent cleared	75 %
Total area in subject land	3.87 ha
Area requiring assessment	1.37 ha of PCT 724 in non-certified lands (previously assessed as 1.52 ha in September 2023 BAR, prior to the additional surveys)
Conservation status	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
Vegetation zones (condition) and plots	Zone 1_Intact – Plot BAM003_WSA Zone 2_Scattered Trees – Plot BAM006_WSA Zone 3_Thinned – Plot BAM007_WSA

Justification for PCT selection:

Associated with shale-gravely soils. This PCT was found in varying degrees of condition and species composition. In intact condition, it occurs as an open eucalypt forest with an understory that may vary between dense shrubs and a low sparse shrub cover with an abundant ground cover of grasses, sedges and herbs, consistent with the species assemblage for this PCT.

Floristic and structural summary of PCT 724 within the study area

Growth form	Typical species
Trees	Broad-leaved Ironbark, White-feather Honey-myrtle
Shrubs	Native Blackthorn, Rice Flower, Parrot Peas, Broadleaf Hopbush
Grass and grass-like	Threeawn Speargrass, Wiry Panic, Spiny-head Mat-rush, Weeping Lovegrass
Forb	Berry Saltbush, White Root, Thyme Spurge
Fern	-

Other	-
Exotic	Paspalum, Paddys Lucerne, Wild Oats, White Flatweed, Paspalum, Cobbler's Pegs
High Threat Exotic	Fire Weed, African Love Grass, Moth Vine, Mother of Millions Rhodes Grass

Condition states

This PCT contains three condition states, Intact, Scattered Trees and Thinned, as described in Section 2.3.2.

Photo 3-1: PCT 724_Intact within the study area

3.1.2 PCT 725 Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion

Description

PCT 725 occurs as Intact condition vegetation on the southern side of Elizabeth Drive within the patch of remnant bushland between Western Road and Devonshire Road, and consisted of a canopy dominated by; Broad-leaved Ironbark, Narrow-leaved Ironbark *E. crebra*, Forest Red Gum and Grey Box. The midstory consisted predominantly of Black She-oak *Allocasuarina littoralis*, Prickly-leaved Paperbark *Melaleuca nodosa*, White-feather Honey-myrtle, Tick Bush *Kunzea ambigua*, Black Wattle *Acacia decurrens* and Gorse Bitter Pea *Daviesia ulicifolia*. The groundcover consisted of; Blueberry Lily *Dianella revoluta*, Rock Fern *Cheilanthes sieberi*, Spiny-headed Mat-rush *Lomandra longifolia*, Ivy Goodenia *Goodenia hederacea*, Variable Sword-sedge *Lepidosperma laterale* and Weeping Grass *Microlaena stipoides*.

PCT ID	725
PCT name	Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
Vegetation class	Cumberland Dry Sclerophyll Forests
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Estimate of per cent cleared	95 %
Total area in subject land	2.25 ha
Area requiring assessment	1.76 ha of PCT 725 in non-certified lands (previously assessed as 1.76 ha in September 2023 BAR, prior to the additional surveys)
Conservation status	BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion
Vegetation zones (condition) and plots	Zone 4_Intact – Plot BAM012_WSA

Justification for PCT selection:

Associated with clay soils derived from Tertiary alluvial deposits. In intact condition, the structure ranges from a moderately tall open eucalypt forest or woodland to a low dense thicket of paperbarks with low emergent eucalypts, consistent with the species assemblage for this PCT.

Floristic and structural summary of PCT 725 within the study area

Growth form	Typical species
Trees	Broad-leaved Ironbark, Melaleuca decora
Shrubs	Prickly-leaved Paperbark, Gorse Bitter Pea
Grass and grass-like	Weeping Grass, Variable Sword-sedge
Forb	Ivy Goodenia, Blueberry Lily
Fern	Rock Fern
Other	
Exotic	--
High Threat Exotic	-

Condition states

This PCT is present within the study area in an Intact condition as described in Section 2.3.2.

Photo 3-2: PCT 725_Intact within the study area

3.1.3 PCT 781 Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion

Description

This community occurs in a disturbed condition state at one location within a tributary of Badgerys Creek. Native species within this community were limited to aquatic species such as; Broad-leaved Cumbungi *Typha orientalis*, Common Rush *Juncus usitatus* and Slender Knotweed *Persicaria decipiens*.

Exotic weed species were present within the fringes of this community and consisted of; Cobblers Pegs *Bidens pilosa*, Umbrella Sedge *Cyperus eragrostis* and Rhodes Grass *Chloris gayana*.

PCT ID	781
PCT name	Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion
Vegetation class	Coastal Freshwater Lagoons
Vegetation formation	Freshwater Wetlands
Estimate of per cent cleared	74 %
Total area in subject land	0.1 ha
Area requiring assessment	0.1 ha of PCT 781 in non-certified lands (previously assessed as 0.1 ha in September 2023 BAR, prior to the additional surveys)
Conservation status	BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EPBC Act, Not listed.
Vegetation zones (condition) and plots	Zone 5_Disturbed – Plot BAM249_WSA

Justification for PCT selection:

Associated with freshwater lagoons and swamps on alluvial flats, found at low elevations less than five metres above sea level. This PCT was found in a disturbed condition, however, this single lagoon contained native aquatic species consistent with the species assemblage for this PCT.

Floristic and structural summary of PCT 781 within the study area

Growth form	Typical species
Trees	Paperbark *Melaleuca decora*
Shrubs	-
Grass and grass-like	Broad-leaved Cumbungi
Forb	Slender knotweed
Fern	-
Other	-
Exotic	Cobblers Pegs, Umbrella Sedge
High Threat Exotic	Rhodes Grass

Condition states

This PCT occurs in a disturbed condition state within the study area resulting in a general lack of characteristic species and low native species diversity overall.

Photo 3-3: PCT 781_Disturbed within the study area

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

Description

PCT 835 occurs within the study area primarily in areas within and adjacent to waterways. The canopy was dominated by Rough-barked Apple *Angophora floribunda*, Forest Red Gum, Grey Box and Cabbage Gum *E. amplifolia*. Scattered occurrences of Broad-leaved Apple *A. subvelutina* and Swamp Oak *Casuarina glauca* are also present. The sub-canopy, where present, shows varying degrees of disturbance. Native species present were limited to a sparse cover of White-feather Honey-myrtle, Sickle Wattle *Acacia falcata* and Native Blackthorn *Bursaria spinosa*. Frequent native groundcover species consisted of; Weeping Grass, Kidney Weed *Dichondra repens*, Cockspur Flower *Plectranthus parviflorus*, Basket Grass *Oplismenus aemulus* and Forest Hedgehog Grass *Echinopogon ovatus*.

Exotic species recorded within the vegetation type primarily included; African Olive *Olea europaea* subsp. *cuspidata*, Large-leaf Privet *Ligustrum lucidum*, Japanese Honeysuckle *Lonicera japonica*, Common Sowthistle *Sonchus oleraceus*, Cobblers Pegs, Rhodes Grass and Sticky Nightshade *Solanum sisymbriifolium*.

PCT ID	835
PCT name	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
Vegetation class	Cumberland Dry Sclerophyll Forests
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Estimate of per cent cleared	93 %
Total area in subject land	7.36 ha
Area requiring assessment	2.81 ha of PCT 835 in non-certified lands (previously assessed as 4.55 ha in September 2023 BAR, prior to the additional surveys)
Conservation status	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
Vegetation zones (condition) and plots	Zone 6_Intact – Plot BAM027_WSA Zone 7_Scattered Trees – Plot BAM039_WSA Zone 8_Thinned – Plot BAM035_WSA

Justification for PCT selection:

Associated with broad alluvial flats, streams and creeks at altitudes between one metre and 160 metres above sea level. This PCT was found in varying degrees of condition and species composition. In intact condition, it occurs as an open eucalypt forest, with occasional sparse to open small tree stratum and a sparse lower shrub layer, with an abundant cover of grasses, small herbs and ferns, consistent with the species assemblage for this PCT.

Floristic and structural summary of PCT 835 within the study area

Growth form	Typical species
Trees	Forest Red Gum, Rough-barked Apple, Cabbage Gum
Shrubs	Native Blackthorn
Grass and grass-like	Weeping Grass, Forest Hedgehog Grass, Basket Grass
Forb	Kidney Weed
Fern	-

Growth form	Typical species
Other	-
Exotic	Japanese Honeysuckle, Common Sowthistle, Cobblers Pegs, Sticky Nightshade
High Threat Exotic	African Olive, Large-leaf Privet, Rhodes Grass

Condition states

This PCT contains three condition states, Intact, Scattered Trees and Thinned, as described in Section 2.3.2.

Photo 3-4: PCT835_Intact within the study area

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

Description

PCT 849 occurs in Intact, Thinned and Scattered Tree condition states within the study area, with the majority mapped as Intact. Dominant canopy species include Forest Red Gum, Grey Box, Broad-leaved Ironbark and Cabbage Gum.

The lower strata was mostly dominated by exotic species such as African Olive and Lantana *Lantana camara*. Native species in the lower strata were limited to midstory species such as Black Wattle *Acacia decurrens* and Native Blackthorn over a groundcover consisting of; Berry Saltbush *Einadia hastata*, Weeping Grass. Kidney Weed, Kangaroo Grass *Themeda triandra*, False Sarsaparilla *Hardenbergia violacea*, Sprawling Bluebell *Wahlenbergia gracilis*, Blue Trumpet *Brunoniella australis* and Twining Glycine *Glycine clandestina*.

In addition to those listed above, exotic species also recorded within the vegetation type included; Rhodes Grass, African Lovegrass *Eragrostis curvula*, Prairie Grass *Bromus catharticus*, Paspalum, Sticky Nightshade *Solanum sisymbriifolium*, Fireweed *Senecio madagascariensis* and Cobblers Pegs.

Intact and Thinned PCT 849 are present within the boundary of the Western Sydney Parklands and occur largely as a revegetated form of the PCT. However, due to access constraints, these areas were unable to be suitably assessed during field investigations. Visual surveys suggest that these areas have a higher native species diversity/abundance.

PCT ID	849
PCT name	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
Vegetation class	Coastal Valley Grassy Woodlands
Vegetation formation	Grassy Woodlands
Estimate of per cent cleared	93 %
Total area in subject land	15.79 ha
Area requiring assessment	6.22 ha of PCT 849 in non-certified lands (previously assessed as 7.74 ha in September 2023 BAR, prior to the additional surveys)
Conservation status	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
Vegetation zones (condition) and plots	Zone 9_Intact – Plots BAM054_WSA and BAM055_WSA Zone 10_Scattered Trees – Plots BAM086_WSA and BAM087_WSA Zone 11_Thinned – Plot BAM072_WSA

Justification for PCT selection:

Associated with a gentle topography less than 150 metres above sea level. This PCT was found in varying degrees of condition and species composition. In intact condition, it occurs as an open grassy eucalypt woodland with a sparse to moderate cover of shrubs and a high cover of grasses and forbs, consistent with the species assemblage for this PCT.

Floristic and structural summary of PCT 849 within the study area

Growth form	Typical species
Trees	Grey Box, Forest Red Gum
Shrubs	Native Blackthorn
Grass and grass-like	Kangaroo Grass

Growth form	Typical species
Forb	Kidney Weed, Blue Trumpet, Sprawling Bluebell, Berry Saltbush, Twining Glycine
Fern	-
Other	-
Exotic	Prairie Grass, Sticky Nightshade, Cobblers Pegs
High Threat Exotic	Rhodes Grass, African Lovegrass, Paspalum, Fireweed

Condition states

This PCT contains three condition states, Intact, Scattered Trees and Thinned, as described in Section 2.3.2

Photo 3-5: PCT849_Intact within the study area

3.1.6 PCT 883 Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion

Description

This community exists in an Intact condition state within the study area consisting of a canopy dominated by; Hard-leaved Scribbly Gum *E. sclerophylla* and occasional Parramatta Red Gum *E. parramattensis* with scattered occurrences of Broad-leaved Ironbark and Narrow-leaved Ironbark. The midstory consisted predominantly of Native Blackthorn, Black She-oak, Prickly-leaved Paperbark, Hairpin Banksia *Banksia spinulosa* and Tick Bush. The groundcover consisted of; Bordered Panic *Entolasia marginata*, *Lomandra obliqua*, Variable Sword-sedge, Trailing Speedwell *Veronica plebeia*, Kangaroo Grass and Rock Fern.

PCT ID	883
PCT name	Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion
Vegetation class	Sydney Sand Flats Dry Sclerophyll Forests
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Estimate of per cent cleared	50 %
Total area in subject land	1.01 ha
Area requiring assessment	0.82 ha of PCT 883 in non-certified lands (previously assessed as 0.83 ha in September 2023 BAR, prior to the additional surveys)
Conservation status	BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion
Vegetation zones (condition) and plots	Zone 12_Intact – Plot BAM148_GPC

Justification for PCT selection:

Associated with soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium, with sandy deposits. In intact condition, it occurs as a shrubby woodland with an open, low-growing eucalypt cover, well developed shrub layer, and a diverse mix of species typically including a high cover of grasses and sedges, consistent with the species assemblage for this PCT.

Floristic and structural summary of PCT 883 within the study area

Growth form	Typical species
Trees	Hard-leaved Scribbly Gum, Parramatta Red Gum,
Shrubs	Native Blackthorn, Black She-oak, Prickly-leaved Paperbark, Hairpin Banksia, Tick Bush
Grass and grass-like	Bordered Panic, *Lomandra obliqua*, Variable Sword-sedge, Kangaroo Grass
Forb	Trailing Speedwell
Fern	Rock Fern
Other	-
Exotic	-
High Threat Exotic	-

Condition states

This PCT is present within the study area in an Intact condition as described in Section 2.3.2.

Photo 3-6: PCT883_Intact within the study area

3.1.7 PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley

Description

This community occurs within the study area with a canopy dominated by Swamp Oak with scattered occurrences of Forest Red Gum and Cabbage Gum. This community was mostly devoid of a midstory with the exception of sporadic occurrences of Prickly-leaved Tea Tree *Melaleuca styphelioides* and Native Blackthorn. The groundcover was mostly dominated by exotic species, however, native species present included; Native Wandering Jew *Commelina cyanea*, Common Rush, Basketgrass, Slender Knotweed, Native Geranium *Geranium solanderi* and Weeping Grass.

Exotic species recorded within the vegetation type primarily included; Paddys Lucerne, Green Cestrum *Cestrum parqui*, Winter Cherry *Solanum pseudocapsicum*, Wandering Jew *Tradescantia fluminensis*, Velcro Weed *Galium aparine*, Madeira Vine *Anredera cordifolia* and Panic Veldtgrass *Ehrharta erecta*.

PCT ID	1800
PCT name	Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley
Vegetation class	Coastal Floodplain Wetlands
Vegetation formation	Forested Wetlands
Estimate of per cent cleared	60 %
Total area in subject land	2.63 ha
Area requiring assessment	1.48 ha of PCT 1800 in non-certified lands (previously assessed as 1.81 ha in September 2023 BAR, prior to the additional surveys)
Conservation status	BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EPBC Act, Endangered - Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community
Vegetation zones (condition) and plots	Zone 13_Intact – Plot BAM230_WSA Zone 14_Thinned – Plot BAM237_WSA

Justification for PCT selection:

Associated with grey-black clay-loams and sandy loams, on drainage lines, lake margins and estuarine fringes associated with coastal floodplains, below 20 metres elevation. This PCT was found in varying degrees of condition and species composition. In intact condition it occurs as an open grassy and herbaceous understorey, consistent with the species assemblage for this PCT.

Floristic and structural summary of PCT 1800 within the study area

Growth form	Typical species
Trees	Swamp Oak, Forest Red Gum, Cabbage Gum
Shrubs	Prickly-leaved Tea Tree, Native Blackthorn
Grass and grass-like	Common Rush, Weeping Grass, Basket Grass
Forb	Native Wandering Jew, Slender Knotweed, Native Geranium
Fern	-
Other	-
Exotic	Paddys Lucerne, Winter Cherry, Wandering Jew, Velcro Weed, Panic Veldtgrass

High Threat Exotic	Green Cestrum, Wandering Jew, Madeira Vine

Condition states

This PCT contains two condition states, Intact and Thinned, as described in Section 2.3.2

Photo 3-7: PCT1800_Intact within the study area

3.2 Threatened ecological communities

All of the PCTs within the study area are associated with TECs listed under the BC Act and in most cases, the EPBC Act, these are:

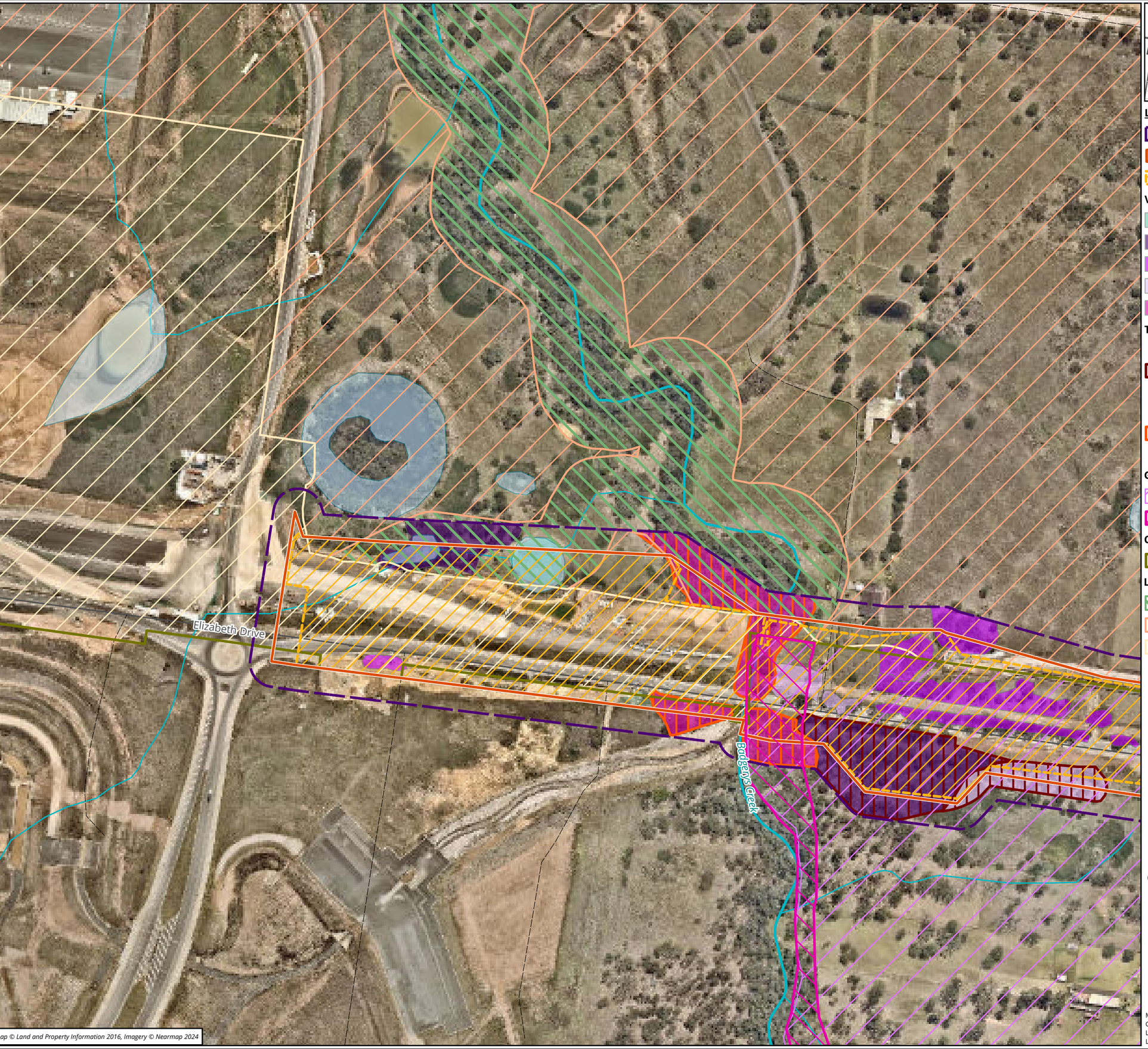
- PCT 724: BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
- PCT 725: BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion
- PCT 781: BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- PCT 835: BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
- PCT 849: BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
- PCT 883: BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion

- PCT 1800: BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.

All PCTs within the study area are considered to represent their associated BC Act listed TECs. This is due to suitable landscape position, soil type and characteristic diagnostic species being present in all cases. Generally, BC Act TEC listings seek to protect even the most disturbed remnants of TECs, therefore, no vegetation zones have been excluded.

In contrast to the BC Act listings of TECs, the EPBC Act listings require that stringent key diagnostics and stringent condition criteria be satisfied. That is, a patch of potential EPBC Act TEC must meet the minimum condition class thresholds of the applicable listing. Generally, this requires a patch to be of a minimum size and the understory be greater or equal to a certain percent native. For each EPBC Act PCT/TEC association listed above, analysis of patch sizes was undertaken to determine instances where the applicable minimum patch size threshold was met. As limited detailed plot data was collected to quantifiably assess condition, the precautionary principle has been applied and all qualifying patches are considered to represent their associated EPBC Act listed TEC.

The distribution of BC Act listed TECs within the study area is shown on Figure 3-2. EPBC Act listed TECs are discussed in Section 3.9 and shown on Figure 3-6.



Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 5_781_Degraded
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 13_1800_Intact

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

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Figure 3-2 Threatened ecological communities
Page 1

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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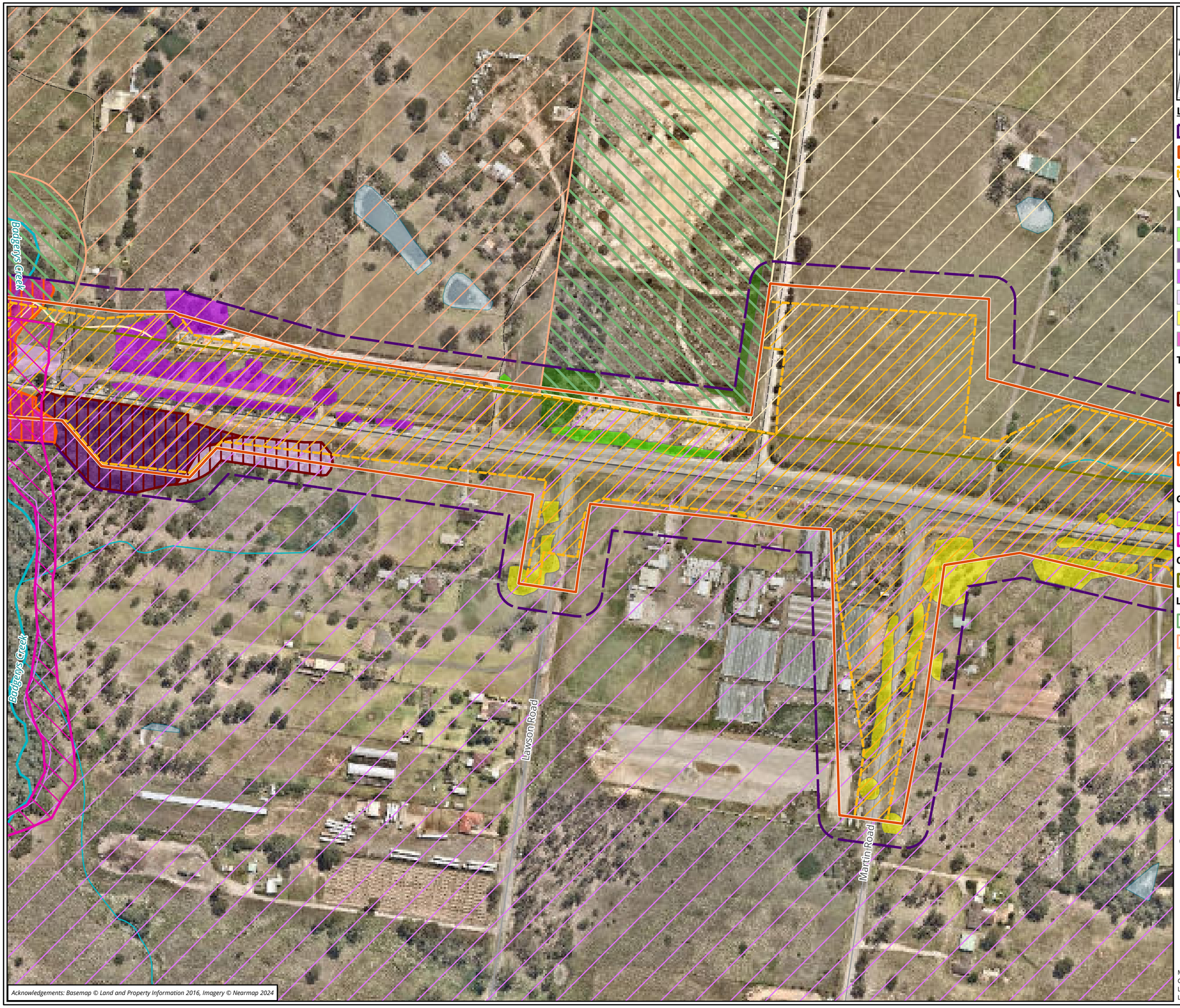

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-2 Threatened ecological communities
Page 2

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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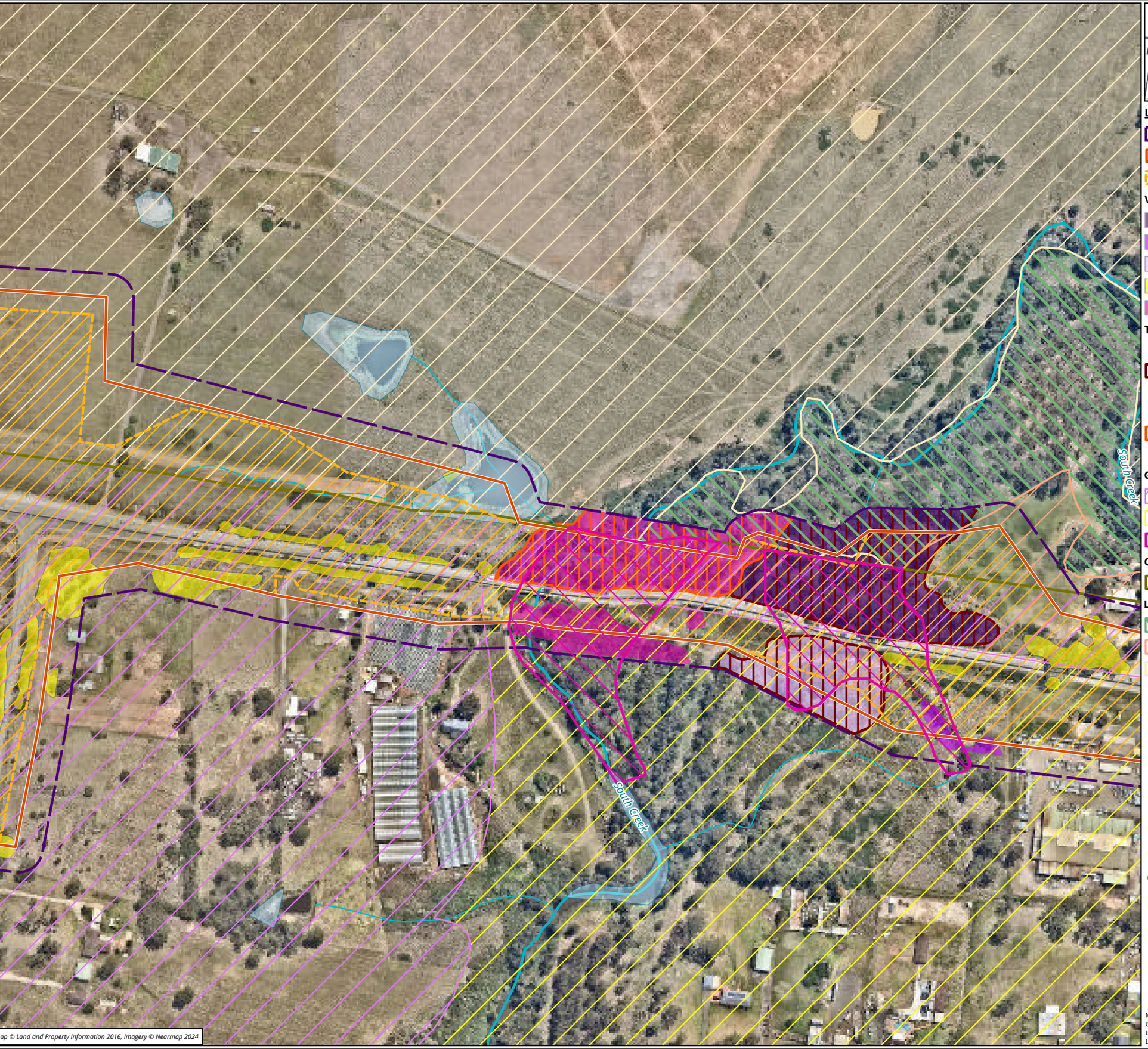

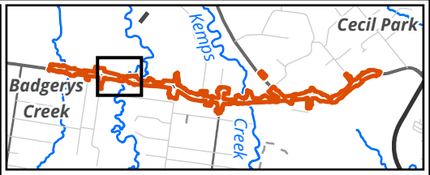

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-2 Threatened ecological communities
Page 3

0 25 50 75 100 125
Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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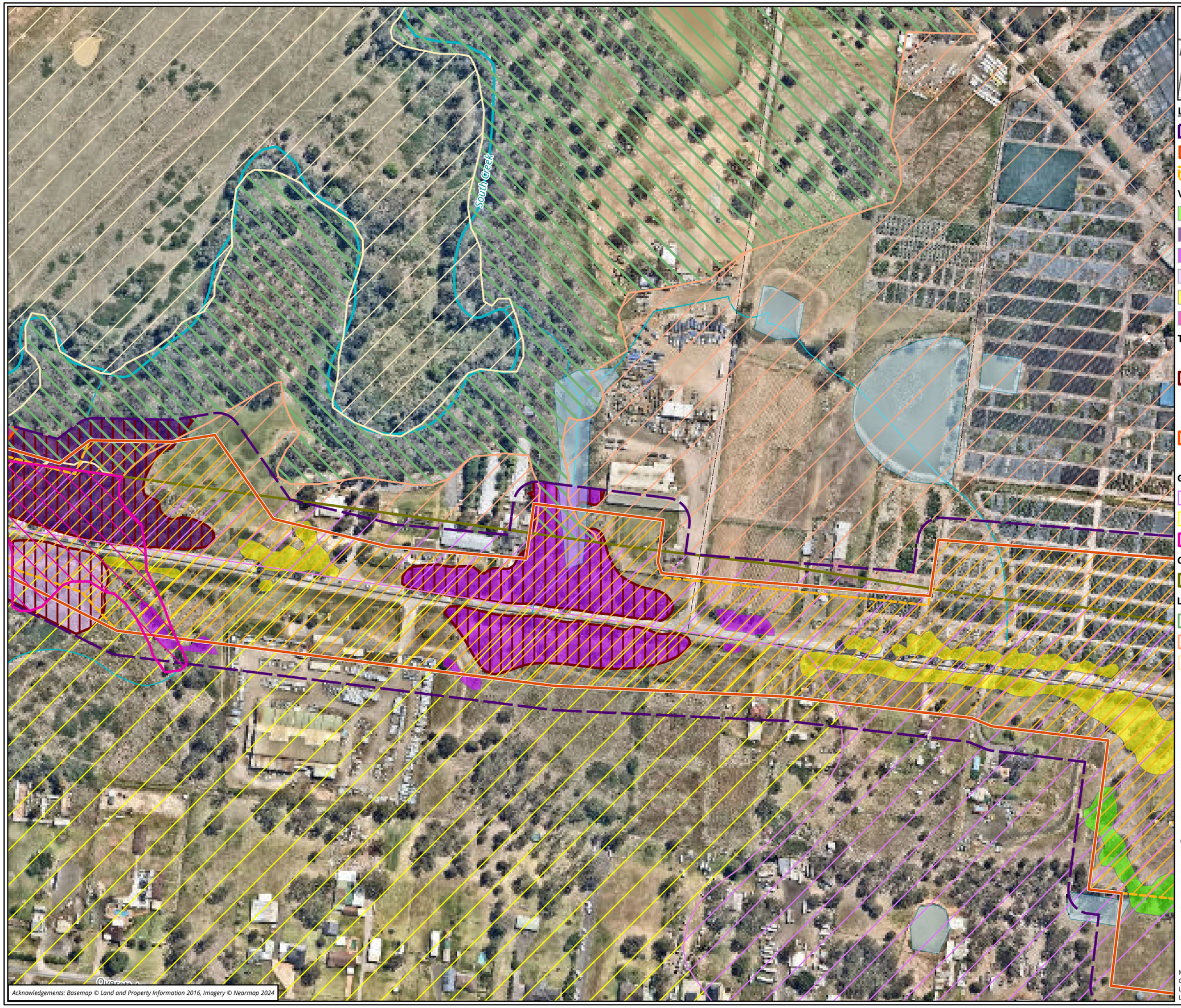

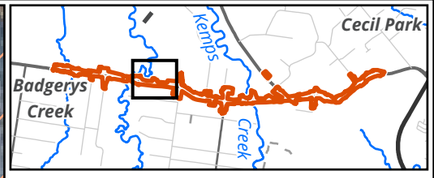

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 2_724_Scattered Trees
- Zone 6_835_Intact
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 13_1800_Intact

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-2 Threatened ecological communities
Page 4

0 25 50 75 100 125
Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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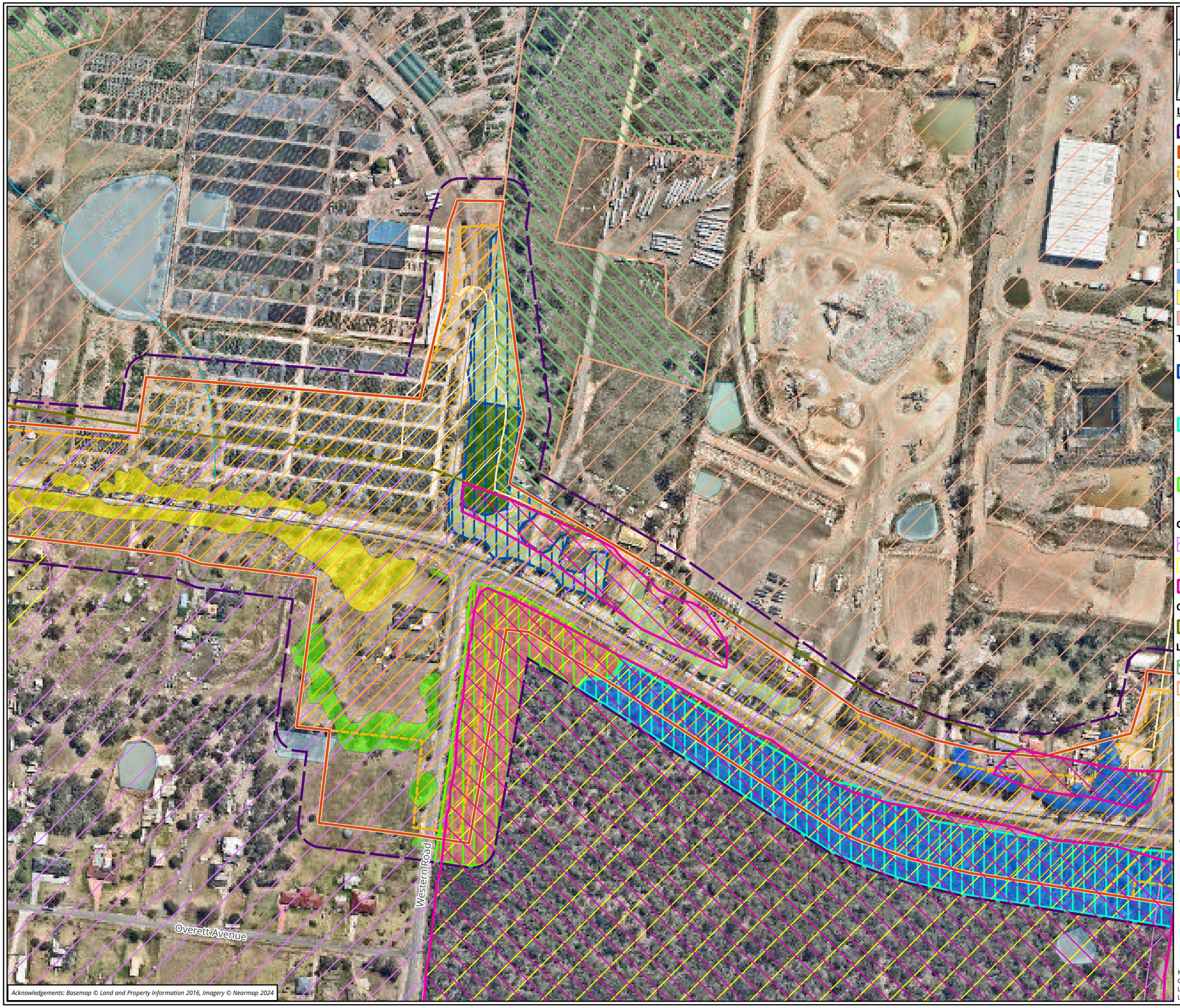

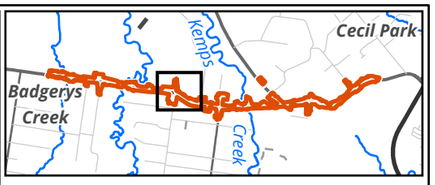

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 3_724_Thinned
- Zone 4_725_Intact
- Zone 10_849_Scattered Trees
- Zone 12_883_Intact

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 1, 3)
- Critically Endangered - Cooks River/ Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Zone 4)
- Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (Zone 12)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-2 Threatened ecological communities

Page 5

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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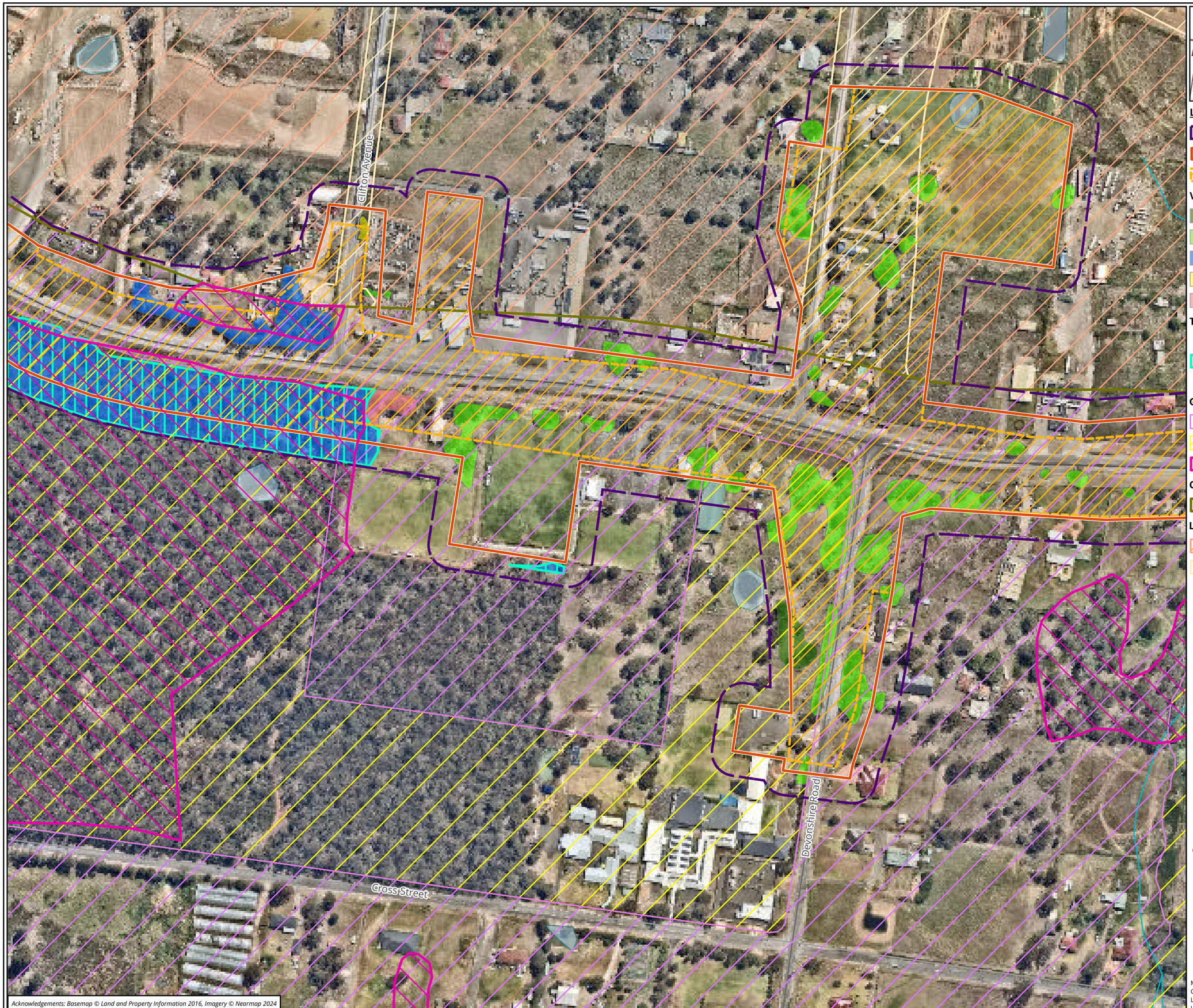

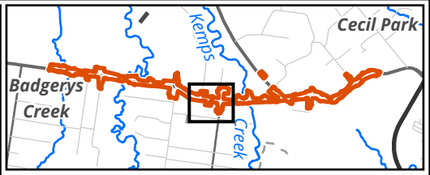

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 4_725_Intact
- Zone 10_849_Scattered Trees
- Zone 12_883_Intact

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cooks River/ Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Zone 4)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Certified - urban capable land
- Excluded land

Figure 3-2 Threatened ecological communities
Page 6

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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Matter: 38207, Date: 15 January 2024,
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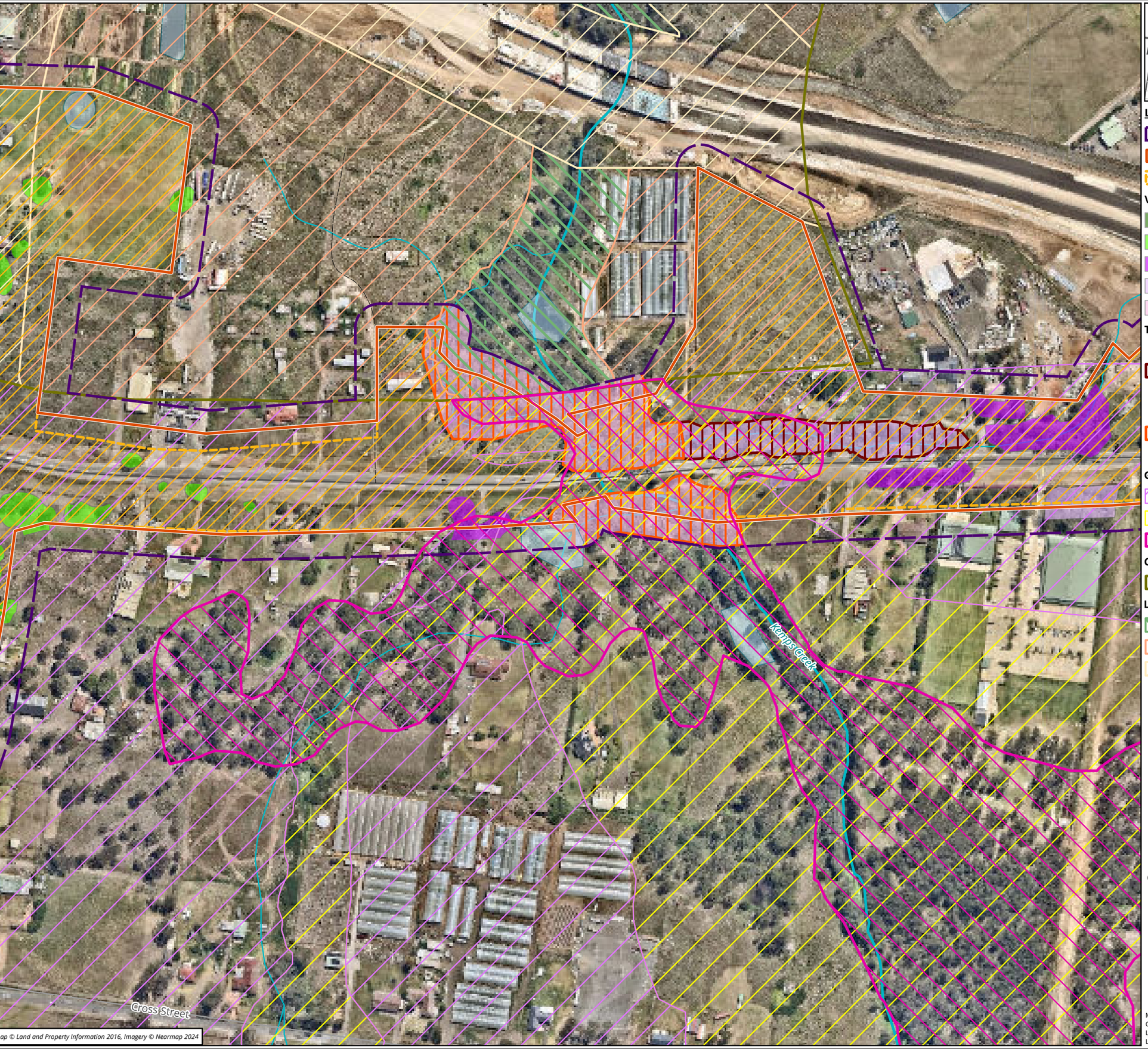

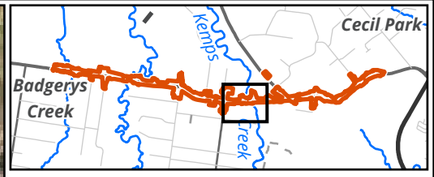

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 1_724_Intact
- Zone 2_724_Scattered Trees
- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 14_1800_Thinned

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

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Figure 3-2 Threatened ecological communities
Page 7

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

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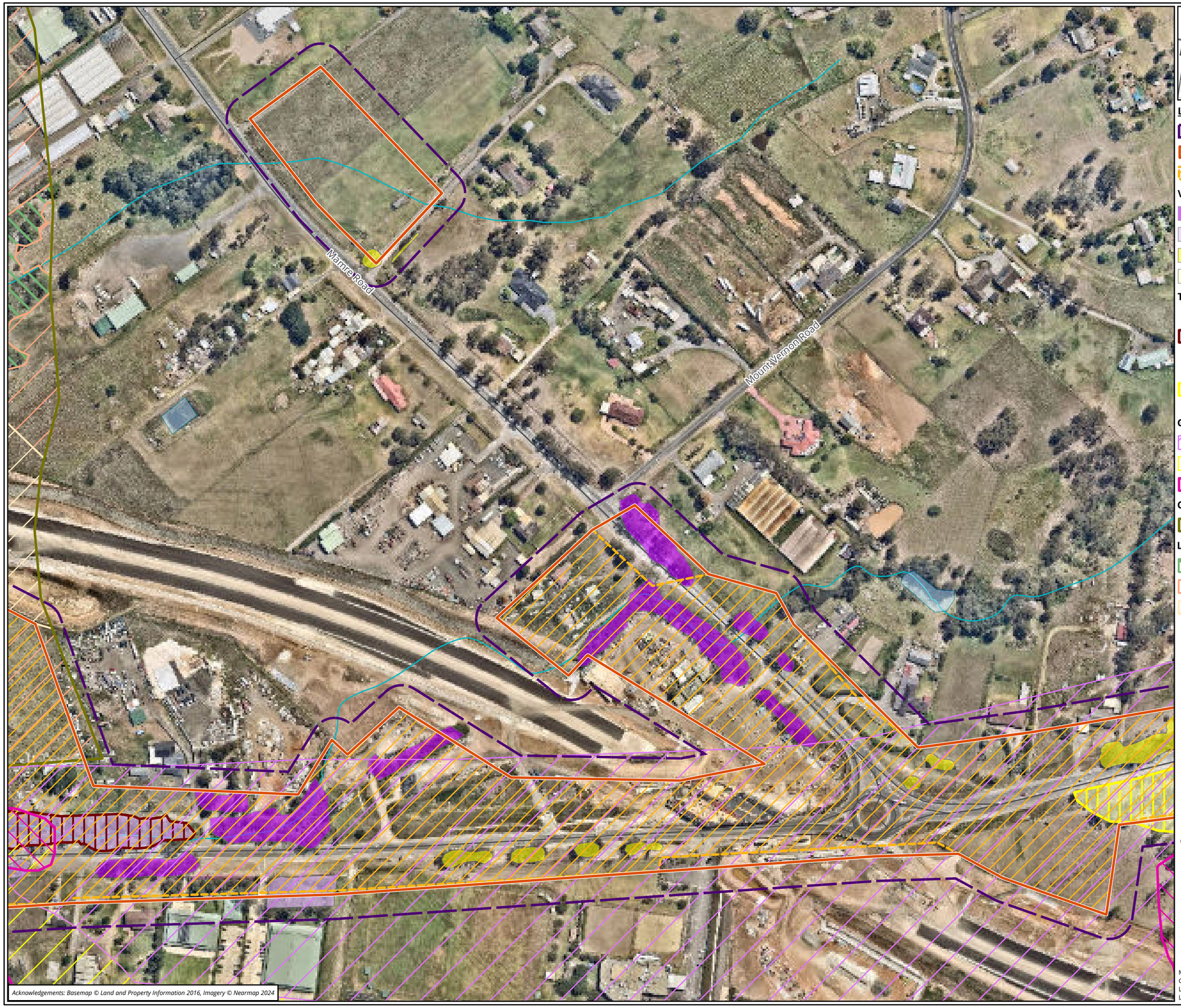

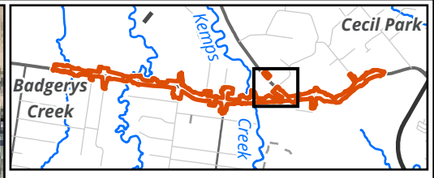

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 7_835_Scattered Trees
- Zone 8_835_Thinned
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

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Figure 3-2 Threatened ecological communities
Page 8

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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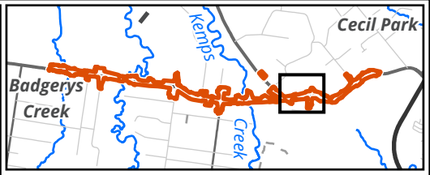

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 7_835_Scattered Trees
- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 3-2 Threatened ecological communities

Page 9

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
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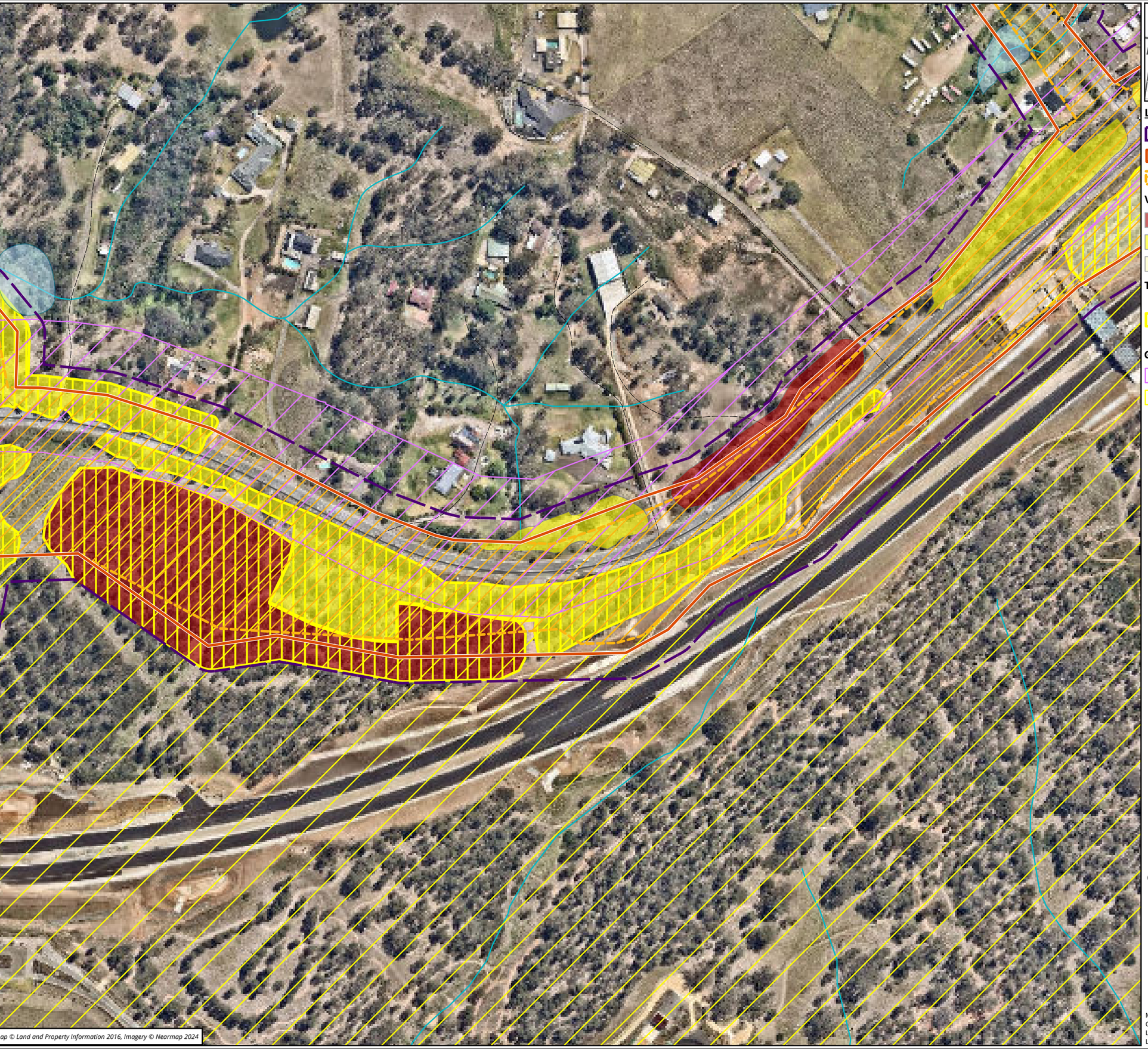

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified

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Figure 3-2 Threatened ecological communities
Page 10

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

N

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Matter: 38207, Date: 15 January 2024,
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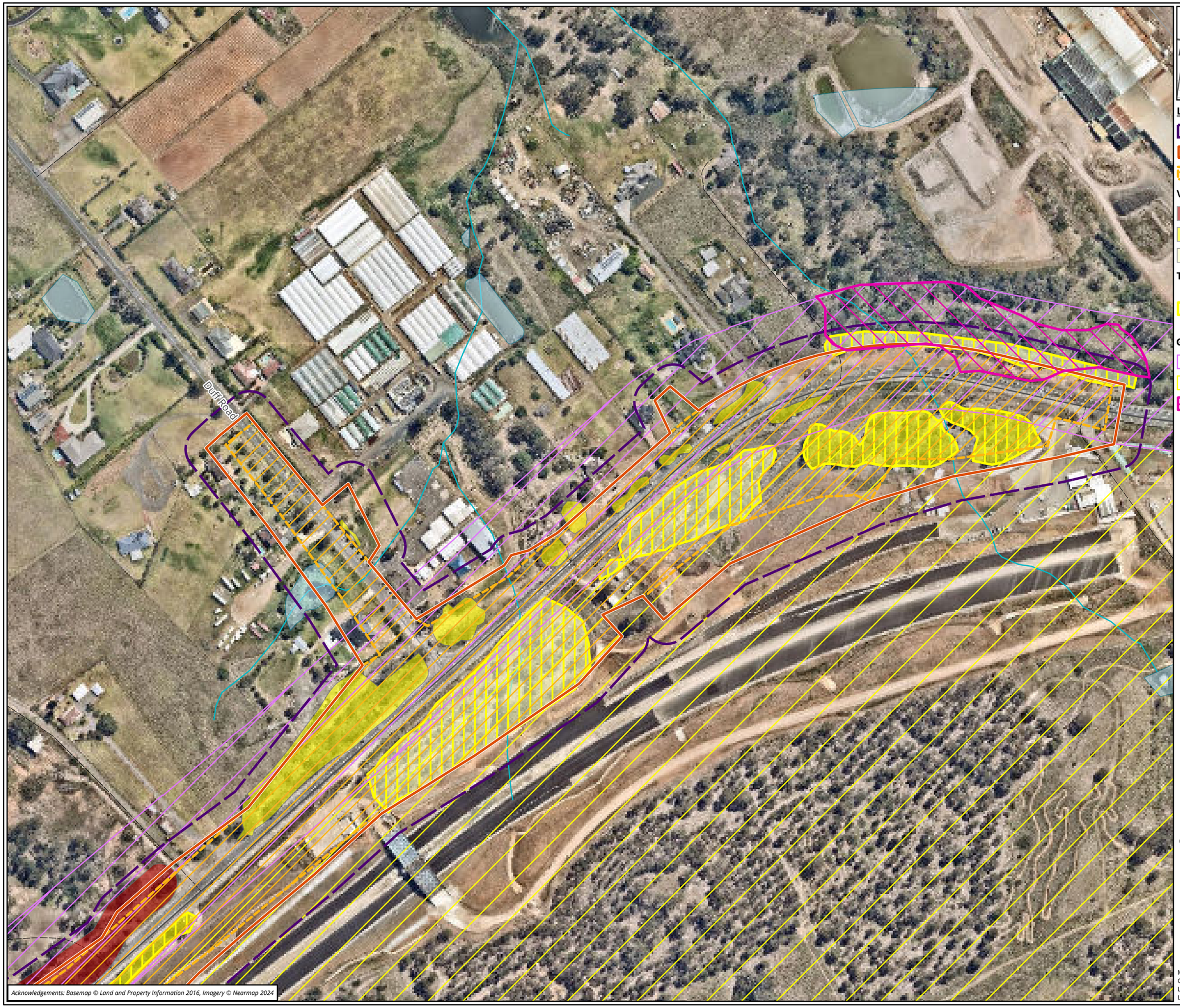

Legend

- Study area
- Subject land
- Operational footprint

Vegetation zone

- Zone 9_849_Intact
- Zone 10_849_Scattered Trees
- Zone 11_849_Thinned

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 3-2 Threatened ecological communities

Page 11

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
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N

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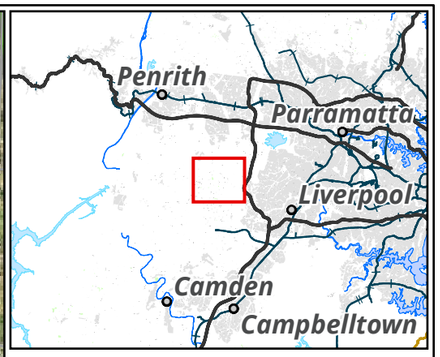
Location: P:\38200s\38207\Mapping\38207_Elizabeth Dr East BAR.aprx
Layout: 38207_F3-2_TEC

3.3 Groundwater dependent ecosystems

The likely degree of groundwater dependence of the PCTs within the study area has been assessed using the Atlas of GDEs (BOM 2023). The Atlas of GDEs (Figure 3-3) identifies areas of the study area that are modelled to contain low to high potential GDEs. Generally, high potential GDEs are those PCTs (PCTs 1800 and 835) associated with Badgerys Creek, South Creek and Kemps Creek. South Creek is also mapped as a high potential aquatic GDE.

While PCTs 1800 and 835 are considered a high likelihood to be a GDE at the locations on Figure 3-3, these PCTs are not entirely dependent on groundwater. PCTs 1800 and 835 is not restricted to locations of groundwater discharge or located within aquifers. Both PCTs are likely to be on opportunistic facultative GDE that depends on the subsurface presence of groundwater in some locations but not in others, particularly where an alternative source of water (i.e. rainfall) cannot be accessed to maintain ecological function (Kuginis et al., 2012).



Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Avoided land
- Certified - major transport corridor
- Certified - urban capable land
- Excluded land

Figure 3-3 Groundwater dependent ecosystem

0 250 500 750 1,000 1,250

Metres
Scale: 1:25,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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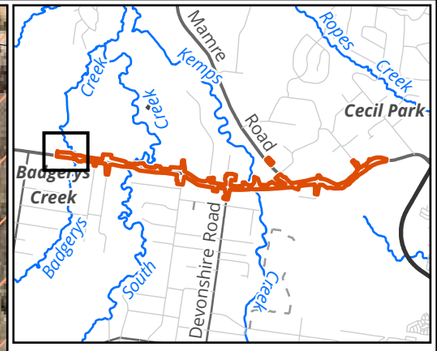

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Elizabeth Drive

Badgerys Creek

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Figure 3-3 Groundwater dependent ecosystem Page 1

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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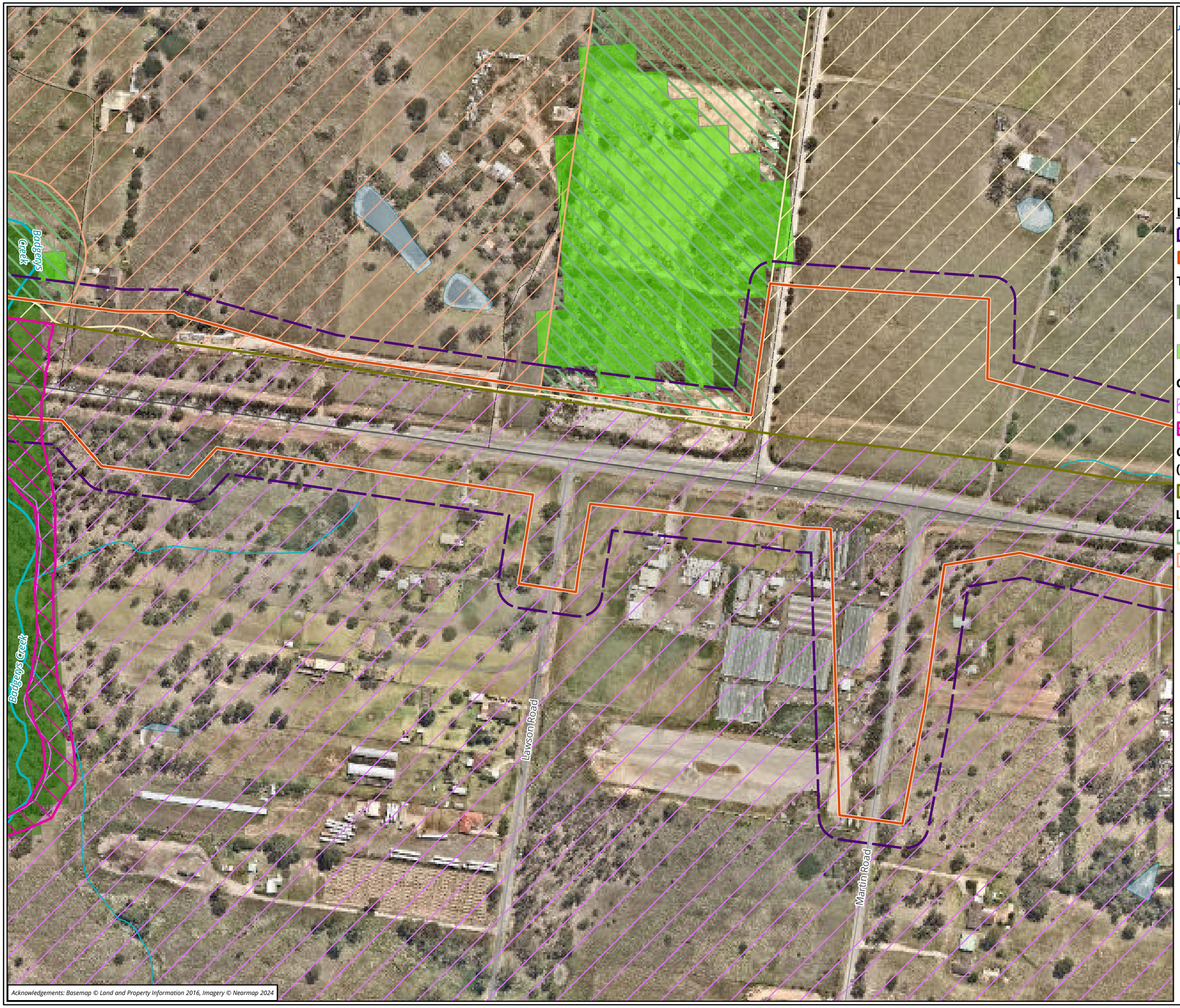

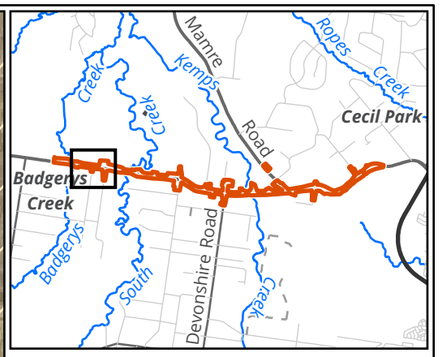

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-3 Groundwater dependent ecosystem Page 2

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 15 January 2024,
GIS: JB, Checked by: JB, Last edited by: jbeckius
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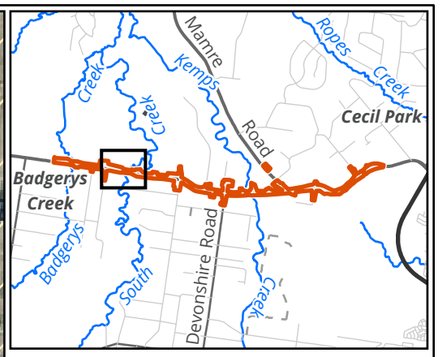

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

South Creek

South Creek

Martin Road

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Figure 3-3 Groundwater dependent ecosystem Page 3

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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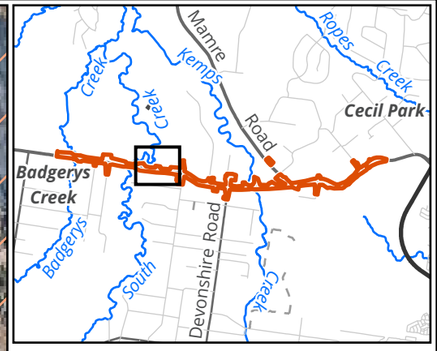

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

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Figure 3-3 Groundwater dependent ecosystem Page 4

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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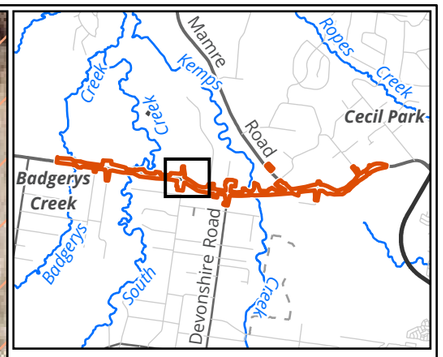

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Overett Avenue

Western Road

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Figure 3-3 Groundwater dependent ecosystem
Page 5

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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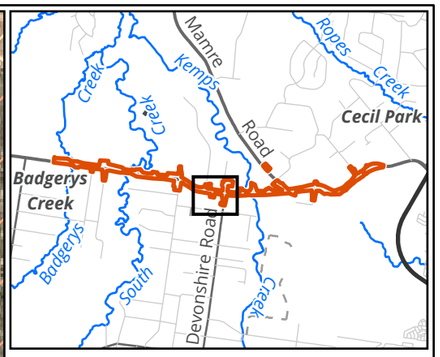

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Certified - urban capable land
- Excluded land

Clifton Avenue

Cross Street

Devonshire Road

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Figure 3-3 Groundwater dependent ecosystem
Page 6

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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biosis

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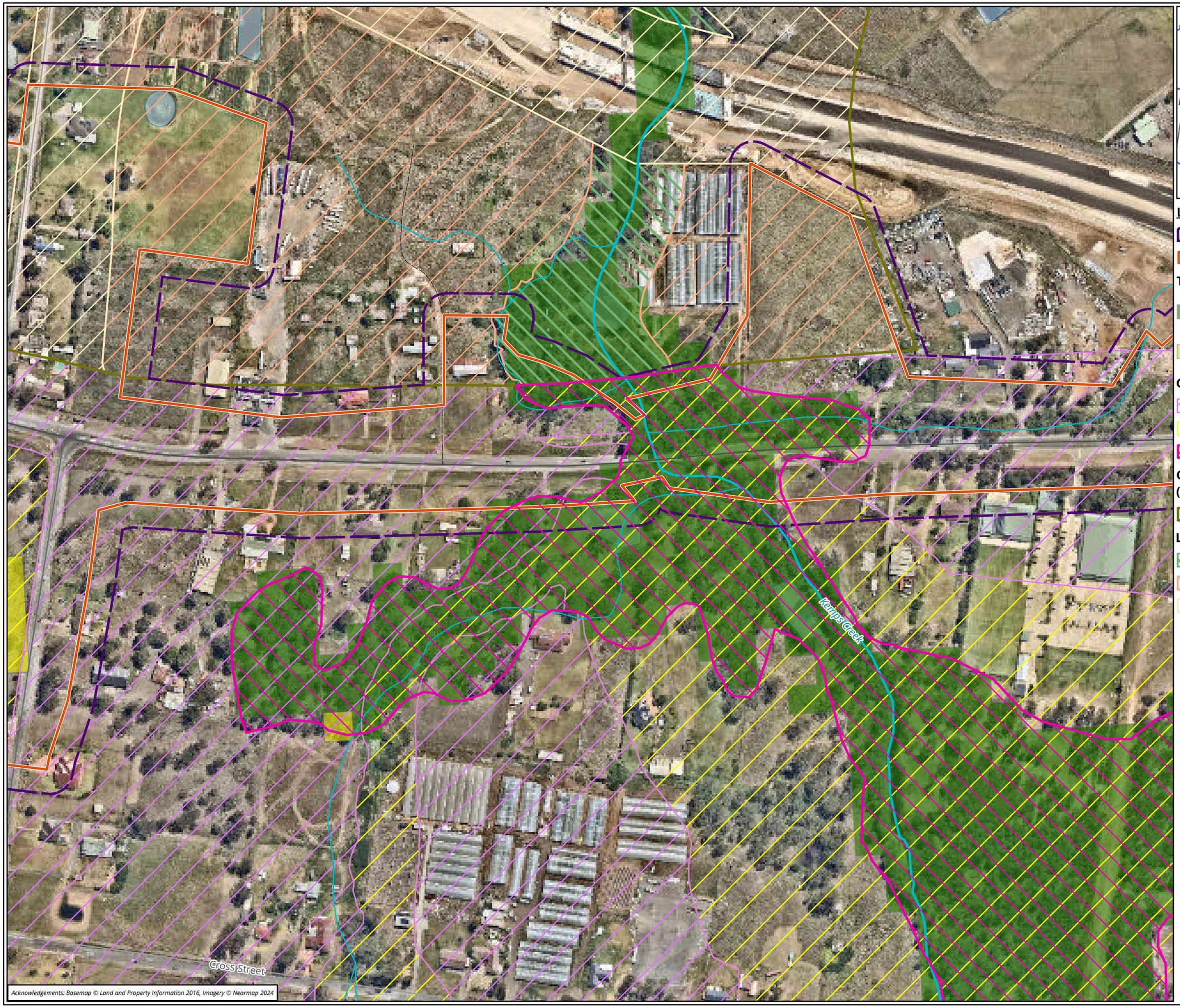

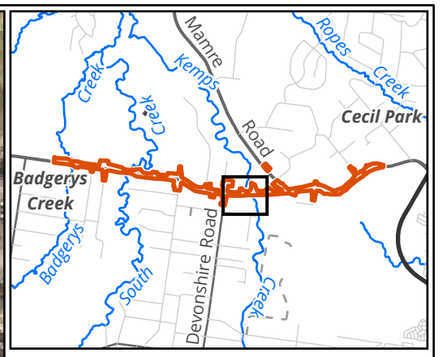

Legend

Study area

Subject land

Terrestrial GDEs (BOM 2022)

High potential GDE - from national assessment

Low potential GDE - from national assessment

Growth Centre Land Certification

Existing Certified

Existing Non Certified

ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

Western Sydney Aerotropolis

Land Category

Avoided land

Certified - urban capable land

Excluded land

Figure 3-3 Groundwater dependent ecosystem Page 7

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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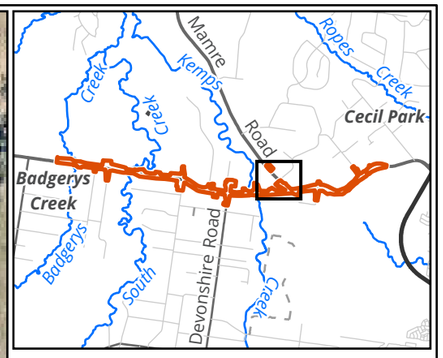

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Low potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Figure 3-3 Groundwater dependent ecosystem
Page 8

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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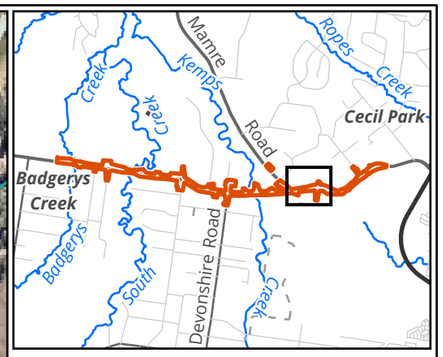

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Low potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Range Road

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Figure 3-3 Groundwater dependent ecosystem
Page 9

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
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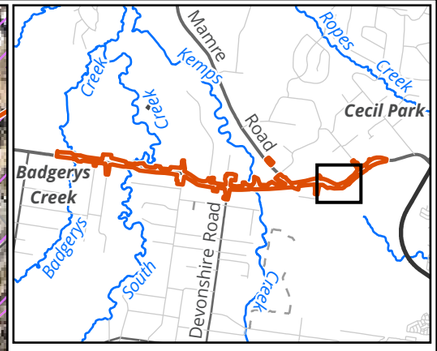

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified

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Figure 3-3 Groundwater dependent ecosystem
Page 10

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

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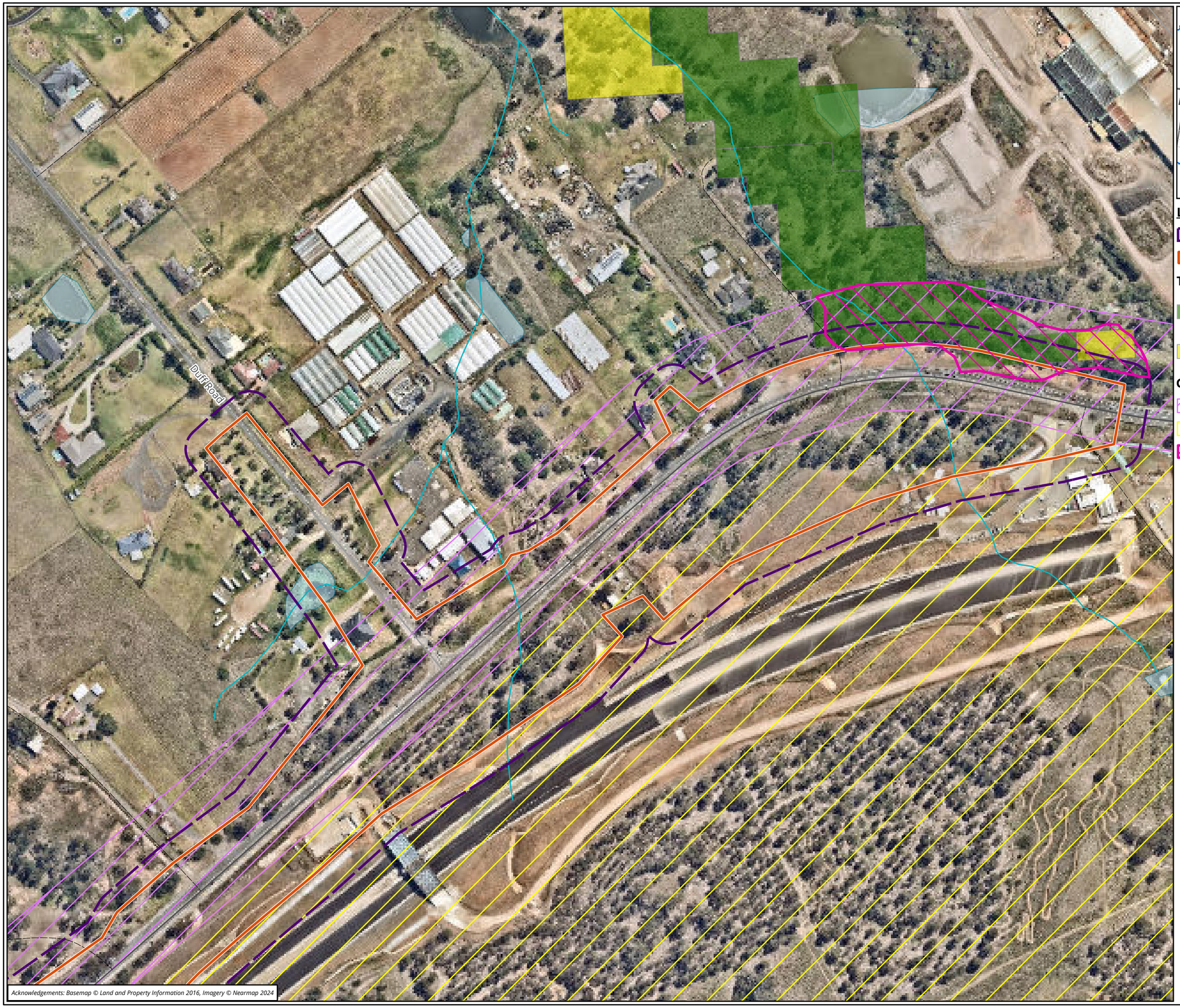

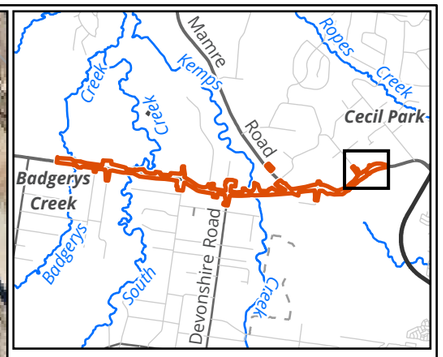

Legend

- Study area
- Subject land

Terrestrial GDEs (BOM 2022)

- High potential GDE - from national assessment
- Low potential GDE - from national assessment

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 3-3 Groundwater dependent ecosystem
Page 11

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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3.4 Threatened species

Habitat modelling and species polygons prepared for the CPCP were utilised for the project to determine the threatened species with mapped habitat in the subject land. Targeted flora surveys were undertaken during October and / or November 2023 for all threatened flora species with a CPCP species polygon intersecting the study area. The coverage of each species' polygon was not absolute in all cases as a small number of properties were unable to be accessed. However, in these small number of properties, threatened flora species were deemed unlikely to occur as a satisfactory level of visual habitat assessment was achievable. Typically, this has occurred where a species polygon included small areas within residential or commercial landholdings that have a highly maintained or grazed understory.

Targeted flora surveys within the subject land detected the presence of one threatened flora species, *Dillwynia tenuifolia* (BC Act, Endangered population) (refer to Table 3-2). Approximately 15 individuals were identified within the subject land in bushland west of Bill Anderson Reserve, of which 13 individuals would be removed. This is a reduction in the total impacts reported in the September 2023 BAR, which identified approximately 30-40 individuals within the subject land.

Due to property access restrictions in the previous BAR, initial survey for threatened flora had to be undertaken from the road corridor along Elizabeth Drive, limiting the detail and extent at which a species could be surveyed. As a result, the initial count of 30 – 40 *Dillwynia tenuifolia* was conservatively estimated based on observations from the road corridor and past records within the study area. As part of the revised BAR, access was obtained to additional parts of the study area and impacts to species were able to be further refined. Therefore, the discrepancy in numbers of *Dillwynia tenuifolia* within the subject land between the September 2023 BAR and the current revision is due to a more comprehensive survey undertaken in the current assessment.

BioNet suggests a population of *Pultenaea parviflora* (BC Act, Endangered and EPBC Act, Vulnerable) is also present in bushland west of Bill Anderson Reserve. The population is considered an important population under the EPBC Act. No individuals were recorded during the October / November 2023 fieldwork.

The November 2023 targeted flora surveys did not record any other threatened flora species previously assumed present (13 threatened flora species as listed in Table 3-2), in the September 2023 BAR.

Targeted fauna surveys recorded four threatened fauna species:

- Cumberland Plain Land Snail *Meridolum corneovirens* (Endangered, BC Act) via shell detection at five locations.
- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Vulnerable, BC Act) via ultrasonic detection.
- Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act) via ultrasonic detection.
- Southern Myotis *Myotis macropus* (Vulnerable, BC Act) via ultrasonic detection.

The preparation of the species polygon for Southern Myotis adheres to the process detailed in *Species credit threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH 2018), whereby all associated PCTs within 200 metres of a waterbody with pools and / or stretches three metres or wider were included.

Potential Southern Myotis calls were recorded at each of the detector locations however, a particularly high volume of calls were detected at unit 701646 (deployed near South Creek). The species was positively identified at this site by ultrasonic analysis, with several calls showing diagnostic features including feeding buzzes. The high number of sequences here that are consistent with Southern Myotis calls indicates there is a large amount of the activity, including foraging activity at this site. Potential calls were recorded from sunset and throughout the night, also indicating that individuals may be roosting close to the detector location.

Visual inspections were subsequently carried out (on 20 February 2024) by Transport for NSW representatives, including a biodiversity specialist (BAM accredited), at four bridges within the study area check for microbat habitat including Kemps Creek Bridge, Badgerys Creek Bridge and two bridges over South Creek (east bridge and west bridge). Weather at the time of the inspections was scattered showers, with around 28 millimetres of rain recorded at Horsley Park weather station in the 24 hours before the survey.

Kemps Creek bridge, Badgerys Creek bridge and western bridge at South Creek were found to contain minimal opportunities for roosting bats, and showed no evidence of bat roosting activity. The eastern bridge at South Creek on Elizabeth Drive is a newer design consisting of pre-cast spans that when assembled result in gaps of approximately one inch between spans. An estimate of about 100-150 individuals presumed to be Southern Myotis were observed roosting in the outer span joins of this bridge (Photo 1). Heavy urine staining and guano deposits were also recorded, indicating the bridge is likely used on a regular basis. Given the high amount of call activity likely to represent Southern Myotis detected in close proximity to this roost site

(at South Creek bridge west), it is highly likely that most if not all of the microbats utilizing this structure for roosting are Southern Myotis, emerging from this roost to forage along South Creek and other nearby waterways. Given the number of individuals and time of year, the colony recorded is considered likely to be a breeding population. The location of the roost is shown on Figure 3-4. With this in consideration, a Microbat Management Plan would be prepared and implemented to minimise impacts to microbats and avoid any potentially significant impacts occurring to threatened species (refer to B08 in Table 6-1). Further details are provided in Section 6.

Photo 8 Roosting microbats within south creek bridge, presumed to be Southern Myotis

Currently, there is no mandated approach under the BAM for the preparation of a species polygon for Cumberland Land Snail. In this instance, all connective habitat at the locations of where shells were detected are included in the species polygon. Cumberland Plain Land Snail shells can be distinguished from other species of snails by a number of key characteristics. These include the following:

- Distinct umbilicus on the underside of the shell.
- The shell may be any shade of brown but is always uniform in colour.
- The shell is typically slightly flattened, very thin and fragile.

Photo 9 Cumberland Plain Land Snail shells

Eastern Coastal Free-tailed Bat and Greater Broad-nosed Bat are both ecosystem credit species under the BAM and therefore no species polygons were generated for these species.

The November 2023 targeted fauna surveys did not record any other threatened fauna species previously assumed present (ten threatened fauna species as listed in Table 3-2) in the September 2023 BAR.

A summary of the threatened species survey results, as well as a summary of the threatened species considered to have a 'Moderate' or higher likelihood of occurring within the study area following targeted surveys is provided in Table 3-2. Species polygons for BAM species credit species or dual credit species that have been recorded in the study area, as per the requirements of the BAM, are shown on Figure 3-4.

Table 3-2: Threatened species surveys results (October / November 2023)

Species name	EPBC Act	BC Act	Target species?	Identification method (not recorded, assumed, recorded, expert report)	Survey effort compliant?[1]	Results
Bynoe's Wattle *Acacia bynoeana*	VU	EN	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Downy Wattle *Acacia pubescens*	VU	VU	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Dillwynia tenuifolia		E2	Y	Recorded – 15 individuals	Yes	Fifteen individuals recorded in bushland west of Bill Anderson Reserve. Species polygon covers all habitat present in this area (4.58 ha).
Juniper-leaved Grevillea *Grevillea juniperina* subsp. *juniperina*		VU	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Small-flower Grevillea *Grevillea parviflora* subsp. *parviflora*	VU	VU	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Marsdenia viridiflora subsp. *viridiflora*		E2	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B:

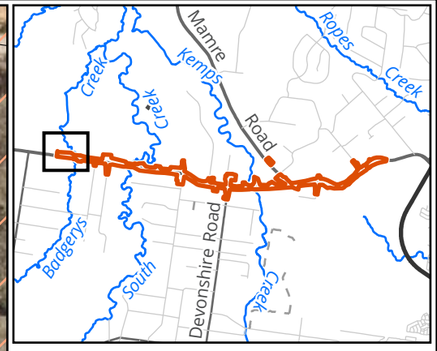
Species name	EPBC Act	BC Act	Target species?	Identification method (not recorded, assumed, recorded, expert report)	Survey effort compliant?[1]	Results
						Habitat suitability assessment
Nodding Geebung *Persoonia nutans*	EN	EN	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Spiked Rice-flower *Pimelea spicata*	EN	EN	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Pultenaea parviflora	VU	EN	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Matted Bush-pea *Pultenaea pedunculata*		EN	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Maundia triglochinoides		VU	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Micromyrtus minutiflora	VU	EN	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Hibbertia fumana		CE	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B:

Species name	EPBC Act	BC Act	Target species?	Identification method (not recorded, assumed, recorded, expert report)	Survey effort compliant?[1]	Results
						Habitat suitability assessment
Hibbertia puberula		EN	Y	Not Recorded	Yes	Not recorded during targeted survey. Survey effort was compliant in all cases. Habitat assessment provided in Appendix B: Habitat suitability assessment
Little Lorikeet *Glossopsitta pusilla*		VU	N	Not Recorded	Yes	Species was not recorded during surveys. Survey effort was compliant in all cases. Allocated a 'Moderate' likelihood of occurrence based on habitat assessment.
Little Eagle *Hieraaetus morphnoides*		VU	Y	Not Recorded	Yes	Species was not recorded during surveys. Survey effort was compliant in all cases.
Eastern False Pipistrelle *Falsistrellus tasmaniensis*		VU	N	Not Recorded	Yes	Species was not recorded during surveys. Survey effort was compliant in all cases.
Cumberland Plain Land Snail *Meridolum corneovirens*		EN	Y	Recorded	Yes	Species was recorded via shell detection at five locations within the study area during surveys (see Photo 9). Species polygon covers 3.78 ha.
Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*		VU	N	Recorded	Yes	Recorded via acoustic detection. No species polygon prepared for ecosystem credit species.*
Southern Myotis *Myotis macropus*		VU	Y	Recorded	Yes	Recorded via acoustic detection and roost observed in eastern bridge over South Creek. Species polygon covers 34.11 ha across the subject land.
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*		VU	N	Not Recorded	Yes	Not recorded during ultrasonic survey.
Greater Broad-nosed Bat		VU	N	Recorded	Yes	Recorded via acoustic detection. No species

Species name	EPBC Act	BC Act	Target species?	Identification method (not recorded, assumed, recorded, expert report)	Survey effort compliant?[1]	Results
Scoteanax rueppellii						polygon prepared for ecosystem credit species.*
Little Bent-winged Bat *Miniopterus australis*		VU	N	Not Recorded	Yes	Not recorded during ultrasonic survey.
Large Bent-winged Bat *Miniopterus orianae oceanensis*		VU	N	Not Recorded	Yes	Not recorded during ultrasonic survey.

VU = Vulnerable, EN = Endangered, CE = Critically Endangered, E2 = Endangered population

*Ecosystem credit species recorded as incidental records during targeted survey for species with CPCP polygon intersecting the study area (species credit species)



Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened fauna species recorded

- Cumberland Plain Land Snail

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Elizabeth Drive

Badgerys Creek

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Figure 3-4 Recorded threatened species
Page 1

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

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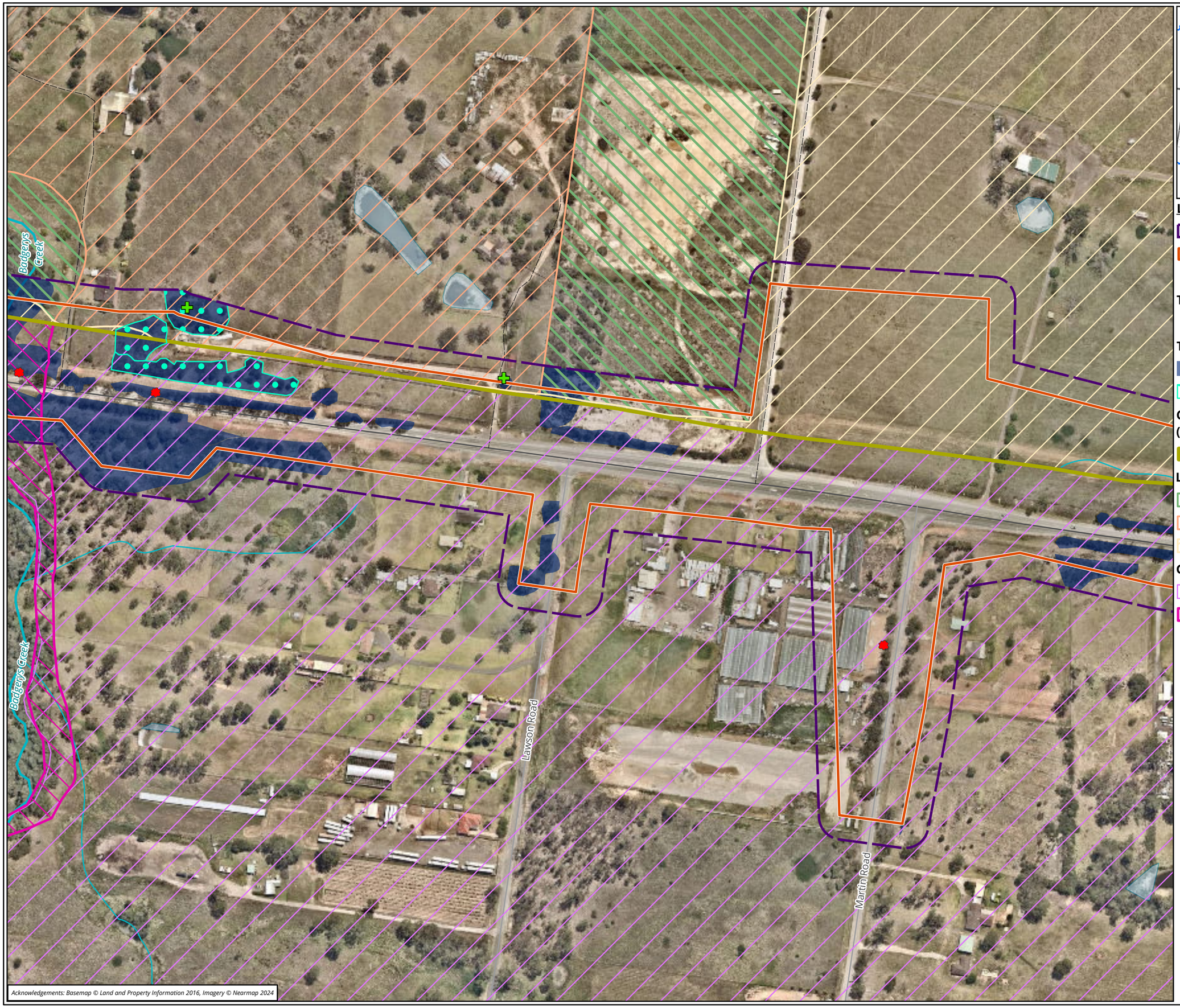

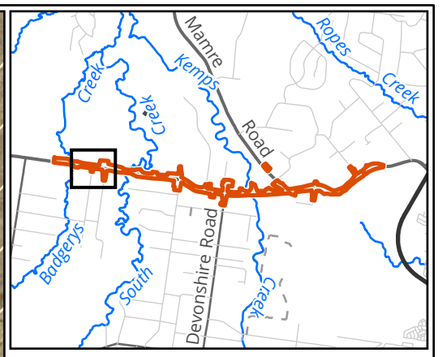

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened fauna species recorded

- Cumberland Plain Land Snail

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- ENV (subject to RBM 8 and 11)

Figure 3-4 Recorded threatened species Page 2

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 01 March 2024,
GIS: JB, Checked by: BT, Last edited by: jbeckius
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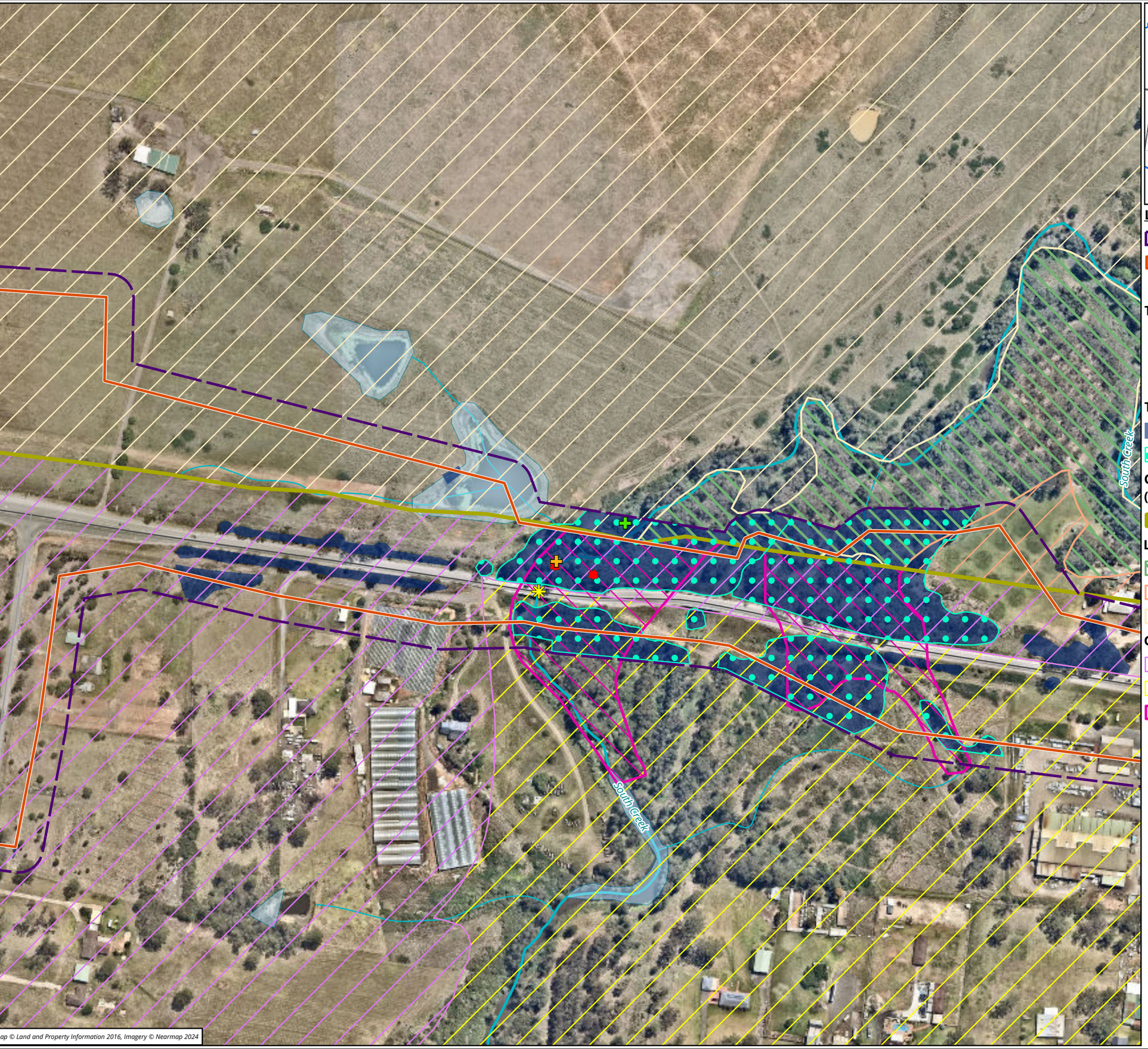

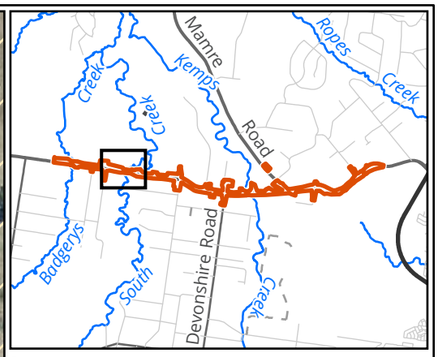

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened fauna species recorded

- Cumberland Plain Land Snail
- Southern Myotis
- Southern Myotis Roost

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 3-4 Recorded threatened species Page 3

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 01 March 2024,
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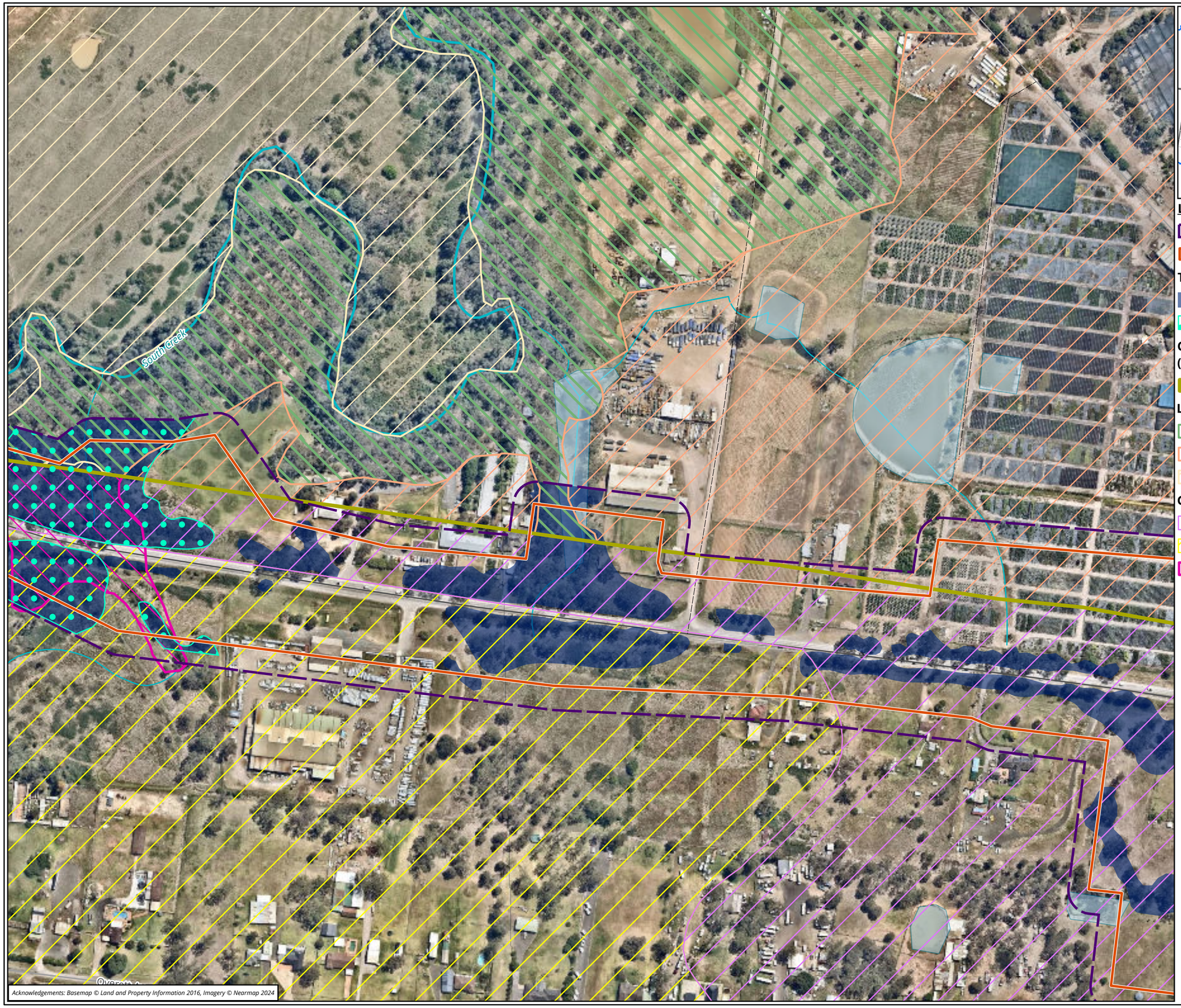

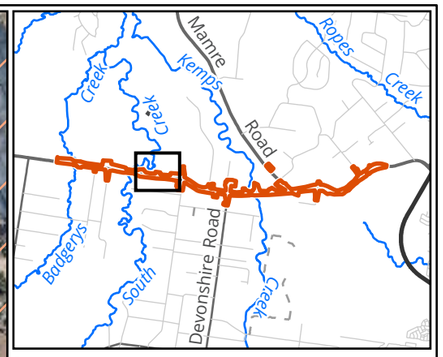

Legend

- Study area
- Subject land

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 3-4 Recorded threatened species Page 4

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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Matter: 38207, Date: 01 March 2024,
GIS: JB, Checked by: BT, Last edited by: jbeckius
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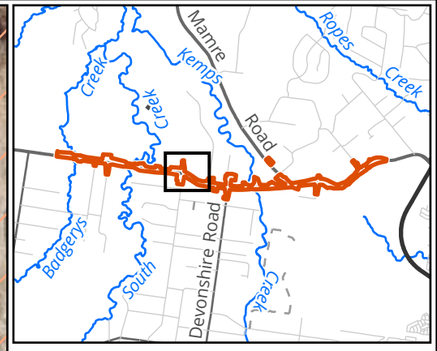

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened flora species recorded

- *Dillwynia tenuifolia*

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail
- *Dillwynia tenuifolia*

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Western Road

Overett Avenue

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Figure 3-4 Recorded threatened species
Page 5

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

biosis

Matter: 38207, Date: 01 March 2024,
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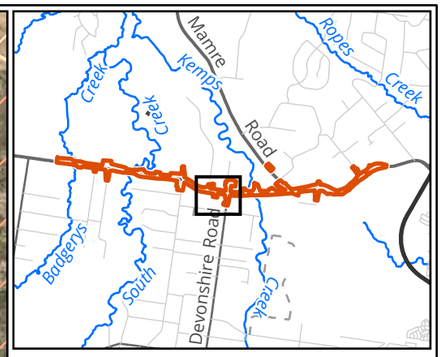

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened flora species recorded

- *Dillwynia tenuifolia*

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail
- *Dillwynia tenuifolia*

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Certified - urban capable land
- Excluded land

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Clifton Avenue
Cross Street
Devonshire Road

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Figure 3-4 Recorded threatened species
Page 6

0 25 50 75 100 125
Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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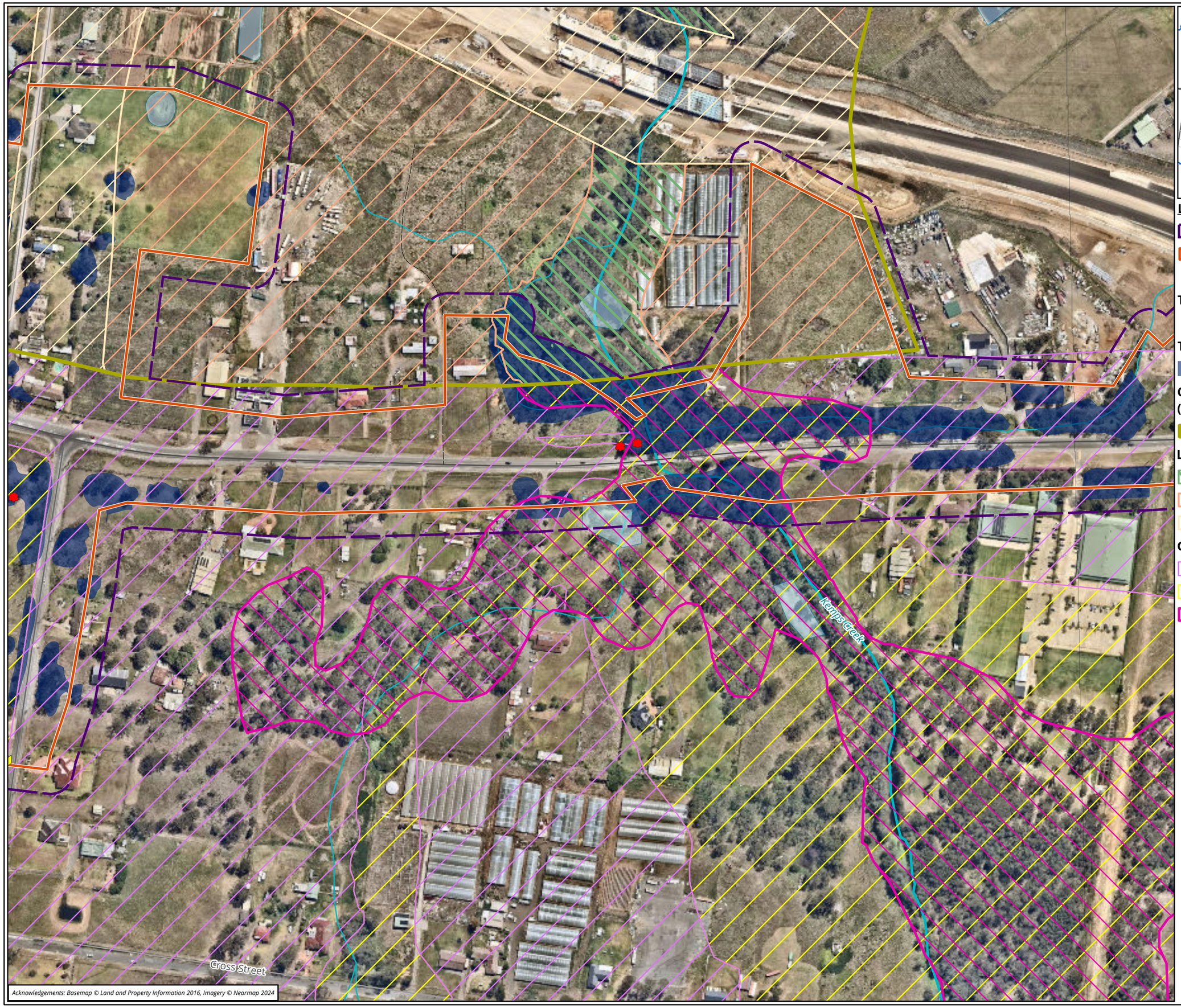

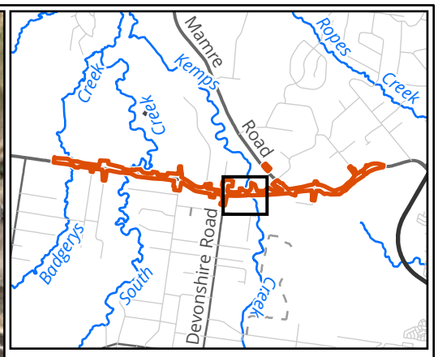

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened flora species recorded

- *Dillwynia tenuifolia*

Threatened species polygon

- Southern Myotis

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 3-4 Recorded threatened species
Page 7

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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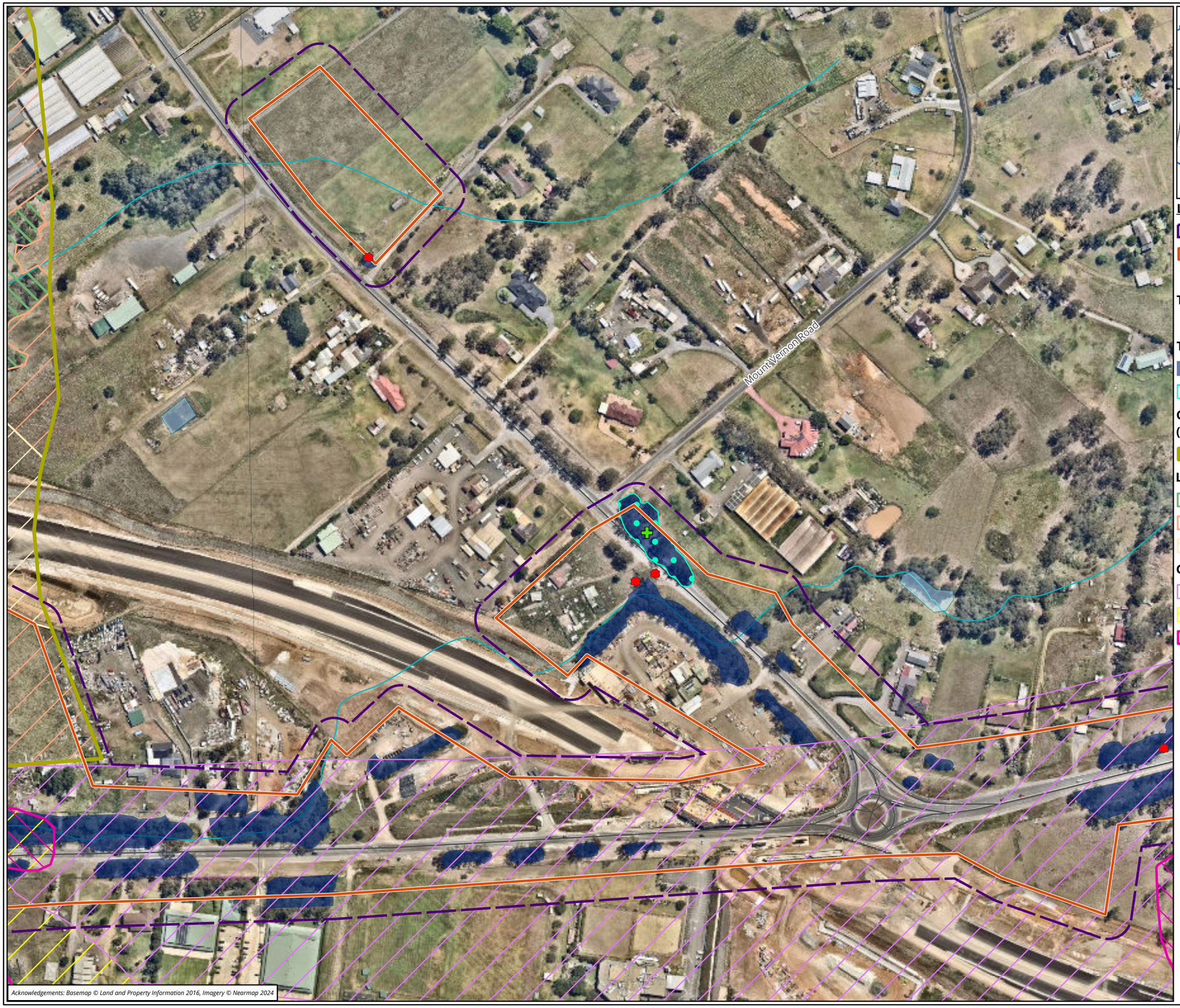

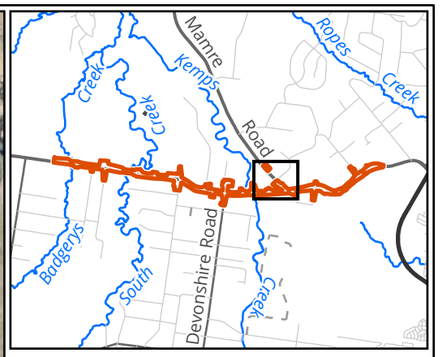

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened fauna species recorded

- Cumberland Plain Land Snail

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

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

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Figure 3-4 Recorded threatened species
Page 8

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

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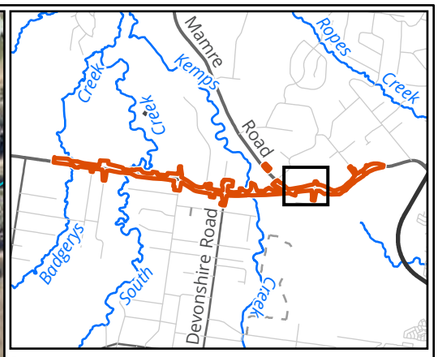

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened fauna species recorded

- Cumberland Plain Land Snail

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Range Road

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Figure 3-4 Recorded threatened species
Page 9

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

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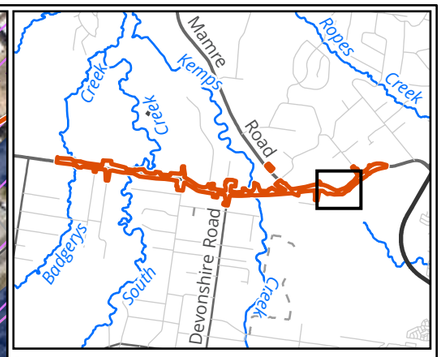

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened fauna species recorded

- Cumberland Plain Land Snail

Threatened species polygon

- Southern Myotis
- Cumberland Plain Land Snail

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified

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Figure 3-4 Recorded threatened species
Page 10

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

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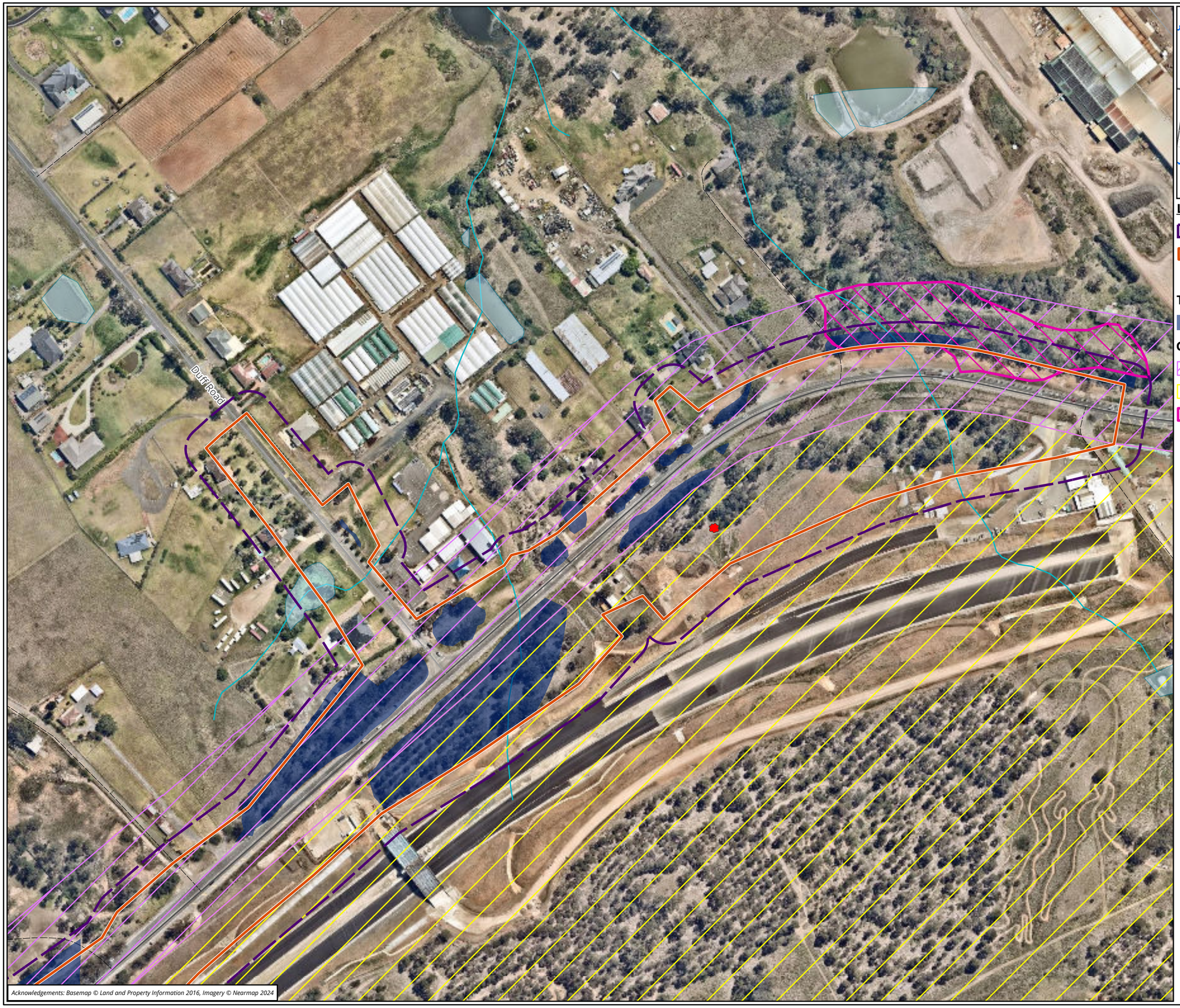

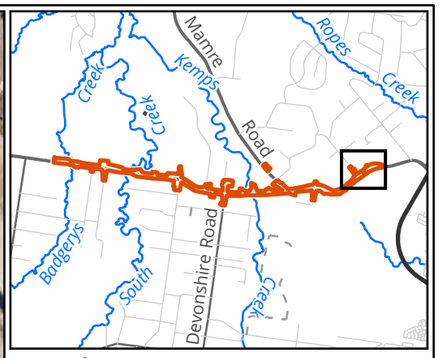

Legend

- Study area
- Subject land
- Hollow-bearing tree

Threatened species polygon

- Southern Myotis

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

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Figure 3-4 Recorded threatened species
Page 11

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

N

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3.5 Aquatic results

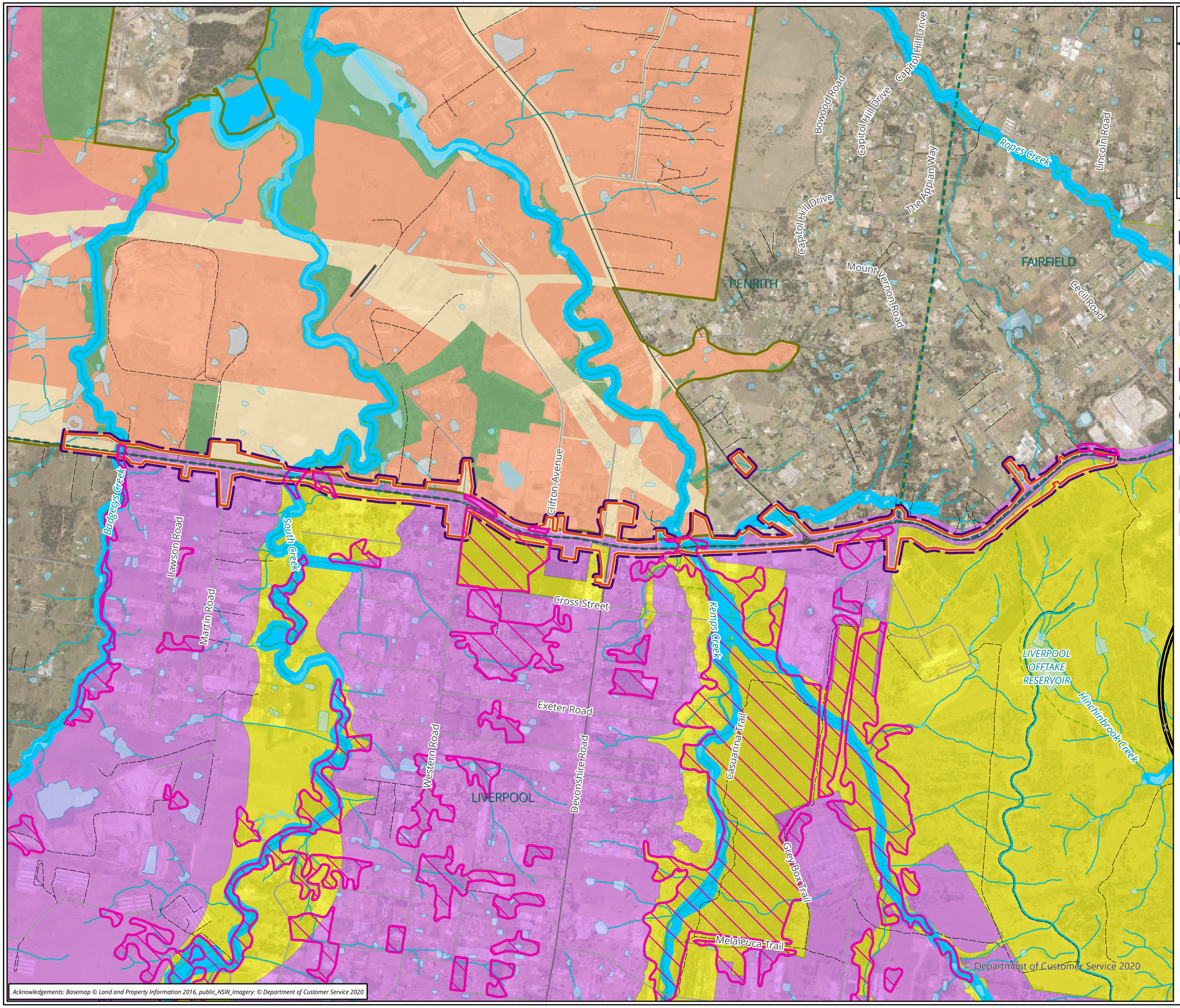
A total of 12 waterways were identified within the study area, of these eight are first order un-named streams. Two fourth order waterways occur, Badgerys Creek and Kemps Creek. Badgerys Creek lies near the western boundary of the study area and intersects the study area parallel to the western boundary, Kemps Creek runs through the approximate centre of the study area. One third order waterway connects to Badgerys Creek near the western boundary of the study area and another third order waterway connects to Kemps Creek from the west and also crosses the study area on Mamre Road.

One sixth order stream, South Creek, occurs between Badgerys Creek and Kemps Creek. Of the first order un-named waterways two occur near the eastern boundary of the study area, two connect to Kemps Creek, one connects directly to South Creek and another three connect to South creek through farm dams.

A total of five man-made dams occur within the study area. One is associated with the third order waterway flowing into Badgerys Creek and two are associated with first order waterways feeding into South Creek. The fourth dam is associated with the second order waterway flowing into Kemps Creek and is located to the north of Elizabeth Drive and east of Salisbury Avenue and could not be inspected due to access. A fifth dam located to the south of Elizabeth Drive and west of Western Road could not be inspected due to access restrictions.

Badgerys Creek, South Creek and Kemps Creek are mapped as Key Fish Habitat under the FM Act (DPI 2019) (Figure 3-5). No habitat for threatened species, populations or ecological communities under the FM Act are suggested to occur from review of the DPI Spatial Data Portal.

The waterways were observed to have a lack of emergent or fringing vegetation. Waterways within the study area were generally highly shaded by canopy species and provided limited structural components such as snags and rocks/boulders occurring only where landscaping had taken place. The aquatic field investigation identified a degree of channel modification, riparian degradation and weed ingress across the study area. Dams within the study area generally contained a high level of emergent and fringing vegetation in the form of *Typha* species.



Legend

- Study area
- Subject land
- NSW Key Fish Habitat

Growth Centre Land Certification

- Existing Certified
- Existing Non Certified
- ENV (subject to RBM 8 and 11)

Cumberland Plain Conservation Plan (CPCP)

- Western Sydney Aerotropolis

Land Category

- Avoided land
- Certified - major transport corridor
- Certified - urban capable land
- Excluded land

Figure 3-5 Aquatic results

0 250 500 750 1,000 1,250

Metres

Scale: 1:25,000 @ A3

Coordinate System:
GDA 1994 MGA Zone 56

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Matter: 38207, Date: 15 January 2024,
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3.6 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value occur within the study area.

3.7 Wildlife connectivity corridors

The prominent movement corridors within the study area are the riparian corridors associated with Badgerys Creek, South Creek and Kemps Creek. While vegetation associated with South Creek terminates about two kilometres north of the study area, Badgerys Creek and Kemps Creek provide connectivity north to Ropes Crossing. Connectivity to habitats to the south are limited for both Badgery's Creek and South Creek as they terminate into residential development and farmland. Kemps Creek, however, has connectivity to the south into Western Sydney Parklands. While there are more significant areas of bushland contiguous with the study area, such as Western Sydney Parklands and bushland west of Bill Anderson Reserve, there is no vegetated connectivity through the study area due to the built or cleared nature of the land north of Elizabeth Drive at these locations.

Genetic exchange of plant material varies significantly by vector of pollination and dispersal mechanism of propagules. However, is it reasonable to expect this process to be more fluid within the consistently vegetated areas described above when compared to the smaller, fragmented areas of vegetation within the study area.

The largely 'stepping stone' connectivity of the vegetation within the study area and its surrounds provide corridors for movement of highly mobile species including birds and flying insect pollinators.

3.8 State Environmental Planning Policies

3.8.1 State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021

The SEPP (Resilience and Hazards) 2021 commenced on 1 March 2022 and includes coastal planning provisions that were enacted by the SEPP (Coastal Management) 2018. No coastal management areas identified under the new SEPP are present within the study area, therefore the proposal need not consider, SEPP (Resilience and Hazards) 2021.

The proposal does not require assessment in accordance with the SEPP as it is an activity being considered under Division 5.1 of the EP&A Act.

3.8.2 SEPP Biodiversity and Conservation 2021

Chapter 13 of the SEPP Biodiversity and Conservation 2021 details development controls for areas mapped as 'Avoided Land' under the CPCP. The objectives of this part are to protect and enhance native vegetation on avoided land and to promote the conservation of and minimise impact of development on native vegetation. The SEPP also provides guidance for the identification of koala habitat which was used to inform the assessment for the proposal. Consideration against the assessment requirements for Avoided Land is provided in Section 5.5.

Further detail on the application of the CPCP is provided in Section 1.1.1

3.8.3 SEPP Precincts – Western Parkland City 2021

SEPP (Precincts – Western Parkland City) 2021 includes the provisions from SEPP (*Sydney Region Growth Centres) 2006.* The Western Parkland City SEPP establishes the broad framework for the development of four identified growth centres in Western Sydney; the North West Growth Area, the South West Growth Area (formerly growth centres), the Wilton Growth Area, and the Greater MacArthur Growth Area. The aim of this policy was to allow for the coordinated release of land for residential, employment and other urban development within the growth centres, in order to ensure high-quality, sustainable and livable developments. The study area lies within the South West Growth Area and includes land designated as Existing Certified and Existing Non Certified under this SEPP.

Order to confer biodiversity certification on the State Environmental Planning Policy **(Precincts - Western Parkland City) 2021**

In December 2007 the Growth Centres Biodiversity Certification Order for the North West Growth Centre and South West Growth Centre was made by the then NSW Minister for the Environment. This biodiversity certification was granted under Schedule 7 of the now repealed NSW *Threatened Species Conservation Act 1995*. However, this certification still has effect due

to the action of Part 8 Clause 43 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017. The effects of the conferred biodiversity certification are:

> *(1) Any development for which development consent is required under the provisions of a biodiversity certified EPI is, for the purposes of the Part 4 of the EP&A Act, taken to be development that is not likely to significantly affect any threatened species, population or ecological community, or its habitat.*
>
> *(2) An activity to which Part 5 of the EP&A Act applies that a biodiversity certified EPI provides can be carried out without the need for development consent is, for the purposes of that Part, taken to be an activity that is not likely to significantly affect any threatened species, population or ecological community, or its habitat.*

A portion of the works proposed by Transport for the proposal occurs on land currently mapped as "Existing Certified". Land mapped within a certified area does not require any further biodiversity assessment and therefore these areas are not subject to this biodiversity assessment.

3.9 Matters of national environmental significance

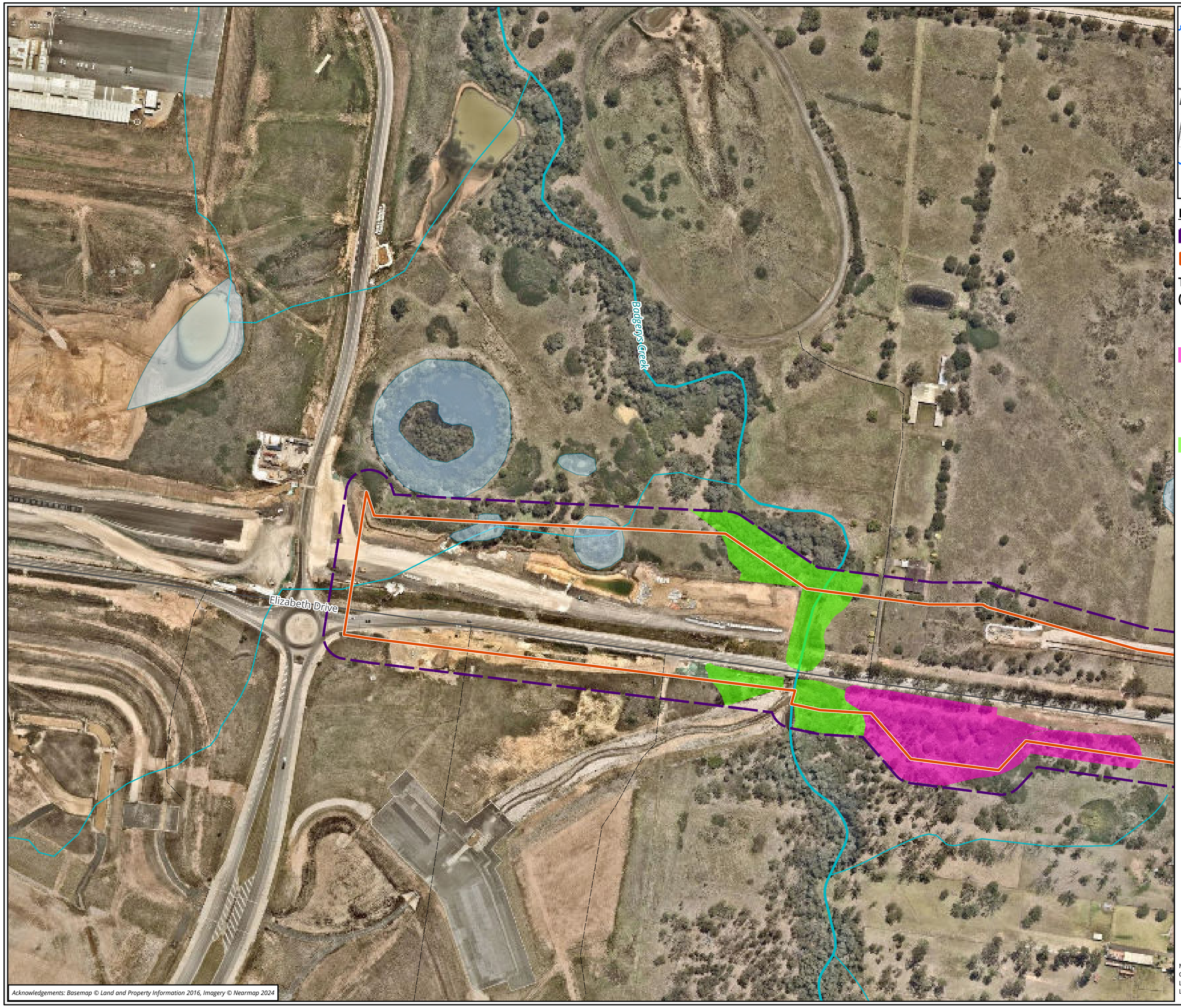
As mentioned in Section 3.2, patch size analysis was undertaken for all PCTs within the study area with an associated EPBC Act listed TEC, based on the November 2023 field surveys. Due to limitations in plot data detail (see Section 2.3.2 Plot-based vegetation survey), a precautionary approach was undertaken in which all BC Act listed TECs were considered to meet their associated EPBC Act listed TEC (where applicable) if the relevant patch size requirements were met. The EPBC Act listed TECs within the study area are listed below in Table 3-3. EPBC Act listed TECs are shown on Figure 3-6.

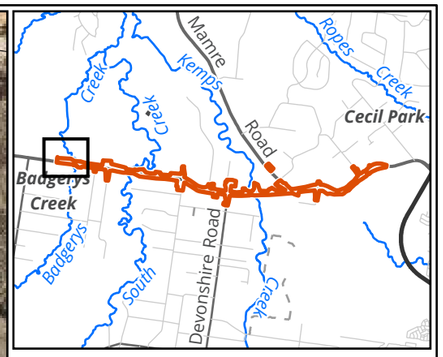
No nationally listed threatened or migratory species were detected within the study area nor are any considered to have a Moderate or higher likelihood of occurring based on habitat assessments.

Table 3-3: EPBC Act listed TECs within the study area

EPBC Act community	PCT	Status	Vegetation zones	Area in study area (ha)	Area in subject land (ha)
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	724	CE	Intact (0.30 ha) Thinned (0.45 ha)	1.26	0.75
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	725	CE	Intact (1.76 ha)	2.95	1.76
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	835	CE	Intact (0.26 ha) Scattered Trees (0.86 ha) Thinned (0.74 ha)	5.76	1.86
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	849 (with the exception PCT 849 within Western Sydney Parklands as the vegetation in this area did not meet the relevant patch size requirements for the community (see Section 3.2)	CE	Intact (2.33 ha) Scattered Trees (2.25 ha) Thinned (1.51 ha)	13.15	6.09
Castlereagh Scribbly Gum and	883	EN	Intact (0.82 ha)	1.54	0.82

EPBC Act community	PCT	Status	Vegetation zones	Area in study area (ha)	Area in subject land (ha)
Agnes Banks Woodlands of the Sydney Basin Bioregion					
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	1800	EN	Intact (0.34 ha) Thinned (1.02 ha)	4.11	1.36





Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Figure 3-6 Matters of environmental significance recorded
Page 1

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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Matter: 38207, Date: 15 January 2024,
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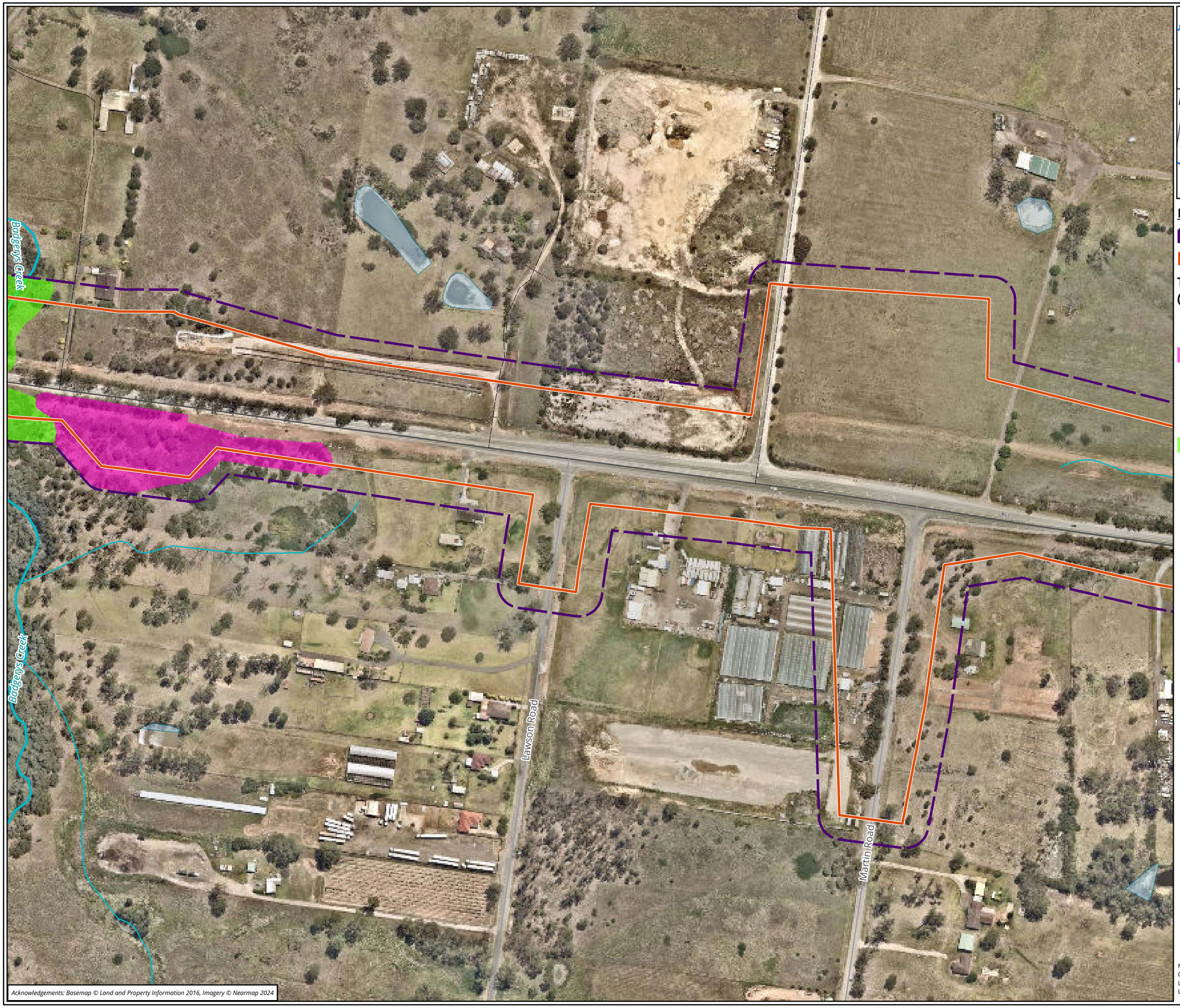

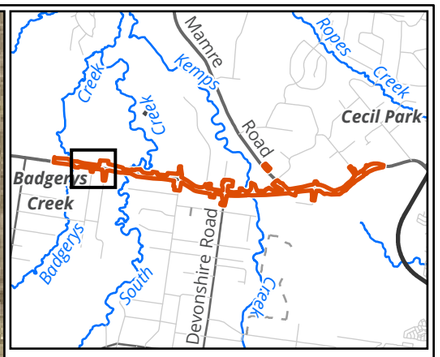

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Figure 3-6 Matters of environmental significance recorded
Page 2

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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Matter: 38207, Date: 15 January 2024,
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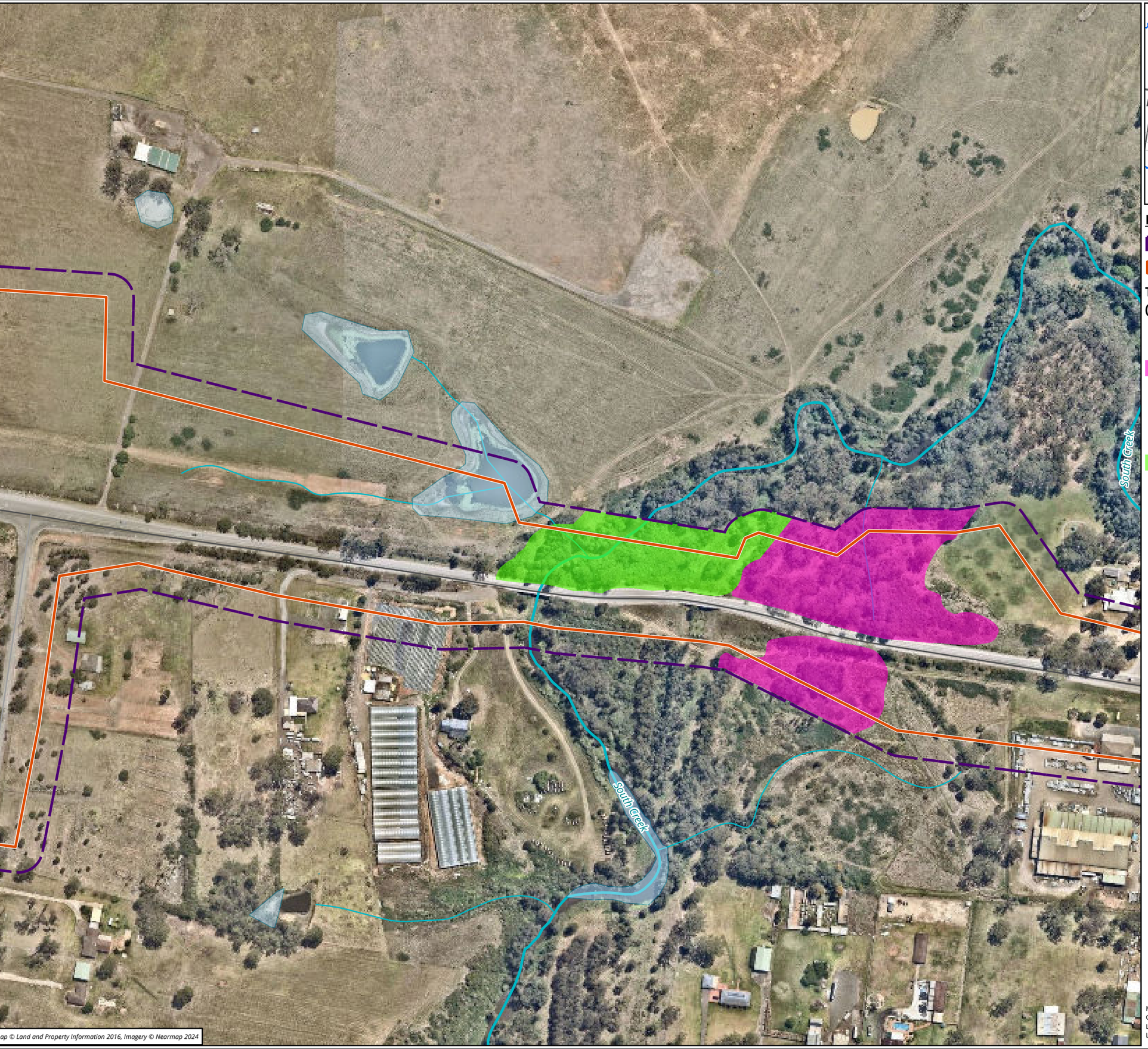

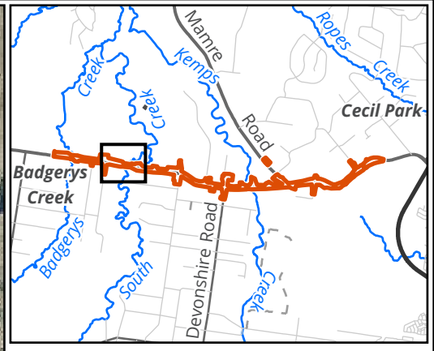

Legend

- Study area
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Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Figure 3-6 Matters of environmental significance recorded
Page 3

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Metres
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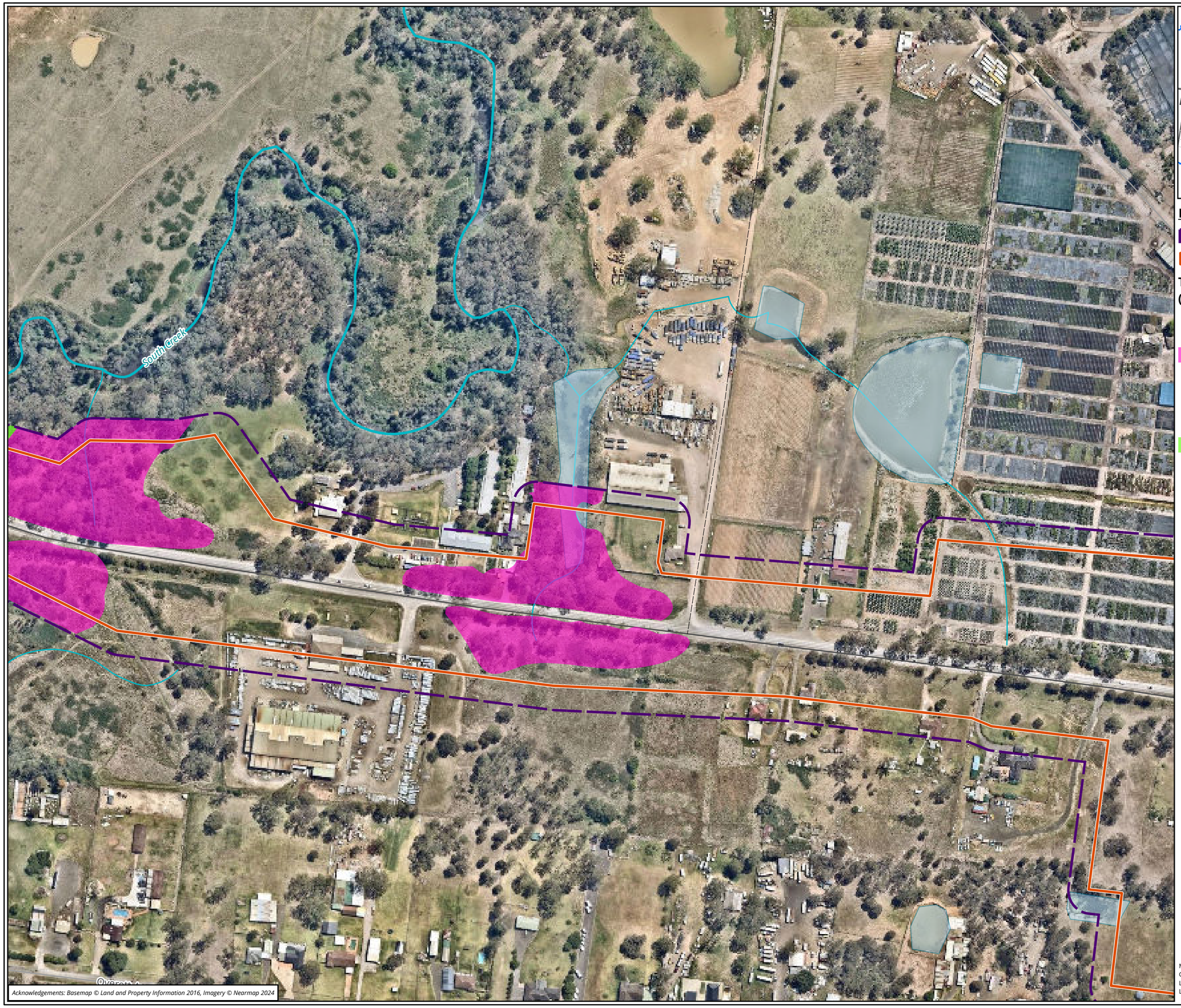

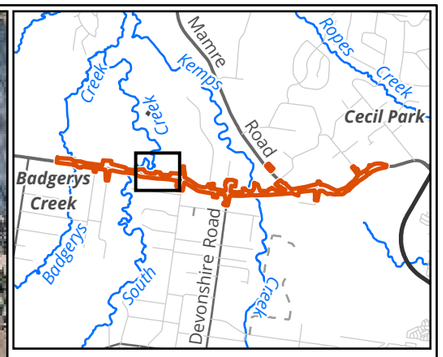

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Figure 3-6 Matters of environmental significance recorded
Page 4

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Metres
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GDA 1994 MGA Zone 56

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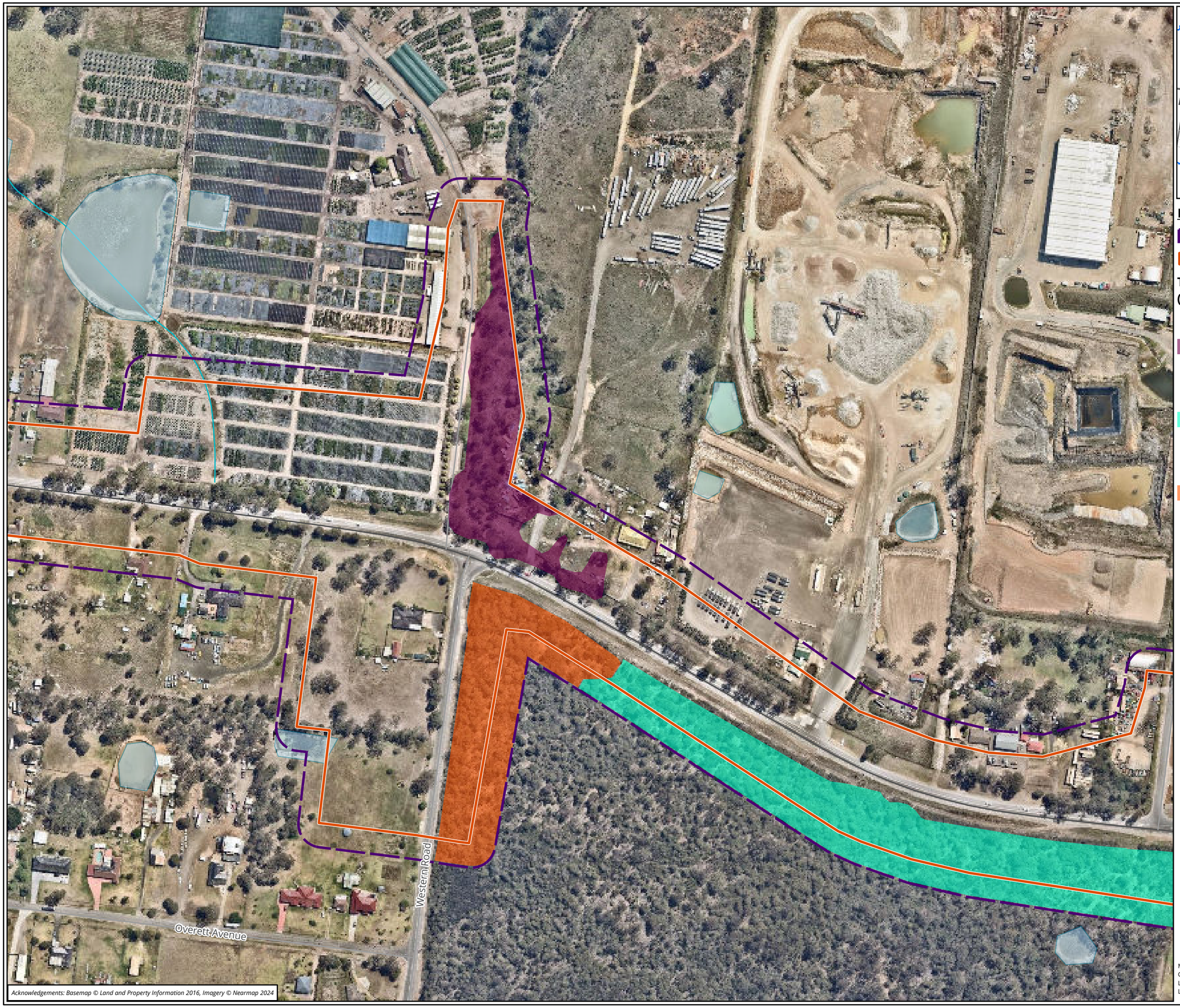

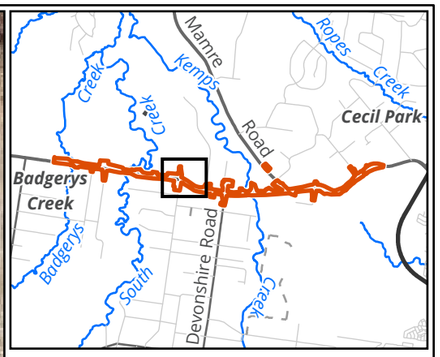

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 1, 3)
- Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Zone 4)
- Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (Zone 12)

Figure 3-6 Matters of environmental significance recorded
Page 5

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Metres
Scale: 1:3,000 @ A3
Coordinate System:
GDA 1994 MGA Zone 56

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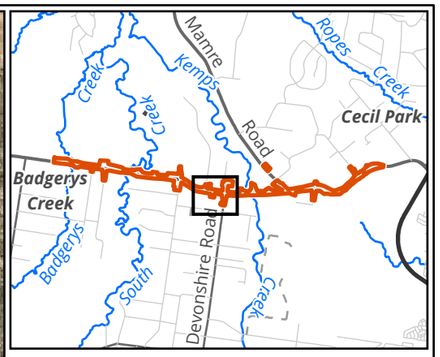

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Zone 4)

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Figure 3-6 Matters of environmental significance recorded
Page 6

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Metres
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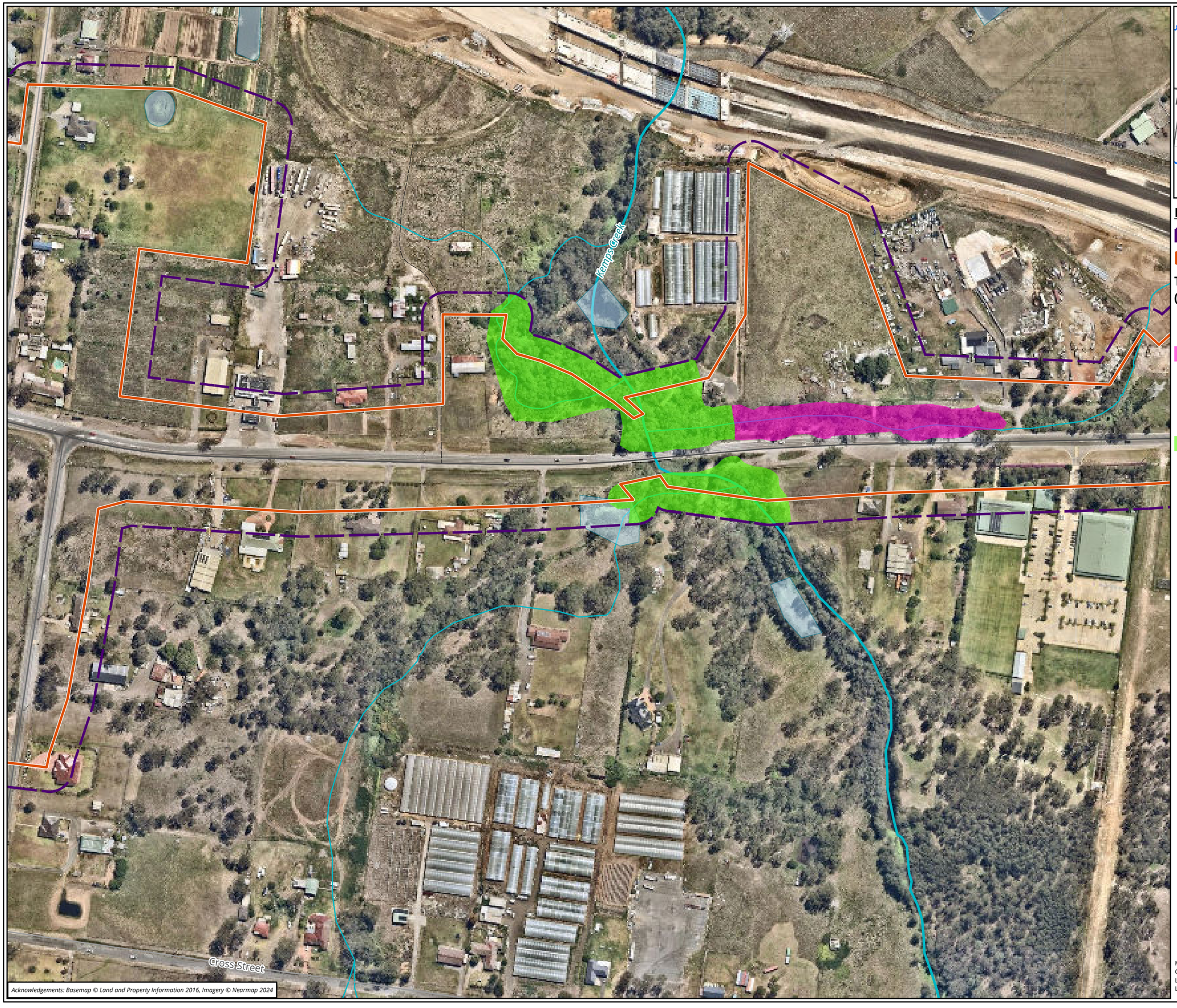

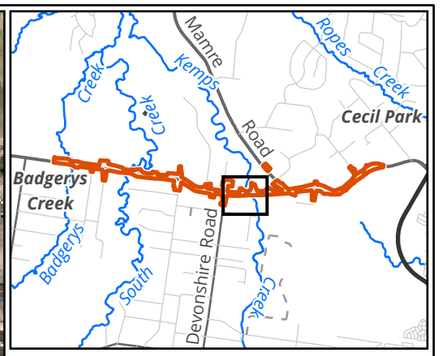

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Zone 13, 14)

Figure 3-6 Matters of environmental significance recorded
Page 7

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Metres

Scale: 1:3,000 @ A3

Coordinate System:
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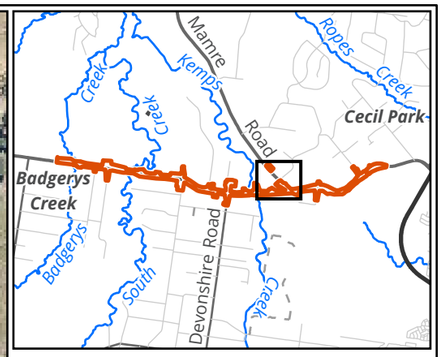

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (Zone 6, 7, 8)
- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

Figure 3-6 Matters of environmental significance recorded
Page 8

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Metres
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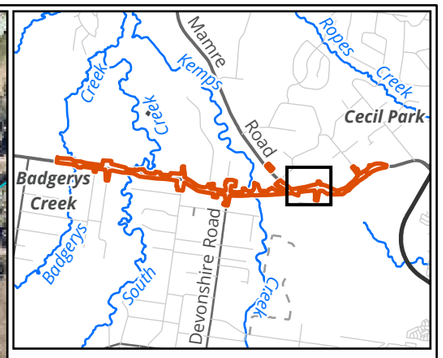

Legend

Study area

Subject land

Threatened ecological communities (EPBC Act)

Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

Range Road

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Figure 3-6 Matters of environmental significance recorded
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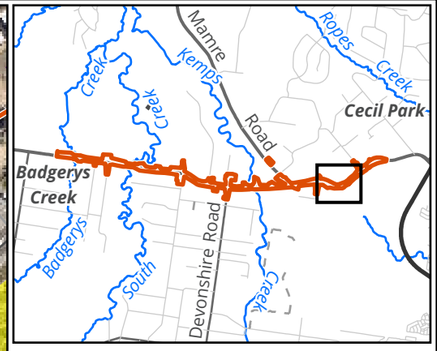

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

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Figure 3-6 Matters of environmental significance recorded
Page 10

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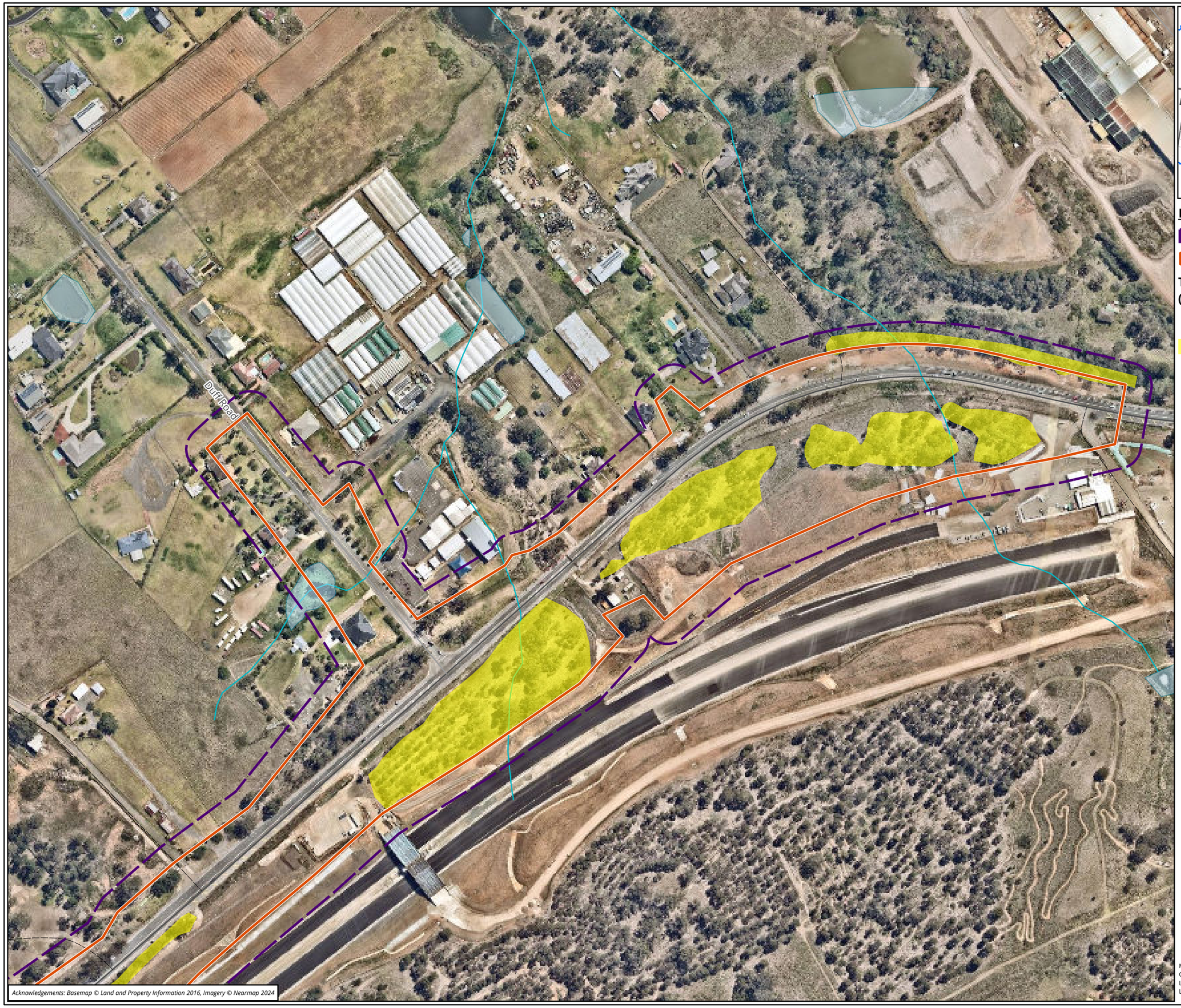

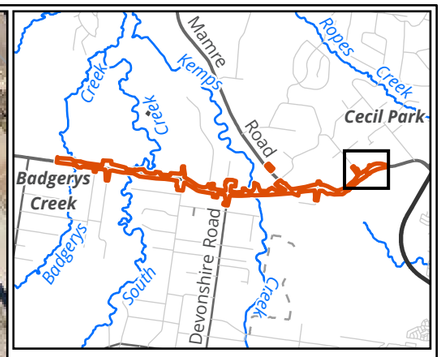

Legend

- Study area
- Subject land

Threatened ecological communities (EPBC Act)

- Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Zone 9, 10, 11)

Figure 3-6 Matters of environmental significance recorded
Page 11

0 25 50 75 100 125

Metres
Scale: 1:3,000 @ A3
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4. Avoidance and minimisation

A key part of Transport's management of biodiversity for this proposal is the application of the 'avoid, minimise, mitigate and offset' hierarchy as follows:

- Avoid and minimise impacts.
- Mitigate impacts.
- Offset impacts in accordance with Transport guidelines.

This chapter of the BAR demonstrates the efforts taken to avoid and minimise impacts on biodiversity values.

As is common regarding infrastructure projects, opportunities to avoid and minimise impacts to the biodiversity values are often limited and the proposal is no different. In acknowledgement of the proposal's objectives and that the 'do nothing' option is not feasible, this is not considered an unexpected outcome. The current footprint of the proposal is considered the minimum required to provide a more functional and safer carriageway, in support of wider planned development in the Western Parkland City.

The limited opportunities available to avoid and minimise impacts to biodiversity have been taken advantage of by:

- Utilising cleared and/or disturbed areas as much as possible, including strategic location of construction facilities.
- Utilising and widening the existing road corridor (as opposed to an entirely new road corridor) and minimising widening outside of this where possible.
- Informing the detailed design phase by plot data collection (DPIE 2020), detailed habitat assessment and targeted surveys for threatened entities. This would identify sensitive areas to avoid and/or reduce the construction footprint further, specifically in regard to threatened flora and fauna and their habitats and around 'avoided' areas as per the CPCP.

Given that there are impacts to biodiversity from the proposal that are not avoidable, standard and site-specific mitigation measures and safeguards would be applied to ameliorate or minimise these expected impacts, as well as the implementation of the No Net Loss Guidelines (Transport 2020a). These are detailed in Section 6 and Section 7 below.

5. Impact assessment

The breakdown of impacts in Section 5.1 below shows the impact to each vegetation zone within areas mapped as:

- Existing Certified and Existing Non Certified under SEPP (Precincts – Western Parkland City) 2021.
- Certified – Urban Capable Land, Excluded Land and Avoided Land under the CPCP for BC Act listed entities.
- ENV within Existing Non Certified lands, which are subject to RBMs 8 and 11.
- ENV within Existing Non Certified lands which are subject to RBM 12.

The impact to be assessed under the BC Act is calculated as the sum of impacts to areas mapped as Existing Non Certified, Excluded Land, Avoided Land and any additional small areas not covered by either the SEPP (Precincts – Western Parkland City) 2021 or CPCP biocertification (not shown in the table). As the Commonwealth government is yet to approve the CPCP under the EPBC Act, impacts to biodiversity values within land mapped as Certified – Urban Capable Land under the CPCP have been included for all impacted EPBC Act listed entities. As the Sydney Growth Centres Strategic Assessment Program is approved both in NSW and at a federal level, no further assessment of impacts to threatened entities is required under the BC Act or EPBC Act for the parts of the study area that mapped as Existing Certified under the SEPP (Precincts – Western Parkland City) 2021. However, the parts of the subject land mapped as Existing Non certified will still require impacts to be assessed under both the BC Act and EPBC Act. Accordingly, impacts to native vegetation and threatened entities have been reported upon separately. For example, Table 5-1, has separate impact columns for impacts assessed under the EPBC Act and lands assessed under the BC Act. This approach has been applied throughout the remainder of this assessment. In cases where impacts for a threatened entity listed under both the BC Act and EPBC Act are not set apart, the impacts are equal.

5.1 Construction direct impacts

5.1.1 Removal of native vegetation

The proposal would result in the direct loss of 14.57 ha of native vegetation, including 14.57 ha comprising seven BC Act listed and 12.63 ha comprising five EPBC Act listed TECs, as summarised in Table 5-1. Impacts were calculated using GIS and by applying the construction footprint (subject land). As previously discussed, a precautionary approach was undertaken in which all BC Act listed TECs were considered to meet their associated EPBC Act listed TEC (where applicable) if the relevant patch size requirements were met (see Section 3.2). As such, all patches of PCTs that met the size requirements under the Listing Advice for the associated EPBC Act listed community have been included in the calculation of impacts to be assessed under the EPBC Act in Table 5-1.

When all of the existing certified lands mapped under the SEPP (Precincts – Western Parkland City) 2021 and the CPCP are included in the assessment of impacts, the proposal would result in the removal of 33.02 hectares native vegetation consistent with TECs listed under the BC Act, and the removal of 12.63 ha of TECs listed under the EPBC Act in total.

Significance assessments were undertaken for all the TECs listed below. In all cases, a significant impact is not considered likely (Section 5.4).

Table 5-1: Summary of direct impacts on native vegetation (areas are provided in hectares)

Veg. zone (refer to Section 3.1)	Plant community type (PCT)	Broad condition class	TEC	SEPP (Precincts – Western Parkland City) 2021			CPCP			Impacts to be assessed under BC Act*	Impacts to be assessed under EPBC Act**
				Existing Non-certified	Existing certified	ENV within Non-certified	Avoided land	Certified – Urban Capable Land	Excluded Land		
Zone 1	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Intact	**BC Act**, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion, AND **EPBC Act**, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.	0.07	0.14	0	0.12	0	0.22	Intact 0.41 Scattered Trees 0.54 Thinned 0.42 **TOTAL[#]: 1.37 ha**	Intact 0.30 Scattered Trees 0 Thinned 0.45 **TOTAL: 0.75**
Zone 2	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Scattered Trees	**BC Act**, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion. (NOT EPBC Act listed)	0.41	1.45	0	0	0.16	0.13		
Zone 3	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Thinned	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion, AND EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands	0	0.73	0	0.23	0.03	0.19		

Veg. zone (refer to Section 3.1)	Plant community type (PCT)	Broad condition class	TEC	SEPP (Precincts – Western Parkland City) 2021			CPCP			Impacts to be assessed under BC Act*	Impacts to be assessed under EPBC Act**
				Existing Non-certified	Existing certified	ENV within Non-certified	Avoided land	Certified – Urban Capable Land	Excluded Land		
			and Shale-Gravel Transition Forest.								
Zone 4	725: Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	Intact	**BC Act**, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion, AND **EPBC Act**, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion.	1.76	0.45	1.72	0	0.04	0	Intact 1.76 **TOTAL: 1.76**	Intact 1.76 **TOTAL: 1.76**
Zone 5	781: Coastal freshwater wetland	Disturbed	**BC Act**, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.	0	0	0	0.10	0	0	Disturbed 0.10 **TOTAL: 0.10**	Disturbed 0 **TOTAL: 0**
Zone 6	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Intact	**BC Act,** Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales	0	1.59	<0.01	0.35	0.04	0.04	Intact 0.38 Scattered Trees 1.68	Intact 0.26 Scattered Trees 0.86

Veg. zone (refer to Section 3.1)	Plant community type (PCT)	Broad condition class	TEC	SEPP (Precincts – Western Parkland City) 2021			CPCP			Impacts to be assessed under BC Act*	Impacts to be assessed under EPBC Act**
				Existing Non-certified	Existing certified	ENV within Non-certified	Avoided land	Certified – Urban Capable Land	Excluded Land		
Zone 7	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Scattered Trees	North Coast, Sydney Basin and South East Corner Bioregions, AND **EPBC Act,** Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	0.81	2.11	0.05	0.11	0.11	0.05	Thinned 0.75 **TOTAL: 2.81**	Thinned 0.74 **TOTAL: 1.86**
Zone 8	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Thinned		0.75	0.69	0.61	0	0	0		
Zone 9	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Intact	**BC Act**, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion, AND **EPBC Act,** Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.	2.33	0.45	0	0	0	0	Intact 2.33 Scattered Trees 2.38 Thinned 1.51 **TOTAL: 6.22**	Intact 2.33 Scattered Trees 2.25 Thinned 1.51 **TOTAL: 6.09**
Zone 10	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Scattered Trees		2.21	6.48	0.03	0	0	0.02		
Zone 11	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Thinned		1.51	2.63	0	0	0	0		
Zone 12	883: Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the	Intact	**BC Act,** Vulnerable - Castlereagh Scribbly Gum Woodland in	0.82	0.19	0.78	0	0	0	Intact 0.82 **TOTAL: 0.82**	Intact 0.82 **TOTAL: 0.82**

Veg. zone (refer to Section 3.1)	Plant community type (PCT)	Broad condition class	TEC	SEPP (Precincts – Western Parkland City) 2021			CPCP			Impacts to be assessed under BC Act*	Impacts to be assessed under EPBC Act**
				Existing Non-certified	Existing certified	ENV within Non-certified	Avoided land	Certified – Urban Capable Land	Excluded Land		
	Cumberland Plain, Sydney Basin Bioregion		the Sydney Basin Bioregion, AND **EPBC Act,** Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion								
Zone 13	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Intact	**BC Act**, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, AND **EPBC Act,** Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland	0.18	0.97	0.16	0.13	0.01	0.12	Intact 0.51 Thinned 0.97 **TOTAL: 1.48**	Intact 0.34 Thinned 1.02 **TOTAL: 1.36**
Zone 14	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Thinned		0.83	0.13	0.82	0.14	0.04	0		

Veg. zone (refer to Section 3.1)	Plant community type (PCT)	Broad condition class	TEC	SEPP (Precincts – Western Parkland City) 2021			CPCP			Impacts to be assessed under BC Act*	Impacts to be assessed under EPBC Act**
				Existing Non-certified	Existing certified	ENV within Non-certified	Avoided land	Certified – Urban Capable Land	Excluded Land		
			ecological community.								
	Urban Native/Exotic	-	-	0.20	0.84	-	0.01	0	0.28	-	-
			Total#	**11.88**	**18.85**	**4.16**	**1.18**	**0.44**	**1.06**	**14.57**	**12.63**

* Impacts to be assessed under the BC Act refers to native vegetation listed under the BC Act within the subject land that is mapped as Existing Non Certified, Excluded Land, Avoided Land and any additional small areas not covered by either the SEPP (Precincts – Western Parkland City) 2021 or CPCP.

**Impacts to be assessed under the EPBC Act refers to native vegetation listed under the EPBC Act within the subject land that is mapped as Existing Non Certified, Excluded Land, Avoided Land and any additional small areas not covered the SEPP (Precincts – Western Parkland City) 2021, as well as land mapped as Certified – Urban Capable Land under the CPCP.

The totals included in this table are based on calculations using the raw impact data which includes more decimal places than what is expressed in the table above. As such, small rounding errors occur between these totals and the summed totals of the vegetation zones that comprise them when values are expressed in two decimal places.

5.1.2 Removal of threatened fauna habitat

The proposal would result in impacts to approximately 14.57 ha (BC Act) of native vegetation in intact, thinned, scattered and disturbed condition classes. Foraging resources, for a range of threatened fauna considered to have a moderate or higher likelihood of occurring would be removed. Additionally, habitat assessment recorded 17 hollow-bearing trees (HBT) containing a range of hollow sizes (5cm -15 cm) primarily suitable for hollow-dependent small birds and microbats, which would be directly impacted. Nine of these HBTs are on non-certified lands. Given the current level of disturbance from the existing road and urbanised surrounds, it is most likely that common mobile disturbance tolerant species would utilise these hollows within the study area. This does not preclude the use of these trees by the threatened microbats recorded and woodland birds such as Little Lorikeet. The loss of hollow-bearing trees is a Key Threatening process (KTP) listed under Schedule 2 of the BC Act. No HBTs that are considered suitable habitat for BAM dual credit species such as the Powerful Owl (living or dead trees with hollow greater than 20 cm diameter) or Glossy-Black Cockatoo (living or dead trees with hollows greater than 15 cm diameter and greater than 8m above ground) would be impacted.

Removal of existing bridges and construction of new bridge structures over Badgerys Creek, South Creek and Kemps Creek would impact the associated waterways and surrounding vegetation directly. Visual inspection of the bridges at Badgerys Creek, Kemps Creek and South Creek (western bridge), did not find any evidence of roosting microbats. These bridges are an older style construction, cast in-situ, and limited opportunities for roosting bats in the form of metal scuppers. The outer span of the eastern bridge at South Creek however, did contain evidence of roosting microbats (urine staining, guano deposits), and an estimate of about 100-150 individuals could be observed roosting in the gaps between the concrete spans. It is likely that this bridge represents a breeding colony of Southern Myotis and it is possible that other artificial structures may also be used within the study area by these individuals for seasonal or temporary roosting. The removal of artificial structures therefore has the potential to impact threatened microbats utilising them for roosting and possibly breeding. A Microbat Management Plan would be prepared and implemented to manage potential impacts to threatened bats that may occur (refer to B08 in Table 6-1).

Cumberland Plain Land Snail is considered to have patchy habitat distribution across the study area, of which 3.78 ha would be directly impacted by the proposal. Shells for the Cumberland Plain Land Snail shells were found in five different locations within the surveyed area, which constituted a positive identification. In the locations where shells were found, all connective habitat suitable for the species in the area, including leaf litter at the base of trees, coarse woody debris, stones and detritus in the study area, was used to determine the species polygon for Cumberland Plain Land Snail and therefore, the area directly impacted by the proposal.

A summary of impacts to potential habitat for those threatened species either recorded or assessed as having a moderate or higher likelihood of occurrence within the study area are presented below. The range of species identified that may be impacted is based on a combination of desktop assessment and targeted survey for select species suggested to occur from CPCP habitat modelling.

Significance assessments were undertaken for all the threatened fauna with a moderate or higher rating listed below. In all cases, a significant impact is not considered likely (Section 5.4).

Table 5-2: Summary of direct impacts on threatened fauna and habitat

Species name	EPBC Act	BC Act	Credit type	Potential occurrence (Moderate, High, Recorded)	Associated habitat in subject land	Impact (ha)
Little Lorikeet *Glossopsitta pusilla*	-	VU	Ecosystem	Moderate	All zones	14.57
Cumberland Plain Land Snail *Meridolum corneovirens*		EN	Species	Recorded	All connective habitat in the locations where shells were found	3.78
Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*		VU	Ecosystem	Recorded	All zones	14.57

Species name	EPBC Act	BC Act	Credit type	Potential occurrence (Moderate, High, Recorded)	Associated habitat in subject land	Impact (ha)
Southern Myotis *Myotis macropus*		VU	Species	Moderate	All zones within 200m of waterbodies containing pools or stretches 3m wide or greater that intersect CPCP species polygon, PCT 724 (Zone 1 and 2), PCT 781 (Zone 5) PCT 835 (Zone 6, 7 and 8) and PCT 1800 (Zone 13 and 14)	11.17
Greater Broad-nosed Bat *Scoteanax rueppellii*		VU	Ecosystem	Moderate	All zones	14.57

5.1.3 Removal of threatened flora

The proposal would lead to the direct loss of at least 13 *Dillwynia tenuifolia* (BC Act, Endangered Population) (2.58 hectares) found located in bushland west of Bill Anderson Reserve. There are a total of 15 individuals recorded in this area, however, two individuals recorded are located outside the impact area.

The population of *Pultenaea parviflora* assumed to occur in bushland west of Bill Anderson Reserve from background research is considered an important population under the EPBC Act and would be impacted via habitat removal. No individuals were recorded during targeted survey such that no individuals are anticipated to be removed.

Threatened flora species recorded in the subject land during targeted survey are listed below in Table 5-3. Where applicable, the differing impacts to these species under the BC Act and EPBC Act have been quoted. All threatened flora listed below are assessed by area of habitat removed and not by the number of individuals recorded.

Significance assessments were undertaken for all the threatened flora listed below. In all cases, a significant impact is not considered likely (Section 5.4).

Table 5-3: Summary of direct impacts on threatened flora

Species name	EPBC Act	BC Act	Potential occurrence (Moderate, High, Recorded)	Associated habitat in subject land	BC Act Impact (ha)	EPBC Impact (ha)
Dillwynia tenuifolia		E2	Recorded, 15 individuals (13 to be removed)	PCT 725 and 883	2.58	n/a

5.1.4 Aquatic impacts

The most likely aquatic impact from the proposal is introduction of sedimentation downstream from construction, potential erosion of stream banks from physical disturbance and potential bed erosion if the replacement culverts do not have sufficient scour protection. The provision of larger culverts and bridges would also impact upon bed area where they are installed (subject to detailed design).

The hydrology of waterways with associated culverts would be altered to facilitate the flow of water into the replacement culvert at an angle in line with the skew of the proposed location. This is not considered likely to have any lasting detrimental effects. The culvert works, in conjunction with rehabilitation works, may improve flow and improve aquatic fauna movements above the present condition. At the time of writing, it is unclear if culvert works would require the removal of specific aquatic habitat features such as snags.

Key Fish Habitat is mapped at Badgerys Creek, South Creek and Kemps Creek. Fish passage is assumed to occur and it is uncertain at the time of writing whether fish passage may be prevented during construction of the proposal. It is recommended that Transport provide formal notification to DPI Fisheries NSW under Section 199 of the FM Act for works occurring within Key Fish Habitat.

At Badgerys Creek, South Creek and Kemps Creek, there would be loss of riparian habitat to facilitate the removal of existing bridges, and construction of the new twin bridges.

No threatened aquatic species, populations and communities have been identified within the study area or are considered likely to occur, therefore, would not be impacted.

5.1.5 Injury and mortality

The potential for wildlife injury or death could occur during the construction phase of the proposal. The clearing of vegetation may result in injury or death to resident fauna. Species at risk include nocturnal species such as possums, glider and microbats which shelter during the day, and ground dwelling species such as snakes, lizards, and small mammals. There is also the risk of displaced fauna succumbing to predation, or stress induced by competing with existing resident populations for resources, particularly shelter / refuge habitat.

In summary, injury and mortality of fauna could occur during construction activities, including:

- During construction, when vegetation and habitat are being cleared.
- Collision/strike by machinery and plant.
- Collision with construction traffic.

5.1.6 Groundwater dependent ecosystems

As discussed in Section 3.3, the Atlas of GDEs (BOM 2022) (Figure 3 3) identifies vegetation within the study area, particularly along Badgerys Creek, South Creek and Kemps Creek, high potential GDEs.

Direct impacts to these GDEs include the clearing of native vegetation and the construction and disturbance footprint required to facilitate the removal and replacement of four bridges and several culverts. There is not anticipated to be any appreciable change in groundwater flow or depth during construction of the proposal. It should also be noted that these GDEs are not entirely groundwater dependent and are more reliant on the collection of rainwater into associated waterways.

Generally, groundwater interference would be temporary and deep excavations are not expected, groundwater would be managed by a Construction Environmental Management Plan (CEMP), and as such substantial impacts to GDEs are not expected.

5.2 Indirect and operational impacts

5.2.1 Edge effects on adjacent native vegetation and habitat

The proposal is likely to create new edge effects in previously undisturbed native vegetation, including vegetation adjacent to known locations of *Dillwynia tenuifolia*. Considering the present degree of edge effects already operating in the study area, such as increased weed encroachment and exposure of habitat along Elizabeth Drive, the proposal would 'push back' these edge effected areas in the long-term, as weeds colonise previously undisturbed areas where vegetation is removed. This indirect impact would be managed using the mitigation measures outlined in Section 6.1 (see B22 and B24 in Table 6-1), including the establishment of exclusion zones to mark clearing limits and restrict works to the subject land boundary, and by adhering to strict weed control measures to avoid the spread of exotic species into adjacent vegetation.

5.2.2 Wildlife connectivity and habitat fragmentation

The study area does not intersect any recognised wildlife corridors, however, the study area contains three main connectivity corridors in the form of native vegetation associated with Badgerys Creek, South Creek and Kemps Creek. Elizabeth Drive already presents a barrier to movement for fauna, particularly ground-dwelling fauna, in a north-south direction. Use of GIS software has revealed that the proposal would increase the present canopy gap across Elizabeth Drive at these locations, and generally, markedly. As the current Elizabeth Drive is a two lane carriageway, where trees are near the road edge, the present canopy gap is often less than 10 metres. The increase in canopy gap resulting from the proposal, whilst variable (as low as 55 metres at Kemps Creek), is consistently over 70 metres and over 100 metres in some locations. Increase in canopy gap in the areas of currently higher levels of connectivity, is likely to introduce a barrier to movement for wildlife that are reliant on canopy connectivity for traversal such as the non-threatened Sugar Glider *Petaurus breviceps*.

Considering the above, the proposal would increase localised habitat fragmentation appreciably, primarily in a north-south direction. There is a high likelihood that a barrier to movement for arboreal fauna such as Sugar Glider and other arboreal fauna would be introduced. Accordingly, mitigation measures are proposed (Section 6) with the aim of reducing any potential operational impacts by attempting to maintaining connectivity where possible, including retaining large trees that are greater than or equal to 50 cm diameter at breast height (including dead trees but excluding noxious weeds) where possible and apply tree protection measures for all vegetation to be retained.

5.2.3 Injury and mortality

Given the widening of roadways proposed, and potential for increased development in the broader locality, it is anticipated that traffic volumes may increase upon operation. The proposal would introduce improvements in traffic safety, management and flow, however coupled with an approximate doubling in crossing distance, it is considered probable that an increase to the risk of injury and mortality to susceptible fauna via vehicle strike would occur during operation.

5.2.4 Invasion and spread of weeds

The proposal has the potential to spread weeds during vegetation removal and through the movement of vehicles and machinery into or out of the proposal area. Weeds are easily transported as seeds and propagules on machinery brought to the proposal area. Equally, they can be carried away to other areas from the site or spread within it. If weeds are not controlled prior to work commencing, then there is the potential for spread throughout the site during and following construction.

Rehabilitation of disturbed areas and ongoing weed management after the completion of construction activities would limit the establishment and spread of weed species during operation.

A summary of the exotic species recorded within the study area is provided below.

Table 5-4 Summary of exotic flora within the study area

Species name	Common Name	Priority Weed	High Threat Weed (BAM)
Ageratina adenophora	Crofton Weed		X
Anredera cordifolia	Madeira Vine		X
Asparagus aethiopicus	Asparagus Fern	X	X
Asparagus asparagoides	Bridal Creeper	X	X
Cestrum parqui	Green Cestrum	X	X
Chloris gayana	Rhodes Grass		X
Lantana camara	Lantana		X
Ligustrum lucidum	Large-leaved Privet		X
Ligustrum sinense	Small-leaved Privet		X

Species name	Common Name	Priority Weed	High Threat Weed (BAM)
Lonicera japonica	Japanese Honeysuckle		X
Lycium ferocissimum	African boxthorn	X	X
Olea europaea subsp. *cuspidata*	African Olive	X	X
Rubus fruticosus	Blackberry	X	X
Senecio madagascariensis	Fireweed		X
Sida rhombifolia	Paddy's Lucerne		
Solanum pseudocapsicum	Madeira Winter Cherry		
Sonchus oleraceus	Common Sowthistle		
Tradescantia fluminensis	Wandering Jew		X
Zantedeschia aethiopica	Arum Lily		

Six priority weeds for the Greater Sydney LLS region have been recorded in the study area and are listed above.

The Biosecurity Act provides for the identification, classification and control of priority weeds with the purpose of determining if a biosecurity risk is likely to occur. A priority weed is any weed identified in a local strategic plan, for a region that includes that land or area, as a weed that is or should be prevented, managed, controlled or eradicated in the region.

The General Biosecurity Duty as outlined in the Biosecurity Act states:

All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

To prevent biosecurity impacts from occurring as a result of the presence of the above listed priority weeds within the study area, all practical steps should be taken to control and eradicated the weeds from the study area as per the biosecurity duty outlined above, or prior to or during any future vegetation removal.

5.2.5 Invasion and spread of pests, pathogens and disease

During construction, the proposal has the potential to cause both the spread of pathogens and diseases currently occurring in the study area and surrounds, and to introduce new biodiversity risks. This is particularly the case for fungus and diseases spread through the introduction and movement of soil. Standard pest hygiene management measures during construction would minimise this risk.

5.2.6 Changes to hydrology

There would be some alteration to the existing surface hydrological conditions, however, this alteration is anticipated to be minor (surface level changes) such that the processes that are currently in place would largely remain.

Additionally, the nature of waterways that intersect the study area (including Badgerys Creek, South Creek and Kemps Creek) would be altered as either the bridge of culvert associated with each would be removed and replaced with larger structures. Ultimately, the condition of each waterway post-construction would differ little from their current state.

Any small change to hydrology is unlikely to be cause a substantial impact to the native vegetation and habitat present in the study area or surrounds post construction.

5.2.7 Noise, light, dust and vibration

Temporary disturbance to wildlife from noise emissions and light spill during construction and night works are likely to be localised to within 50-100 metres of the construction footprint and are not likely to have a significant long-term impact on wildlife that may occur within the study area or surrounding environment.

Noise, light and vibration may disturb any fauna, including threatened microbats that may be inhabiting nearby HBTs or man-made structures. Night works may be sufficient enough to act as a deterrent to arboreal fauna traversing the study area as they would normally do.

An increase in operational noise is anticipated. Traffic noise can reduce the distance over which acoustic signals such as song can be detected, an effect known as acoustic interference or masking. Traffic noise could hamper detection of acoustic signals by members of the same species or predator species that use these signals to locate prey. Traffic noise makes it more difficult for fauna to establish and maintain territories, attract mates and maintain pair bonds, possibly leading to reduced breeding success in noisy roadside habitats.

5.3 Cumulative impacts

Cumulative impacts are impacts that, when considered together, have different and/or greater impacts than a single impact on its own. Cumulative impacts can result from the successive, incremental and/or combined effects of a project when considered with other project/s. The extent to which another project would interact with the construction or operation of the proposal depends on its scale, location and/or timing of construction and/or operation. Generally, cumulative impacts would be expected to occur in situations where multiple long-duration construction activities are undertaken close to, and over a similar timescale to, construction activities for the proposal.

Cumulative impacts would also be expected to occur in situations where projects are operating at a similar scale and location to the proposal. Assessment of cumulative impacts can be quite complex, as the degree of impact on a vegetation community or habitat for a threatened species may differ across the study area, particularly for large-scale projects such as a road upgrade or construction of an airport where the study area may cover an extensive area. Due to the historical clearing of native vegetation undertaken in the Western Sydney region, much of the vegetation across the landscape is largely cleared and now occurs in a highly fragmented state consisting of remnant patches of disturbed vegetation. As a result, while a development may not remove entire patches of a community or cause any significant fragmentation, there is potential that it may occur in areas where the development footprint of multiple projects intersect. In relation to the current assessment, the remnant patch of intact PCT 849 within the boundary of the Western Sydney Parklands would be subject to further isolation as a result of the proposed impacts for this assessment, in combination with impacts derived from the M12 Motorway project. The remaining small and isolated patch is considered unfavourable for the long-term viability and ecological function of the community. Both projects are, in a sense, would result in a, isolated local occurrence/patch, making it susceptible to further loss.

The cumulative impact assessment below (Table 5-5) displays the extent of impacts associated with other approved and proposed developments that occur within the Western Sydney region. Based on this assessment, the impacts associated with the current proposal comprise only a small proportion of the total cumulative impacts on threatened entities in the Western Sydney region.

Table 5-5 demonstrates known projects in the broader locality that will impact upon similar native vegetation, habitat and threatened species. The last column of the table reflects the area of impact to each threatened entity under the current proposal, as a percentage of the total cumulative impacts of all other projects considered in this assessment.

Table 5-5: Present and future project/proposals

Project/proposal	Western Sydney Airport (Commonwealth of Australia 2018)	Sydney Metro Western Sydney Airport (Sydney Metro 2021)	M12 Motorway (Roads and Maritime Services 2019)	Elizabeth Drive Upgrade (West)	Elizabeth Drive Upgrade (East)	Cumulative Impact	% impacted by Elizabeth Drive Upgrade (East)
Plant Community Types, TECs (BC Act and EPBC Act) and fauna habitat (ha)							
PCT 724 Shale Gravel Transition Forest in the Sydney Basin Bioregion, BC Act	10.6	7.27	6.91	-	1.37	26.15	5.24
PCT 724 Cumberland Plain Shale Woodlands	10.6	7.27	6.91	-	0.75	25.54	2.98

Project/proposal	Western Sydney Airport (Commonwealth of Australia 2018)	Sydney Metro Western Sydney Airport (Sydney Metro 2021)	M12 Motorway (Roads and Maritime Services 2019)	Elizabeth Drive Upgrade (West)	Elizabeth Drive Upgrade (East)	Cumulative Impact	% impacted by Elizabeth Drive Upgrade (East)
and Shale-Gravel Transition Forest, EPBC Act							
PCT 725 Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion, BC Act, AND EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	-	-	-	-	1.76	1.76	100
PCT 781 Coastal Freshwater Wetland, BC Act	35.4	-	-	-	0.10	35.5	0.28
PCT 835 River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, BC Act	110.7	15.93	3.23	2.09	2.81	134.77	2.09
PCT 835 River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria, EPBC Act	110.7	15.93	3.23	0.27	1.86	131.98	1.40

Project/proposal	Western Sydney Airport (Commonwealth of Australia 2018)	Sydney Metro Western Sydney Airport (Sydney Metro 2021)	M12 Motorway (Roads and Maritime Services 2019)	Elizabeth Drive Upgrade (West)	Elizabeth Drive Upgrade (East)	Cumulative Impact	% impacted by Elizabeth Drive Upgrade (East)
PCT 849 Cumberland Plain Woodland in the Sydney Basin Bioregion, BC Act	250.9	33.32	6.09	1.77 (BC Act listed TEC only)	6.22	296.53	2.10
PCT 849 Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest, EPBC Act	250.9	33.32	6.09	-	6.09	296.40	2.05
PCT 883 Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion, BC Act AND Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion, EPBC Act	-	-	-	-	0.82	0.82	100
PCT 1800 Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions, BC Act	-	4.11	2.53	2.39	1.48	10.51	14.08
PCT 1800 Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South	-	4.11	2.53	1.91	1.36	9.91	13.64

Project/proposal	Western Sydney Airport (Commonwealth of Australia 2018)	Sydney Metro Western Sydney Airport (Sydney Metro 2021)	M12 Motorway (Roads and Maritime Services 2019)	Elizabeth Drive Upgrade (West)	Elizabeth Drive Upgrade (East)	Cumulative Impact	% impacted by Elizabeth Drive Upgrade (East)
East Queensland ecological community, EPBC Act							
Threatened flora habitat (ha)							
Dillwynia tenuifolia	30 individuals	0.82 (recorded) 2.23 (assumed)	244 individuals	-	2.58	5.63	45.83
Threatened fauna habitat (ha)							
Cumberland Plain Land Snail *Meridolum corneovirens*	183.2	5.31	1.9	-	3.78	194.19	1.95
Southern myotis *Myotis macropus*	71.7	10.68	0.9 (breeding) 3.7 (foraging)	19.99	11.17	118.14	9.45

5.4 Assessments of significance

BC Act Tests of Significance (ToS) and EPBC Act Significant Impact Criteria (SIC) assessments were undertaken for all relevant threatened entities recorded or considered to have a moderate or higher likelihood of occurrence within the construction footprint. These assessments are summarised in Table 5-6 and Table 5-7 respectively. It should be noted that several species that were subject to an assessment of significance in the September 2023 BAR were not identified and therefore an assessment was not required.

No FM Act 7-part tests were undertaken as no threatened entities protected under the FM Act are considered likely to occur and are subsequently at no risk of impact.

A significant impact to any threatened entity is not considered likely, however this finding is underpinned by the effective implementation of the mitigation measures detailed in Section 6.

Table 5-6: Summary of BC Act significance assessments findings

Significance assessment question *(per Section 7.2 of the BC Act and Threatened Species Test of Significance Guidelines (OEH 2018))*						
Threatened species, or communities	a	b	c	d	e	Likely significant impact?
Shale Gravel Transition Forest in the Sydney Basin Bioregion (Endangered)	X	N	N	N	N	No
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (Endangered)	X	N	N	N	N	No
Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (Endangered)	X	N	N	N	N	No
River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered)	X	N	N	N	N	No
Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered)	X	N	N	N	N	No
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion (Vulnerable)	X	N	N	N	N	No
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered)	X	N	N	N	N	No
Dillwynia tenuifolia	N	X	N	N	N	No
Little Lorikeet *Glossopsitta pusilla*	N	X	N	N	N	No
Cumberland Plain Land Snail *Meridolum corneovirens*	N	X	N	N	N	No
Eastern Coastal Free-tailed Bat *Micronomus norfolkensis*	N	X	N	N	N	No
Southern Myotis *Myotis macropus*	N	X	N	N	N	No
Greater Broad-nosed Bat	N	X	N	N	N	No

Significance assessment question *(per Section 7.2 of the BC Act and Threatened Species Test of Significance Guidelines (OEH 2018))*						
Threatened species, or communities	a	b	c	d	e	Likely significant impact?
Scoteanax rueppellii						
***Y** = Yes (negative impact), **N** = No (no or positive impact), **X** = Yes/No answer not applicable, **?** = unknown impact.*						

Table 5-7: Summary of EPBC Act significance assessments findings

Threatened species, or communities	Important population *(per Significant Impact Guidelines 1.1 (DoE 2013))*	Likely significant impact?
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CEEC)	X	N
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (CEEC)	X	N
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (CEEC)	X	N
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (EEC)	X	N
Coastal Swamp Oak Casuarina glauca Forest of New South Wales and South East Queensland ecological community (EEC)	X	N
Pultenaea parviflora	Y	N
***Y** = Yes (negative impact), **N** = No (no or positive impact), **X** = Yes/No answer not applicable, **?** = unknown impact.*		

5.5 Cumberland Plain Conservation Plan 2022

As per Section 1.6 of the infrastructure guidelines, the CPCP would apply to the proposal. Consideration against the assessment requirements for Avoided Land are provided in Table 5-8 below.

Avoided Land

The subject land intersects with the Avoided Land category in various locations, the most prominent being within the riparian vegetation zones of Badgerys Creek, South Creek and Kemps Creek. As outlined in Section 1.1.1, the proposal would be assessed against the criterial for 'all other activities' in Section 3.1.2 of the infrastructure guidelines, the BC Act, and approval sought under the EPBC Act, if required.

Table 5-8: Assessment against Section 3.1.2 of the CPCP infrastructure guidelines

Section 3.1.2	Assessment against the proposal
For all other activities to which these guidelines apply, the activity must: *1. Avoid an adverse impact on threatened ecological communities, threatened species and their habitats, both on the site of the activity and on adjoining land that is avoided land.*	As discussed in Section 4 of this BAR, lengths have been undertaken to avoid impacts to Avoided Land. Targeted surveys have been undertaken in November 2023 to clearly ascertain the level of impact to threatened entities from the proposal. Assessments were undertaken for all relevant threatened entities recorded or considered to have a moderate or higher likelihood of occurrence within the construction footprint. A significant impact to any threatened entity is not considered likely, however this finding is underpinned by the effective implementation of the mitigation measures detailed in Section 6.
2. Avoid an adverse impact on habitat connectivity and fauna movement, including koala and wildlife corridors, both on the site of the activity and on adjoining land that is avoided land	The primary connectivity features within the subject land are those areas of native vegetation (also Avoided Land) associated with Badgerys Creek, South Creek and Kemps Creek. As Elizabeth Drive would be widened, the distance between wooded vegetation either side of Elizabeth Drive would increase to an extent (about 100 metres) that the passage of strictly arboreal fauna would be hindered. Accordingly, mitigation measures are proposed (Section 6) with the aim of reducing any potential operational impacts by attempting to maintaining connectivity where possible, including retaining large trees that are greater than or equal to 50 cm diameter at breast height (including dead trees but excluding noxious weeds) where possible and apply tree protection measures for all vegetation to be retained. Injury and mortality. The study area does not contain a recognised fauna corridor or a corridor for Koala, protected under the CPCP. Common species, such as macropods, are most likely to use the above corridors, including traversing underneath the existing bridges, and given their mobility are likely to still do so post-construction.
3. Avoid an adverse impact on the integrity and resilience of the biophysical, ecological, and hydrological environments, including surface and groundwater, and the quality of the natural flow of water in a riparian corridor	It is not anticipated that the proposal would adversely impact upon components listed in this criterion, and in the case of surface water quality, is likely to have a beneficial effect post-construction via improvement of the current stormwater system.
4. Avoid an adverse impact on MNES referred to in Chapter 2, Part 3, Division 1 of the EPBC Act	A significant impact to any MNES is not considered likely. Detailed survey for EPBC Act listed threatened species was undertaken in November 2023. The distribution of EPBC Act listed TECs assessed in this BAR is precautionary. Those areas of EPBC Act listed TECs that remain are not anticipated to be significantly impacted given the linear nature of the proposal is inherently unlikely to remove substantial areas of whole patches.
5. Install temporary koala-exclusion fencing before construction in areas identified as koala habitat	No Koala habitat mapped and protected by the CPCP is present within the study area. A such, this criterion does not apply.

protected by the CPCP and maintain the integrity of any existing koala-exclusion fencing	
6. Design linear infrastructure to include appropriate access treatments such as gates or koala bridges to ensure the integrity and connectivity of koala corridors and habitat protected under the CPCP is maintained.	No Koala habitat mapped and protected by the CPCP is present within the study area. A such, this criterion does not apply.

5.6 Comparison of impacts from September 2023 BAR and Current BAR

Table 5-9 provides a comparison of the impacts identified in the September 2023 BAR, and the revised impacts which are presented in the current BAR (informed by additional survey effort and assessment).

Table 5-9: Comparison of impacts from September 2023 BAR and Current BAR

Biodiversity value	Sept 2023 BAR Impacts	Jan 2024 BAR Impacts
PCT 724, BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion	1.52 ha	1.37 ha
PCT 724, EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	1.74 ha	0.75 ha
PCT 725, BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion, and EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	1.76 ha	1.76 ha
PCT 781, BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.10 ha	0.1 ha
PCT 835, BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	4.55 ha	2.81 ha
PCT 835 EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	4.71 ha	1.86 ha
PCT 849 BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion	7.74 ha	6.22 ha
PCT 849 EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	7.74 ha	6.09 ha
PCT 883: BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion, and EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	0.82 ha	0.82 ha
PCT 1800, BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	1.81 ha	1.48 ha

PCT 1800 EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	1.84 ha	1.36 ha
Dillwynia tenuifolia (BC Act, Endangered Population)	30-40 individuals	15 individuals recorded, and 13 individuals (2.58 ha) impacted
Likely foraging and roosting activity of Southern Myotis Myotis macropus (BC Act, Vulnerable)	1.88 ha	11.17 ha impacted
Presence of two ecosystem credit (BAM) threatened microbats, Eastern Coastal Free-tailed Bat Micronomus norfolkensis (Vulnerable, BC Act) and Greater Broad-nosed Bat Scoteanax rueppellii (Vulnerable, BC Act)	18.32 ha	14.57 ha
Habitat for, and historical presence of Cumberland Plain Land Snail Meridolum corneovirens (BC Act, Endangered)	11.9 ha	3.78 ha
Hollow-bearing trees (HBTs) containing a range of small to medium hollows, decorticating bark and fissuring	35 hollow bearing trees	40 hollow bearing trees recorded in the study area, 34 recorded in the subject land and 17 hollow bearing trees within non-certified lands.
Existing non-certified lands mapped as ENV which are subject to RBM 8 and 11	4.15 ha	4.16 ha
Impacts to an important population of Pultenaea parviflora (EPBC Act, Vulnerable)	3.9 ha	2.71 ha
Habitat for five threatened species considered to have a 'Moderate' or higher likelihood of occurring	45.93 ha	14.57 ha
Total area of native vegetation to be removed	18.32 ha	14.57 ha
Total area of BC Act TECs to be removed	18.32 ha	14.57 ha
Total area of EPBC Act TECs to be removed	18.71 ha	12.63 ha

6. Mitigation

6.1 Mitigation measures

Mitigation measures recommended for the proposal are detailed in Table 6-1. Note that the residual impacts column refers to impacts assessed under the BC Act. A complete, final list of mitigation measures is included in Chapter 6 of the Elizabeth Drive East Upgrade Submissions Report (Transport, 2024).

Mitigation measures have been updated since the September 2023 revision of the BAR to reflect the assessment findings of the revised BAR. Additions to existing mitigation measures are shown in **bold text**, with deletions shown with a ~~strikethrough~~.

Table 6-1: Mitigation measures

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
B01	Removal of native vegetation	Measures to further avoid and minimise native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible	Detailed design	Effective	14.57 ha of native vegetation and TEC	Transport/Contractor
B02		Pre-clearing surveys will be carried out in accordance with ***Guide 1: Pre-clearing process*** **of the** ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Guide 1: Pre-clearing process* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*~~	Prior to construction	Effective	14.57 ha of native vegetation and TEC	Transport/Contractor
B03		Native vegetation and flora and fauna habitat removal will be carried out in accordance with ***Guide 4: Clearing of vegetation and removal of bushrock*** **of the** ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Guide 4: Clearing of vegetation and removal of bushrock* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*~~	During construction	Effective	14.57 ha of native vegetation and TEC	Transport/Contractor
B04		Native vegetation will be re-established in accordance with ***Guide 3: Re-establishment of native vegetation*** **of the** ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Guide 3: Re-establishment of native vegetation* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*~~	Post construction	Effective	14.57 ha of native vegetation and TEC	Transport/Contractor
B05		The unexpected species find procedure is to be followed under ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*~~ if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site.	During construction	Proven	14.57 ha of native vegetation and TEC	Transport/Contractor
B06		Flora and Fauna Management Plan will be prepared in accordance with Transport for NSW's ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines:*~~	During construction	Proven	14.57 ha of native vegetation and TEC	Transport/Contractor

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
		~~*Protecting and Managing Biodiversity on Projects*~~ and implemented as part of the CEMP. It will include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • Pre-clearing survey requirements • Procedures for unexpected threatened species finds and fauna handling. • Procedures addressing relevant matters specified in the DPI Policy and guidelines for fish habitat conservation and management (2013). • Protocols to manage weeds, pathogens and pest species				
B07		**BAM Plots will be carried out within the subject land to confirm the biodiversity credits required for the project.**	**Detailed design**	**Effective**	**14.57 ha of native vegetation and TEC**	**Transport/Contractor**
~~B07~~	Removal of threatened fauna habitat	~~Targeted surveys will be undertaken as part of detailed design, if not sooner. The results will guide the avoidance and minimisation of threatened fauna habitat removal where it is identified.~~	~~Detailed design~~	~~Effective~~	~~18.32 ha native vegetation, three bridges and numerous culverts removed that are potential microbat habitat, removal of 7 HBTs~~	~~Transport/Contractor~~
B08		~~Targeted surveys to determine the presence of threatened microbats in culvert/bridge etc structures to be removed are to be undertaken as soon as access becomes available.~~ ~~These surveys are required to confirm that direct impacts to important roosting habitat is not likely to occur as a result of the proposal, and to identify the need for mitigation measures to prevent direct impacts to individuals when the structures are to be removed.~~ ~~Should roosting threatened microbats be recorded, Tests of Significance will need to be updated to re-assess the significance of the impacts of the proposal.~~	Detailed design	Effective	No direct impacts to individual microbats. Potential impacts to roost habitat availability	Transport/Contractor

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
		As a roosting population of Southern Myotis was recorded in the eastern bridge above South Creek, a Microbat Management Plan will be prepared and implemented for the proposal. The plan will incorporate recommendations to ensure significant impacts to Southern Myotis are avoided including: • **Installation of temporary habitat alternatives and/or permanent supplementary habitat (bat boxes, roosting opportunities within new bridges)** • **Mitigation measures to minimise impacts of construction noise on roosting bats (noise dampening, containment of bats)** • **Exclusion measures to prevent microbats returning to a bridge to roost during its removal** • **Ongoing monitoring measures pre, during and post construction to assess impacts** • **Requirements to conduct works on roosting habitat or implement any exclusion measures outside of breeding season** • **Recommendations for construction staging and methods to avoid impacts to microbats.** **In addition to the above, the new bridge design will incorporate similar long-term roosting opportunities (for example, suitable roosting gaps in the underside of the bridge).**				
B09		Fauna will be managed in accordance with ***Guide 9: Fauna handling*** **of the** ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Guide 9: Fauna handling* of the *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*~~	During construction	Effective	14.57 ha native vegetation, four bridges and numerous culverts removed that are potential microbat habitat, removal of 9 HBTs on non-certified lands.	Transport/Contractor
B10		Habitat removal will be undertaken in accordance with ***Guide 4: Clearing of vegetation and removal of bushrock*** **of the** ***Biodiversity Management Guideline: Protecting and managing***	During construction	Effective	14.57 ha native vegetation, four bridges and	Transport/Contractor

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
		biodiversity of Transport for NSW projects **(Transport for NSW, 2024)** ~~Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects~~			numerous culverts removed that are potential microbat habitat, removal of 9 HBTs on non-certified lands.	
B11		Habitat will be replaced or re-instated in accordance with Guide 5: Re-use of woody debris and bushrock and Guide 8: **Artificial Hollows** ~~Nest boxes~~ of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects~~	During construction	Proven	14.57 ha native vegetation, four bridges and numerous culverts removed that are potential microbat habitat, removal of 9 HBTs	Transport/Contractor
B12		The unexpected species find procedure is to be followed under Guide 1: Pre-clearing process of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011)~~ if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal site.	During construction	Proven	14.57 ha native vegetation, four bridges and numerous culverts removed that are potential microbat habitat, removal of 9 HBTs on non-certified lands.	Transport/Contractor
B13		Pre-clearing surveys will be undertaken in accordance with ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).~~	During construction	Proven	14.57 ha native vegetation, four bridges and numerous culverts removed that are potential microbat habitat, removal of 9 HBTs on non-certified lands.	Transport/Contractor
B14		Pre-clearing surveys will be undertaken in accordance with *Guide 1: Pre-clearing process* of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW***	During construction	Proven	Loss of approximately 13 *Dillwynia tenuifolia*, removal of modelled threatened flora	Transport/Contractor

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
		projects **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).~~			habitat as detailed in Section 5.1.3.	
B15		The unexpected species find procedure will be followed under *Guide 1: Pre-clearing process* of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011)~~ if threatened flora species, not assessed in the biodiversity assessment, are identified in the proposal site.	During construction	Proven	Loss of approximately 13 *Dillwynia tenuifolia*, removal of modelled threatened flora habitat as detailed in Section 5.1.3. Pre-clearing surveys likely to reveal more threatened flora that would be removed.	Transport/Contractor
B16		**Pre-clearance surveys for Cumberland Plain Land Snail will be carried out, in accordance with an approved Cumberland Plain Land Snail Translocation Plan, prior to removal of vegetation to ensure any individuals are translocated and not impacted by the proposed works**	**Prior to clearing**	**Effective**	**Loss of 3.78 ha of habitat for the Cumberland Plain Land Snail as detailed in Section 5.1.2. Pre-clearing surveys have the potential to identify more individuals.**	**Transport/Contractor**
B17	Aquatic impacts	Impacts to aquatic habitat will be minimised through detailed design.	Detailed design	Effective	Removal of riparian vegetation and temporary disturbance/impact to Key Fish Habitat during construction.	Transport/Contractor
B18		Aquatic habitat will be protected in accordance with *Guide 10: Aquatic habitats and riparian zones* of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011)~~ and Section 3.3.2 *Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013* (DPI (Fisheries NSW) 2013).	During construction	Effective	Removal of riparian vegetation and temporary disturbance/impact to Key Fish Habitat during construction	Transport/Contractor

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
B19		Instream silt curtains will be implemented and maintained for construction in Badgerys Creek, South Creek and Kemps Creek. Silt curtains will be installed such that they do not block fish passage.	During construction	Effective	Removal of riparian vegetation and temporary disturbance/impact to Key Fish Habitat during construction	Transport/Contractor
B20	Groundwater dependent ecosystems	Interruptions to water flows associated with groundwater dependent ecosystems will be minimised through detailed design.	Detailed design	Effective	Minimal, if any	Transport/Contractor
B21	Changes to hydrology	Changes to existing surface water flows will be minimised through detailed design.	Detailed design	Effective	Minimal, if any	Transport/Contractor
B22	Edge effects on adjacent native vegetation and habitat	Exclusion zones will be set up at the limit of clearing in accordance *with Guide 2: Exclusion zones* of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).~~	During construction	Effective	The proposal would 'push back' these edge effected areas in the long-term as weeds colonise previously undisturbed areas.	Transport/Contractor
B23	Injury and mortality of fauna	Fauna will be managed in accordance with *Guide 9: Fauna handling* of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).~~	During construction	Effective	Unknown	Transport/Contractor
B24	Invasion and spread of weeds	Weed species will be managed in accordance *with Guide 6: Weed management* of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).~~	During construction	Effective	Unknown	Transport/Contractor
B25	Invasion and spread of pathogens and disease	Pathogens will be managed in accordance with *Guide 2: Exclusion zones* of the ***Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects*** **(Transport for NSW, 2024)** ~~*Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA 2011).~~	During construction	Effective	Unknown	Transport/Contractor

ID	Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated?	Responsibility
B26	Noise, light, dust and vibration	Shading and artificial light impacts will be minimised through detailed design.	Detailed design	Effective	Unknown	Transport/Contractor
B27	Residual impacts to native flora and fauna	A Biodiversity Offset Strategy will be developed and implemented to facilitate offsetting of impacts that exceed the thresholds within the No Net Loss Guidelines (Transport 2022a) (see Section 7)	Prior to construction	Effective	None	Transport
B28		The requirement to replace trees and hollows in will be calculated accordance with the Tree and Hollow Replacement Guidelines (Transport 2022b). If onsite replacement is sought, a Tree and Hollow Replacement Plan will be prepared (see Section 7) and/or equivalent payment to the Transport Conservation Fund will be made.	Prior to construction	Effective	None	Transport
B29	**Wildlife connectivity and habitat fragmentation**	**Large trees that are greater than or equal to 50 centimetre diameter at breast height (including dead trees but excluding noxious weeds) will be retained possible**	**Detailed design**	**Effective**	**None**	**Transport/Contractor**

6.2 CPCP infrastructure guidelines

Section 3.3 of the infrastructure guidelines details the mitigation requirements for activities carried out under Part 5 of the EP&A Act, proposed on Certified – Urban Capable Land. These are reproduced below, with discussion and the appropriate mitigation measures from Table 6-1 noted. The suite of mitigation measures proposed for the proposal are considered to adequately address the requirements for Section 3.3 of the infrastructure guidelines.

Table 6-2: Assessment against Section 3.3 of the CPCP infrastructure guidelines

Category	Objective	Mitigation Requirement	Proposal consistency
Threatened fauna	Commitment 5: Mitigate indirect and prescribed impacts from infrastructure on threatened ecological communities, species and their habitat. Commitment 7: Mitigate indirect and prescribed impacts from infrastructure on the southern Sydney koala population to best-practice standards and in line with advice from the NSW Chief Scientist and Engineer, and in accordance with Appendix E of the CPCP. Commitment 16: Manage priority pest species in strategic locations in the Cumberland subregion to reduce threats to protected land. Commitment 18: Support new or existing programs to control key diseases affecting threatened species and ecological communities in the Cumberland subregion.	**Habitat features and connectivity** 1. Retain large trees that are greater than or equal to 50 cm diameter at breast height (including dead trees but excluding noxious weeds) where possible and apply tree protection measures for all vegetation to be retained. This is to provide ongoing roosting and foraging opportunities for fauna.	Large trees will be avoided and incorporated into landscaping areas where feasible. Clearing protocols, such as measure to protect vegetation to be retained would be in place in accordance with *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024).
		2. Retain areas of high density Proteaceae shrubs where possible, particularly along riparian corridors, to retain foraging resources, habitat and movement corridors for the Eastern Pygmy-possum.	The study area is not known to contain high density Proteaceae species, though sporadic Hairpin Banksia were noted within bushland west of Bill Anderson Reserve. The proposal would remove a small amount of these resources, however, were this bushland parcel able to support Eastern Pygmy-possum, it would still be able to post-construction.
		3. Before any disturbance, all structures potentially providing habitat for microbats (bridges, culverts, mine shafts, storm water tunnels, old or derelict buildings) must be inspected by a qualified ecologist at an appropriate time of year as part of the Microbat Management Plan. Where microbats are found, the structure providing habitat must not be affected, or a bat management plan must be prepared by a microbat specialist which allows for:	Targeted surveys were undertaken in November 2023 and confirmed the presence of microbats as discussed in Section 3.4. Furthermore, pre-clearing protocols and procedures would be in place in accordance with *Biodiversity Guidelines: Protecting and Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024). A microbat management plan would be prepared as described in Table 6-1.

Category	Objective	Mitigation Requirement	Proposal consistency
		- exclusion mechanisms to reduce the risk of direct physical harm to the microbats; and/or - supplementary habitat to compensate for lost habitat: and/or - regular inspections of structures and briefing of relevant construction staff.	
		Pests 4. Before construction works begin, a pest control strategy must be prepared. This strategy must be implemented during construction and operation of the development. This strategy must include pest control methods that reduce the risk of secondary poisoning (for example, from Pindone or second-generation rodenticides).	An increase in pest animal populations resulting from the proposal is considered unlikely. Therefore, this mitigation requirement is not applicable to the proposal.
		Human disturbance 5. Before vegetation is removed, a suitably qualified ecologist must assess the site and do pre-clearance surveys for koalas. If koalas are identified, implement a tree-felling protocol and translocation plan, as required.	The study area is considered to contain highly sub-optimal Koala habitat. Nevertheless, pre-clearing surveys and felling supervision of habitat trees by a qualified ecologist would be undertaken in accordance with *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024).
		6. For development within koala habitat protected by the CPCP, a management plan must be developed and implemented which includes: - before construction, temporary exclusion fencing to prevent koalas entering the site- measures to ensure the safety of koalas during construction and operation of the infrastructure, including traffic calming measures - hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees.	The study area does not contain any Koala habitat protected by the CPCP. Therefore, this mitigation requirement is not applicable to the proposal. However, mitigation measure to reduce vehicle strike risk to fauna generally, would be in place.

Category	Objective	Mitigation Requirement	Proposal consistency
		7. Above-ground infrastructure must be set back from Grey-headed Flying-fox camps (minimum 100 m where possible) and raptor – bird of prey – nests (minimum 100 m where possible) at a suitable distance. Operational management measures to minimise disturbance to populations and nests must also be implemented.	At the time of writing, the study area is not known to contain Grey-headed Flying-fox camps or raptor nests, and is considered unlikely to do so in the future. Targeted surveys in November did not detect any Grey-headed Flying-fox camps or raptor nests within the subject site.
		8. Where existing koala-exclusion fencing is located, works must ensure the integrity of the koala-exclusion fencing is to be maintained.	At the time of writing, the study area does not contain any Koala exclusion fencing. Were this to change by the time construction begins, the integrity of said fencing would be maintained.
		9. Where linear infrastructure crosses identified koala habitat, the infrastructure must be designed to ensure the functionality and connectivity of the corridor.	The study area does not contain recognised Koala habitat. Therefore, this mitigation requirement is not applicable to the proposal.
		Disease 10. Incorporate best-practice site hygiene protocols to manage the potential spread of pathogens, such as Phytophthora and myrtle rust adjacent to potential habitat for species targeted by the CPCP, including koala use trees from which koalas and the greater glider feed.	Pathogens would be managed in accordance with *Guide 7: Pathogen management* of the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024).
Threatened flora	Commitment 5: Mitigate indirect and prescribed impacts from infrastructure on threatened ecological communities, species and their habitat. Commitment 17: Manage fire in strategic locations in the Cumberland subregion to support the maintenance of biodiversity values on conservation land	**Weed invasion** 1. Implement mitigation measures to manage weeds during construction and operation of the development, taking into account relevant guidance in the CPCP's Weed Control Implementation Strategy.	Weed species would be managed in accordance with *Guide 6: Weed management* of the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024).
		Altered fire regime 2. Fire hazard management within asset protection zones is to be designed to protect existing *Pimelea spicata* individuals and be sympathetic to the ongoing recruitment of new	*Pimelea spicata* is not known to occur within the study area or in sufficient proximity such that recruitment of new individuals into the study area could realistically take place. Currently, this

Category	Objective	Mitigation Requirement	Proposal consistency
		individuals of this species to ensure its ongoing protection.	mitigation requirement is not applicable to the proposal.
Threatened ecological communities (TEC)	Commitment 5: Mitigate indirect and prescribed impacts from infrastructure on threatened ecological communities, species and their habitat Commitment 18: Support new or existing programs to control key diseases affecting threatened species and ecological communities in the Cumberland subregion.	**Habitat features and connectivity** 1. When works are likely to have indirect impacts on Cooks River/Castlereagh Ironbark Forest, undertake mitigation in accordance with best-practice guidelines (for example, Cooks River/Castlereagh Ironbark Forest – NSW DECC, 2008) within and adjacent to the TEC.	Removal of 1.76 ha of Cooks River/Castlereagh Ironbark Forest is proposed within bushland west of Bill Anderson Reserve. A suite of mitigation measures will be put in place to minimise indirect impacts to this TEC, including B01 – B06, B20, B22, B23, B25, B27.
		Disease 2. Incorporate best-practice site hygiene protocols to manage the potential spread of pathogens, such as Phytophthora and myrtle rust adjacent to potential habitat for TECs.	Pathogens would be managed in accordance with *Guide 7 Pathogen management* of the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024).
Other protected matters	Commitment 5: Mitigate indirect and prescribed impacts from infrastructure on TEC, species and their habitat.	**Habitat features and connectivity** 1. Development adjacent to the southern and western boundaries of Commonwealth land comprising the Orchid Hills Defense Establishment must mitigate impacts on surface water flows and the water quality of Blaxland Creek.	The study area is not adjacent to the Orchard Hills Defense Establishment. Therefore, this mitigation requirement is not applicable to the proposal.

Table 6-3 CPCP Mitigation Requirements for activities carried out on Certified - Urban Capable Land

Category	Mitigation requirements	Corresponding Transport Mitigation Measures
Threatened fauna	**Habitat features and connectivity** 1. Retain large trees that are greater than or equal to 50 cm diameter at breast height (including dead trees but excluding noxious weeds) where possible and apply tree protection measures for all vegetation to be retained. This is to provide ongoing roosting and foraging opportunities for fauna. 2. Retain areas of high density Proteaceae shrubs where possible, particularly along riparian corridors, to retain foraging resources, habitat and movement corridors for the Eastern Pygmy-possum.	B01, B06– B12, B27

Category	Mitigation requirements	Corresponding Transport Mitigation Measures
	3. Before any disturbance, all structures potentially providing habitat for microbats (bridges, culverts, mine shafts, storm water tunnels, old or derelict buildings) must be inspected by a qualified ecologist at an appropriate time of year. Where microbats are found, the structure providing habitat must not be affected, or a bat management plan must be prepared by a microbat specialist which allows for: ▪ exclusion mechanisms to reduce the risk of direct physical harm to the microbats; and/or ▪ supplementary habitat to compensate for lost habitat: and/or ▪ regular inspections of structures and briefing of relevant construction staff	
	Pests 4. Before construction works begin, a pest control strategy must be prepared. This strategy must be implemented during construction and operation of the development. This strategy must include pest control methods that reduce the risk of secondary poisoning (for example, from Pindone or second-generation rodenticides).	B23
	Human disturbance 5. Before vegetation is removed, a suitably qualified ecologist must assess the site and do pre-clearance surveys for koalas. If koalas are identified, implement a tree-felling protocol and translocation plan, as required. 6. For development within koala habitat protected by the CPCP, a management plan must be developed and implemented which includes: ▪ before construction, temporary exclusion fencing to prevent koalas entering the site measures to ensure the safety of koalas during construction and operation of the infrastructure, including traffic calming measures ▪ hygiene procedures to prevent the spread of vegetation pathogens to koala habitat trees. 7. Above-ground infrastructure must be set back from Grey-headed flying fox camps (minimum 100 m where possible) and raptor – bird of prey – nests (minimum 100 m where possible) at a suitable distance. Operational management measures to minimise disturbance to populations and nests must also be implemented. 8. Where existing koala-exclusion fencing is located, works must ensure the integrity of the koala-exclusion fencing is to be maintained. **9.** Where linear infrastructure crosses identified koala habitat, the infrastructure must be designed to ensure the functionality and connectivity of the corridor.	B08 allows for pre-clearance surveys. A Flora and Fauna Management Plan would be prepared as part of B06. No Koala habitat protected by the CPCP is present within the study area, therefore a specific Koala management plan and koala specific mitigation measures are not required. B12 would facilitate avoidance of Grey-headed Flying-fox camps and raptor nests if present, however surveys have been undertaken and neither were identified. If Grey-headed flying fox camps and raptor – bird of prey – nests are located during pre-clearance surveys Transport are committed to minimising impacts and ensuring suitable setbacks are implemented as far as is practicable.
	Disease	B23

Category	Mitigation requirements	Corresponding Transport Mitigation Measures
	10. Incorporate best-practice site hygiene protocols to manage the potential spread of pathogens, such as *Phytophthora* and myrtle rust adjacent to potential habitat for species targeted by the CPCP, including koala use trees from which koalas and the greater glider feed.	
Threatened flora	**Weed Invasion** 1. Implement mitigation measures to manage weeds during construction and operation of the development, taking into account relevant guidance in the CPCP's Weed Control Implementation Strategy.	B22
	Altered Fire Regime 2. Fire hazard management within asset protection zones is to be designed to protect existing *Pimelea spicata* individuals and be sympathetic to the ongoing recruitment of new individuals of this species to ensure its ongoing protection.	*Pimelea spicata* is not known to be present. If B05 records this species, this measure would apply.
Threatened Ecological Communities	**Habitat features and connectivity** 1. When works are likely to have indirect impacts on Cooks River/Castlereagh Ironbark Forest, undertake mitigation in accordance with best-practice guidelines within and adjacent to the TEC .	B01 – B06, B20, B22, B23, B25, B27
	Disease 2. Incorporate best-practice site hygiene protocols to manage the potential spread of pathogens, such as *Phytophthora* and myrtle rust adjacent to potential habitat for TECs.	B23
Other protected matters	**Habitat features and connectivity** 1. Development adjacent to the southern and western boundaries of Commonwealth land comprising the Orchid Hills Defence Establishment must mitigate impacts on surface water flows and the water quality of Blaxland Creek.	Not applicable given the location of the proposal.

7. Offsets and other measures

This section considers whether any impacts require the provision of biodiversity offsets, conservation measures or tree and hollow replacement in accordance with the Transport:

- No Net Loss Guidelines (Transport 2022a) and supporting resources, and
- Tree and Hollow Replacement Guidelines (Transport 2022b) and supporting resources.

The preliminary offset calculations have been updated in the revised BAR to reflect the results of additional survey effort carried out in October / November 2023.

7.1 Thresholds

The thresholds set out by the No Net Loss Guidelines are demonstrated in Table 7-1.

Table 7-1: Offset thresholds (Transport No Net Loss Guidelines)

Category	Impact	Threshold
A – Threatened Ecological Communities		
A1	Works involving clearing of a CEEC	Where there is any clearing of a CEEC in 'moderate to good' condition
A2	Works involving clearing of an EEC	Where clearing of a EEC ≥ 2 ha in 'moderate to good' condition
A3	Works involving clearing of VEC	Where clearing of VEC ≥ 5 ha in 'moderate to good' condition
B – Threatened fauna habitat		
B1	Works involving clearing of threatened ecosystem-credit fauna habitat that is also a TEC identified in Category A	No – covered by TEC thresholds
B2	Works involving clearing of any habitat for a known species credit fauna species or clearing of breeding habitat (as defined by the TBDC) for dual-credit fauna species (excluding exotic and planted vegetation that cannot be assigned to a plant community type)	Where clearing ≥ 1 ha in 'moderate to good' condition
C- Threatened flora and habitat		
C1	Works involving removal of known threatened flora species and their habitat	Where loss of individuals is ≥ 10 (species that have a 'count of individuals' as the unit of measure) or where clearing of habitat (calculated by a species polygon in accordance with the BAM) is ≥ 1 ha
D – Key Fish Habitat		
D1	Type 1 or Type 2 key fish habitats	Where there is a net loss of habitat
Tree and Hollow Replacement		

	Any residual biodiversity impact that doesn't require offsets in accordance with the No Net Loss Guideline is to be assessed against the requirements of the Tree and Hollow Replacement Guideline.	**Any clearing of hollows and/or trees ≥5cm DBH**

EEC = Endangered Ecological Community, CEEC = Critically Endangered Ecological Community, VEC = Vulnerable Ecological Community

Table 7-2 details the assessment of direct impacts to native vegetation and habitat against the above thresholds. The category of each threshold that has been triggered is quoted as well as the applicable threatened entity.

Category A1 has been triggered for clearing of an CEEC in 'moderate to good' condition. Of the total 14.57 ha being impacted, 11.31 ha is triggered under this threshold.

Category B2 has been triggered for cumulative impacts ≥ 1 ha (Table 5-2) to Cumberland Plain Land Snail and Southern Myotis.

Category C1 has also been triggered for cumulative impacts ≥ 1 ha (Table 5-3) Dillwynia tenuifolia – endangered population.

Table 7-2: Assessment of vegetation impacts against thresholds

Veg. zone	Plant community type (PCT)	Condition	TEC	Impact area (ha)[1]	Threshold triggered?
Zone 1_Intact	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion, AND EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	0.41	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail and Southern Myotis) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 2_Scattered Trees	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	0.54	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail and Southern Myotis) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 3_Thinned	724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	0.42	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail) C1- threatened flora with cumulative impacts ≥ 1 ha

Veg. zone	Plant community type (PCT)	Condition	TEC	Impact area (ha)[1]	Threshold triggered?
Zone 4_Intact	725: Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	1.76	A1 - CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 5_Disturbed	781: Coastal freshwater wetland	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	B2- threatened fauna with cumulative impacts ≥ 1 ha (Southern Myotis) Tree and Hollow replacement for areas not covered by a species polygon (0.08 ha)
Zone 6_Intact	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	0.39	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail and Southern Myotis) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 7_Scattered Trees	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	0.97	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail and Southern Myotis) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 8_Thinned	835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the	Moderate to good – above BAM condition	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales	0.75	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha

Veg. zone	Plant community type (PCT)	Condition	TEC	Impact area (ha)[1]	Threshold triggered?
	Cumberland Plain, Sydney Basin Bioregion	threshold VI score of 15	North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria		(Cumberland Plain Land Snail and Southern Myotis) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 9_Intact	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	2.33	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 10_Scattered Trees	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	2.23	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 11_Thinned	849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	1.51	A1 – CEEC B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail) C1- threatened flora with cumulative impacts ≥ 1 ha
Zone 12_Intact	883: Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly	0.82	B2- threatened fauna with cumulative impacts ≥ 1 ha (Cumberland Plain Land Snail) C1- threatened flora with cumulative impacts ≥ 1 ha

Veg. zone	Plant community type (PCT)	Condition	TEC	Impact area (ha)[1]	Threshold triggered?
			Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion		
Zone 13_Intact	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.	0.51	B2- threatened fauna with cumulative impacts ≥ 1 ha (Southern Myotis) C1- threatened flora with cumulative impacts ≥ 1 ha Tree and Hollow replacement for areas not covered by a species polygon (0.14 ha)
Zone 14_Thinned	1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Moderate to good – above BAM condition threshold VI score of 15	BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community.	0.97	B2- threatened fauna with cumulative impacts ≥ 1 ha (Southern Myotis) C1- threatened flora with cumulative impacts ≥ 1 ha

7.2 Preliminary offset calculations

Preliminary calculations of offsets for each threshold category triggered above are provided in Table 7-3 and Table 7-4. Calculations for impacts to ecosystem and species credit species have been calculated using the BAM Calculator. The impacts to vegetation mapped as ENV under the Biocertification Order (DECCW 2007) have been included in the calculations in Table 7-3, however, a separate offsetting mechanism for the ENV mapped areas also applies (see Section 7.4). Impacts to vegetation mapped as ENV have been evaluated below in Section 7.4.

It should be noted, based on TfNSW No Net Loss Guidelines Threshold triggers, only impacts to PCT 724, PCT 725, PCT 835 and PCT 849 require offsets (ecosystem credits), as described in Table 7-2.

Table 7-3: Preliminary ecosystem credit calculations for impacts to threatened ecological communities

Plant community type	BC Act	EPBC Act	VI score	BRW	HBT	Impact (ha)*	Ecosystem credits
724: Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the	BC Act, Endangered - Shale Gravel Transition Forest	EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands	24.8 – 48.7	2	Yes	1.37	25

Plant community type	BC Act	EPBC Act	VI score	BRW	HBT	Impact (ha)*	Ecosystem credits
Cumberland Plain, Sydney Basin Bioregion	in the Sydney Basin Bioregion.	and Shale-Gravel Transition Forest					
725: Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion.	EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	69.9	2	Yes	1.76	61
835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.	EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	40.8 - 70	2	Yes	2.81	56
849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion.	EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	17.5 – 41.2	2.5	Yes	6.22	109
Total ecosystem credits							251

VI = Vegetation Integrity, BRW = Biodiversity Risk Weighting, HBT = Hollow-bearing tree
*Impacts in this table exclude land mapped as ENV under the Biocertification Order (DECCW 2007)

Table 7-4: Preliminary credit calculations for impacts to species-credit species

Species name	EPBC Act	BC Act	Impact (ha)	Species credits
Dillwynia tenuifolia – endangered population		E2	2.58	83
Cumberland Plain Land Snail *Meridolum corneovirens*		EN	3.78	122
Southern Myotis *Myotis macropus*		VU	11.17	231
Total species credits				436

7.3 Biodiversity offset strategy/tree and hollow replacement plan

As biodiversity offsetting thresholds have been reached under the No Net Loss Guidelines, offsets or conservation measures are required. In accordance with the No Net Loss Guidelines, a detailed Biodiversity Offset strategy is to be developed to outline how the proposal would address the offsetting requirements of these residual impacts.

For impacts to vegetation that would not otherwise be offset via the Biodiversity Offset Strategy, the Tree and Hollow Replacement Guidelines would apply. This includes PCT 781 (Zone 5) and the portions of PCT 1800 (Zone 13 and 14) that are not offset via a threatened species polygon. Areas mapped as Urban Native/Exotic would also require consideration for trees that qualify under the guidelines.

A Tree and Hollow Replacement Plan would be prepared to address the impacts prior to the commencement of works. Where tree and hollow replacement cannot be accommodated locally or can only be partially accommodated, payment must be made to the Transport of NSW Conservation Fund prior to the commencement of works in accordance with the Transport for NSW (2022b) Tree and hollow replacement guidelines.

7.4 SEPP Precincts – Western Parkland City 2021

The *Order to confer biodiversity certification on the SEPP (Sydney Region Growth Centres) 2006* (DECCW 2007) outlines 41 conditions, known as the RBMs, to ensure consistency with the biodiversity certification for the growth centres during future development. RBMs 8,11 and 12are relevant to the proposal and pertain to the removal of vegetation in non-certified land.

RBM 8 relates to the removal of 'existing native vegetation' from Existing Non-Certified land and provides details on offsetting requirements for any impacts that may occur.

RBM 8 states that the clearing of any existing native vegetation in the Existing Non-Certified land will be offset by:

a) the protection of an equal or greater area of existing native vegetation elsewhere in the Growth Centres; and/or

b) the revegetation and/or restoration of an area of land elsewhere in the Growth Centres, subject to a number of additional conditions relating to the protection, size, ongoing management, and any potential additionality of proposed revegetation/restoration.

RBM 12 states: '*Notwithstanding any other conditions of biodiversity certification, in the lands marked by a red hatching on the biodiversity certification maps existing native vegetation must not be cleared unless it is in accordance with a plan of management or unless such clearance has been agreed to by the DECC* (now NSW DCCEEW)'.

The proposal would impact upon 4.16 hectares of existing native vegetation (ENV) on existing non-certified lands, subject to RBMs 8 and RBM 11, 3.56 hectares of which are subject to RBM 12, where the subject land crosses Kemps Creek and intersects a patch of bushland west of Bill Anderson Reserve (Figure 3-1, pages 5-7). This ENV would require offsetting in accordance with the Biodiversity Certification Order.

Transport is committed to securing offsets for this residual impact to existing native vegetation, as defined in the Biodiversity Certification Order, in accordance with RBMs 8 and 11.

8. Conclusion

Through a combination of on-ground assessment and use of data prepared by Biosis and BAM species experts for the CPCP, the study area was found to contain a range of biodiversity values including:

- Seven PCTs covering 41.49 ha in moderate-good condition
- Seven BC Act and five EPBC Act listed TECs
  - PCT 724: BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
  - PCT 725: BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion
  - PCT 781: BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
  - PCT 835: BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
  - PCT 849: BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion. EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
  - PCT 883: BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion. EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion
  - PCT 1800: BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community
- At least 15 individuals of *Dillwynia tenuifolia* (BC Act, Endangered Population)
- Up to 41.49 ha of habitat for five threatened fauna species considered to have a 'Moderate' or higher likelihood of occurring including woodland birds, microbats and Cumberland Plain Land Snail
- At least 40 HBTs containing a range of small to medium hollows, decorticating bark and fissuring
- Three waterways, that in lieu of detailed aquatic survey, are considered to constitute Key Fish Habitat
- Four bridges and numerous culverts that likely provide habitat for threatened and non-threatened microbats
- Three wildlife corridors within the native vegetation associated with Badgerys Creek, South Creek and Kemps Creek

Following efforts to avoid and minimise, the proposal would result in the following residual impacts within non biodiversity certified lands to native vegetation and well as NSW and nationally listed biodiversity values:

- Clearing of up to 14.57 ha of native vegetation comprising the following TECs (note the same patch of vegetation may represent one or both of a BC Act and an EPBC Act TEC, each with different total areas impacted):
  - 1.37 ha of PCT 724, BC Act, Endangered - Shale Gravel Transition Forest in the Sydney Basin Bioregion
  - 0.75 ha of PCT 724, EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
  - 1.76 ha of PCT 725, BC Act, Endangered - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion, and EPBC Act, Critically Endangered - Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion
  - 0.10 ha of PCT 781, BC Act, Endangered - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
  - 2.81 ha of PCT 835, BC Act, Endangered - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
  - 1.86 ha of PCT 835 EPBC Act, Critically Endangered - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

  - 6.22 ha of PCT 849 BC Act, Critically Endangered - Cumberland Plain Woodland in the Sydney Basin Bioregion
  - 6.09 ha of PCT 849 EPBC Act, Critically Endangered - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest
  - 0.82 ha of PCT 883: BC Act, Vulnerable - Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion, and EPBC Act, Endangered - Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion
  - 1.48 ha of PCT 1800, BC Act, Endangered - Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
  - 1.36 ha of PCT 1800 EPBC Act, Endangered - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community
- Removal of 4.16 ha of ENV on 'Existing non-certified' lands, subject to RBM 8 and 11
- Removal of 3.56 ha of ENV on 'Existing non-certified' lands, subject to RBM 12
- Removal of at least 13 individuals and 2.58 ha of habitat for *Dillwynia tenuifolia.*
- Impacts, at minimum, habitat removal, to an important population of *Pultenaea parviflora* (EPBC Act, Vulnerable)
- Removal of up to 14.57 ha of habitat for five threatened fauna including Southern Myotis and Cumberland Plain Land Snail which were recorded.
- Removal of at least 17 HBTs containing small to medium size hollows that may be used by smaller hollow-dependent fauna such as Gliders, microbats and birds.
- Increased impacts to three riparian wildlife corridors (Badgerys Creek, South Creek and Kemps Creek) by increasing the canopy gap across Elizabeth Drive from about 10 metres to over 100 metres in some locations.
- Impacts to four bridges and numerous culverts that may provide habitat for threatened and non-threatened microbats.

In accordance with Transport No Net Loss Guidelines (Transport 2022a), the proposal would trigger the consideration of offsets or conservation measures to offset impacts to the PCTs/TECs and BAM species credit species detailed in Section 7.2. Outside of the areas that would be otherwise offset via these PCTs and species credit species, the Tree and Hollow Replacement Guidelines (Transport 2022b) apply whereby a Tree and Hollow Replacement Plan would be developed or payment made into the Transport Conservation Fund.

Appropriate significant impact assessments were undertaken for threatened species and ecological communities either recorded or considered as having a moderate or higher likelihood of occurring. These assessments concluded that the proposal is unlikely to have a significant impact on any NSW or nationally listed entities. This finding is underpinned on the effective application of measures to avoid said impact. Furthermore, it is anticipated that as design progresses, the level of impact to threatened entities would continue to be reduced from the levels assessed in this BAR. Therefore, Transport is not required to prepare a SIS or BDAR.

With the effective implementation of safeguards and mitigation measures identified in this BAR, risk of impacts to biodiversity can be mitigated to an acceptable level.

9. Glossary

Term	Definition
Accredited person or assessor	Means as person accredited under section 6.10 (of the BC Act) to prepare reports in accordance with the BAM.
Biodiversity Assessment Method	The Biodiversity Assessment Method is established under section 6.7 of the BC Act. The BAM is established for the purpose of assessing certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values.
Biodiversity Assessment Method Calculator	Biodiversity Assessment Method Calculator (BAM-C) – the online computer program that provides decision support to assessors and proponents by applying the BAM and referred to as the BAM-C. The BAM-C contains biodiversity data from the BioNet Vegetation Classification and the Threatened Biodiversity Data Collection that the assessor is required to use in a BAM assessment. The BAM-C applies the equations used in the BAM, including those to determine the number and class of biodiversity credits required to offset the impacts of a development, or created at a biodiversity stewardship site. It is published by the Department (DPIE 2020a).
Biodiversity credit report	The report produced by the BAM-C that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site (DPIE 2020a).
Biodiversity offsets	The gain in biodiversity values achieved from the implementation of management actions on areas of land, to compensate for losses to biodiversity values from the impacts of development (DPIE 2020a).
Biodiversity risk weighting	A factor of the formulas used by the BAM to calculate credits. The biodiversity risk weighting (BRW) is a score given to each vegetation zone and species based on the 'sensitivity to loss' versus the 'sensitivity to gain'. The value is set for threatened species and listed in the TBDC. The BRW for vegetation is calculated for each vegetation zone by the BAM-C using a factor of the 'sensitivity to loss' of the PCT or TEC (located in the BioNet vegetation classification) and the 'sensitivity to gain' of the ecosystem credit species (in the TBDC) that are predicted to occur.
BioNet Atlas	The DPIE database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the BC Act) and some fish (DPIE 2020a).
BioNet Vegetation classification	Refers to the vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. Refer About BioNet Vegetation Classification | NSW Environment and Heritage (DPE 2020a).
Construction footprint	The area to be directly impacted by the proposal during construction activities. See also definition for subject land.
Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.

Direct impact	Direct impacts on biodiversity values include those related to clearing native vegetation and threatened species habitat and impacts on biodiversity values prescribed by the Biodiversity Conservation Regulation 2017 (the BC Regulation) (DPIE 2020a).
Ecosystem credit species	Threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for ecosystem credits. This is analogous with the definition of 'predicted species'.
Ecosystem credits	A measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development, activity, clearing or biodiversity certification site and the gain in biodiversity values at a biodiversity stewardship site (DPIE 2020a).
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component (DPIE 2020a).
Indirect impact	Impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish). This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts (DPIE 2020a).
Local population	The population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions: – *The local population of a threatened plant species comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area.* – *The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area.* – *The local population of migratory or nomadic fauna species comprises those individuals that are likely to occur in the study area from time to time or return year to year (OEH 2018).*
Matter of national environmental significance	A matter of national environmental significance (MNES) is any of the nine defined components protected by a provision of Part 3 of the EPBC Act (Commonwealth).
Mitigation	Action to reduce the severity of an impact.
Native vegetation	Has the same meaning as in section 1.6 of the BC Act and section 60B of the LLS Act. In summary, • trees (including any sapling or shrub or any scrub) • understorey plants • groundcover (being any type of herbaceous vegetation) • plants occurring in a wetland. A plant is native to New South Wales if it was established in New South Wales before European settlement (BC Act). Native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). Marine vegetation is covered by the provisions of the FM Act.
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (DPIE 2020a).

Operational footprint	The area that would be subject to ongoing operational impacts from the proposal. This includes the road, surrounding safety verges and infrastructure, fauna connectivity structures and maintenance access tracks and compounds.
Patch size	An area of native vegetation that: – *occurs on the development site or biodiversity stewardship site* – *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).* Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site (DPIE 2020a).
Population	A group of organisms, all of the same species, occupying a particular area (DPIE 2020a).
Spatial datasets	Spatial databases required to prepare a BAR – *BioNet NSW (Mitchell) Landscapes – Version 3.1* – *NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7* – *NSW soil profiles* – *hydrogeological landscapes* – *acid sulfate soils risk* – *digital cadastral database* – *Vegetation Information Systems maps* – *Geological sites of NSW.*
Species credit species	Threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits (DPIE 2020a). This is analogous with the definition of 'candidate species'.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection (DPIE 2020a).
Species polygon	An area of land identified in Chapter 5 (of the BAM) that contains habitat or is occupied by a threatened species (DPIE 2020a).
Study area	The area directly affected by the proposal (subject land or construction footprint) and any additional areas likely to be affected by the proposal, either directly or indirectly.
Subject land	Land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the landscape assessment area which surrounds the subject land (i.e., the area of land in the 1500 m buffer zone around the subject land or 500m buffer zone for linear proposals). In the case of a biodiversity certification proposal, subject land includes the biodiversity certification assessment area (DPIE 2020a). See also definition for construction footprint.
Threatened Biodiversity Data Collection	A publicly assessable online database (registration required) which contains information for listed threatened species, populations and ecological communities (DPIE 2020a). Part of the BioNet database, published by the Ecology and Heritage Group and accessible from the BioNet website at www.bionet.nsw.gov.au.
Vegetation integrity (score)	The condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT. The vegetation integrity score is the quantitative measure of vegetation condition calculated by the BAM-C (DPIE 2020a).
Vegetation zone	A relatively homogeneous area of native vegetation on a development site, clearing site, land to be biodiversity certified or biodiversity stewardship site that is the same PCT and has the same broad condition state (DPIE 2020a).

10. Abbreviations

Term	Definition
AOBV	Area of Outstanding Biodiversity Value
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
BOS	Biodiversity Offset Scheme
BRW	Biodiversity risk weighting
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
Cth DCCEEW	Australian Commonwealth Department of Climate Change, Energy, the Environment and Water
DIWA	Directory of Important Wetlands in Australia
DPE	Department of Planning and Environment
DPI	Department of Primary Industries
EEC	Endangered ecological community
EHG	NSW Environment and Heritage Group within the Department of Planning and Environment
EP&A Act	*Environment Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
Fisheries NSW Policy and guidelines	Fisheries NSW Policy and guidelines for fish habitat conservation and management (Update 2013)
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater dependent ecosystems
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of national environmental significance
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
PCT	Plant community type
PMST	Protected Matters Search Tool
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TBDC	Threatened Biodiversity Data Collection
TECs	Threatened ecological communities (VECs, EECs and CEECs)
Transport	Transport for NSW
VEC	Vulnerable Ecological Community

11. References

Transport (2022a), No Net Loss Guidelines

Transport (2022b), Tree and Hollow Replacement Guidelines

Transport (2024), Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects.

Appendix A: Species recorded

Recorded flora

Scientific name	Common name	Status		Incidental observation
		BC Act	EPBC Act	
Acacia falcata	-			X
Acacia parramattensis	Parramatta Wattle			X
*Ageratina adenophora**	Crofton Weed			X
*Anredera cordifolia**	Madeira Vine			X
*Asparagus aethiopicus**	Asparagus fern			X
*Asparagus asparagoides**	Bridal Creeper			X
Bursaria spinosa	Native Blackthorn			X
Casuarina glauca	Swamp Oak			X
*Cestrum parqui**	Green Cestrum			X
*Chloris gayana**	Rhodes Grass			X
Clematis aristata	Old Man's Beard			X
Commelina cyanea	Native Wandering Jew			X
Dillwynia tenuifolia	-	E2		X
Ehrharta erecta	Panic Veldtgrass			X
Einadia hastata	Berry Saltbush			X
Eucalyptus amplifolia	Cabbage Gum			X
Eucalyptus tereticornis	Forest Red Gum			X
Galium spp.	-			X
Geranium solanderi	Native Geranium			X
Juncus usitatus	-			X
*Lantana camara**	Lantana			X
*Ligustrum lucidum**	Large-leaved Privet			X
*Ligustrum sinense**	Small-leaved Privet			X
*Lonicera japonica**	Japanese Honeysuckle			X
*Lycium ferocissimum**	African Boxthorn			X
Melaleuca squarrosa	Scented Paperbark			X

Microlaena stipoides	Weeping Grass			X
Olea europaea subsp. *cuspidata**	African Olive			X
Oplismenus hirtellus	-			X
Persicaria decipiens	Slender Knotweed			X
*Senecio madagascariensis**	Fireweed			X
*Sida rhombifolia**	Paddy's Lucerne			X
*Solanum pseudocapsicum**	Madeira Winter Cherry			X
*Sonchus oleraceus**	Common Sowthistle			X
*Tradescantia fluminensis**	Wandering Jew			X
*Zantedeschia aethiopica**	Arum Lily			X

Note: *denotes exotic species.

Recorded fauna

Class	Scientific name	Common name	Status	
			BC Act	EPBC Act
Aves	*Anthochaera carunculata*	Red Wattlebird		
	Coracina novaehollandiae	Black-faced Cuckoo-shrike		
	Corcorax melanorhamphos	White-winged Chough		
	Corvus coronoides	Australian Raven		
	Grallina cyanoleuca	Magpie-lark		
	Malurus cyaneus	Superb Fairy-wren		
	*Manorina melanocephala**	Noisy Miner		
	Petrochelidon nigricans	Tree Martin		
	Psephotus haematonotus	Red-rumped Parrot		
	Rhipidura albiscapa	Grey Fantail		
	Strepera graculina	Pied Currawong		
	*Sturnus vulgaris**	Common Starling		

Amphibians	*Crinia signifera*	Common Eastern Froglet		
	Litoria peronii	Peron's Tree Frog		
Mammals	*Myotis macropus*	Southern Myotis	VU	
	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	VU	
	Scoteanax rueppellii	Greater Broad-nosed Bat	VU	
Invertebrates	*Meridolum corneovirens*	Cumberland Plain Land Snail	VU	

Note: *denotes exotic species.

Appendix B: Habitat suitability assessment

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey or has been recorded within the past five years (known from a reputable source).
High	A species is considered highly likely to occur in the study area if: – *There are previous credible records on BioNet within the study area from the last 10 years and suitable habitat is present.* **OR** – *The species is highly mobile, is dependent on identified suitable habitat within the study area (i.e., for breeding or important life cycle periods such as winter flowering resources) and has been recorded recently (within five years) on BioNet in the locality. This also includes species known or likely to visit the study area during regular seasonal movements or migration.*
Moderate	A species is considered moderately likely to occur in the study area if: – *Any suitable habitat (e.g., foraging) is present in the study area, the species is highly mobile and has been recorded in the locality in the last 10 years on BioNet. The species may be unlikely to maintain sedentary populations, however, may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area.* **OR** – *The species is not highly mobile, is dependent on identified suitable habitat features (e.g., hollows, rocky outcrops) within the study area and has been recorded in the locality in the last 10 years on BioNet.* **OR** – *For flora species that are associated with PCTs in the study area (see TBDC) or have been recorded in the locality in the last 10 years on BioNet – the associated PCT/habitat present in the study area is not degraded and the species was not targeted by surveys in accordance with the BAM and relevant survey guidelines. In addition, for flora species known to occur in disturbed areas (e.g., orchids), records from any time within the locality may warrant inclusion in this category.*
Low	A species is considered to have a low likelihood of occurring in the study area if: – *For highly mobile species, the species may be an occasional visitor, but habitat similar to the study area is widely distributed in the locality, meaning that the species is not dependent (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitats in the study area and the species has not been recorded in the locality in the last 10 years on BioNet.* **OR** – *The species is not highly mobile, is dependent on identified suitable habitat features (e.g., hollows, rocky outcrops) within the study area and has not been recorded in the locality in the last 10 years on BioNet.* **OR** – *For flora species that are associated with PCTs in the study area (see TBDC) and the species was not identified following targeted surveys in accordance with the BAM and relevant survey guidelines. Flora species that have been recorded in the locality on BioNet at any time, associated suitable habitat (see the TBDC) is not present in the study area, though similar habitats of the same vegetation formation is present in the study area.*

Unlikely	Suitable habitat for the species is absent from the study area.

Habitat suitability assessment table

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Plants							
Acacia bynoeana Bynoe's Wattle	VU	EN	Species		Semi prostrate shrub growing in central eastern NSW spanning from the Hunter District, west to the Blue Mountains and south to the Southern Highlands. Grows in a variety of communities including; Southern Tableland Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands and Sydney Coastal Heaths. Prefers open, slightly disturbed sites on sandy soils.	0 – BioNet	Unlikely – not recorded during targeted survey. – CPCP Species polygon intersects the study area
Acacia pubescens Downy Wattle	VU	VU	Species		A spreading shrub primarily confined to the Bankstown-Fairfield-Rookwood area and the Pitt Town area, with outliers at Barden Ridge, Oakdale and Mountain Lagoon. Grows in Cooks/River Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland, usually within roadside and bushland remnants. Grows on shale, sandstone, alluvium and gravely soils, often including ironstone.	353 – BioNet	Low – not recorded during targeted survey
Allocasuarina glareicola	EN	EN	Species		Small, depauperate shrub restricted to a few populations in the Richmond district with an outlier population at Voyager Point in Liverpool. Grows in Castlereagh Woodlands, Cumberland Dry Sclerophyll Forest, Sydney Hinterland Dry Sclerophyll Forest, Sydney Sand Flats Dry Sclerophyll Forests. Grows in lateritic soil.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for *Allocasuarina glareicola* intersects the study area.

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Callistemon linearifolius Netted Bottle Brush		VU	Species		Shrub recorded from the Georges River to the Hawkesbury River, north of the Nelson Bay area and south at Coalcliff in the Illawarra region. Grows on the coast and adjacent ranges in a variety of communities including Cumberland Dry Sclerophyll Forests, Coastal Floodplain Wetlands, Sydney Coastal Heaths and North Coast Wet Sclerophyll Forests.	1 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Netted Bottle Brush intersects the study area.
Cryptostylis hunteriana Leafless Tongue Orchid	VU	VU	Species		Orchid with a distribution spanning from Gibraltar Range National Park southwards to the coastal area near Orbost in Victoria. Grows in a variety of communities including Sydney Coastal Dry Sclerophyll Forests, Coastal Heath Swamps, New England Dry Sclerophyll Forests and Sydney Coastal Heaths. Grows in sandy soils.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Leafless Tongue Orchid intersects the study area.
Cynanchum elegans White-flowered Wax Plant	EN	EN	Species		Climbing vine restricted to eastern NSW from Brunswick Heads to Gerroa in the Illawarra region. Grows in rainforest gully scrub and scree slope on the edge of dry rainforests in a variety of communities including Coastal Floodplain Wetlands, Maritime Grasslands, Coastal Valley Grassy Woodlands and Northern Hinterland Wet Sclerophyll Forests.	1 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon White-flowered Wax Plant intersects the study area.
Dillwynia tenuifolia		E2	Species		Low, spreading shrub restricted to the Cumberland Plain in Western Sydney. Grows in scrubby or heathy areas within a variety of communities including Castlereagh Ironbark Forest, Shale Gravel Transition Forest, Castlereagh Scribbly Gum Woodland and Sydney Hinterland Dry Sclerophyll Forests. Grows on tertiary alluvium, laterised clays and in shale-sandstone transitions.	713 – BioNet	Recorded - in bushland west of Bill Anderson Reserve.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Diuris aequalis Buttercup Doubletail	VU	EN	Species		Terrestrial orchid with a scattered distribution between Kanangra-Boyd National Park south to Bungendore. Grows amongst grass in South East Dry Sclerophyll Forests, Temperate Montane Grasslands, Subalpine Woodlands and Southern Escarpment Wet Sclerophyll Forests.	1 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Buttercup Doubletail intersects the study area.
Genoplesium baueri Bauer's Midge Orchid	EN	EN	Species		Terrestrial orchid with 13 populations totalling 200 plants distributed between Ulladulla and Port Stephens. Grows on moss gardens in a variety of communities including Sydney Coastal Dry sclerophyll Forests, Sydney Coastal Heaths, Sydney Montane Heaths, Southern Lowland Wet Sclerophyll Forests and Sydney Hinterland Dry Sclerophyll Forests. Grows on sandstone substrates	0 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Bauer's Midge Orchid intersects the study area.
Grevillea juniperina* subsp. *juniperina Juniper-leaved Grevillea		VU	Species		Spreading to erect medium sized shrub endemic to Western Sydney with a distribution spanning from Blacktown, Erskine Park, Londonderry and Windsor and outlying populations at Kemps Creek and Pitt Town. Grows at elevations <50 m in Cumberland Plain Woodland, Castlereagh Ironbark Forest, Castlereagh Scribbly Gum Woodland, Shale/Gravel Transition Forest, Sydney Sand Flats Dry Sclerophyll Forests and Coastal Valley Grassy Woodlands. Grows in sandy to clay loam soils and red pseudolateritic gravels derived from Wianamatta Shale and Tertiary Alluvium.	1358 – BioNet	Low – not recorded during targeted survey
Grevillea parviflora* subsp. *parviflora Small-flower Grevillea	VU	VU	Species	N/A	Low spreading to erect shrub sporadically distributed throughout the Sydney Basin, most notably in the Picton, Appin and Bargo regions, in the Cessnock - Kurri Kurri area and isolated populations from Putty to Wyong and Lake	16 – BioNet	Low – not recorded during targeted survey

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Macquarie. Grows in Shale Sandstone Transition Forest, Kurri Sand Swamp Woodland, Corymbia maculata - Angophora costata Open Forest in the Dooralong Area, Sydney Sandstone Ridgetop Woodland at Wedderburn and Cooks River/Castlereagh Ironbark Forest at Kemps Creek. Grows in sandy or light clay soils including tertiary alluviums over thin shales and lateritic ironstone gravels.		
Haloragis exalata* subsp. *exalata Square Raspwort	VU	VU	Species		Small to medium sized shrub found growing in four widely scattered locations in eastern NSW including the central coast, south coast and north western slopes. Grows in damp, protected and shaded areas in riparian zones in a variety of communities including South East Dry Sclerophyll Forests, Coastal Floodplain Wetlands, Montane Bogs and Fens and Northern Warm Temperate Rainforests.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Square Raspwort intersects the study area.
Isotoma fluviatilis* subsp. *fluviatilis	EX		Species		Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone. May be an early successional species that benefits from some disturbance. Possibly out competed when overgrown by some species such as Cynodon dactylon.	8 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon *Isotoma fluviatilis* subsp. *fluviatilis* intersects the study area.
Macadamia integrifolia Macadamia Nut	VU		Species		Medium sized tree found growing from Mount Bauple, near Gympie to Currumbin Valley in the Gold Coast hinterland in south-east Queensland. Occurs in the Northern Rivers region of NSW in	2 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					remnant rainforest, mixed notophyll forest and rainforest margins.		Macadamia Nut intersects the study area.
Marsdenia viridiflora* subsp. *viridiflora Native Pear		E2	Species		Slender climber with twining stems with a scattered distribution within the Prospect, Bankstown, Smithfield, Cabramatta Creek, St Mary's and north from Razorback Range. Grows in vine thickets and open shale woodland in a variety of communities including Cumberland Dry Sclerophyll Forests, Coastal Floodplains Wetlands, Coastal Valley Grassy Woodlands and Dry Rainforests.	342 – BioNet	Low – not recorded during targeted survey
Melaleuca deanei Deane's Paperbark	VU	VU	Species		Medium sized shrub found growing in two distinct populations in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas along with a few outliers at Springwood and in the Wollemi National Park, Yalwal and the Central Coast regions. Grows in ridgetop woodland in a variety of communities including Sydney Coastal Dry Sclerophyll Forests, South East Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands, Sydney Coastal Heaths. Grows on sandstone substrates in alluvial soils.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Deane's Paperbark intersects the study area.
Persicaria elatior Tall Knotweed	VU	VU	Species	Semi-permanent/ephemeral wet areas; or within 50 m| Swamps; or within 50 m| Waterbodies ; including Wetlands, or within 50 m	Erect herb found growing in south-eastern NSW at Moutn Dromedary, Moruya State Forest near Turlinjah, Upper Avon River catchment north of Robertson, Bermagui and Picton Lakes. Also grows in northern NSW around Raymond Terrace near Newcastle and Cherry Tree and Gibberagee State Forests in the Grafton area. Grows in damp places usually on the margins of waterbodies and in swamp forests in a variety of communities including Coastal Floodplain Wetlands, Coastal Swamp	0 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Tall Knotweed intersects the study area.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Forests, Eastern Riverine Forests, Coastal Freshwater Lagoons and Coastal Heath Swamps.		
Persoonia hirsuta Hairy Geebung	EN	EN	Species		Spreading, hairy shrub with a scattered distribution throughout Sydney from Singleton to the north, the east coast of Bargo to the south and the Blue Mountains to the west. Grows at elevations between 350 - 600 metres in a variety of communities including Southern Tableland Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands, Sydney Coastal Heaths and Southern Escarpment Wet Sclerophyll Forests. Grows in sandy soils on sandstone substrates.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Hairy Geebung intersects the study area.
Persoonia nutans Nodding Geebung	EN	EN	Species		Erect or spreading shrub with a disjunct distribution restricted to the Cumberland Plain between Richmond in the north and Macquarie Fields in the south with core distribution occurring in the Penrith and to a lesser extent, Hawkesbury regions. Grows in Cumberland Dry Sclerophyll Forests including Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland, Cooks River/Castlereagh Ironbark Forest and Shale-Sandstone Transition Forest as well as Sydney Sand Flats Dry Sclerophyll Forests and Coastal Valley Grassy Woodlands. Grows in sandy soils derived from aeolian or alluvial sediments as well as in tertiary alluviums to the south of its range.	14 – BioNet	Low – not recorded during targeted survey
Pimelea curviflora* var. *curviflora	VU	VU	Species		Small to medium sized shrub restricted to the coastal areas of Sydney between northern Sydney and Maroota with an outlying population at Croom	2 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Reserve near Albion Park in the Illawarra region. Grows on ridgetops and upper slopes amongst grasses and sedges in a variety of communities including Cumberland Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands, Sydney Coastal Heaths and Northern Hinterland Wet Sclerophyll Forests. Can be inconspicuous amongst grasses and sedges although easier to find in October to May when flowering. Grows on sandstone substrates in shale/lateritic soils and shale/sandstone transition soils.		No CPCP species polygon for *Pimelea curviflora* var. *curviflora* intersects the study area.
Pimelea spicata Spiked Rice-flower	EN	EN	Species		Small erect or spreading shrub with populations occurring in two disjunct areas, one occurring on the Cumberland Plain from Marayong and Prospect Reservoir south to Narellan and Douglas Park, and the other occurring in the Illawarra from Landsdowne to Shellharbour and north Kiama. Grows in Maritime Grasslands and Coastal Valley Grassy Woodlands including Cumberland Plain Woodlands and Moist Shale Woodlands within the Cumberland Basin and in Coast Banksia Open Woodland Coastal Grasslands in the Illawarra region. Grows on well structured clay soils.	77 – BioNet	Low – not recorded during targeted survey
Pomaderris brunnea Brown Pomaderris	VU	EN	Species		Medium sized shrub with a distribution limited to the area around the Colo, Nepean and Hawkesbury Rivers including the Bargo area and near Camden. Grows on floodplains and creeklines in a variety of communities including Sydney Hinterland Dry Sclerophyll Forests, Central Gorge Dry Sclerophyll Forests, Coastal Floodplain Wetlands, Coastal Valley	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Brown Pomaderris intersects the study area.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Grasslands and North Coast Wet Sclerophyll Forests. Grows in clay and alluvial soils.		
Pterostylis gibbosa Illawarra Greenhood	EN	EN	Species		Deciduous terrestrial orchid with a disjunct distribution from the Milbrodale in the Hunter Region, Albion Park and Yallah in the Illawarra Region and Nowra in the Shoalhaven Region. Found growing amongst grasses on flat or gently sloping land with poor drainage in woodland dominated by Forest Red Gum Eucalyptus tereticornis, Woolybutt E. longifolia, and White Feather Honey-myrtle Melaleuca decora. In Nowra, the orchid can be found growing in association with Spotted Gum Corymbia maculata, Forest Red Gum and Grey Ironbark E. paniculata. In the Hunter Region, the orchid is associated with Narrow-leaved Ironbark E. crebra, Forest Red Gum and Black Cypress Pine Callitris endlicheri. Grows in red brown loam soils.	0 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Illawarra Greenhood intersects the study area.
Pterostylis nigricans Dark Greenhood		VU	Species		Deciduous terrestrial orchid with a distribution spanning north from Evans Heath through to Queensland. Found growing in coastal scrub and heath in association with Heath Banksia Banksia ericifolia and lower growing heath with lichen encrusted undisturbed surfaces in Coastal Heath Swamps, Northern Montane Heaths and Wallum Sand Heaths. Grows in sandy soils.	1 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Dark Greenhood intersects the study area.
Pterostylis Saxicola Sydney Plains Greenhood	EN	EN	Species		Deciduous terrestrial orchid restricted to a few small populations located in Western Sydney between Freemans Reach in the north and Picton in the south including Georges River National Park. Found growing near streams in depression on sandstone rock shelves above cliff lines faces,	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Sydney Plains Greenhood intersects the study area.

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					moist, sheltered ridges and creek banks on mossy rocks in Temperate Montane Grasslands, Northern Warm Temperate Rainforests, Southern Warm Temperate Rainforests and Southern Tableland Wet Sclerophyll Forests. Grows in small pockets of shallow shale or shale/sandstone transition soils over sandstone substrates.		
Pultenaea parviflora	VU	EN	Species		Small erect, branching shrub endemic to the Cumberland Plain from Windsor to Penrith east to Dean Park with outlying populations at Kemps Creek and Wilberforce. Found growing in Cumberland Dry Sclerophyll Forests including Castlereagh Ironbark Forest, Shale Gravel Transition Forest and Castlereagh Scribbly Gum Woodland, Sydney Coastal Dry Sclerophyll Forests, Sydney Sand Flats Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands and Southern Lowland Wet Sclerophyll Forests. Grows in soils derived from Wianamatta shale, laterite or alluvium.	266 – BioNet	Low – not recorded during targeted survey
Pultenaea pedunculata Matted Bush-pea		EN	Species		Small prostrate, mat forming shrub restricted to three disjunct populations, in Villawood, Prestons and north-west of Appin in the Cumberland Plains in Sydney, the coast between Tathra and Bermagui and the Windellama area south of Goulburn. Found growing in a variety of habitats including intact woodland, creeklines, broad valleys, headlands, rock crevices, disturbed sites such as road batters and coastal cliffs in a variety of communities including Central Gorge Dry Sclerophyll Forests, South Coast Sands Dry Sclerophyll Forests, Cumberland Dry Sclerophyll Forests, Temperate Montane Grasslands, Coastal Valley Grassy	13 - BioNet	Low – not recorded during targeted survey

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Woodlands and Southern Tableland Wet Sclerophyll Forests. Grows in a variety of soils including sandy clay soils, loam soils, transitional soils with ironstone nodule inclusions and soils derived from Wianamatta shale, laterite or alluvium.		
Rhizanthella slateri Eastern Australian Underground Orchid	EN	VU	Species		Terrestrial orchid with a distribution spanning from south-east NSW to south-east Queensland. Recorded in ten populations in NSW including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wisemans Ferry Area, Agnes Banks and near Nowra. A cryptic species which grows beneath the soil surface with flowers being the only part of the plant to occur aboveground in Sydney Sand Flats Dry Sclerophyll Forests, Eastern Riverine Forests, Northern Warm Temperate Rainforests, North Coast Wet Sclerophyll Forests, Northern Hinterland Wet Sclerophyll Forests and Southern Lowland Wet Sclerophyll Forests. Grows in deep loam soils.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Eastern Australian Underground Orchid intersects the study area.
Rhodamnia rubescens Scrub Turpentine		CR	Species		Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Scrub Turpentine intersects the study area.
Syzygium paniculatum Magenta Lilly Pilly	VU	EN	Species		Small to medium sized rainforest tree restricted to a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Found growing on stabilized dunes near the sea in South Coast Sands Dry Sclerophyll Forests, Coastal Swamp Forests, Coastal Headland Heaths, Littoral Rainforests, Northern Hinterland Wet Sclerophyll Forests and Southern	1 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Magenta Lilly Pilly intersects the study area.

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Lowland Wet Sclerophyll Forests. Grows on grey sandy, gravelly, silty or clay soils over sandstone substrates.		
Thesium austral Austral Toadflax	VU	VU	Species		Small, straggling herb with a distribution comprising of small populations scattered along the coast of eastern NSW including the Northern and Southern Tablelands, Tasmania, Queensland and eastern Asia. A root parasite found growing on damp sites in grassland, grassy woodlands and coastal headlands often in association with Kangaroo Grass Themeda triandra in a variety of communities including New England Dry Sclerophyll Forests, Western Slopes Grasslands, Northern Tableland Wet Sclerophyll Forests, Brigalow Clay Plain Woodlands, Subalpine Woodlands and Maritime Grasslands.	0 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon for Austral Toadflax intersects the study area.
Birds							
Anthochaera phrygia Regent Honeyeater	CR	CR	Dual	As per mapped important areas.	Regent Honeyeaters are semi-nomadic, occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Nectar and fruit from mistletoes are also eaten. This species usually nest in tall mature eucalypts and sheoaks.	5 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Artamus cyanopterus cyanopterus Dusky Woodswallow		VU	Ecosystem	N/A	Primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also	26 - BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					found in farmland, usually at the edges of forest or woodland.		
Botaurus poiciloptilus Australasian Bittern	EN	EN	Ecosystem	Waterbodies; Brackish or freshwater wetlands	The Australasian Bittern is distributed across south-eastern Australia. Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including Typha spp. and Eleoacharis spp. Typically this bird forages at night on frogs, fish and invertebrates, and remains inconspicuous during the day. The breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds.	3 - BioNet	Low
Burhinus grallarius Bush Stone-curlew		EN	Species	N/A	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Occurs in lightly timbered open forest and woodland, or partly cleared farmland with remnants of woodland, with a ground cover of short sparse grass and few or no shrubs where fallen branches and leaf litter are present.	4 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Calidris ferruginea Curlew Sandpiper	CR	EN	Dual	As per mapped important areas	Inhabits sheltered intertidal mudflats. Also non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Callocephalon fimbriatum Gang-gang Cockatoo	EN	VU	Dual	Hollow bearing trees; Eucalypt tree species with hollows greater than 9 cm diameter	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	7 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Calyptorhynchus lathami Glossy Black-Cockatoo		VU	Dual	Hollow bearing trees; Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground.	Inhabits forest with low nutrients, characteristically with key Allocasuarina species. Tends to prefer drier forest types. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead.	3 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Chthonicola sagittate Speckled Warbler		VU	Ecosystem	N/A	THE Speckled Warbler occurs on the hills and tablelands of the Great Dividing Range. Found in eucalypt and cypress woodlands with a grassy understorey, often on ridges or gullies. The species nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground for arthropods and seeds.	18 - BioNet	Low
Circus assimilis Spotted Harrier		VU	Ecosystem	N/A	The Spotted Harrier is found throughout Australia but rarely in densely forested and wooded habitat of the escarpment and coast. Preferred habitat consists of open and wooded country with grassland nearby for hunting. Habitat types include open grasslands, acacia and mallee remnants, spinifex, open shrublands, saltbush, very open woodlands, crops and similar low vegetation. The	7 – BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Spotted Harrier is more common in drier inland areas, nomadic part migratory and dispersive, with movements linked to the abundance of prey species. Nesting occurs in open or remnant woodland and unlike other harriers, the Spotted Harrier nests in trees.		
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)		VU	Ecosystem	N/A	Lives in eucalypt woodlands, especially areas of relatively flat open woodland typically lacking a dense shrub layer, with short grass or bare ground and with fallen logs or dead trees present.	1 – BioNet	Low
Daphoenositta chrysoptera Varied Sittella		VU	Ecosystem	N/A	The Varied Sittella is a sedentary species which inhabits a wide variety of dry eucalypt forests and woodlands, usually with either shrubby understorey or grassy ground cover or both, in all climatic zones of Australia. Usually inhabit areas with rough-barked trees, such as stringybarks or ironbarks, but also in mallee and acacia woodlands, paperbarks or mature Eucalypts. The Varied Sittella feeds on arthropods gleaned from bark, small branches and twigs. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	87 – BioNet	Low
Ephippiorhynchus asiaticus Black-necked Stork		VU	Ecosystem	Swamps; Shallow, open freshwater or saline wetlands or shallow edges of	Found in swamps, mangroves and mudflats. Can also occur in dry floodplains and irrigated lands and	3 – BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
				deeper wetlands within 300m of these swamps. Waterbodies; Shallow lakes, lake margins and estuaries within 300m of these waterbodies	occasionally forages in open grassy woodland. Nests in live or dead trees usually near water.		
Falco hypoleucos Grey Falcon	VU	EN	Ecosystem	N/A	Found over open country and wooded lands of tropical and temperate Australia. Mainly found on sandy and stony plains of inland drainage systems with lightly timbered acacia scrub.	0 – BioNet	Low
Falco subniger Black Falcon		VU	Ecosystem	N/A	Mainly occur in woodlands and open country where can hunt. Often associated with swamps, rivers and wetlands. Nest in tall trees along watercourses.	7 – BioNet	Low
Glossopsitta pusilla Little Lorikeet		VU	Ecosystem	N/A	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	22 – BioNet	Moderate – ToS undertaken.
Grantiella picta Painted Honeyeater	VU	VU	Ecosystem	Other; Mistletoes present at a density of greater than five mistletoes per hectare	Found mainly in dry open woodlands and forests, where it is strongly associated with mistletoe. Often found on plains with scattered eucalypts and remnant trees on farmlands.	0 – BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Haliaeetus leucogaster White-bellied Sea-Eagle		VU	Dual	N/A	A species that is generally sedentary in Australia, although immature individuals and some adults are dispersive. Found in terrestrial and coastal wetlands; favouring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes. It hunts over open terrestrial habitats. Feeds on birds, reptiles, fish, mammals, crustaceans and carrion. Roosts and makes nest in trees.	56 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Hieraaetus morphnoides Little Eagle		VU	Dual	N/A	The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests.	77 – BioNet	Low – not recorded during targeted survey.
Hirundapus caudacutus White-throated Needletail	VU		Ecosystem	N/A	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges. Breeds in Asia.	14 – BioNet	Low
Ixobrychus flavicollis Black Bittern		VU	Ecosystem	Waterbodies; Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	The Black Bittern is found along the coastal plains within NSW, although individuals have rarely being recorded south of Sydney or inland. It inhabits terrestrial and estuarine wetlands such as flooded grasslands, forests, woodlands, rainforests and mangroves with permanent water and dense waterside vegetation. The Black Bittern typically roosts on the ground or in trees during the day and forages at night on frogs, reptiles, fish and invertebrates. The breeding season extends from	3 – BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					December to March. Nests are constructed of reeds and sticks in branches overhanging the water.		
Lathamus discolor Swift Parrot	CR	EN	Dual	As per mapped important areas	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Mugga Ironbark E. sideroxylon, and White Box E. albens. Commonly used lerp infested trees include Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E. pilularis. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	23 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Limosa limosa Black-tailed Godwit		VU	Dual	As per mapped important areas	The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the coast, and inland. Records in western NSW indicate that a regular inland passage is used by the species, as it may occur around any of the large lakes in the western areas during summer, when the muddy shores are exposed. The species has been recorded within the Murray-Darling Basin,	1 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					on the western slopes of the Northern Tablelands and in the far north-western corner of the state.		
Lophoictinia isura Square-tailed Kite		VU	Dual	N/A	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia maculata, E. elata, or E. smithii. Individuals appear to occupy large hunting ranges of more than 100 km2. They require large living trees for breeding, particularly near water with surrounding woodland /forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	22 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Melanodryas cucullata cucullata Hooded Robin (south-eastern form)		VU	Ecosystem	N/A	This species lives in a wide range of temperate woodland habitats, and a range of woodlands and shrublands in semi-arid areas.	2 – BioNet	Low
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)		VU	Ecosystem		Found mostly in open forests and woodlands dominated by box and ironbark eucalypts. It is rarely recorded east of the Great Dividing Range.	1 – BioNet	Low
Neophema pulchella Turquoise Parrot		VU	Ecosystem	N/A	Occurs in open woodlands and eucalypt forests with a ground cover of grasses and understorey of low shrubs. Generally found in the foothills of the Great Divide, including steep rocky ridges and	2 – BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					gullies. Nest in hollow-bearing trees, either dead or alive; also in hollows in tree stumps. Prefer to breed in open grassy forests and woodlands, and gullies that are moist.		
Ninox connivens Barking Owl		VU	Dual	N/A	Generally found in open forests, woodlands, swamp woodlands, farmlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. Territories are typically 2000 ha in NSW habitats. Hunts small arboreal mammals or birds and terrestrial mammals when tree hollows are absent.	4 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Ninox strenua Powerful Owl		VU	Dual	N/A	The Powerful Owl occupies wet and dry eucalypt forests and rainforests. It may inhabit both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm. It has a large home range of between 450 and 1450 ha.	10 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Numenius madagascariensis Eastern Curlew	CR		Dual	As per mapped important areas	Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Pandion cristatus Eastern Osprey		VU	Dual	Other; Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting	Found in coastal waters, inlets, estuaries and offshore islands. Occasionally found 100 km inland along larger rivers. It is water-dependent, hunting for fish in clear, open water. The Osprey occurs in terrestrial wetlands, coastal lands and offshore islands. It is a predominantly coastal species, generally using marine cliffs as nesting and roosting sites. Nests can also be made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	0 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Petroica boodang Scarlet Robin		VU	Ecosystem	N/A	The Scarlet Robin inhabits dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. During autumn and winter it moves to more open and cleared areas. The Scarlet Robin 6 - BioNet forages amongst logs and woody debris for insects. The nest is an open cup of plant fibres and cobwebs, sited in the fork of a tree.	7 - BioNet	Low
Petroica phoenicea Flame Robin		VU	Ecosystem		Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The preferred habitat in summer includes moist eucalyptus forests and open woodlands, in winter prefers open woodlands and farmlands. It is considered migratory. Diet consists mainly of invertebrates.	6 – BioNet	Low
Rostratula australis Australian Painted Snipe	EN	EN	Ecosystem	N/A	Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. They prefer freshwater wetlands, but have been recorded in brackish waters. Forages on mud-flats and in shallow water.	1 – BioNet	Low

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					Feeds on worms, molluscs, insects and some plant-matter.		
Stagonopleura guttata Diamond Firetail		VU	Ecosystem		The Diamond Firetail is widely distributed, found in a range of habitat types including open eucalypt forest, mallee and acacia scrubs. Often occur in vegetation along watercourses. Feeds exclusively on the ground on ripe grass and herb seeds, green leaves and insects.	3 – BioNet	Low
Stictonetta naevosa Freckled Duck		VU	Ecosystem	N/A	The Freckled Duck breeds in permanent fresh swamps that are heavily vegetated. Found in fresh or salty permanent open lakes, especially during drought. Often seen in groups on fallen trees and sand spits.	1 – BioNet	Low
Tyto novaehollandiae Masked Owl		VU	Dual	Hollow bearing trees; Living or dead trees with hollows greater than 20cm diameter.	The Masked Owl is found in range of wooded habitats that provide tall or dense mature trees with hollows suitable for nesting and roosting. It is mostly seen in open forests and woodlands adjacent to cleared lands. Prey includes hollow-dependent arboreal marsupials and terrestrial mammals.	6 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Mammals							
Chalinolobus dwyeri Large-eared Pied Bat	VU	VU	Species	Cliffs; Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within	Occurs from the Queensland border to Ulladulla, with largest numbers from the sandstone escarpment country in the Sydney Basin and Hunter Valley. Primarily found in dry sclerophyll forests and woodlands, but also found in rainforest fringes and subalpine woodlands. Forages on small, flying	1 - BioNet	Low – not recorded during targeted survey

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
				two kilometres of old mines or tunnels.	insects below the forest canopy. Roosts in colonies of between three and 80 in caves, Fairy Martin nests and mines, and beneath rock overhangs, but usually less than 10 individuals. Likely that it hibernates during the cooler months. The only known existing maternity roost is in a sandstone cave near Coonabarabran.		
Dasyurus maculatus Spotted-tailed Quoll	EN	VU	Ecosystem	N/A	Occurs along the east coast of Australia and the Great Dividing Range. Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through which to forage. The home range of a female is between 180 and 1000 ha, while males have larger home ranges of between 2000 and 5000 ha. Breeding occurs from May to August.	1 - BioNet	Low
Falsistrellus tasmaniensis Eastern False Pipistrelle		VU	Ecosystem	N/A	Distribution extending east of the Great Dividing Range throughout the coastal regions of NSW, from the Queensland border to the Victorian border. Prefers wet high-altitude sclerophyll and coastal mallee habitat, preferring wet forests with a dense understorey but being found in open forests at lower altitudes. Apparently hibernates in winter. Roosts in tree hollows and sometimes in buildings	19 – BioNet	Low – not recorded during targeted survey

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					in colonies of between 3 and 80 individuals. Often change roosts every night. Forages for beetles, bugs and moths below or near the canopy in forests with an open structure, or along trails. Has a large foraging range, up to 136 ha. Records show movements of up to 12 km between roosting and foraging sites.		
Micronomus norfolkensis Eastern Coastal Free-tailed Bat		VU	Ecosystem	N/A	Distribution extends east of the Great Dividing Range from southern Queensland to south of Sydney. Most records are from dry eucalypt forests and woodland. Individuals tend to forage in natural and artificial openings in forests, although it has also been caught foraging low over a rocky river within rainforest and wet sclerophyll forest habitats. The species generally roosts in hollow spouts of large mature eucalypts (including paddock trees), although individuals have been recorded roosting in the roof of a hut, in wall cavities, and under metal caps of telegraph poles. Foraging generally occurs within a few kilometres of roosting sites.	29 – BioNet	Recorded via call detection
Miniopterus australis Little Bent-winged Bat		VU	Dual	Caves: 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	Occurs from Northern Queensland to the Hawkesbury River near Sydney. Roost sites encompass a range of structures including caves, tunnels and stormwater drains. Young are raised by the females in large maternity colonies in caves in summer. Shows a preference for well timbered areas including rainforest, wet and dry sclerophyll forests, Melaleuca swamps and coastal forests. The Little Bentwing bat forages for small insects (such as moths, wasps and ants) beneath the canopy of densely vegetated habitats.	4 - BioNet	Low – not recorded during targeted survey

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
				from the scientific literature.			
Miniopterus orianae oceanensis Large Bent-winged Bat		VU	Dual	Caves: Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	Occurs from Victoria to Queensland, on both sides of the Great Dividing Range. Forms large maternity roosts (up to 100,000 individuals) in caves and mines in spring and summer. Individuals may fly several hundred kilometres to their wintering sites, where they roost in caves, culverts, buildings, and bridges. They occur in a broad range of habitats including rainforest, wet and dry sclerophyll forest, paperbark forest and open grasslands. Has a fast, direct flight and forages for flying insects (particularly moths) above the tree canopy and along waterways.	62 – BioNet	Low – not recorded during targeted survey
Myotis macropus Southern Myotis		VU	Species	Hollow bearing trees; Within 200 m of riparian zone. Other; Bridges, caves or artificial structures within 200 m of riparian zone. Waterbodies: This includes rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	Scattered, mainly coastal distribution extending to South Australia along the Murray River. Roosts in caves, mines or tunnels, under bridges, in buildings, tree hollows, and even in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. They catch aquatic insects and small fish with their large hind claws, and also catch flying insects.	64 – BioNet	Recorded via call detection –
Petauroides Volans Greater Glider	EN		Species	Hollow bearing trees	The distribution of the Greater Glider includes the ranges and coastal plain of eastern Australia, where it inhabits a variety of eucalypt forests and	2 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area.

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					woodlands. Presence and density of Greater Gliders is related to soil fertility, eucalypt tree species, disturbance history and density of suitable tree hollows. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe.		No CPCP species polygon intersects the study area.
Petaurus australis Yellow-bellied Glider		VU	Ecosystem	Hollow bearing trees; Hollows > 25cm diameter	Restricted to tall native forests in regions of high rainfall along the coast of NSW. Preferred habitats are productive, tall open sclerophyll forests where mature trees provide shelter and nesting hollows. Critical elements of habitat include sap-site trees, winter flowering eucalypts, mature trees suitable for den sites and a mosaic of different forest types.	2 – BioNet	Low
Petrogale penicillate Brush-tailed Rock-wallaby	VU	EN	Species		Occurs along the Great Dividing Range south to the Shoalhaven, and also occurs in the Warrumbungles and Mt Kaputar. Habitats range from rainforest to open woodland. It is found in areas with numerous ledges, caves and crevices particularly with northern aspects. The species forages on grasses and forbs.	0 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Phascolarctos cinereus Koala	EN	VU	Species	Areas identified via survey as important habitat	In NSW the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. Primary feed trees include *Eucalyptus robusta, E. tereticornis, E. punctata, E. haemostoma* and *E. signata*. They are solitary with varying home ranges.	10 – BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Pseudomys novaehollandiae New Holland Mouse	VU		Ecosystem	N/A	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to	0 – BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. The home range of the New Holland Mouse can range from 0.44 ha to 1.4 ha. The New Holland Mouse is a social animal, living predominantly in burrows shared with other individuals. The species is nocturnal and omnivorous, feeding on seeds, insects, leaves, flowers and fungi, and is therefore likely to play an important role in seed dispersal and fungal spore dispersal. It is likely that the species spends considerable time foraging above-ground for food, predisposing it to predation by native predators and introduced species. Breeding typically occurs between August and January, but can extend into autumn.		
Pteropus poliocephalus Grey-headed Flying-fox	VU	VU	Dual	Breeding Camps	Occurs along the NSW coast, extending further inland in the north. This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Roosts in large colonies, commonly in dense riparian vegetation.	407 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area. No camps within the study area.
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat		VU	Ecosystem		Found throughout NSW in habitats including wet and dry sclerophyll forest, open woodland, acacia shrubland, mallee, grasslands and desert. They roost in tree hollows in colonies and have also been observed roosting in animal burrows, abandoned Sugar Glider nests, cracks in dry clay, hanging from buildings and under slabs of rock. Forages for insects above the canopy in forests.	4 – BioNet	Low – not recorded during targeted survey
Scoteanax rueppellii		VU	Ecosystem		Occurs along the Great Dividing Range and in coastal areas. Occurs in woodland and rainforest,	29 - BioNet	Recorded via call detection

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Greater Broad-nosed Bat					preferring open habitats or openings in wetter forests. Often hunts along creeks or river corridors. Preys upon beetles and other large, flying insects, other bats and spiders. Roosts in hollow tree trunks and branches.		
Amphibians							
Heleioporus australiacus Giant Burrowing Frog	VU	VU	Species	N/A	Prefers hanging swamps on sandstone shelves adjacent to perennial non-flooding creeks. Can also occur within shale outcrops within sandstone formations. Known from wet and dry forests and montane woodland in the southern part range. Individuals can be found around sandy creek banks or foraging along ridge-tops during or directly after heavy rain. Males often call from burrows located in sandy banks next to water. Spends the majority of its time in non-breeding habitat 20-250m from breeding sites.	0 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.
Litoria aurea Green and Golden Bell Frog	VU	EN	Species	Semi-permanent/ephemeral wet areas; Within 1km of wet areas. Swamps; Within 1km of swamp. Waterbodies; Within 1km of waterbody	Most existing locations for the species occur as small, coastal, or near coastal populations, with records occurring between south of Grafton and northern VIC. The species is found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks , although the species has also been recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land. Breeding usually occurs in summer. Tadpoles, which take approximately 10-12	17 - BioNet	Low – Habitat mapping undertaken as part of the CPCP did not identify habitat for this species within the study area. No CPCP species polygon intersects the study area.

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					weeks to develop , feed on algae and other vegetative matter. Adults eat insects as well as other frogs, including juveniles of their own species.		
Gastropods							
Meridolum corneovirens Cumberland Plain Land Snail		EN	Species		Most likely restricted to Cumberland Plain, Castlereagh Woodlands and boundaries between River-flat Forest and Cumberland Plain Woodland. It is normally found beneath logs, debris and amongst accumulated leaf and bark particularly at the base of trees. May also use soil cracks for refuge.	547 - BioNet	Recorded 10 shells across five locations.
Fish							
Macquaria australasica Macquarie Perch	EN				Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	0 - BioNet	Low
Prototroctes maraena Australian Grayling	VU				The Australian Grayling occurs in streams and rivers on the eastern and southern flanks of the Great Dividing Range from Sydney southwards to the Otway Ranges in Victoria, and Tasmania. Australian grayling do not occur in the inland Murray–Darling Basin system. Grayling is a diadromous species; migrating between freshwater streams and the ocean. This species has been found in clear, gravel-bottomed streams with alternating pools and	0 - BioNet	Low

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
					riffles, and granite outcrops, and also in muddy-bottomed, heavily silted habitats.		
Migratory species							
Actitis hypoleucos Common Sandpiper						0 - BioNet	Low
Apus pacificus Fork-tailed Swift						4 – BioNet	Low
Calidris acuminata Sharp-tailed Sandpiper						2 – BioNet	Low
Calidris ferruginea Curlew Sandpiper	CR	EN				0 – BioNet	Low
Calidris melanotos Pectoral Sandpiper						0 – BioNet	Low
Gallinago hardwickii Latham's Snipe						26 – BioNet	Low
Hirundapus caudacutus	VU					14 – BioNet	Low

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Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
White-throated Needletail							
Hirundo rustica Barn Swallow						1 – BioNet	Low
Hydroprogne caspia Caspian Tern						2 – BioNet	Low
Limosa limosa Black-tailed Godwit		VU				1 – BioNet	Low
Motacilla flava Yellow Wagtail						0 – BioNet	Low
Numenius madagascariensis Eastern Curlew	CR					0 – BioNet	Low
Pandion cristatus Eastern Osprey		VU				0 – BioNet	Low
Plegadis falcinellus Glossy Ibis						2 – BioNet	Low
Pluvialis squatarola Grey Plover						2 – BioNet	Low
Tringa nebularia						2 – BioNet	Low

Scientific name	Status		BAM credit type	Habitat constraints and/or geographic limitations	Distribution and habitat	Number of records (source)	Likelihood of occurrence
	BC Act	EPBC Act					
Common Greenshank							

Appendix C: Plot-based field data sheets

Plot: BAM003_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Aristida vagans	2	Grass & grasslike (GG)	
Bursaria spinosa	1	Shrub (SG)	
Cyathochaeta diandra	1	Grass & grasslike (GG)	
Daviesia ulicifolia	1	Shrub (SG)	
Dillwynia parvifolia	1	Shrub (SG)	
Dillwynia sieberi	1	Shrub (SG)	
Dodonaea viscosa	1	Shrub (SG)	
Einadia hastata	1	Forb (FG)	
Entolasia stricta	1	Grass & grasslike (GG)	
Eragrostis curvula	2		HTE
Eragrostis leptostachya	1	Grass & grasslike (GG)	
Eucalyptus fibrosa	15	Tree (TG)	
Eucalyptus globoidea	1	Tree (TG)	
Exocarpos cupressiformis	1	Shrub (SG)	
Lepidosperma gunnii	1	Grass & grasslike (GG)	
Lepidosperma laterale	1	Grass & grasslike (GG)	
Lomandra gracilis	1	Grass & grasslike (GG)	
Lomandra longifolia	1	Grass & grasslike (GG)	
Lomandra multiflora	1	Grass & grasslike (GG)	
Melaleuca decora	2	Shrub (SG)	
Melaleuca nodosa	15	Shrub (SG)	
Ozothamnus diosmifolius	1	Shrub (SG)	
Phyllanthus hirtellus	1	Shrub (SG)	
Pratia purpurascens	1	Forb (FG)	
Pultenaea microphylla	1	Shrub (SG)	

Plot: BAM006_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Acacia decurrens	0.5	Tree (TG)	
Araujia sericifera	0.2		HTE
Aristida vagans	1	Grass & grasslike (GG)	
Bidens pilosa	0.1		E
Billardiera scandens	0.2	Other (OG)	
Bursaria spinosa	5	Shrub (SG)	
Cheilanthes sieberi	0.1	Fern (EG)	
Chloris gayana	2		HTE
Cynodon dactylon	1	Grass & grasslike (GG)	
Dillwynia sericea	2	Shrub (SG)	
Elymus scaber	0.1	Grass & grasslike (GG)	
Eragrostis curvula	1		HTE
Eragrostis leptostachya	0.1	Grass & grasslike (GG)	
Eucalyptus fibrosa	20	Tree (TG)	
Glycine tabacina	0.1	Other (OG)	
Gonocarpus tetragynus	0.1	Forb (FG)	
Hypochaeris radicata	0.1		
Juncus spp.	0.1	Grass & grasslike (GG)	
Laxmannia gracilis	0.1	Forb (FG)	
Lobelia gibbosa	0.1	Forb (FG)	
Lycium ferocissimum	1		HTE
Melaleuca decora	15	Shrub (SG)	
Microlaena stipoides	0.5	Grass & grasslike (GG)	
Paspalum dilatatum	2		E
Plantago lanceolata	0.1		
Senecio madagascariensis	0.1		HTE
Setaria parviflora	0.1		

Sida rhombifolia	0.1		
Themeda triandra	20	Grass & grasslike (GG)	
Thysanotus tuberosus	0.1	Forb (FG)	

Plot: BAM007_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Axonopus affinis	1		
Bursaria spinosa	1	Shrub (SG)	
Cassinia uncata	1	Shrub (SG)	
Cynodon dactylon	1	Grass & grasslike (GG)	
Dichelachne micrantha	1	Grass & grasslike (GG)	
Einadia hastata	1	Forb (FG)	
Entolasia stricta	1	Grass & grasslike (GG)	
Eragrostis brownii	1	Grass & grasslike (GG)	
Eragrostis curvula	1		HTE
Eucalyptus globoidea	30	Tree (TG)	
Hypochaeris radicata	1		
Lomandra multiflora	1	Grass & grasslike (GG)	
Melaleuca decora	2	Shrub (SG)	
Microlaena stipoides	40	Grass & grasslike (GG)	
Senecio madagascariensis	1		HTE
Setaria parviflora	1		
Sida rhombifolia	1		
Sporobolus creber	1	Grass & grasslike (GG)	

Plot: BAM012_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Acacia decurrens	1	Tree (TG)	
Acacia elongata	0.1	Shrub (SG)	
Allocasuarina littoralis	4	Tree (TG)	
Anagallis arvensis	0.1		
Angophora subvelutina	15	Tree (TG)	
Araujia sericifera	0.1		HTE
Asparagus asparagoides	3		HTE
Aster subulatus	0.2		
Axonopus compressus	0.1		
Bidens pilosa	5		HTE
Bursaria spinosa	2	Shrub (SG)	
Centella asiatica	0.5	Forb (FG)	
Chloris gayana	2		HTE
Conyza spp.	0.1		
Cryptandra spinescens	0.1	Shrub (SG)	
Cynodon dactylon	5	Grass & grasslike (GG)	
Cyperus eragrostis	0.1		HTE
Dichondra repens	0.5	Forb (FG)	
Ehrharta erecta	1		HTE
Entolasia spp.	0.1	Grass & grasslike (GG)	
Eragrostis brownii	0.1	Grass & grasslike (GG)	
Eragrostis curvula	1		HTE
Eucalyptus tereticornis	5	Tree (TG)	
Glycine clandestina	0.1	Other (OG)	
Hibbertia aspera	0.1	Shrub (SG)	
Hydrocotyle peduncularis	0.1	Forb (FG)	
Juncus usitatus	1	Grass & grasslike (GG)	

Lepidosperma laterale	2	Grass & grasslike (GG)	
Ligustrum lucidum	1		HTE
Lomandra multiflora	1	Grass & grasslike (GG)	
Melaleuca decora	25	Shrub (SG)	
Microlaena stipoides	50	Grass & grasslike (GG)	
Ozothamnus diosmifolius	0.5	Shrub (SG)	
Panicum simile	0.5	Grass & grasslike (GG)	
Passiflora subpeltata	1		
Plantago lanceolata	2		
Pratia purpurascens	0.5	Forb (FG)	
Senecio madagascariensis	0.5		HTE
Setaria parviflora	2		
Sida rhombifolia	3		
Solanum prinophyllum	0.2	Forb (FG)	
Sonchus oleraceus	0.1		
Themeda australis	2	Grass & grasslike (GG)	
Verbena bonariensis	0.2		

Plot: BAM249_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Alternanthera denticulata	1	Forb (FG)	
Baumea articulata	80	Grass & grasslike (GG)	
Bolboschoenus fluviatilis	1	Grass & grasslike (GG)	
Carex appressa	5	Grass & grasslike (GG)	
Centella asiatica	1	Forb (FG)	
Cyperus eragrostis	1		HTE
Eclipta platyglossa	1	Forb (FG)	
Juncus usitatus	2	Grass & grasslike (GG)	
Lachnagrostis aemula	2	Grass & grasslike (GG)	
Philydrum lanuginosum	2	Forb (FG)	
Phragmites australis	1	Grass & grasslike (GG)	
Plantago lanceolata	1		
Ranunculus inundatus	1	Forb (FG)	
Rumex crispus	1		
Schoenoplectus validus	2	Grass & grasslike (GG)	
Trifolium repens	1		
Typha australis	1		

Plot: BAM027_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Acacia parramattensis	0.2	Tree (TG)	
Angophora subvelutina	5	Tree (TG)	
Araujia sericifera	0.2		HTE
Bursaria spinosa	8	Shrub (SG)	
Casuarina glauca	5	Tree (TG)	
Cestrum parqui	0.1		HTE
Cirsium vulgare	0.2		
Clematis aristata	0.5	Other (OG)	
Dianella caerulea var. caerulea	0.1	Forb (FG)	
Dichondra repens	1	Forb (FG)	
Ehrharta erecta	0.5		HTE
Entolasia spp.	0.1	Grass & grasslike (GG)	
Eucalyptus tereticornis	15	Tree (TG)	
Glycine clandestina	0.2	Other (OG)	
Glycine microphylla	0.5	Other (OG)	
Ligustrum sinense	0.1		HTE
Lomandra longifolia	2	Grass & grasslike (GG)	
Lomandra multiflora	0.2	Grass & grasslike (GG)	
Microlaena stipoides	80	Grass & grasslike (GG)	
Pratia purpurascens	0.1	Forb (FG)	
Rubus parvifolius	0.5	Shrub (SG)	
Rumex brownii	0.1	Forb (FG)	
Sida rhombifolia	0.5		
Solanum pseudocapsicum	0.2		
Solanum sisymbriifolium	0.1		
Sonchus oleraceus	0.1		

Tradescantia fluminensis	5		HTE

Plot: BAM039_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Acacia decurrens	1	Tree (TG)	
Acacia parramattensis	3	Tree (TG)	
Araujia sericifera	0.2		HTE
Aristida ramosa	3	Grass & grasslike (GG)	
Aristida vagans	2	Grass & grasslike (GG)	
Brunoniella australis	0.1	Forb (FG)	
Bursaria spinosa	4	Shrub (SG)	
Cheilanthes sieberi	0.1	Fern (EG)	
Clematis glycinoides	0.1	Other (OG)	
Cynodon dactylon	0.2	Grass & grasslike (GG)	
Dichondra repens	0.1	Forb (FG)	
Ehrharta erecta	0.1		HTE
Einadia nutans	0.2	Forb (FG)	
Einadia trigonos	0.1	Forb (FG)	
Eragrostis brownii	0.1	Grass & grasslike (GG)	
Eragrostis leptostachya	0.1	Grass & grasslike (GG)	
Eucalyptus tereticornis	25	Tree (TG)	
Glycine tabacina	0.1	Other (OG)	
Lomandra filiformis subsp. filiformis	3	Grass & grasslike (GG)	
Lomandra multiflora subsp. multiflora	0.1	Grass & grasslike (GG)	
Microlaena stipoides	0.3	Grass & grasslike (GG)	
Olea europaea	0.1		HTE
Opuntia stricta	0.1		HTE
Oxalis perennans	0.1	Forb (FG)	
Paspalidium distans	0.1	Grass & grasslike (GG)	
Paspalum dilatatum	0.1		HTE
Phyllanthus virgatus	0.1	Forb (FG)	

Plantago lanceolata	0.1		
Senecio madagascariensis	0.1		HTE
Setaria parviflora	0.1		
Sida rhombifolia	0.5		
Sporobolus creber	0.1	Grass & grasslike (GG)	
Themeda triandra	10	Grass & grasslike (GG)	
Tricoryne elatior	0.1	Forb (FG)	
Wahlenbergia communis	0.1	Forb (FG)	

Plot: BAM035_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Acacia decurrens	3	Tree (TG)	
Angophora subvelutina	5	Tree (TG)	
Aristida ramosa	2	Grass & grasslike (GG)	
Bidens pilosa	0.1	#N/A	HTE
Brunoniella australis	0.5	Forb (FG)	
Bursaria spinosa	5	Shrub (SG)	
Callistemon linearis	0.3	Shrub (SG)	
Crassula multicava	0.1	#N/A	
Desmodium varians	0.1	Other (OG)	
Dianella longifolia	0.1	Forb (FG)	
Dichondra repens	0.1	Forb (FG)	
Dillwynia sieberi	0.1	Shrub (SG)	
Ehrharta erecta	0.5	#N/A	HTE
Einadia hastata	0.2	Forb (FG)	
Einadia nutans	0.1	Forb (FG)	
Eucalyptus amplifolia	15	Tree (TG)	
Eucalyptus tereticornis	5	Tree (TG)	
Glycine tabacina	0.1	Other (OG)	
Lissanthe strigosa	0.1	Shrub (SG)	
Lomandra filiformis	0.1	Grass & grasslike (GG)	
Lomandra multiflora subsp. multiflora	0.1	Grass & grasslike (GG)	
melaleuca decora	1	Shrub (SG)	
Melaleuca linariifolia	0.5	Shrub (SG)	
Microlaena stipoides	10	Grass & grasslike (GG)	
Opuntia stricta	0.1	#N/A	HTE
Paspalidium distans	1	Grass & grasslike (GG)	
Plectranthus parviflorus	0.1	Forb (FG)	

Polymeria calycina	0.1	Other (OG)	
Sida rhombifolia	0.1	#N/A	
Tradescantia fluminensis	5	#N/A	HTE

Plot: BAM054_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Acacia parramattensis	0.1	Tree (TG)	
Allocasuarina torulosa	1	Tree (TG)	
Aristida ramosa	0.5	Grass & grasslike (GG)	
Briza subaristata	0.1		HTE
Brunoniella australis	0.1	Forb (FG)	
Bursaria spinosa	25	Shrub (SG)	
Carex inversa	0.1	Grass & grasslike (GG)	
Cheilanthes sieberi	0.1	Fern (EG)	
Desmodium varians	0.1	Other (OG)	
Dichelachne micrantha	1	Grass & grasslike (GG)	
Dichondra repens	0.1	Forb (FG)	
Entolasia marginata	0.1	Grass & grasslike (GG)	
Eragrostis brownii	0.1	Grass & grasslike (GG)	
Eragrostis curvula	0.1		HTE
Eucalyptus eugenioides	10	Tree (TG)	
Eucalyptus tereticornis	1	Tree (TG)	
Glycine microphylla	0.1	Other (OG)	
Lomandra filiformis subsp. filiformis	1	Grass & grasslike (GG)	
Lomandra multiflora subsp. multiflora	0.3	Grass & grasslike (GG)	
Microlaena stipoides	25	Grass & grasslike (GG)	
Romulea rosea	0.1		HTE
Senecio madagascariensis	0.1		HTE
Themeda triandra	25	Grass & grasslike (GG)	

Plot: BAM055_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Aristida ramosa	1	Grass & grasslike (GG)	
Bidens pilosa	0.1		HTE
Brunoniella australis	0.1	Forb (FG)	
Bursaria spinosa	25	Shrub (SG)	
Chrysanthemoides monilifera ssp. monilifera	0.5		HTE
Cirsium vulgare	0.1		
Cynodon dactylon	0.5	Grass & grasslike (GG)	
Desmodium varians	0.1	Other (OG)	
Dichelachne micrantha	0.1	Grass & grasslike (GG)	
Dichondra repens	0.1	Forb (FG)	
Eragrostis curvula	0.1		HTE
Eucalyptus moluccana	10	Tree (TG)	
Eucalyptus tereticornis	8	Tree (TG)	
Glycine tabacina	0.1	Other (OG)	
Juncus spp.	0.1	Grass & grasslike (GG)	
Lomandra filiformis subsp. filiformis	0.1	Grass & grasslike (GG)	
Lomandra multiflora subsp. multiflora	0.1	Grass & grasslike (GG)	
Melaleuca linearifolia	5	Tree (TG)	
Microlaena stipoides	60	Grass & grasslike (GG)	
Paspalum dilatatum	0.1		HTE
Plantago lanceolata	0.1		
Rytidosperma spp.	0.1	Grass & grasslike (GG)	
Sida rhombifolia	0.1		
Themeda triandra	20	Grass & grasslike (GG)	

Plot: BAM086_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Cenchrus clandestinus	10		HTE
Chenopodium murale	0.1		
Cynodon dactylon	5	Grass & grasslike (GG)	
Eucalyptus tereticornis	30	Tree (TG)	
Oxalis perennans	0.1	Forb (FG)	
Paspalum spp.	0.2	Grass & grasslike (GG)	
Plantago lanceolata	0.1		
Portulaca oleracea	0.1	Forb (FG)	
Sida rhombifolia	0.2		
Taraxacum officinale	0.1		

Plot: BAM087_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Carex inversa	0.1	Grass & grasslike (GG)	
Cenchrus clandestinus	0.2		HTE
Commelina cyanea	0.1	Forb (FG)	
Cynodon dactylon	5	Grass & grasslike (GG)	
Cyperus spp.	0.1	Grass & grasslike (GG)	
Eragrostis curvula	25		HTE
Eucalyptus tereticornis	10	Tree (TG)	
Juncus spp.	0.1	Grass & grasslike (GG)	
Melaleuca decora	5	Shrub (SG)	
Microlaena stipoides	0.1	Grass & grasslike (GG)	
Paspalum dilatatum	10		HTE
Senecio madagascariensis	0.1		HTE
Sida rhombifolia	0.1		
Solanum nigrum	0.1		
Solanum sisymbriifolium	0.1		
Sporobolus creber	0.1	Grass & grasslike (GG)	

Plot: BAM072_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Amyema gaudichaudii	0.1	Other (OG)	
Amyema spp.	0.1	Other (OG)	
Araujia sericifera	0.1		HTE
Bidens subalternans	0.2		HTE
Bromus catharticus	0.2		
Bursaria spinosa	0.2	Shrub (SG)	
Cenchrus clandestinus	40		HTE
Cirsium vulgare	0.1		
Commelina cyanea	0.1	Forb (FG)	
Cynodon dactylon	10	Grass & grasslike (GG)	
Desmodium varians	0.1	Other (OG)	
Ehrharta erecta	0.3		HTE
Einadia hastata	0.2	Forb (FG)	
Einadia nutans	0.1	Forb (FG)	
Einadia trigonos	0.4	Forb (FG)	
Eragrostis curvula	3		HTE
Eucalyptus amplifolia	15	Tree (TG)	
Glycine tabacina	0.1	Other (OG)	
Hypochaeris radicata	0.1		
Lolium spp.	0.1		
Lomandra filiformis subsp. filiformis	0.3	Grass & grasslike (GG)	
Melaleuca decora	3	Shrub (SG)	
Melaleuca nodosa	0.5	Shrub (SG)	
Microlaena stipoides	0.2	Grass & grasslike (GG)	
Sida rhombifolia	0.5		
Solanum linnaeanum	0.1		
Tricoryne elatior	0.1	Forb (FG)	
Verbena quadrangularis	0.1		

Plot: BAM148_GPC

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Acacia brownii	0.3	Shrub (SG)	
Acacia parramattensis	0.3	Tree (TG)	
Allocasuarina littoralis	3	Tree (TG)	
Billardiera scandens	1	Other (OG)	
Brachyloma daphnoides	0.1	Shrub (SG)	
Callistemon pinifolius	0.1	Shrub (SG)	
Calotis cuneifolia	0.1	Forb (FG)	
Cassytha pubescens	0.1	Other (OG)	
Cheilanthes sieberi	0.1	Fern (EG)	
Cyathochaeta diandra	2	Grass & grasslike (GG)	
Daviesia ulicifolia	5	Shrub (SG)	
Dianella revoluta	0.5	Forb (FG)	
Dodonaea falcata	0.1	Shrub (SG)	
Entolasia stricta	0.1	Grass & grasslike (GG)	
Eucalyptus fibrosa	15	Tree (TG)	
Eucalyptus sclerophylla	10	Tree (TG)	
Exocarpos cupressiformis	0.1	Shrub (SG)	
Glycine clandestina	0.1	Other (OG)	
Gompholobium minus	0.1	Shrub (SG)	
Gonocarpus micranthus	0.1	Forb (FG)	
Grevillea juniperina	0.3	Shrub (SG)	
Grevillea mucronulata	0.1	Shrub (SG)	
Hibbertia diffusa	0.1	Shrub (SG)	
Lepidosperma laterale	2	Grass & grasslike (GG)	
Lissanthe strigosa	0.3	Shrub (SG)	
Lomandra cylindrica	0.3	Grass & grasslike (GG)	
Lomandra glauca	0.3	Grass & grasslike (GG)	

Lomandra longifolia	0.3	Grass & grasslike (GG)	
Lomandra multiflora subsp. multiflora	0.3	Grass & grasslike (GG)	
Melaleuca decora	3	Shrub (SG)	
Melaleuca nodosa	2	Shrub (SG)	
Microlaena stipoides	0.1	Grass & grasslike (GG)	
Ozothamnus diosmifolius	0.1	Shrub (SG)	
Persoonia linearis	0.3	Shrub (SG)	
Phyllanthus hirtellus	0.1	Shrub (SG)	
Pomax umbellata	0.1	Forb (FG)	
Pratia purpurascens	0.3	Forb (FG)	
Prostanthera scutellarioides	0.3	Shrub (SG)	
Rhytidosporum procumbens	0.1	Shrub (SG)	
Schoenus paludosus	0.5	Grass & grasslike (GG)	
Xanthorrhoea minor	0.3	Other (OG)	

Plot: BAM230_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Asparagus asparagoides	0.1		HTE
Aster subulatus	0.1		
Carex appressa	0.1	Grass & grasslike (GG)	
Casuarina glauca	35	Tree (TG)	
Centella asiatica	0.1	Forb (FG)	
Clematis aristata	0.2	Other (OG)	
Conyza spp.	0.1		
Dichondra repens	0.1	Forb (FG)	
Echinopogon ovatus	0.1	Grass & grasslike (GG)	
Ehrharta erecta	0.5		HTE
Hypolepis muelleri	0.1	Fern (EG)	
Juncus usitatus	0.1	Grass & grasslike (GG)	
Melaleuca decora	8	Shrub (SG)	
Oplismenus aemulus	0.3	Grass & grasslike (GG)	
Solanum pseudocapsicum	0.1		

Plot: BAM237_WSA

Scientific name	Cover (%)	Growth Form	High Threat Exotic
Alternanthera denticulata	0.1	Forb (FG)	
Araujia sericifera	0.1		HTE
Asparagus asparagoides	1		HTE
Bromus catharticus	0.1		
Bursaria spinosa	1	Shrub (SG)	
Cardiospermum grandiflorum	2		HTE
Casuarina glauca	20	Tree (TG)	
Conyza bone	0.1		
Ehrharta erecta	0.1		HTE
Eleocharis gracilis	0.1	Grass & grasslike (GG)	
eucalyptus tereticornis	2	Tree (TG)	
Galium spp.	0.1	Forb (FG)	
Glycine tabacina	0.1	Other (OG)	
Microlaena stipoides	0.1	Grass & grasslike (GG)	
Oplismenus aemulus	0.1	Grass & grasslike (GG)	
Pennisetum clandestinus	0.1		
Setaria parviflora	0.1		
Solanum nigra	0.1		
Solanum pseudocapsicum	0.1		
Tradescantia fluminensis	95		HTE
Verbena bonariensis	0.1		

Appendix D: Tests of Significance (BC Act)

Cumberland Plain Woodland in the Sydney Basin Bioregion – Critically Endangered Ecological Community (CEEC)

The Cumberland Plain Woodland is listed as a CEEC under the BC Act. This community occurs on soils derived from Wianamatta Shale, throughout the driest part of the Sydney Basin. It is well adapted to drought and fire and is typically found on heavy clay soils (OEH 2022). This community has undergone significant declines since European settlement with the expansion of Sydney and the outlying regional centres, now only 9 % of the original extent of this community remains in-tact (OEH 2022) with around 12 % occurring as scattered remnants (DECCW 2010b).

Cumberland Plain Woodland within the study area

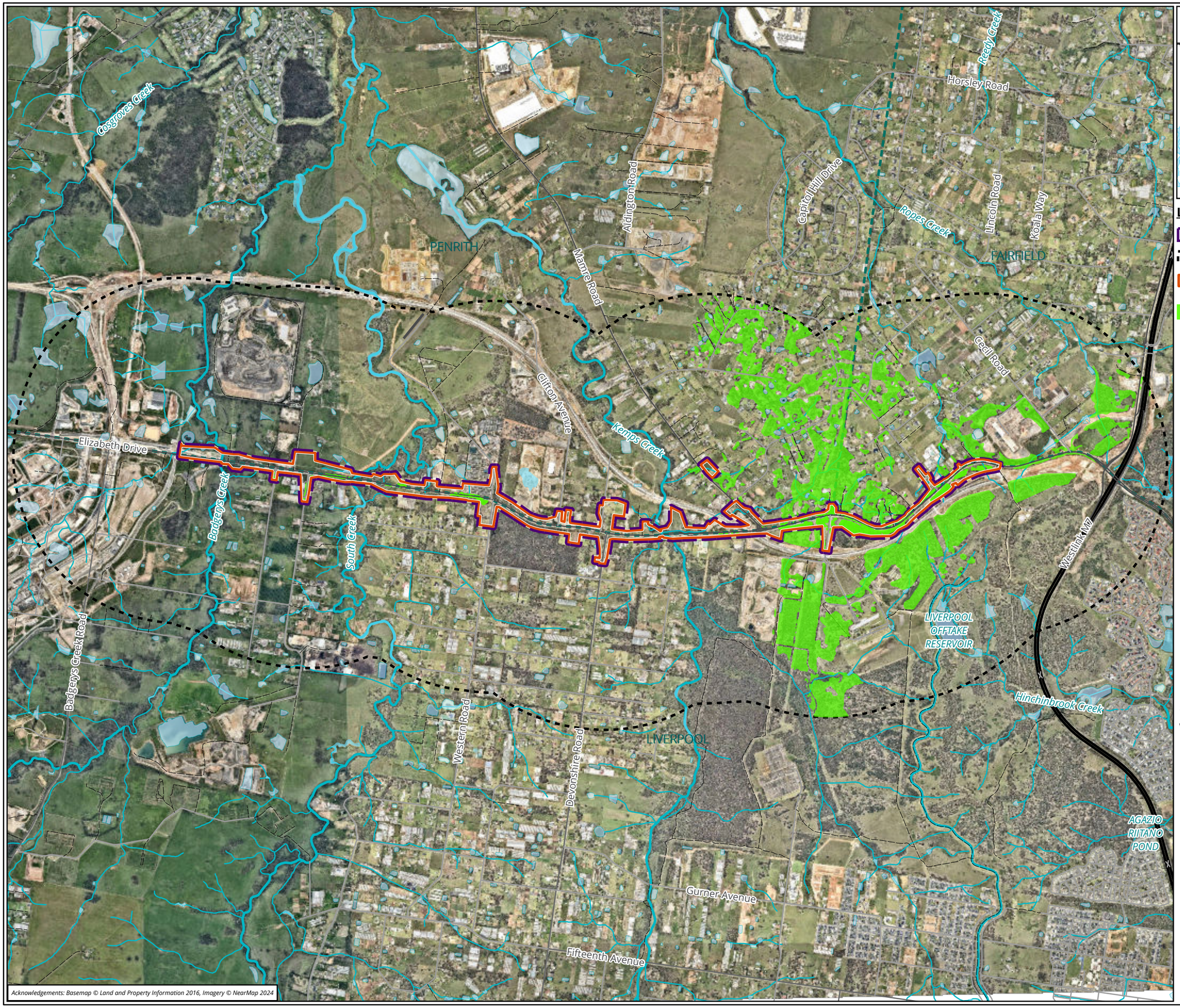
Cumberland Plain Woodland aligns with PCT 849 within the study area. The proposal would result in the removal of approximately 6.22 hectares of Cumberland Plain Woodland CEEC.

For this assessment, the local occurrence of Cumberland Plain Woodland comprises all PCT 849 mapped within the study area and any contiguous areas of the community that extend outside the study area into the surrounding landscape. The local occurrence of this CEEC covers approximately 198.01 ha of land and has been estimated based on the area of contiguous Cumberland Plain Woodland mapped in the State Vegetation Type Mapping ((DPE 2023) (refer to Figure A-1). Vegetation was considered contiguous when no breaks in connectivity over 100 metres occurred. The greatest degree of connectivity with areas outside the study area occurs at Western Sydney Parklands where the local occurrence exceeds 100 hectares.

Test of Significance for Cumberland Plain Woodland
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.
Not applicable.
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.***
The local occurrence of Cumberland Plain Woodland is considered to comprise the areas directly impacted by the proposal, and the areas potentially indirectly impacted through increased fragmentation and isolation. These areas include the contiguous areas of the CEEC extending east to west across the study area along Elizabeth Drive, and the patches that occur contiguous with the study area, most significantly, Western Sydney Parklands. The local occurrence of Cumberland Plain Woodland is present in low and moderate conditions, consisting of small patches of scattered trees along the road verges of Elizabeth Drive, with larger more intact patches toward the eastern most end of the study area on the boundary of the Western Sydney Parklands. The low condition occurrence of this CEEC consists of a sparse native canopy with a mixture of native and exotic species in the mid storey and a lower storey dominated by exotic species. Due to access constraints, areas of moderate condition were unable to be assessed in detail during field investigations. Visual surveys of areas of moderate condition CEEC were undertaken in November 2023, and confirmed that these areas have a higher species diversity and abundance than those along the road verges. The local occurrence of this community covers approximately 198.01 ha of land. The direct removal of 6.22 ha (or 3.14% of the local occurrence) of low and moderate condition Cumberland Plain Woodland for the widening of Elizabeth Drive Road is not considered likely to have an adverse effect on the extent of the ecological community that the local occurrence is likely to be placed at risk of extinction. The CEEC within the subject land already occurs in a patchy and edge effected state, and the proposal would not result in a substantial increase to these negative pressures. While the remaining area of this community is highly

Test of Significance for Cumberland Plain Woodland
fragmented, the removal of 6.22 ha of predominantly roadside vegetation across a 7.8 kilometre stretch of Elizabeth Drive, is unlikely to significantly exacerbate fragmentation. Additional vegetation outside of the impact area may be indirectly impacted through increased edge effects, however, following implementation of the mitigation measures outlined in Section 6 of this report, these additional impacts are not expected to be substantial. A large proportion of the local occurrence of this CEEC will not be directly impacted, which likely comprises vegetation in a higher condition that the vegetation observed within the subject land. Overall, the vegetation that would be removed as part of the proposed works does not comprise any ecological components critical to the survival of the CEECs broader local occurrence, which is substantive within the Western Sydney Parklands.
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 habitat supporting the local occurrence of Cumberland Plain Woodland comprises small fragmented areas where canopy trees have been retained, allowing a low condition form of the community to persist, as well a larger intact patches that has sustained a moderate condition form of the community. These areas of habitat occur with a patchy distribution along the roadside, between land used for agriculture and infrastructure development. The proposal would result in the direct removal of 6.22 ha of potential habitat for Cumberland Plain Woodland, however areas contiguous to that being removed would be retained. The proposal involves the widening of an existing road, in which the vegetation that would be directly impacted consists of predominantly roadside vegetation in low condition. The proposed impacts are linear in nature, occurring adjacent to Elizabeth Drive, thus the vegetation removal will not extend into the surrounding landscape such that are area of this CEEC may be separated from another. While the proposal may result in some minor fragmentation particularly when considering the cumulative impacts associated with other local projects such as the M12 and Elizabeth Drive West upgrade, areas of habitat would not become fragmented or isolated appreciably. The area of habitat to be directly and indirectly impacted by the proposal is not considered important to the long term survival of the local occurrence given that it is linear in nature and occurs in a degraded state within a road corridor.
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).
The proposal would not impact on an area declared as of outstanding biodiversity value (either directly or indirectly).
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.
The proposal has the potential to result in the following key threatening processes which are listed under the Schedule 4 of the BC Act and which are considered relevant to Cumberland Plain Woodland: Clearing of native vegetation. The proposed roadway widening requires clearing of land where this community occurs, resulting in the removal 6.07 ha of the CEEC. However, vegetation to be cleared is of low and moderate condition, subject to edge effects, and occurs in proximity to higher, better quality patches of vegetation within the locality.
Conclusion.
The proposal is unlikely to significantly impact Cumberland Plain Woodland for the following reasons:

Test of Significance for Cumberland Plain Woodland
• The proposal would not adversely affect the extent or composition of the ecological community to the point where its current ecological function is compromised to cause it to become locally extinct. • The proposal is unlikely to significantly alter floristic or structural diversity of the retained portions of the CEEC. • The localised nature of the proposal would not significantly trigger or exacerbate any key threatening processes. Therefore, no further assessment is required and a SIS or BDAR is not required.



Acknowledgements: Basemap © Land and Property Information 2016, Imagery © NearMap 2024

Figure A-1 Local occurrence of Cumberland Plain Woodland

Matter: 38207, Date: 22 February 2024,
GIS: JB, Checked by: JB, Last edited by: jbeckius
Location: P:\38200s\38207\Mapping\38207_ElizabethDr_East_BAR_F3s.aprx
Layout: 38207_FA-1_CPW

River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – Endangered Ecological Community (EEC)

River-flat Eucalypt Forest is listed as an EEC under the BC Act. The community is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 metres in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. Major examples once occurred on the floodplains of the Hunter, Hawkesbury, Moruya, Bega and Towamba Rivers, although many smaller floodplains and river flats also contain examples of the community. The remaining area is likely to represent much less than 30 % of its original range. Given its habitat, the community has an important role in maintaining river ecosystems and riverbank stability. Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains (DPE 2022c).

River-flat Eucalypt Forest within the study area

River-flat Eucalypt Forest aligns with PCT 835 in low condition within the study area. The proposal would result in the removal of approximately 2.81 hectares of this EEC.

For this assessment, the local occurrence of River-flat Eucalypt Forest comprises all PCT 835 mapped within the study area and any contiguous areas of the community that extend outside the study area into the surrounding landscape. This predominantly occurs along named waterways (Badgerys Creek, South Creek and Kemps Creek) and their tributaries that extend north and south of the study area for many kilometres. Assuming the community is present along these waterways, the local occurrence would cover many tens of hectares, if not more.

Test of Significance for River-flat Eucalypt Forest
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.
Not applicable.
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.***
As outlined above the local occurrence of River-flat Eucalypt Forest comprises all PCT 835 mapped within the study area and primarily patches that extend up and downstream along Badgery's Creek, South Creek and Kemps Creek. The local occurrence of River-flat Eucalypt Forest is present in low to moderate condition and is contiguous with larger area of vegetation which would not be impacted by the proposal extending north and south of the study area along the riparian corridors of the above waterways. The viability of these patches of the TEC along these waterways would not be substantially affected by the impacts associated with the proposal. The proposal requires the removal of 2.81 ha of River-flat Eucalypt Forest. This community is present in low to moderate condition, and occurs in a patchy and edge effected state in an already fragmented landscape where introduced vegetation cover is significant and intensive land clearing has taken place over the past 150 years. Therefore, clearing for the proposal is considered unlikely to substantially modify the composition of the local occurrence of the EEC.
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***

Test of Significance for River-flat Eucalypt Forest
(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 habitat supporting the local occurrence of River-flat Eucalypt Forest comprises degraded patches located within and adjacent to waterways, where canopy trees have been retained and degraded patches of the community have been able to persist. These areas of habitat occur with a patchy distribution between land used for agriculture and infrastructure development. The proposal would result in the direct removal of 2.81 ha of habitat for River-flat Eucalypt Forest in areas that are already subject to edge effects resulting from the fragmented and patchy landscape within which they occur. However the proposal is not considered likely to increase the level to which these negative pressures occur. The area of habitat to be directly and indirectly impacted by the proposal is not considered important to the long term survival of the community in the locality.
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).
The proposed works would not impact on an area declared as of outstanding biodiversity value (either directly or indirectly).
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.
The proposal has the potential to result in the following key threatening processes which are listed under the Schedule 4 of the BC Act and which are considered relevant to River-flat Eucalypt Forest: • Clearing of native vegetation. The proposed roadway widening requires clearing of land where this community occurs, resulting in the removal 2.11 ha of the EEC. However, vegetation to be cleared is of low condition, subject to edge effects, and occurs in proximity to larger, higher quality patches of vegetation within the locality.
Conclusion.
The proposed works are unlikely to significantly impact River-flat Eucalypt Forest for the following reasons: • The proposal would not adversely affect the extent or composition of the ecological community to the point where its current ecological function is compromised to cause it to become locally extinct. • The proposal is unlikely to significantly alter floristic or structural diversity of the retained portions of the EEC. • The localised nature of the proposed works would not significantly trigger or exacerbate any key threatening processes. Therefore, no further assessment is required and a SIS or BDAR is not required.

Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions – Endangered Ecological Community (EEC)

Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions is listed as an CEEC under the BC Act (NSW Scientific Committee 2011). The community is typically dominated by *Casuarina glauca* (Swamp Oak) and is found in close proximity to rivers and estuaries. The community is found in areas where soil is influenced by salinity and soils are wet or subject to water inundation. The vegetation structure can vary significantly so may differ markedly between different localities (DPE 2022d).

Swamp Oak Floodplain Forest within the study area

Swamp Oak Floodplain Forest aligns with PCT 1800 in low condition within the study area. The proposal would result in the removal of approximately 1.48 hectares of this EEC.

For this assessment, the local occurrence of Swamp Oak Floodplain Forest comprises all PCT 1800 mapped within the study area and any contiguous areas of the community that extend outside the study area into the surrounding landscape. This predominantly occurs along named waterways (Badgerys Creek, South Creek and Kemps Creek) and their tributaries that extend north and south of the study area for many kilometres. Assuming the community is present along these waterways, the local occurrence would cover many tens of hectares, if not more.

Test of Significance for Swamp Oak Floodplain Forest
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.
Not applicable.
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.***
As outlined above the local occurrence of Swamp Oak Floodplain Forest comprises all PCT 1800 mapped within the study area and primarily patches that extend up and downstream along Badgery's Creek, South Creek and Kemp's Creek. The local occurrence of Swamp Oak Floodplain Forest is present in low condition and consists of a relatively intact canopy with a predominantly thinned midstorey and exotic lower stratum. Vegetation occurring within the study area is contiguous with larger areas of vegetation which would not be impacted by the proposal extending north and south of the study area along the riparian corridors of these waterways. The viability of these patches of the TEC along these waterways would not be substantially affected by the impacts associated with the proposal. The proposal requires the removal of 1.48 ha (less than 15%) of the local occurrence of Swamp Oak Floodplain Forest. This community is present in low condition, and occurs in a patchy and edge effected state in an already fragmented landscape where introduced vegetation cover is significant and intensive land clearing has taken place over the past 150 years. Therefore, clearing for the proposal is considered unlikely to substantially modify the composition of the EEC in the locality.
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.***

Test of Significance for Swamp Oak Floodplain Forest
The habitat supporting the local occurrence of Swamp Oak Floodplain Forest comprises patches located along the roadside where small degraded patches of the community have been able to persist, and linear patches within the riparian zones of Badgery's Creek, South Creek and Kemps Creek The habitat to be removed adjacent to Elizabeth Drive supports a small portion of that which supports the local occurrence of the TEC. The proposal would result in the direct removal of 1.48 ha of habitat for Swamp Oak Floodplain Forest in areas that are already subject to edge effects resulting from the fragmented and patchy landscape within which they occur. However the proposal is not considered likely to increase the level to which these negative pressures occur. The area of habitat to be directly and indirectly impacted by the proposal is not considered important to the long term survival of the community in the locality.
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).
The proposal would not impact on an area declared as of outstanding biodiversity value (either directly or indirectly).
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.
The proposal has the potential to result in the following key threatening processes which are listed under the Schedule 4 of the BC Act and which are considered relevant to Swamp Oak Floodplain Forest: Clearing of native vegetation. The proposed roadway widening requires clearing of land where this community occurs, resulting in the removal 1.48 ha of the EEC. However, vegetation to be cleared is of low condition, subject to edge effects, and occurs in proximity to larger, higher quality patches of vegetation within the locality, extending along Badgery's, South, and Kemps Creek waterways.
Conclusion.
The proposed works are unlikely to significantly impact Swamp Oak Floodplain Forest for the following reasons: • The proposal would not adversely affect the extent or composition of the ecological community to the point where its current ecological function is compromised to cause it to become locally extinct. • The proposal is unlikely to significantly alter floristic or structural diversity of the retained portions of the EEC. • The localised nature of the proposal would not significantly trigger or exacerbate any key threatening processes. Therefore, no further assessment is required and a SIS or BDAR is not required.

Shale-gravel Transition Forest in the Sydney Basin Bioregion – Endangered Ecological Community (EEC)

The *Shale-gravel Transition Forest in the Sydney Basin Bioregion* is listed as endangered under the BC Act. This community is a transitional community that grades into Cumberland Plain Woodland where the influence of gravel soil is high, throughout the driest part of the Sydney Basin (OEH 2022a).

Threats to the Shale-gravel Transition Forest include:

- Inappropriate fire regimes.
- Clearing for urban or rural development.
- Fragmentation.
- Invasion by weeds and foreign plants.
- Tree death caused by fungus following borers.
- Bell miner associated dieback.
- Disturbance and damage by recreational users (including litter, creation of trails for motorbikes and four wheel drives, firewood collection and removal of woody debris).
- Inappropriate water run-off leading to increased nutrients and sedimentation.

Shale-gravel Transition Forest within the study area

Shale-gravel Transition Forest aligns with PCT 724 within the study area. The proposal would require the removal of 1.37 hectares of Shale-gravel Transition Forest.

For this assessment, the local occurrence of Shale-gravel Transition Forest comprises all PCT 724 mapped within the study area and any contiguous areas of the community that extend outside the study area into the surrounding landscape. This occurs in three locations, between Badgerys Creek and Kemps Creek covering 20.29 hectares conservatively.

Test of Significance for Shale-gravel Transition Forest in the Sydney Basin Bioregion
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.
Not applicable.
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.***
The local occurrence of Shale-gravel Transition Forest is present in low and high conditions. The low condition form of this community occurs as smaller degraded patches with scattered canopy that are devoid of a lower stratum and with a high level of weed ingress. The high condition form of this community consists of an intact canopy and understorey, with high floristic and structural diversity. This condition class occurs as two patches totalling 1.37 ha, extending to the north of the study area west of South Creek and east of South Creek. The proposed works require the removal of 1.37 ha of Shale-gravel Transition Forest, with the majority being the low condition class. This community occurs within and adjacent to predominantly cleared agricultural land. All patches of this community within the study area are currently subject to edge effects and are surrounded by a highly fragmented landscape. Given that the portion of the local occurrence to be removed is small (less than 10%) and predominantly in low condition, and the presence of high

Test of Significance for Shale-gravel Transition Forest in the Sydney Basin Bioregion
condition connected to the study area, clearing for the proposal is considered unlikely to adversely affect the extent or composition of the community such that the local occurrence is likely to be placed at risk of extinction.
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 habitat supporting portion of the local occurrence of Shale-gravel Transition Forest within the study area comprises patches located along the roadside where predominantly small degraded patches of the community have been able to persist. 1.37 hectares of this habitat would be removed. The proposal would result in the direct removal of 1.37 ha of habitat for Shale-gravel Transition Forest in areas that are already subject to edge effects resulting from the fragmented and patchy landscape within which they occur. However the proposal is not considered likely to increase the level to which these negative pressures occur. The area of habitat to be directly and indirectly impacted by the proposal is not considered important to the long term survival of the community in the locality.
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).
The proposed works would not impact on an area declared as of outstanding biodiversity value (either directly or indirectly).
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.
The proposed works have the potential to result in the following key threatening processes which are listed under the Schedule 4 of the BC Act and which are considered relevant to Shale-gravel Transition Forest: Clearing of native vegetation. The proposed roadway widening requires clearing of land where this community occurs, resulting in the removal 1.37 hectares of the EEC. However, vegetation to be cleared is currently subject to edge effects, and occurs in proximity to larger, contiguous patches of vegetation that are of higher quality, within the locality.
Conclusion.
The proposal is unlikely to significantly impact Shale-gravel Transition Forest for the following reasons: • The proposal would not adversely affect the extent or composition of the ecological community to the point where its current ecological function is compromised to cause it to become locally extinct. • The proposal is unlikely to significantly alter floristic or structural diversity of the retained portions of the TEC. • The localised nature of the proposal would not significantly trigger or exacerbate any key threatening processes. Therefore, no further assessment is required and a SIS or BDAR is not required.

Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion – Endangered ecological community (EEC)

Cooks River/Castlereagh Ironbark Forest is listed as an Endangered Ecological Community (EEC) under the NSW BC Act. Cooks River/Castlereagh Ironbark Forest occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. The community has a very restricted natural distribution and mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales. The composition of the tree stratum ranges from open forest to low woodland, with a canopy dominated by Broad-leaved Ironbark *Eucalyptus fibrosa*, Woolybutt *E. longifolia* and Paperbarks *Melaleuca decora* (DoE 2015a).

Cooks River/Castlereagh Ironbark Forest within the study area

Cooks River/Castlereagh Ironbark Forest aligns with PCT 725 within the study area. The proposal would require the removal of 1.76 hectares of Cooks River/Castlereagh Ironbark Forest.

For this assessment, the local occurrence of Cooks River/Castlereagh Ironbark Forest comprises all PCT 725 mapped within the study area and any contiguous areas of the community that extend outside the study area into the surrounding landscape. PCT 725 occurs in the centre of the study area north and south of Elizabeth Drive between South Creek and Kemp's Creek. The southern section is connected with reserved lands to the west of Bill Anderson Reserve. Immediately to the north of this location, PCT 725 has been subject to past residential and industrial development resulting in the modification or loss of the mid and understory.

Test of Significance for Cooks River/Castlereagh Ironbark Forest
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.
Not applicable.
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.***
The local occurrence of Cooks River/Castlereagh Ironbark Forest is present in low and high conditions. The low condition form of this community occurs as fragmented patches of scattered trees with a thinned understorey along the road verge of Elizabeth Drive and adjoined industrial area. The high condition form of this community consists of a relatively intact canopy and understorey, with high floristic and structural diversity. This community forms part of the Bill Anderson Reserve, which occurs as a large contiguous patch of approximately 29.6 ha, extending south of the study area. The proposed works require the removal of 1.76 ha of Cooks River/Castlereagh Ironbark Forest. Given the portion of the local occurrence that would be removed is small (5 %), and the remaining portion is all high in condition and within reserved lands, clearing for the proposal is considered unlikely to adversely affect the extent or composition of the community such that the local occurrence is likely to be placed at risk of extinction.
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***

Test of Significance for Cooks River/Castlereagh Ironbark Forest
(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 habitat supporting portion of the local occurrence of Cooks River/Castlereagh Ironbark Forest within the study area comprises a small patch located along the northern roadside that has been able to persist and reserved lands immediately to the south in high condition. 1.5 ha of habitat would be removed. The proposal would result in the direct removal of 1.76 ha of habitat for Cooks River/Castlereagh Ironbark Forest in areas that are already subject to edge effects resulting from the fragmented and patchy landscape within which they occur. However, the proposal is not considered likely to increase the level to which these negative pressures occur. The area of habitat to be removed on the south side of Elizabeth Drive, while in high condition, is not considered important to the EECs survival in broader locality as this area is relatively small compared to what would remain.
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).
The proposal would not impact on an area declared as of outstanding biodiversity value (either directly or indirectly).
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.
The proposal has the potential to result in the following key threatening processes which are listed under the Schedule 4 of the BC Act and which are considered relevant to Cooks River/Castlereagh Ironbark Forest: Clearing of native vegetation. The proposed roadway widening requires clearing of land where this community occurs, resulting in the removal 1.76 ha of the EEC. Vegetation to be removed is of low and high condition, with low condition vegetation existing in small fragmented patches, and high condition vegetation currently subject to edge effects. Areas to be cleared either occur in close proximity to larger, higher quality patches, or are contiguous with these patches.
Conclusion.
The proposed works are unlikely to significantly impact Cooks River/Castlereagh Ironbark Forest for the following reasons: • The proposal would not adversely affect the extent or composition of the ecological community to the point where its current ecological function is compromised to cause it to become locally extinct. • The proposal is unlikely to significantly alter floristic or structural diversity of the retained portions of the EEC. • The localised nature of the proposal would not significantly trigger or exacerbate any key threatening processes. Therefore, no further assessment is required and a SIS or BDAR is not required.

Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion – Vulnerable ecological community (VEC)

Castlereagh Scribbly Gum Woodland is listed as a Vulnerable Ecological Community (VEC) under the NSW BC Act. Castlereagh Scribbly Gum Woodland occurs in western Sydney, with the main occurrence g in the Castlereagh area of the Cumberland Plain, with smaller patches occurring at Kemps Creek and Longneck Lagoon. The community occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. It is often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion. The composition of the tree stratum is dominated by *Eucalyptus parramattensis, Angophora bakeri and E. sclerophylla*. It has a well-developed shrub layer consisting of sclerophyllous species such as *Banksia spinulosa* var. *spinulosa and Melaleuca nodosa*, while the groundcover stratum consists of a diverse range of forbs including *Themeda australis*, *Entolasia stricta*, *Cyathochaeta diandra*, and *Dianella revoluta* subsp. *revolute* (DoE 2015b).

Castlereagh Scribbly Gum Woodland within the study area

Castlereagh Scribbly Gum Woodland aligns with PCT 883 within the study area. The proposal would require the removal of 0.82 hectares of Castlereagh Scribbly Gum Woodland.

For this assessment, the local occurrence of Castlereagh Scribbly Gum Woodland comprises all PCT 883 mapped within the study area and any contiguous areas of the community that extend outside the study area into the surrounding landscape. PCT 883 occurs in the centre of the study area south of Elizabeth Drive between South Creek and Kemp's Creek. The community is connected with reserved lands to the west of Bill Anderson Reserve and is in high condition. The local occurrence covers 2.5 hectares conservatively.

Test of Significance for Castlereagh Scribbly Gum Woodland
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.
Not applicable.
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.***
The local occurrence of Castlereagh Scribbly Gum Woodland is in high condition as it occurs within reserved lands immediately west of Bill Anderson Reserve. The local occurrence is approximately 2.5 ha in size and 0.82 ha (or 32 %) would be removed. Given the portion of the local occurrence that would be removed is subject to some edge effect of higher exotic growth and that the larger, more diverse portion would remain as a consolidated patch, clearing for the proposal is considered unlikely to adversely affect the extent or composition of the community such that the local occurrence is likely to be placed at risk of extinction.
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.***

Test of Significance for Castlereagh Scribbly Gum Woodland
The habitat supporting the portion of the local occurrence of Castlereagh Scribbly Gum Woodland within the study area is within reserved lands to the west of Bill Anderson Reserve. 0.82 ha of this habitat would be removed. The proposal would result in the direct removal of 0.82 ha of habitat for Castlereagh Scribbly Gum Woodland in areas that are already subject to edge effects resulting from the fragmented and patchy landscape within which they occur. However the proposal is not considered likely to increase the level to which these negative pressures occur. The area of habitat to be removed, while in high condition, is not considered important to the VECs survival in the broader locality as this area is relatively small compared to what would remain within the associated reserved lands and further afield.
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).
The proposal would not impact on an area declared as of outstanding biodiversity value (either directly or indirectly).
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.
The proposal has the potential to result in the following key threatening processes which are listed under the Schedule 4 of the BC Act and which are considered relevant to Castlereagh Scribbly Gum Woodland: Clearing of native vegetation. The proposed roadway widening requires clearing of land where this community occurs, resulting in the removal 0.8 hectares of the VEC.
Conclusion.
The proposed works are unlikely to significantly impact Castlereagh Scribbly Gum Woodland for the following reasons: • The proposal would not adversely affect the extent or composition of the ecological community to the point where its current ecological function is compromised to cause it to become locally extinct. • The proposal is unlikely to significantly alter floristic or structural diversity of the retained portions of the VEC. • The localised nature of the proposal would not significantly trigger or exacerbate any key threatening processes. Therefore, no further assessment is required and a SIS or BDAR is not required.

Dillwynia tenuifolia – Kemps Creek – Endangered population

The Kemps Creek population of *Dillwynia tenuifolia* is listed as Endangered under the BC Act. It is a low spreading pea-flower shrub, growing up to a metre high. It has small and narrow leaves and its flowers are wide and in an orange-yellow and red colour combination. This species core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire (DPE 2022e). The common threats to this species include:

- Habitat fragmentation / habitat loss
- Inappropriate fire regimes
- Illegal dumping
- Weed invasion

***Dillwynia tenuifolia* within the study area**

Approximately 30-40 individuals of *Dillwynia tenuifolia* were recorded within the study area during field investigations. The endangered population in question is known to extend throughout the patch of bushland west of Bill Anderson Reserve and contain thousands of individuals within 100 m of the subject site (based on BioNET records). The proposal would result in the removal of approximately 13 individuals and 2.58 hectares of habitat for the species. Two records will not be impacted within the subject site.

Test of Significance for *Dillwynia tenuifolia*
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 would remove 13 individuals and impact upon approximately 2.58 ha of habitat of *Dillwynia tenuifolia*. The removal of this vegetation would reduce the available habitat for the *Dillwynia tenuifolia* in the study area, however, given the availability of a large contiguous patch of habitat adjacent to the study area to the south, as well as known records of the species within this patch, the removal of these individuals and vegetation is considered unlikely to have an adverse effect on the life cycle of the species. Due to the localised scale of the impacts and given the known large size of the local population of the species, the level of impact would not lead to the extinction of the viable local population.
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.
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 proposed works would impact upon approximately 2.58 ha of habitat of *Dillwynia tenuifolia* through removal of native vegetation for the widening of Elizabeth Drive roadway.

Test of Significance for *Dillwynia tenuifolia*

While approximately 13 individuals of *Dillwynia tenuifolia* were recorded within the subject land, these form a part of a larger population in a larger contiguous patch south of the study area. Approximately 13 are predicted to be directly impacted by the proposal. The extent of habitat removal is not considered to be substantial given that approximately 30 ha of habitat and a local population thought to number in the thousands would remain.

The proposed works would not result in fragmentation to, or isolation of, *Dillwynia tenuifolia* habitat, as vegetation within the study area exists in an already highly fragmented landscape. The extent to which habitat would be impacted when considered in the context of that which is available to the entire local populations is small, and as such the impacts are not considered substantial.

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).

The proposed works would not impact on an area declared as of outstanding biodiversity value (either directly or indirectly).

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.

The proposed works have the potential to result in the following key threatening processes which are listed under the Schedule 4 of the BC Act and which are considered relevant to *Dillwynia tenuifolia*:

- Clearing of native vegetation.

Approximately 2.58 ha of native vegetation that provides habitat for *Dillwynia tenuifolia* would be impacted by the proposed works.

Conclusion.

In consideration of the above five factors, the proposed activity is not likely to significantly impact *Dillwynia tenuifolia* within the study area or wider locality, as:

- The proposal would remove 13 *Dillwynia tenuifolia* individuals within the study area, and remove 2.58 hectares of potential habitat which are currently exposed to a number of disturbances which are unlikely to be further exacerbated by the proposed works.
- The proposal is unlikely to significantly alter the extent of the population to the point where it becomes locally extinct.
- The removal of approximately 2.58 ha area of vegetation would not result in the isolation or fragmentation of locally occurring habitat within the study area and as such is unlikely to affect its long term survival in the locality.
- The localised nature of the proposed works would not significantly trigger or exacerbate any key threatening processes.

Therefore, no further assessment is required and a SIS or BDAR is not required.

Little Lorikeet *Glossopsitta pusilla* - Vulnerable species BC Act

Little Lorikeet is listed as vulnerable under the BC Act. Little Lorikeet is distributed in forests and woodlands from the east coast to the western slopes of the Great Dividing Range in NSW, extending from Queensland to Victoria. The Little Lorikeet mostly occurs in dry, open eucalypt forests and woodlands, feeding primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 metres and 15 metres, mostly in living, smooth-barked eucalypts. Most breeding records for the species come from the western slopes.

Little Lorikeet within the study area

Previous records of the Little Lorikeet exist in the surrounding localities (8 records within 10 kilometres of the study area), with the most recent records collected in 2018 and the closest records located within 1.5 kilometres of the study area.

The proposed works would result in the removal of up to 14.57 hectares of potential habitat and nine hollow-bearing trees providing potential roosting and nesting resources for the species. An assessment of whether the proposed proposal is likely to lead to a significant impact to habitat for Little Lorikeet is provided below.

Test of Significance for Little Lorikeet
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 proposed works would involve removal of up to 14.57 ha of native vegetation providing potential habitat for the Little Lorikeet within the study area. The habitat within the study area includes foraging resources such as flowering eucalyptus species and up to nine hollow-bearing trees providing potential nesting resources for breeding. Habitat within the study area is highly disturbed due to historic clearing, surrounding land uses (residential and industrial including extractive resources and roads) and ongoing land management (agriculture and grazing). Potential habitat exists primarily as remnant roadside vegetation, remnant patches in paddocks and surrounding residential dwellings and riparian corridors. Larger areas of suitable habitat occur within reserves including Bill Anderson Reserve, to the south of Elizabeth Drive. Breeding habitat within the study area is considered to be of low quality due to disturbance from the adjacent roads including noise and vibration and relatively exposed position of hollow-bearing trees. Similarly, foraging habitat provided by the study area includes thin linear roadside vegetation remnants and riparian corridor vegetation. Removal of the small areas (total 14.57 ha) of vegetation providing potential habitat in the context of the habitat available in the wider locality is not expected to significantly reduce the resources for this species such that it would impact the life cycle of the species, or a local population to the extent that they would be likely to be placed at risk of extinction. Standard mitigation measures as detailed in the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024) would be in place to ensure no interruption of breeding or direct impact to individuals is likely.
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, not an ecological community.
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.***

Test of Significance for Little Lorikeet

The proposal would remove 14.57 ha of potential foraging habitat and 9 hollow-bearing trees providing potential low quality breeding habitat for Little Lorikeets throughout the study area.

The Little Lorikeet is a highly mobile species of bird and is widespread throughout the east coast and western slopes of NSW. The development would remove a small area of potential habitat in multiple locations throughout the study area. As such, the species distribution is considered continuous throughout the species range and the species is considered to be a single continuous population.

The development would not increase fragmentation or isolation of any areas of habitat for this highly mobile species and is not likely to result in any local population becoming genetically isolated.

The habitat within the study area is considered to be of low quality for breeding due to the exposed position of hollows and the existing indirect impacts (noise and vibration) from the adjacent roads and in some areas, industrial activities. Removal of a small area of this habitat (14.57 ha and nine hollow-bearing trees) is not expected to impact the resources available to the population such that it would impact the long-term survival of the species in the locality.

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).

To date no declared areas of outstanding biodiversity value within the study area.

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 relevant to the Little Lorikeet identified on the Schedule 4 of the BC Act that may be exacerbated by the proposed slope works include:

- Clearing of native vegetation
- Human caused climate change
- Loss of Hollow bearing trees

The removal of seven hollow-bearing trees providing potential roosting habitat would contribute to these KTPs, but is unlikely to significantly impact Little Lorikeets within the locality.

The proposal would result in clearing of native vegetation and therefore would form part of a key threatening process. The small scale of vegetation removal (14.57 ha) providing low quality foraging habitat for the species, in the context of the larger patches retained along riparian corridors and in the wider locality is considered unlikely to significantly increase the impact of this key threatening process such that it would lead to the decline of the species.

Conclusion.

The proposed works is not considered likely to cause a significant impact to Little Lorikeet given the following factors:

- Habitat within the study area includes a small area of foraging habitat and low-quality potential breeding habitat, removal of vegetation is not considered likely to cause an adverse impact on the life cycle of the species such that the local population (or species as a whole) is likely to be placed at risk of extinction.
- The vegetation to be removed would not fragment or isolate remaining areas of habitat for the local population of Little Lorikeet.
- Habitat to be impacted comprises of low quality breeding habitat containing up to seven hollows potentially suitable for nesting and a small area of foraging habitat and is not considered to be important to the survival of the local population or the species as a whole.
- The proposed works would contribute on a small scale to the Key Threatening process of clearing of native vegetation.

Test of Significance for Little Lorikeet

- Standard mitigation measures as detailed in the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024) would be in place to ensure no interruption of breeding or direct impact to individuals is likely.

As such, further assessment in the form of a BDAR or SIS is not required.

Southern Myotis *Myotis macropus* – Vulnerable species BC Act

Southern Myotis is listed as vulnerable under the BC Act. Southern Myotis has a wide distribution within the coastal band (i.e. less than 100 kilometres inland), occurring from north-west Australia, across the top-end and south to western Victoria (DPE 2022j). The species generally roosts in groups of 10 to 15 individuals, preferably close to water in a number of different habitat structures including caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, bridges and in dense foliage. The Southern Myotis forages over open water, generally across pools and channels greater than 3 metres wide, using its large feet to collect insects and small vertebrates from the water surface (DPE 2022j, Law & Urquhart 2000, Campbell 2009).

Southern Myotis within the study area

Southern Myotis has previously been recorded in the locality (36 records within 10 kilometres of the study area), with the most recent records collected in 2021 and the closest records located within the study area. Ultrasonic recorders detected calls for the species, with a large volume of calls recorded near South Creek containing diagnostic features and feeding buzzes. Subsequent inspection of nearby bridges found approximately 100-150 individuals roosting within the eastern bridge overlying South Creek. It is assumed that most (if not all) of these bats are Southern Myotis, and may represent a breeding colony. Impacts to this bridge are expected and therefore the below test of significance was prepared.

Test of Significance for Southern Myotis

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.

Impacts likely to have an adverse effect on the life cycle of the Southern Myotis include direct mortality, loss of high productivity foraging habitat, loss of roosting habitat, introduction of exotic pathogens and hazard reduction and wildfire fires during the breeding season. Southern Myotis are highly mobile and the local population is not considered to be isolated or disjunct from other areas.

A total of 11.17 ha of vegetation within the species polygon of Southern Myotis would be removed, including nine hollow-bearing trees containing hollows providing potential roosting habitat for this species. The proposal would also have an impact on the South creek east bridge which was confirmed to contain a roost for the species. Given this, a Microbat Management Plan is to be prepared and implemented. The aim of this plan is to minimise the potential for individual mortality and prevention of a significant impact. Key aspects include:

- Installation of temporary habitat alternatives and/or permanent supplementary habitat (bat boxes, roosting opportunities within new bridges)
- Mitigation measures to minimise impacts of construction noise on roosting bats (noise dampening, containment of bats)
- Exclusion measures to prevent microbats returning to a bridge to roost during its removal
- Ongoing monitoring measures pre, during and post construction to assess impacts
- Requirements to conduct works on roosting habitat or implement any exclusion measures outside of breeding season
- Recommendations for construction staging and methods to avoid impacts to microbats.

In addition to the above, the new bridge design will incorporate similar long-term roosting opportunities (for example, suitable roosting gaps in the underside of the bridge).

With the successful implementation of the above measures, impacts to bats utilising the existing roost can be avoided. Therefore, it is unlikely removal of this habitat, with the implementation of a Microbat Management Plan, would have a significant impact on the life-cycle of Southern Myotis such that the species would be placed at risk of extinction.

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.

Test of Significance for Southern Myotis
Not applicable, not an ecological community.
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 proposed works would result in the removal of up to 11.17 ha of native vegetation, including the removal of up to nine hollow-bearing trees throughout the alignment that represents potential roosting habitat for Southern Myotis. The proposal would also have an impact on four bridges (over Badgerys Creek, South Creek (east and west) and Kemps Creek) and one culvert (directly east of South Creek) earmarked for replacement and dams that provide foraging habitat for this species. Of these, only the South Creek east bridge has been confirmed as containing roosting bats, and provides the most opportunities for roosting in comparison to the other bridges. Southern Myotis are highly mobile and are capable of foraging over large distances. The proposed works would not reduce the available area of foraging and would not result in the construction of any barrier likely to impact dispersal of the species. Vegetation to be removed would be confined to small areas of previous disturbance within the strip of vegetation running parallel to the road verge, which represents the main cause of edge effects and fragmentation within the locality. Given the location of the study area directly beside agricultural and industrial land, and the highly mobile nature of the species, removal of this vegetation would not result in further fragmentation or isolation of habitat for the species. The area of potential habitat proposed for removal represents a small proportion of the available habitat for the species within 10 kilometres of the study area. Foraging habitat would not be impacted by the proposed works and mitigation measures including erosion and sediment controls would prevent indirect impacts to waterways. Habitat adjoining the study area and surrounding riparian corridors is of similar structure, age and composition as vegetation within the impact area. The hollow-bearing trees within the study area likely represents a small fraction of the available habitat for this species in the locality. The South Creek east bridge supports a roost of at least 100-150 microbats assumed to be Southern Myotis .The removal of this feature has the potential to result in a significant impact to the survival of Southern Myotis utilising the study area for breeding through direct mortality and reduction of the availability of suitable breeding habitat in the locality. However, preparation and implementation of a Microbat Management Plan would minimise the potential for individual mortality and avoid of a significant impact occurring to this population. Key aspects of the Microbat Management Plan would include: • Installation of temporary habitat alternatives and/or permanent supplementary habitat (bat boxes, roosting opportunities within new bridges) • Mitigation measures to minimise impacts of construction noise on roosting bats (noise dampening, containment of bats) • Exclusion measures to prevent microbats returning to a bridge to roost during its removal • Ongoing monitoring measures pre, during and post construction to assess impacts • Requirements to conduct works on roosting habitat or implement any exclusion measures outside of breeding season • Recommendations for construction staging and methods to avoid impacts to microbats. In addition to the above, the new bridge design will incorporate similar long-term roosting opportunities (for example, suitable roosting gaps in the underside of the bridge). With the successful implementation of the above measures, significant impacts to microbats utilising the existing roost can be avoided, and it is unlikely the proposal would have a significant impact on the long-term survival of the species within the locality.
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).

Test of Significance for Southern Myotis
To date no areas of outstanding biodiversity value have been declared within the proposal's impact area.
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.
The proposed works have the potential to result in the following key threatening processes (KTPs) which are listed under the Schedule 4 of the BC Act and which are considered relevant to the Southern Myotis: • Clearing of native vegetation • Loss of hollow-bearing trees Approximately 11.17 ha of native vegetation, including hollow-bearing trees, which may provide marginal foraging and roosting habitat for Southern Myotis would be impacted by the proposed works. However, with the implementation of a Microbat Management Plan (see previous responses for included mitigation measures), the proposed works are unlikely to increase the impact of any of these KTPs.
Conclusion.
In consideration of the above five factors, with the preparation and implementation of a Microbat Management Plan to avoid significant impacts to Southern Myotis, the proposed activity is not likely to significantly impact Southern Myotis within the study area or wider locality, as: • A Microbat Management Plan is to be implemented that will incorporate recommendations to avoid significant impacts to Southern Myotis. • The proposed works would remove approximately 11.17 ha of native vegetation that provides marginal foraging habitat for Southern Myotis. • Works are limited to removal of seven hollow-bearing trees, adjacent to existing infrastructure and disturbed areas. • Replacement of four bridges is unlikely to reduce the availability of resources in the locality such that the species is placed at risk of extinction. • The localised nature of the proposed works would not significantly trigger or exacerbate any key threatening processes. • The habitat to be removed is not considered important to the survival of the species as a whole. • Standard mitigation measures as detailed in the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024) would be in place to ensure no interruption of breeding or direct impact to individuals is likely. Therefore, no further assessment is required and a SIS or BDAR is not required.

Hollow-roosting Microchiropteran Bat Species – Vulnerable species BC Act

Two tree-roosting Microchiropteran bat species listed as Vulnerable under the BC Act were recorded during targeted survey via ultrasonic detectors:

- Eastern Coastal Free-tailed Bat *Mormopterus norfolkensis* (Vulnerable, BC Act)
- Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act)

Ecological descriptions for each identified species have been provided below.

Eastern Coastal Free-tailed Bat

Eastern Coastal Free-tailed Bat, listed as Vulnerable under the BC Act, has a characteristically hairless faces with wrinkled lips and triangular ears. The species is found along the east coast of Australia ranging from south Queensland to southern NSW in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.

The species generally roosts in tree hollows but would also roost under bark or in man-made structures. It has been recorded roosting both solitary as well as in a communal roost. The species is most likely to be insectivorous (DPE 2022k).

The Eastern Coastal Free-tailed Bat has 11 records within the 5 kilometre search radius, with the closest record located within the study area, and the most recent record in the locality is from 2021 (EES 2022, Commonwealth of Australia 2019).

Greater Broad-nosed Bat

Greater Broad-nosed Bat, listed Vulnerable under the BC Act, is a large powerful species of Microchiopteran bat that grows up to 95 millimetres long. It has a broad head a short square muzzle and is coloured dark reddish-brown above and slightly paler below. Its larger size is used to distinguish it from other broad-nosed bats. The species occurs in gullies and river system that drain the Great Dividing Range and ranges from north-eastern Victoria up to the Gold Coast in Queensland.

The species utilises a variety of habitats including woodland, moist and dry Eucalyptus forests and rainforest, however it is most commonly found in tall wet forests. It generally roosts in tree hollows however it is also known to utilised man-made structures. The species forages after sunset along creek and river corridors in search of beetles and other large, slow-flying insects (DPE 2023a).

Microchiropteran Bat Species within the study area

Eastern Coastal Free-tailed Bat and Greater Broad-nosed Bat were both recorded via ultrasonic detector. .

Tree roosting microbats have been previously recorded within the locality (10 kilometres). A total of 40 hollow-bearing trees were recorded within the study area. These hollows may provide suitable roosting habitat for these species and nine located on non-certified land may require removal as part of the proposed works. These microbats are likely to forage within remnant vegetation along waterways and larger patches adjacent to Elizabeth Drive, such as within Bill Anderson Reserve. Due the presence of potential roosting and foraging habitat within the study area, assessment of potential significant impacts due to the proposed works has been undertaken in accordance with Section 7.3 of the BC Act has been undertaken below.

Test of Significance for Hollow-dependent Microchiropteran Bat Species
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.
Impacts likely to have an adverse effect on the life cycle of the four listed bats include direct mortality, loss of high productivity foraging habitat and loss of roosting habitat. The proposed works would result in removal of 14.57 ha of vegetation providing potential foraging habitat for the four species and up to nine trees providing potential roosting habitat. Within the wider locality multiple areas would be retained which provide similar habitat containing similar resources. These areas include vegetation along riparian corridors adjacent to the study area and vegetation within Bill Anderson Reserve, Kemps Creek Nature Reserve and the Western Sydney Parklands further to the east.

Test of Significance for Hollow-dependent Microchiropteran Bat Species
Removal of hollow-bearing trees may reduce the overall carrying capacity of the study area for the species, however the small scale of proposed vegetation clearing across the length of the alignment and removal of up to nine hollow-bearing trees is unlikely to significantly reduce the availability of resources such that an adverse effect on the life cycle of the species would occur to the extent they are likely to be placed at risk of extinction. Standard mitigation measures as detailed in the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024) would be in place to ensure no interruption of breeding or direct impact to individuals is likely.
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, not an ecological community.
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 proposed works would result in the removal of up to 14.57 ha of native vegetation, including the removal of nine hollow-bearing trees that represents potential roosting habitat for the microbat species. The vegetation to be removed would be confined to areas of previous disturbance within the strip of vegetation running parallel to the road verge, which represents the main cause of edge effects and fragmentation within the locality. Given the highly mobile nature of the microchiropteran bat species which are capable of foraging over large distances, and the location of the study area being adjacent to remnant suitable habitat, the removal of this vegetation is unlikely to result in further fragmentation or isolation of habitat for the species. The hollow-bearing trees within the study area likely represents a very small fraction of the available habitat for this species. Retained vegetation within riparian corridors and multiple reserves to the east of the study area would continue to provide similar habitat and can be reasonably expected to support similar features. Whilst some species may utilise hollow-bearing trees for roosting during breeding, it is unlikely that the removal of the small number of hollows within the study area would reduce the availability of resources in the locality to the point that the long-term survival of these species would be significantly impacted.
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).
To date no ***area of outstanding biodiversity value*** has been declared within the proposal's impact area.
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.
The proposed works have the potential to result in the following key threatening processes (KTPs) which are listed under the Schedule 4 of the BC Act and which are considered relevant to the Eastern False Pipistrelle, Greater Broad-nosed Bat, Yellow-bellied Sheath-tail Bat and Eastern Coastal Free-tailed Bat:

Test of Significance for Hollow-dependent Microchiropteran Bat Species

- Clearing of native vegetation
- Loss of hollow-bearing trees

Approximately 14.57 ha of native vegetation, including seven hollow-bearing trees, would be impacted by the proposed works. Although the cumulative impacts of vegetation clearing and hollow loss across the region over time would contribute to an increase in the impact of the above listed KTPs, the small scale of impacts proposed by the current proposal is not considered to contribute significantly to the KPTs listed above.

Conclusion.

In consideration of the above five factors, the proposed activity is not likely to significantly impact the two microbat species within the study area or wider locality, as:

- The proposed works would remove approximately 14.57 ha of native vegetation that provides marginal foraging habitat for the microbat species.
- Works are limited to removal of seven hollow-bearing trees, adjacent to existing infrastructure and disturbed areas.
- The localised nature of the proposed works would not significantly trigger or exacerbate any key threatening processes.
- The habitat to be removed is not considered important to the survival of the species.
- Standard mitigation measures as detailed in the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024) would be in place to ensure no interruption of breeding or direct impact to individuals is likely.
- It is assumed that the proven avoidance and minimisation measures employed on Transport projects would allow a significant impact to be avoided.

Therefore, no further assessment is required and a SIS or BDAR is not required.

Cumberland Plain Land Snail *Meridolum corneovirens* - Endangered species BC Act

Previous records of the Cumberland Plain Land Snail exist in the surrounding localities (206 records within 10 kilometres of the study area), with the most recent records collected in 2020 and the closest records located within the study area

The study area contains primarily roadside remnant vegetation in the form of woodland and forest which provides potential habitat for Cumberland Plain Land Snail. Cumberland Plain Land Snail shells were found at five locations. A species polygon was prepared totalling 10.85 hectares that includes all connective habitat where the shells were detected. The proposed works would result in the removal of up to 3.78 hectares of habitat for the species. In particular, 2.6 hectares of bushland west of Bill Anderson Reserve would be removed which has historical records and may be able to support a viable population. An assessment of whether the proposed proposal is likely to lead to a significant impact Cumberland Plain Land Snail is provided below.

Test of Significance for Cumberland Plain Land Snail
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 would remove up to 3.78 ha of native vegetation, including leaf litter and understorey vegetation that may provide foraging and breeding habitat for the Cumberland Plain Land Snail. The removal of this vegetation would reduce the available habitat for the Cumberland Plain Land Snail in the study area. Higher quality habitat occurs within remnant patches of Cumberland Plain Woodland within private land adjacent to the proposal alignment, including areas associated with riparian corridors. Higher quality habitat for the species also occurs within the wider locality, within Bill Anderson Reserve and Kemps Creek Nature Reserve to the east of the study area. Given the availability of higher quality habitat adjacent to study area, as well as higher quality habitat within the local area, the removal of the small area of low quality habitat for the Cumberland Plain Land Snail is considered unlikely 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. Recommendations included within this report are to undertake preclearance survey and translocation of any Cumberland Plain Land Snail found within the study area to native vegetation of similar habitat adjacent to the study area immediately prior to the commencement of works. This would further ensure minimal impact to this species as a result of the proposed works. Standard mitigation measures as detailed in the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024) would be in place to ensure no direct impacts to individuals is likely, such as the Cumberland Plain Translocation Plan translocation plan which will include relocation of individuals during pre-clearance surveys.
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, not an ecological community.
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 proposed development would result in the removal of up to 3.7 ha of native vegetation, including removal of leaf litter and groundcover vegetation that represents potential foraging and breeding habitat for the Cumberland Plain Land Snail.

Test of Significance for Cumberland Plain Land Snail

The vegetation to be removed is located mostly within the road reserve. Within the region, habitat fragmentation has occurred as a product of historic and ongoing land clearing for development and agricultural activities. As a result, habitat connectivity through the landscape is maintained primarily through riparian corridor vegetation. Given the location of the study area, the removal of this vegetation may reduce habitat connectivity for the species which has a relatively low range of dispersal. However, the small scale of removal of low quality habitat is unlikely to result in significant fragmentation of habitat for the species as connectivity through the riparian corridors would be maintained.

The small area of potential habitat proposed for removal represents a small proportion of the available habitat for this species within 10 kilometres of the study area. The surrounding locality contains larger areas of bushland providing habitat within reserves that would remain undeveloped. These areas contain more intact native vegetation with native understorey that provide higher quality habitat than the area to be impacted by the proposed works. Therefore, the importance of the habitat to be removed is not considered significant for the long-term survival of the species within the locality.

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).

To date no areas of outstanding biodiversity value have been declared within the proposal's study area.

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.

The proposed works have the potential to result in the following key threatening process which are listed under the Schedule 4 of the BC Act and which is considered relevant to Cumberland Plain Land Snail:

- Clearing of native vegetation.

Approximately 3.78 ha of native vegetation that provides breeding and foraging habitat for the Cumberland Plain Land Snail would be impacted by the proposed works. Clearing of habitat would contribute to the KTP 'clearing of native vegetation', however the small scale of impacts and retained connectivity in the landscape is unlikely to significantly increase the action of this KTP through the current proposal. Cumulative impacts across the region may result in increased impacts of this KTP.

Conclusion.

In consideration of the above, the proposed activity is not likely to significantly impact the Cumberland Plain Land Snail within the study area or wider locality, as:

- The proposed works would remove approximately 3.78 ha of native vegetation that provides low quality habitat for Cumberland Plain Land Snail.
- The localised nature of the proposed works would not significantly trigger or exacerbate any key threatening processes.
- The habitat to be removed is not considered important to the survival of the species and would not fragment or isolate a local population.
- Preclearance surveys for Cumberland Plain Land Snail would be undertaken prior to removal of vegetation to ensure any individuals are translocated and not impacted by the proposed works.
- Standard mitigation measures as detailed in the *Biodiversity Management Guideline: Protecting and managing biodiversity of Transport for NSW projects* (Transport for NSW, 2024) would be in place to ensure no interruption of breeding or direct impact to individuals is likely.
- Targeted survey would occur during detailed design to determine the presence/absence of this species within the study area. If present, it is assumed that the proven avoidance and minimisation measures employed on Transport projects would allow a significant impact to be avoided.

Therefore, no further assessment is required and a SIS or BDAR is not required.

Appendix E: Assessments of significance (EPBC Act)

Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion - Endangered Ecological Community

Castlereagh Scribbly Gum Woodland is listed as an EEC under the NSW BC Act. Castlereagh Scribbly Gum Woodland occurs in western Sydney, with the main occurrence g in the Castlereagh area of the Cumberland Plain, with smaller patches occurring at Kemps Creek and Longneck Lagoon. The community occurs almost exclusively on soils derived from Tertiary alluvium, or on sites located on adjoining shale or Holocene alluvium. It is often adjacent to and on slightly higher ground than Castlereagh Ironbark Forest or Shale Gravel Transition Forest in the Sydney Basin Bioregion. The composition of the tree stratum is dominated by *Eucalyptus parramattensis, Angophora bakeri and E. sclerophylla*. It has a well-developed shrub layer consisting of sclerophyllous species such as *Banksia spinulosa var. spinulosa and Melaleuca nodosa*, while the groundcover stratum consists of a diverse range of forbs including *Themeda australis*, *Entolasia stricta*, *Cyathochaeta diandra*, and *Dianella revoluta* subsp. *revolute* (DoE 2015b).

Castlereagh Scribbly Gum and Agnes Banks Woodlands within the study area

EPBC Act listed Castlereagh Scribbly Gum and Agnes Banks Woodlands occurs within the study area consistent with PCT 883 and forms part of the Bill Anderson Reserve. It is comprised of a canopy dominated by Hard-leaved Scribbly Gum *Eucalyptus sclerophylla* and Parramatta Red Gum *Eucalyptus parramattensis*, with the understorey predominantly comprised of Native Blackthorn *Bursaria spinosa,* Black She-oak *Allocasuarina littoralis,* and the groundcover consists of grass, sedge and forb species. It is contained within vegetation west of Bill Anderson Reserve in the central section of the study area, covering approximately 2.5 hectares, 0.82 hectares of which is within the study area. The patches are assessed as being high condition as it satisfies the condition thresholds set out in the Conservation Advice (DoE 2015) of being > 2 hectares and having a native understorey >50%.

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
Reduce the extent of an ecological community.	Unlikely	The extent of the Castlereagh Scribbly Gum and Agnes Banks Woodlands is estimated to include 3190 ha (Department of Environment 2015). The removal of 0.82 ha within the study area, equates to 0.03% and as such is not considered likely to reduce the extent of the ecological community.
Fragment or increase fragmentation of an ecological community.	Unlikely	The proposals impact area is confined to two small patches along the verge of Elizabeth Drive roadway, which are currently subject to some level of disturbance and edge effects. The proposal would result in minor fragmentation to the local occurrence of the EEC as the vegetation to be removed forms part of a larger contiguous patches extending south of the study area. The proposal is unlikely to cause substantial degradation to the retained vegetation.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	At the landscape level, approximately 5 ha of Castlereagh Scribbly Gum and Agnes Banks Woodland occurs within a 5km radius of the study area. At a local scale the two patches of the community contiguous with the study area comprise 2 and 1 ha respectively. Areas that meet the minimum (moderate class) condition thresholds are considered critical habitat (Department of Environment 2015). The proposed works would impact vegetation with some level of disturbance and edge effects, along the road verge of Elizabeth Drive and would result in the permanent removal of 0.82 ha of habitat. When considered to both a landscape and local scale cannot be said to be likely to cause serious or long-term impacts on habitat critical to the survival of the community in a broader context.

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Unlikely	Construction is likely to result in some minor change in surface water drainage patterns, however it is highly unlikely that the affect would be to regularly flood or dry out the vegetation. As such the proposal would not cause substantial modification to abiotic factors necessary for the community's survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.	Unlikely	The proposed works are confined to areas of previous disturbance within the strip of vegetation running parallel to the road verge. While the community is in high condition and the works would results in the permanent removal of s small portion of vegetation, the species likely to be affected are proportionately represented in the adjacent retained vegetation that is contiguous to that being impacted, and as such the works would not cause a substantial change in species composition within the community.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: - ***Assisting invasive species establishment*** ***- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.***	Unlikely	The Castlereagh Scribbly Gum and Agnes Banks Woodland vegetation in the study area is currently subject to minimal weed invasion along the road verge of Elizabeth Drive, and within the Bill Anderson Nature Reserve. The vegetation is also currently subject to edge effects and potential effects from fertilizers and other pollutants from adjacent agricultural and urban development. The proposal is confined to the area along the road verge of Elizabeth Drive which has been subject to previous disturbance. There is potential for disturbance during construction to result in establishment of exotic species on the edges of the new road verge, however mitigation measures including hygiene practices during construction works, and maintenance weed treatments following completion would prevent a substantial reduction in condition or integrity of the retained vegetation.
Interfere with the recovery of an ecological community.	Unlikely	There is no adopted or made Commonwealth Recovery Plan for this ecological community (Department of the Environment 2015). However, the Approved Conservation Advice for this community does describe a number of priority conservation actions to mitigate the extinction risk to the species, some of which include: Protect and conserve remnants that meet the condition thresholds for this ecological community to avoid further clearance and fragmentation. Identify high conservation value sites for conservation management (formal reserve and off-reserve protection), on private and public lands. Avoid disturbances to native vegetation (e.g. under-scrubbing, slashing, mowing, grazing or burning), particularly during peak flowering and fruiting seasons of the ecological community. Protect the soil seedbank and support the regeneration of the ecological community. Undertake weed control and restoration activities. The proposal is considered unlikely to interfere with recovery actions and recommendations to control weed ingress within the community

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
		have been made, which are in line with recovery actions described in (Department of the Environment 2015).

Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion – Critically Endangered Ecological Community

Cooks River/Castlereagh Ironbark Forest is listed as a CEEC under the EPBC Act. Cook's River/Castlereagh Ironbark Forest is endemic to NSW within the Cumberland subregion of the Sydney Basin Bioregion. It occurs on clay rich soils derived from Tertiary alluvium and on Wiannamatta Shale derived soils found near Tertiary alluvium. It is generally characterised by Red Ironbark and *Melaleuca decora* with occurrences of Woollybutt. The factors considered critical to the survival of the community include conservation of larger patches with high percentage native understorey. There is no adopted or made Recovery Plan for this ecological community (Department of the Environment 2015).

Cooks River/Castlereagh Ironbark Forest within the study area

EPBC Act listed Cook's River/Castlereagh Ironbark Forest occurs within the study area consistent with PCT 725 and forms part of the Bill Anderson Reserve. It is comprised of a canopy dominated by Broad-leaved Ironbark *Eucalyptus fibrosa*, with the understorey ranging from open to dense with a moderate cover of *Melaleuca decora* throughout. It is contained within vegetation west of Bill Anderson Reserve in the central section of the study area, with the broader patch covering approximately 29.6 hectares. Around 3.33 hectares is within the study area and 1.76 hectares would be removed. The patch is assessed as in high condition as it satisfies the condition thresholds set out in the Conservation Advice of being > 2 hectares and having a native understorey >50%.

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
Reduce the extent of an ecological community.	Unlikely	The extent of the Cook's River/Castlereagh Ironbark Forest includes 1011 ha and ranges throughout the Cumberland IBRA subregion (Department of Environment 2015). The removal of 1.76 ha within the study area, equates to 0.18% and as such is not considered likely to reduce the extent of the ecological community.
Fragment or increase fragmentation of an ecological community.	Unlikely	The proposals impact area is confined to a linear strip along the verge of Elizabeth Drive roadway, which is currently subject to some level of disturbance and edge effects. The proposal would result in minor fragmentation to the local occurrence of the CEEC as the vegetation to be removed forms part of a larger contiguous patch extending south of the study area. The proposal is unlikely to cause substantial degradation to the retained vegetation.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	At the landscape level, approximately 45.7 ha of Cooks River/Castlereagh Ironbark Forest occurs within a 5km radius of the study area. At a local scale the patch of the community contiguous with the study area comprises 29.6 ha in area. All EPBC listed vegetation is considered critical habitat (Department of Environment 2015). The proposed works would impact vegetation with some level of disturbance and edge effects, and would result in the permanent removal of 1.76 ha of habitat, which when considered to both a landscape and local scale cannot be said to be likely to cause serious or long-term impacts on habitat critical to the survival of the community in a broader context.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Unlikely	Construction is likely to result in some minor change in surface water drainage patterns, however it is highly unlikely that the affect would be to regularly flood or dry out the vegetation. As such the proposal would not cause substantial modification to abiotic factors necessary for the community's survival.

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.	Unlikely	The proposed works are confined to areas of previous disturbance within the strip of vegetation running parallel to the road verge. While the community is in high condition and the works would result in the permanent removal of a small portion of vegetation, the species likely to be affected are proportionately represented in the adjacent retained vegetation that is contiguous to that being impacted. As such the works would not cause a substantial change in species composition within the community.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: - ***Assisting invasive species establishment*** ***- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.***	Unlikely	The Cook's River Castlereagh Ironbark Forest vegetation in the study area is currently subject to minimal weed invasion along the road verge of Elizabeth Drive, and within the Bill Anderson Nature Reserve. The vegetation is also currently subject to edge effects and potential effects from fertilizers and other pollutants from adjacent agricultural and urban development. The proposal is confined to the area along the road verge of Elizabeth Drive which has been subject to previous disturbance. There is potential for disturbance during construction to result in establishment of exotic species on the edges of the new road verge. However mitigation measures including hygiene practices during construction works, and maintenance weed treatments following completion would prevent a substantial reduction in condition or integrity of the retained vegetation.
Interfere with the recovery of an ecological community.	Unlikely	Cook's River/Castlereagh Ironbark Forest located within the Cumberland Plain is included in the Cumberland Plain Recovery Plan (DECCW 2011). The Recovery Plan has the overall objective of providing for the long-term survival and protection of the threatened biodiversity of the Cumberland Plain. The specific recovery objectives are: • to build a protected area network, comprising public and private lands, focused on the priority conservation lands; • to deliver best practice management for threatened biodiversity across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with biodiversity conservation; • to develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program Cumberland Plain Recovery Plan; and • to increase knowledge of the threats to the survival of the Cumberland Plain's threatened biodiversity, and thereby improve capacity to manage these in a strategic and effective manner. The proposal is considered unlikely to interfere with recovery actions.

Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community – Endangered Ecological Community (EEC)

Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Coastal Swamp Oak Forest) is listed as an EEC under the EPBC Act. The community is often found in association with other vegetation types such as coastal saltmarsh, mangroves, freshwater wetlands, littoral rainforests or swamp sclerophyll forests in a 'mosaic' of coastal floodplain communities. The structure of Coastal Swamp Oak Forest can vary from forest to woodland depending on its location in the landscape and disturbance history. The canopy layer is dominated by Swamp oak *Casuarina glauca*. This often occurs as a relatively uniform upper layer of swamp oak, with height and density dependent on the local environmental conditions. A number of Eucalypt species including Forest Red Gum *Eucalyptus tereticornis*, Bangalay *E. botryoides*, Flooded Gum *E. grandis* also emerge from the canopy, with a present but typically sparse mid-layer of species including Lilly Pilly *Acmena smithii*, Red Ash *Alphitonia excelsa*, Cheese Tree *Glochidion ferdinandi*, and a groundlayer of continuous to semi-continuous cover of either forbs, ferns, sedges, grasses and/or plant litter with species including Swamp water fern *Blechnum indicum*), Tussock Sedge *Carex appressa*, Pennywork *Centella asiatica* (DoE 2018).

Coastal Swamp Oak Forest within the study area

Coastal Swamp Oak Forest aligns with PCT 1800 in low condition within the study area. The proposal would result in the removal of approximately 1.36 hectares of this EEC.

For this assessment, the local occurrence of Swamp Oak Floodplain Forest comprises all PCT 1800 mapped within the study area and patches that extend up and downstream along South and Kemps Creeks mapped by Biosis and NPWS (2013).

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
Reduce the extent of an ecological community.	Unlikely	Coastal Swamp Oak Forest is estimated to have declined between 64-79% since 1750 (DoE 2018). The removal of 1.36 ha within the study area, is not considered likely to reduce the extent of the ecological community which is likely to cover thousands of hectares.
Fragment or increase fragmentation of an ecological community.	Unlikely	The proposals impact area is confined to patches along the riparian corridors of South and Kemps Creek, bound by the road verges of Elizabeth drive, which are currently subject to some level of disturbance from weed ingress and edge effects. The proposal would result in minor fragmentation to the local occurrence of the EEC as the vegetation to be removed forms part of larger contiguous patches extending up and downstream of the study area. In addition, the proposal would not result in the creation of any new barrier to connectivity as the Elizabeth Drive currently fragments these patches. The proposal is therefore unlikely to cause substantial fragmentation or degradation to the retained vegetation.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	At the landscape level, approximately 40 ha of Coastal Swamp Oak Forest occurs within a 5km radius of the study area. At a local scale the four patches of the community contiguous with the study area comprise approximately 1, 1.5, 2.5 and 1.8 ha respectively, totalling 6.8 ha. Areas that meet the high quality threshold are considered as most critical habitat, while minimum (moderate quality) condition threshold are considered potentially critical habitat (DoE 2018). The proposed works would impact low condition vegetation with some level of disturbance and edge effects along the road verge of Elizabeth Drive, and would result in the permanent removal of 1.36 ha of habitat, which when considered to both a landscape and local scale cannot be said to be

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
		likely to cause serious or long-term impacts on habitat critical to the survival of the community in a broader context.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Unlikely	Construction is likely to result in some minor change in surface water drainage patterns, however it is highly unlikely that the affect would be to regularly flood or dry out the vegetation. As such the proposal would not cause substantial modification to abiotic factors necessary for the community's survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.	Unlikely	The proposed works are confined to areas of previous disturbance within the strips of vegetation running parallel to the road verge. While the works would result in the permanent removal of a small portion of vegetation, the community is in low condition and subject to some level of edge effects. Species likely to be affected are proportionately represented in the adjacent retained vegetation that is contiguous to that being impacted up and downstream of the study area, and as such the works would not cause a substantial change in species composition within the community.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: - ***Assisting invasive species establishment*** ***- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.***	Unlikely	The Coastal Swamp Oak Forest vegetation in the study area is currently subject to moderate weed invasion where the community borders the road verge of Elizabeth Drive. The vegetation is also currently subject to edge effects and potential effects from fertilizers and other pollutants from adjacent agricultural and urban development. The proposal is confined to the area along the road verge of Elizabeth Drive which has been subject to previous disturbance. There is potential for disturbance during construction to result in establishment of exotic species on the edges of the new road verge, however mitigation measures including hygiene practices during construction works, and maintenance weed treatments following completion would prevent a substantial reduction in condition or integrity of the retained vegetation.
Interfere with the recovery of an ecological community.	Unlikely	There is no adopted or made Commonwealth Recovery Plan for this ecological community (DoE 2018). However, the Approved Conservation Advice for this community does describe a number of priority conservation actions to mitigate the extinction risk to the species, some of which include: • Protect and conserve remaining areas of the ecological community, including protecting potential areas of natural or managed retreat (e.g. upslope and upstream of current occurrences). • Retain other native vegetation remnants, near patches of the ecological community, where they are important for connectivity, diversity of habitat and act as buffer zones between the ecological community and threats or development zones

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
		• Avoid activities that could cause significant hydrological change or significantly alter the fire regime of the ecological community • Identify potential new weed incursions early (particularly transformer species) and manage for local eradication, where possible. • Prioritise weed control in patches for which management is most urgent. The proposal is considered unlikely to interfere with recovery actions and recommendations to control weed ingress within the community have been made, which are in line with recovery actions described in (DoE 2018).

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered, EPBC Act)

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest is listed as critically endangered under the EPBC Act. The community ranges from grassy woodland to forest, with the understorey varying from predominately grassy to predominately shrubby. Some stands are much denser than the typical woodland form, particularly in the shale-gravel transition forest variant.

The tree canopy is typically dominated by Grey Box *Eucalyptus moluccana*, Forest Red Gum *Eucalyptus tereticornis*, and/or Red Ironbark *Eucalyptus fibrosa*. A sparse smaller tree stratum, typically with young Eucalypts and Acacia species, may also be present. The understorey typically is dominated by the ground layer and comprises a variety of perennial native grasses, grass-like plants and other non-woody plants. A shrub layer may also be present, to variable extent, and is usually dominated by Blackthorn *Bursaria spinosa* (Threatened Species Scientific Committee 2009).

Threats to this community include clearing for urban, industrial or rural development, fragmentation of native remnants, inappropriate grazing and fire regimes, weed invasion, and a low level of protection in reserves (Threatened Species Scientific Committee 2009).

Cumberland Plain Shale Woodlands and Shale Gravel transition Forest within the study area

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest is consistent with all remnant and regrowth PCT 849 and PCT 724 within the subject land.

The proposal would result in the removal of approximately 6.85 hectares of this community for the upgrade of Elizabeth Drive.

The local occurrence of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest within the subject land is assumed to consist of all remnant and regrowth PCT 849 and PCT 724 including contiguous patches that extend outside of the subject land without major breaks in connectivity. The local occurrence of this CEEC covers approximately 198.1 hectares of land. Given the need for the removal of 6.85 hectares of Cumberland Plain Shale Woodland and Shale-Gravel Transition forest for the proposal, an assessment against the significant impact criteria has been undertaken below.

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
Reduce the extent of an ecological community.	Unlikely	As of 2009, the total extent of the Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest was estimated to include 12,300 ha (Threatened Species Scientific Committee 2009). The removal of 6.82 ha within the subject land, equates to 0.06% of the total extent of the community, and as such is not considered likely to reduce the extent of the ecological community, even when clearing of the TEC since 2009 is considered.
Fragment or increase fragmentation of an ecological community.	Unlikely	Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest within the subject land is currently fragmented into small and moderately sized patches along the road verges of Elizabeth Drive by surrounding agricultural and infrastructural land use. These patches are currently subject to edge effects and disturbance through weed encroachment within the understorey. Several patches to the west of Western Sydney Parklands, and those adjacent to the Bill Anderson Reserve extend beyond the subject land and would be retained. Therefore, the proposal would result in only minor fragmentation to the CEEC, and the proposal is unlikely to cause substantial degradation to the retained vegetation.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	No critical habitat has been declared within the Approved Conservation Advice and listing advice for Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest.

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
		At the landscape level, over 15 ha of Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest occurs within a 5 km radius of the study area, with notable areas of contiguous vegetation located within and adjacent to Kemps Creek Nature Reserve, and with patches of high quality remnant vegetation likely to occur within areas of Western Sydney Parklands. At a local scale, several patches of contiguous vegetation occur the east and west of the Western Sydney Parkland, and adjacent to the Bill Anderson Reserve. The proposal would impact 6.82 hectares of edge effected Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest along the road verges of Elizabeth Drive, while areas of contiguous habitat would be retained adjacent to the subject land. When considered at both a landscape and local scale, 6.82 hectares cannot be said to be likely to cause serious or long-term impacts on habitat critical to the survival of the community in a broader context.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Unlikely	Construction is likely to result in some minor change in surface water drainage patterns, however it is highly unlikely that the affect would be to regularly flood or dry out the vegetation. As such the proposal would not cause substantial modification to abiotic factors necessary for the community's survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.	Unlikely	The proposed works are mostly restricted to areas of previous disturbance within road verges, private property along Elizabeth Drive and vegetation parallel the roadside. The vegetation within these areas is present in several condition states from low to intact, although the majority has experienced weed encroachment in both the groundstorey and midstorey. The impacted vegetation within Bill Anderson Reserve and the riparian corridors remained intact and possess a higher structural and floristic diversity, however these areas form part of larger patches of similarly high-quality vegetation that extend beyond the study area, and likely won't experience any significant change in composition. In addition, the species within these high condition patches likely to be impacted are proportionately represented in the adjacent retained vegetation that is contiguous to that being impacted. Although the vegetation within the lower condition patches may contain canopy species, the quality of all strata is significantly lower than the intact vegetation and do not include as many functionally important species. Therefore, the proposed works are unlikely to cause a substantial change in species composition within the community.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: - ***Assisting invasive species establishment***	Unlikely	The Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest vegetation in the study area is currently subject to minimal invasion within the Bill Anderson Nature Reserve, while the remaining parts of the study area have a significant level of weed ingress. The vegetation is also currently subject to edge effects and potential effects from fertilizers and other pollutants from adjacent agricultural and urban development. The proposal is confined to the area along the road verge of Elizabeth Drive which has been subject to previous disturbance. There is potential for the establishment of exotic species on the edges of the new road verge, however mitigation measures regarding hygiene and construction outlined in

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.		this report would prevent a substantial reduction in condition of the retained vegetation. In addition, since the widening of Elizabeth Drive would only impact road verge vegetation, works would not create new areas of open vegetation that allow for establishment of exotic species. Machinery or vehicles required for the construction process may contribute to additional erosion or the release of pollutants or chemicals; however, it is not expected to substantially higher than the level currently operating within the highly developed area, nor is it expected to be substantial enough to inhibit the growth of species in the ecological community. Although the works may contribute to localised erosion or the release of pollutants, it is not expected to be substantial. In addition, areas of this community outside of the study area and across the broader landscape would remain largely unaffected by the proposed works. Therefore, the proposed works are unlikely to cause a substantial reduction in the quality or integrity of an occurrence of the CEEC.
Interfere with the recovery of an ecological community.	Unlikely	There is no adopted or made Commonwealth Recovery Plan for this ecological community (Department of the Environment 2015). However, the Approved Conservation Advice for this community does describe a number of priority management actions to mitigate threats to this community, some of which include: Identify sites of high conservation priority. Implement appropriate management regimes to maintain the biodiversity, including threatened species, of the ecological community. Develop and implement best practice standards for management of remnants on private and public lands. Manage any changes to hydrology that may result in changes to water table levels. In addition, develop and implement urban stormwater management guidelines that address risks of urban run-off to the ecological community. Manage sites to prevent introduction or further spread of invasive weeds, which become a threat to the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community, using appropriate methods. Develop and implement a management plan for the control of African Olive (*Olea europea* subsp. *cuspidata*) in the region. Investigate options to maintain and improve connectivity of remnants, including the protection of paddock trees and replanting of key canopy tree species in derived grasslands and shrublands, where possible. The proposal is considered unlikely to interfere with the priority actions of the conservation advice.

River-flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria – Critically Endangered Ecological Community EPBC Act

River-flat Eucalypt Forest occurs on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates, including floodplains, river-banks, riparian zones, lake foreshores, creek lines (including the floors of tributary gullies), floodplain pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans. Floodplains may be occasionally or more often saturated, water-logged or inundated (DAWE 2020).

River-flat Eucalypt Forest occurs on coastal floodplains of southern NSW and eastern VIC occurs on productive agricultural land, or in close proximity to coastal areas, where continuing population growth and urban development is expected. Historically, clearing was primarily for timber and agriculture, and actions such as culling of native fauna were undertaken largely to support agricultural productivity, while in recent times it is more likely to occur for residential and industrial development. The nature of some areas of the ecological community has changed structurally due to clearing, followed by regrowth that is likely to be subject to altered fire and water regimes and livestock grazing.

River-flat Eucalypt Forest within the study area

River-flat Eucalypt Forest aligns with PCT 835 covering 8.89 ha within the study area. 1.86 ha of PCT 835 listed under the EPBC Act would be impacted by the proposal. The area of PCT 835 within the study area is subject to self-assessment under the EPBC Act. An assessment of the impacts of this vegetation in accordance with the *Matters of National Environmental Significance Significant impact guidelines* is provided below.

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
Reduce the extent of an ecological community.	Unlikely	The extent of the EPBC Act listed River-flat Eucalypt Forest within the study area includes approximately 8.89 ha of PCT 835. The patches of River-flat Eucalypt Forest that would be impacted, as they extend up and down stream along Badgerys Creek, South Creek and Kemps Creek, are far larger. The viability of these patches of the TEC along these waterways would not be substantially affected by the impacts associated with the proposal. The proposal requires the removal of 1.86 ha of River-flat Eucalypt Forest. An impact that is not considered to reduce the extent of the community appreciably.
Fragment or increase fragmentation of an ecological community.	Unlikely	Areas of River-flat Eucalypt Forest present within the study area are already fragmented by the surrounding built environment including Elizabeth Drive. The widening of Elizabeth Drive would increase fragmentation of the community in a north-south direction. However, as is shown with the persistence of the community under the present level of fragmentation, remaining patches of the community are expected to remain viable.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	The habitat or areas most critical to the survival of the ecological community are those patches that are in the best condition. These represent those parts of the ecological community closest to the benchmark state of the ecological community, they are the patches that retain the highest diversity and most intact structure and ecological function, and have the highest chance of persisting in the long-term. The occurrence of PCT 835 within the study area is assumed to meet the minimum condition thresholds of River-flat Eucalypt Forest. Given the degree of fragmentation and disturbance with the evident within

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
		the community, it is unlikely that would be impacted by the proposal is critical to the survival of the community generally.
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Unlikely	Construction would result in localised disturbance to soil, hydrology and topography. However, the proposal is not expected to result in substantial alteration to surface water patterns as the impact area would be rehabilitated following completion of construction works. Alterations to hydrological patterns may also occur, which may cause some impact to River-flat Eucalypt Forest due to its occurrence on the banks of creeks drainage lines across the study area. Mitigation measures would ensure that downstream indirect impacts (such as sediment and nutrient transportation) would be controlled and would not impact remaining areas of River-flat Eucalypt Forest. As such, the proposal is not expected to result in impacts that modify or destroy abiotic factors necessary for the survival of the community.
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.	Unlikely	The occurrence of River-flat Eucalypt Forest is defined as the patches of the community that occur within the study area and extend outside the study area without major (over 100 m) breaks in connectivity. The community occurs in a landscape where introduced vegetation cover is significant and intensive land clearing has taken place over the past 150 years. Land use impacts from drainage works and past vegetation clearing, have reduced the community integrity and functionality (e.g. loss of hydrological functioning, reduced flora species richness, reduced genetic exchange across the community due to fragmentation). Clearing required for the proposal is unlikely to further reduce species diversity and simplify community structure. The areas of the community within the broader area would remain in a similar condition and are unlikely to suffer substantial changes in species composition.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: ***- Assisting invasive species establishment*** ***- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.***	Unlikely	All River-flat Eucalypt Forest within the study area is subject to existing weed invasion, pest animals, erosion and chemical inputs as a result of surrounding land uses. Nonetheless, the proposed works are not considered to increase weed or pest invasion, or cause mobilisation of fertilisers, herbicides or other chemical within the CEEC. Construction activities can be managed through standard practices to avoid further sedimentation and pollution. Therefore, the proposed works are unlikely to cause a substantial reduction in the quality or integrity of an occurrence of the CEEC.
Interfere with the recovery of an ecological community.	Unlikely	River-flat Eucalypt Forest does not currently have an adopted or made recovery plan. However, within the Commonwealth Conservation Advice (DAWE 2020) recovery strategies have been listed to support the recovery of River-flat Eucalypt Forest. Some of

Significant impact criteria (critically endangered / endangered community)	Likelihood of significant impact	Justification
		the priority conservation actions significant to the proposed works are: • Protect and conserve remaining areas of the ecological community. • Avoid further clearance and destruction of the ecological community. • Retain other native vegetation near patches of the ecological community, where they are important for connectivity, diversity of habitat, and/or act as buffer zones between the ecological community and threats or development zones. • Protect patches identified as wildlife refuges, or of regional importance in formal conservation reserves. • Protect mature and over-mature trees and stags, particularly with hollows. Interference with the objectives of the Commonwealth conservation advice can be minimised by implementing management strategies and ensuring any potential impacts are avoided if possible. As the proposed works would cause clearing of the community, it is determined the proposed actions are considered likely to interfere with recovery actions.

Pultenaea parviflora – Vulnerable

Pultenaea parviflora is listed as Vulnerable under the Commonwealth EPBC Act. It is a small, branching shrub endemic to the Cumberland Plain. *Pultenaea parviflora* may be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. Flowering may occur between August and November depending on environmental conditions. Populations range in number between 10 and more than 5000 individuals, with disturbance history often important in numbers at a site. This also influences the population structure, with fire-induced recruitment producing a more evenly-aged population than soil disturbances (DEWHA 2008).

***Pultenaea parviflora* within the study area**

The population of *Pultenaea parviflora* that occurs within the remnant bushland bound by Cross Street, Western Road, Elizabeth Drive and Bill Anderson Reserve is considered to meet the criteria for an important population of the species, as outlined in EPBC Act Significant impact guidelines 1.1 (Commonwealth of Australia 2013). This conclusion is based on the population occurring at the southern extent of the species range, and it potentially being a population necessary for maintaining genetic diversity of the species, due to its occurrence in a Priority Conservation Area within a largely cleared and disturbed landscape.

The proposed works would result in the removal of 2.71 hectares of habitat for the important population of the species along Elizabeth Drive, west of Bill Anderson Reserve. Targeted surveys did not detect this species within the study area, therefore no individuals are anticipated to be removed. An assessment of whether the proposal is likely to lead to a significant impact to *Pultenaea parviflora* is provided below.

Significant impact criteria (vulnerable species)	Likelihood of significant impact	Justification
Lead to the long-term decrease in the size of an important population of a species	Unlikely	Potential impacts to the important population of the species would occur along the northern and western edge of a patch of an approximately 36 ha patch of habitat for the species. This impacted edge is degraded by weed encroachment along Elizabeth Drive, where species such as African Lovegrass are common. Habitats within the remainder of the bushland remnant improve, as does the condition of the bushland, albeit somewhat impacted by illegal access in places. Impacts as a result of the proposal would not substantially degrade the retained habitats over the majority of the 36 ha remnant where the vast majority of the population is likely to be present. Targeted survey did not reveal this species within the study area, therefore, it is considered unlikely the proposal would result in a long-term decrease in the size of the important population.
Reduce the area of occupancy of an important population	Unlikely	Impacts associated with the proposal are confirmed to the northern edge of the bushland remnant supporting the important population of *Pultenaea parviflora*. Whilst this would result in a small reduction to the habitat available to the population of the species, the remainder of the approximately 36 ha patch of vegetation would remain unimpacted by the proposal. The bushland remnant is also planned to become a conservation area as part of the Growth Centres biodiversity certification which would lead to protection and management of the habitat in the future. The removal of potential habitat for *Pultenaea parviflora* along the northern and western edge of the bushland remnant is not considered likely to reduce the populations overall area of occupancy.
Fragment an existing important population into two or more populations	Unlikely	Potential impacts to the important population of the species would occur along the northern and western edge of a patch of an approximately 36 ha patch of habitat for the species. This impacted edge is degraded by weed encroachment along Elizabeth Drive, where species such as African Lovegrass are common. Habitats within the remainder of the bushland remnant improve, as does the condition of the bushland, albeit it somewhat impacted by illegal access in places. Impacts as a result of the proposal would not result in the creation of

Significant impact criteria (vulnerable species)	Likelihood of significant impact	Justification
		new physical barrier to connectivity, and as such it is unlikely that the population would suffer significant fragmentation.
Adversely affect habitat critical to the survival of a species	Unlikely	Critical habitat has not yet been declared for *Pultenaea parviflora.*
Disrupt the breeding cycle of an important population	Unlikely	*Pultenaea parviflora* regenerates from seed dispersal and often in response to rainfall events. Little is known of the biology and ecology of *Pultenaea parviflora*. Populations range in number between 10 and more than 5000 individuals, with disturbance history often important in numbers at a site. This also influences the population structure, with fire-induced recruitment producing a more evenly-aged population than soil disturbances. Given vegetation clearing and soil disturbance would occur as part of the works, there is potential for natural regeneration post-disturbance given the life history of *Pultenaea parviflora*. Therefore, the proposed action is unlikely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	Potential impacts to the important population of the species would occur along the northern edge of a patch of an approximately 36 ha patch of habitat for the species. This impacted edge is degraded by weed encroachment along Elizabeth Drive, where species such as African Lovegrass are common. Habitats within the remainder of the bushland remnant improve, as does the condition of the bushland, albeit it somewhat impacted by illegal access in places. The scale of impacts to the species' habitat that would occur as a result of the proposal would not impact upon the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely	The localised occurrences of habitat for the species are subject to existing weed invasion and pest animals as a result of land clearing and surrounding agricultural land use. The proposal is unlikely to exacerbate the current level of invasive species threat operating within the study area.
Introduce disease that may cause the species to decline	Unlikely	The proposal would not result in the introduction of a disease that is harmful to *Pultenaea parviflora.*
Interfere substantially with the recovery of the species	Unlikely	A Recovery Plan has not been prepared for *Pultenaea parviflora.* However, The NSW Conservation Advice (DEWHA 2008) identifies several priority actions for the recovery of the species: Investigate options for linking, enhancing or establishing additional populations. Implement national translocation protocols if establishing additional populations is considered necessary and feasible. Undertake appropriate seed collection and storage. Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment.

Significant impact criteria (vulnerable species)	Likelihood of significant impact	Justification
		Considering the above factors, the proposal would not interfere substantially with the recovery of *Pultenaea parviflora.*

Appendix F: Biodiversity credit reports

Copies of the credit summary reports generated by the BAM-C follow. Note that as areas of ENV are removed from the calculation of ecosystem credits, separate revisions of the BAM-C care required to calculate ecosystem credits and species credits separately. Below, revision 4 contains the details of the preliminary ecosystem credits as they appear in Table 7-3. Revision 2 contains the preliminary species credits as they appear in Table 7-4.