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NSW GOVERNMENT

M12 Motorway

Amendment Report - Appendix A
Biodiversity supplementary technical report
October 2020

Executive summary

Background

Transport for New South Wales proposes to build the M12 Motorway between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham (the project), over a distance of about 16 kilometres. Transport for New South Wales is seeking approval under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* to construct and operate the project. An environmental impact statement was prepared to assess the potential impacts of the project and recommend management measures to appropriately address those impacts and this document was placed on exhibition and submissions received. To respond to these submissions and assess design development that has occurred since the environmental impact statement was submitted, an amendment report is being developed.

Purpose of this report

To support the development of the amendment report, a biodiversity supplementary technical report is required, which is this document. This document is designed to:

- Provide a review of threatened species and ecological communities that occur within the amended construction footprint and compare to the project as described in the environmental impact statement construction footprint as described in the environmental impact statement
- Report on results of additional surveys within the amended construction footprint
- Assess biodiversity impacts of the amended project and compare to those of the project as described in the environmental impact statement as described in the environmental impact statement
- Update calculations for biodiversity offsets.

This supplementary technical report should be read in conjunction with the M12 Motorway biodiversity assessment report (see Appendix E of the environmental impact statement).

Overview of potential impacts

Key changes proposed to the project that may impact on biodiversity were concentrated around changes to the connection to the M7 Motorway on the eastern side of the amended project and the new proposed ancillary facilities for construction. This would equate to an overall increase in native vegetation clearing of about seven hectares. This increase in area to be cleared is primarily due to three design changes: the realignment of Wallgrove Road to connect to Cecil Road, the direct connection between the M12 Motorway and Elizabeth Drive at the motorway-to-motorway interchange at the M7 Motorway, and additional construction ancillary facilities. Avoidance and minimisation measures that have been considered during development of these design changes include siting laydown areas in cleared areas wherever possible and protecting threatened species within fenced exclusion areas.

The increase in impact would mean changes to the area to be cleared for one threatened ecological community, Cumberland Plain Woodland, as listed under the *Environment Protection and Biodiversity Conservation Act 1999.* The potential impacts are summarised in the table below.

Impact	Biodiversity value	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas and exclusion zones (ha)	Change in area excluding certified areas (ha)
Removal of native vegetation	Total native vegetation	73.65	80.64	+6.99
	Total Threatened Ecological Communities (NSW Legislation)	73.27	80.07	+6.80
	Total Threatened Ecological Communities (Commonwealth Legislation)	38.92	42.91	+3.99
Removal of threatened fauna species habitat and habitat features	Threatened fauna – Cumberland Plain Land Snail	1.86	5.22	+3.36
	Threatened fauna – threatened microbats (foraging habitat only)	55.58	62.58	+7.00
	Threatened fauna – Southern Myotis	0.92 (breeding) 3.69 (foraging)	0.96 (breeding) 4.53 (foraging)	+0.04 (breeding) +0.84 (foraging)
	Threatened fauna – Grey-headed Flying-fox (foraging habitat only)	55.58	62.58	+7.00
	Threatened flora – *Dillwynia tenuifolia*	244 individuals	244 individuals	No change
	Threatened flora – *Pultenaea parviflora*	90 individuals	Up to 100 individuals	Up to 10 individuals
Aquatic habitat	Waterway modification and water quality	No significant impact, minor temporary and localised impacts may occur	No change	No change
Fauna injury and mortality	Local fauna	Local impacts that can be minimised with appropriate fencing. No change in amended footprint.		No change

Impact	Biodiversity value	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas and exclusion zones (ha)	Change in area excluding certified areas (ha)
Indirect impacts	Vegetation to be impacted by edge effects	12.73	13.52	+0.79
	Threatened flora to be impacted by edge effects	18 plants of *Pultenaea parviflora* and 49 plants of *Dillwynia tenuifolia* may be indirectly impacted.	Up to 142 plants of *Pultenaea parviflora* and up to 850 plants of *Dillwynia tenuifolia* may be indirectly impacted.	Up to 124 individuals of *Pultenaea parviflora* Up to 801 individuals of *Dillwynia tenuifolia*
	Invasion of weeds and pests and pathogens	Local impacts that can be minimised with appropriate fencing. No change in amended footprint.		No change
	Noise, light and vibration	Local impacts that can be minimised with appropriate fencing. No change in amended footprint.		No change

Summary of revised offsets

With small changes to impacts as a result of the proposed design changes and response to submissions, offset re-calculations were required. A summary of the offset credits required from the amended project, compared with the project as described in the environmental impact statement, are provided in the table below. Offset requirements have increased, from a total of 8354 to 8810.

Entity impacted	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)	Total credits required for impacts of construction footprint as described in the EIS	Total credits required for impacts of amended construction footprint	Change in total credits
Total direct ecosystem offset requirements	73.27	80.07	+6.80	2,414	2,674	+260
Total indirect ecosystem offset requirements	12.73	13.52	+0.79	154	155	+1
Species credit species – Cumberland Plain Land Snail	1.86	5.22	+3.36	24	68	+44
Species credit species – Southern Myotis	0.92 (breeding)	0.96 (breeding)	+0.04 (breeding)	20	21	+1
Species credit species – *Dillwynia tenuifolia*	244 individuals	244 individuals	No change	4,392	4,392	No change
Species credit species – *Pultenaea parviflora*	90 individuals	Up to 100 individuals	Up to 10 individuals	1,350	1,500	+150
Total credits required	**N/A**			**8,354**	**8,810**	**+456**

Summary of environmental management measures

Twenty seven specific management measures were recommended in the environmental impact statement biodiversity assessment report. These measures covered the preparation of a flora and fauna management plan, habitat compensation plan, pre-clearing surveys, specific measures for riparian vegetation and aquatic impacts and other measures to reduce impacts on biodiversity. Assessment as part of this report identified an additional measure to reduce impacts to soil and water, revisions as a result of amended water diversions at a tributary of Kemps Creek, and specific areas that need to be designated as “no-go” areas for protection of populations of threatened flora.

Conclusions

Transport for New South Wales have proposed a number of changes to the M12 Motorway project and these changes have been assessed within this technical report. The amended project would require the removal of about seven hectares of additional native vegetation in the eastern part of the amended construction footprint. Additional ancillary facilities have been identified, but these have been sited to reduce impacts on vegetation where possible.

The study area comprises primarily of Plant Community Type 850 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion. Much of the additional areas that would be impacted by the amended project are revegetation areas of the Western Sydney Parklands.

Significant impacts to Cumberland Plain Woodland and *Pultenaea parviflora* were expected at the conclusion of the assessment of the project as described in the environmental impact statement, and offsets for these, and other minor impacts proposed. The amended project is consistent with this finding, with no significant changes to the impact assessment found.

Contents

Glossary of terms and abbreviations

Term	Meaning
AF	Ancillary facility
airport access road	Part of the M12 Motorway connecting the Western Sydney International Airport interchange with the Western Sydney International Airport
BAR	Biodiversity assessment report
batter	A receding slope of a wall, structure, or earthwork
BBCC	BioBanking credit calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
Bilateral agreement	The bilateral agreement made under section 45 of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) relating to environmental assessment
BR	Bridge
BVT	BioMetric vegetation type
CAMBA	China-Australia Migratory Bird Agreement
CEMP	Construction environment management plan
construction footprint	The construction footprint is the area required to build the project. This includes the area required for temporary work such as sedimentation basins, drainage lines, access roads, construction ancillary facilities
CSSI	Critical state significant infrastructure
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAWE	Department of Agriculture, Water and the Environment *Former Department of Environment and Energy (DoEE)*
DECCW	Department of Environment, Climate Change and Water
DoEE	Former Department of the Environment and Energy *Now Department of Agriculture, Water and the Environment (DAWE)*
DP	Deposited plan
DPC (Heritage)	Department of Premier and Cabinet (Heritage) *Formerly Office of Environment and Heritage (OEH)*
DPIE	Department of Planning, Industry and Environment *Formerly Department of Planning and Environment (DPE)*
DPIE (Regions, Industry, Agriculture & Resources)	Department of Planning, Industry and Environment (Regions, Industry, Agriculture & Resources) *Formerly Department of Primary Industries (DPI) – Agriculture* *Formerly Department of Primary Industries (DPI) – Fisheries*
DPIE (Water)	Department of Planning, Industry and Environment (Water) *Formerly NSW Office of Water / Natural Resources Access Regulator*
EEC	Endangered ecological community

Term	Meaning
EESG	Environment, Energy and Science Group of the Department of Planning, Industry and Environment *Formerly NSW Office of Environment and Heritage*
EIS	environmental impact statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).
Exclusion zones	Exclusion zones are areas of environmental importance (eg threatened vegetation or heritage items) that need to be protected. Exclusion zones are shown on figures throughout this amendment report where relevant. These exclusion zones are defined as no-go areas and are to be protected for the duration of construction in that particular footprint area
FBA	Framework for Biodiversity Assessment
FM Act	*Fisheries Management Act 1994* (NSW)
GDE	Groundwater dependent ecosystems
Grade separated interchange	An interchange that is separated vertically (at different heights) involving bridges, underpasses and/or overpasses
IBRA	Interim Biogeographical Regionalisation of Australia
JAMBA	Japan-Australia Migratory Bird Agreement
LCZ	Landscape character zone
LEP	Local Environmental Plan
LGA	Local government area
the M12 Motorway	The proposed M12 Motorway which is the subject of this document (also known as 'the project')
the M7 Motorway	The M7 Motorway is a major connecting road on Sydney's orbital motorway network. It runs for 40 km and links the M5 Motorway with the M4 Motorway and the M2 Motorway
MNES	Matters of National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
OEH	Office of Environment and Heritage
Operational footprint	Generally includes the M12 Motorway and additional areas required for operation and maintenance of the project
OSO	The Outer Sydney Orbital is a future transport corridor being investigated by the NSW Government which will provide for a connection between Box Hill in the north and the Hume Motorway near Menangle in the south. The OSO will provide for a major transport link (motorway and/or freight rail line) between western Sydney's growth areas, connecting with the planned Western Sydney International Airport and future employment lands
PCT	Plant community type

Term	Meaning
Proposed changes	The changes to the project as described in the EIS that are being proposed as part of the Amendment Report. Proposed changes include both include design changes and construction updates
Roads and Maritime	Roads and Maritime Services; now known as Transport for NSW
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SEARs	Secretary's environmental assessment requirements
SEMP	Site Establishment Management Plan
SEPP	State environmental planning policy
shared user path	The area designated for active transport catering to both pedestrian and cyclists
SSI	State significant infrastructure
study area	The term study area is used to describe the locations investigated. The study area varies based on the specific areas of interest targeted for each environmental issue (eg ecology, heritage, noise, visual amenity etc). The study area relevant to particular environmental issues is shown on figures where relevant
TECs	Threatened ecological communities
TfNSW	Transport for New South Wales
the project	M12 Motorway
TNR	The Northern Road
TSC Act	*Threatened Species Conservation Act 1995* (NSW) (repealed) but relevant for this assessment due to being saved under the BC Transitional arrangements
TSPD	Threatened Species Profile Database
BioNet VIS	BioNet Vegetation Information System
VMS	Variable Messaging Signs
Western Sydney Aerotropolis	As defined in the Western Sydney Aerotropolis Stage 1 Plan, the Aerotropolis surrounds the Western Sydney International Airport site at Badgerys Creek and will comprise industrial, commercial and residential development
WSA Co	WSA Co is a Government Business Enterprise that was established in August 2017 to build the Western Sydney International Airport in Badgerys Creek
WSAGA	Western Sydney Airport Growth Area is defined in the Western Sydney Infrastructure Plan, and will include industrial, commercial and residential development surrounding the Western Sydney International Airport site in Badgerys Creek
WSIP	Western Sydney Infrastructure Program
Wylde Mountain Bike Trail	The Wylde Mountain Bike Trail is a publicly accessible mountain bike riding trail located in the Western Sydney Parklands which caters for intermediate, competent and advanced standard mountain bike riders

1. Introduction and background

1.1 Overview

Transport for New South Wales (TfNSW; formerly Roads and Maritime Services) proposes to build the M12 Motorway between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham (the project), over a distance of about 16 kilometres. The project would provide the main access from the Western Sydney International Airport at Badgerys Creek to Sydney's motorway network and is expected to be opened to traffic before the opening of the Western Sydney International Airport.

TfNSW is seeking approval under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to construct and operate the project. An environmental impact statement (EIS) was prepared to assess the potential impacts of the project and recommend management measures to appropriately address those impacts. The key features of the project as described in the EIS is provided in Section 1.1 of the amendment report. This EIS was placed on public exhibition from 16 October to 18 November 2019.

TfNSW proposes to amend the project following further design development since the exhibition of the EIS. The proposed changes include design changes and construction updates. These provide functional improvements to the design and improved integration with surrounding major transport infrastructure projects and potential future development. They also respond to issues raised in community and stakeholder submissions, and, in some instances, further reduce the potential impacts of the project as described in the EIS.

The proposed changes are described in **Section 1.2**.

1.2 Proposed changes

The proposed changes to the project as described in the EIS are summarised below and are described in detail in Chapter 3 and Chapter 4 of the amendment report:

- Amendments to the motorway-to-motorway interchange at the M7 Motorway, including:
  - Changes to Elizabeth Drive and Cecil Road intersections, proposed exit ramps, the Wallgrove Road connection to Elizabeth Drive and proposed shared user path realignments
  - The widening of Elizabeth Drive under the M7 Motorway and approaches
- An option to provide a new connection between the M12 Motorway and Elizabeth Drive near the M7 Motorway interchange
- Two new signalised intersections into the Western Sydney International Airport, with provisions for future connection to potential developments north of the Western Sydney International Airport
  - Additional ancillary facilities to support the delivery of the project.

Refinements have also been made as part of the ongoing development of the project since the EIS was exhibited. Refinements are changes that are consistent with the parameters of the project description as described in the EIS. For completeness, however, these refinements have been factored into the amended construction and operational footprint and included in the impact assessment described in this supplementary technical memorandum.

The refinements are described in Section 3.3 and Section 4.2 of the amendment report and include:

- Lowering the height of the M12 Motorway in and around the Western Sydney International Airport interchange
- Reduction in the scope of work associated with the M12 Motorway and The Northern Road intersection
  - This intersection would still be constructed, but the main infrastructure work would be delivered as part of The Northern Road upgrade project
- Relocation of utilities
- Changes to property access and acquisition
- Changes to drainage
- Adjustments to construction access, hours, haulage, timing and material quantities.

The project with all proposed changes is referred to as the amended project.

1.3 Amended project

1.3.1 Overview

The amended project would continue to provide the main access from the Western Sydney International Airport at Badgerys Creek to Sydney's motorway network and be located between The Northern Road in the west and the M7 Motorway in the east. The amended project includes an option for a direct connection between the M12 Motorway and Elizabeth Drive at the eastern extent of the project. This option would include some realignment of Wallgrove Road and widening of Elizabeth Drive at the motorway-to-motorway interchange at the M7 Motorway to facilitate the connection. Therefore, two options are being proposed for the amended project at the interchange with the M7 Motorway.

The two options for the amended project would be consistent from The Northern Road in the west until Duff Road in the east. At the motorway-to-motorway interchange with the M7 Motorway, the project is proposed to be either:

- Option 1 – Without Elizabeth Drive connection
  - Interchange provides entry and exit ramps between the M12 Motorway and the M7 Motorway; in addition, it would maintain the existing connection of the M7 Motorway to Elizabeth Drive with new entry and exit ramps
- Option 2 – With Elizabeth Drive connection
  - Interchange as per option 1 and also provides entry and exit ramps between the M12 Motorway and Elizabeth Drive, Cecil Road and Wallgrove Road.

This section of the amended project is shown in **Figure 1-1** with the Elizabeth Drive connection associated with option 2 shown in a different colour and detailed in inset A. The decision on which option would be built is dependent on funding being available to include the Elizabeth Drive connection. This will be determined during the detailed design and construction phase of the project. The key features of each option are described in the following sections.

The proposed changes (see **Section 1.2**) would result in an amended construction footprint (**Figure 1-2**) and an amended operational footprint (**Figure 1-3**). The footprints would be the same for both options, with each footprint assuming the worst case scenario (ie option 2).

The assessment of potential impacts described in **Section 5** relates to the worst case scenario and covers both options, unless stated otherwise.

The key features of the amended project are listed in **Section 1.3.2** and include both options.

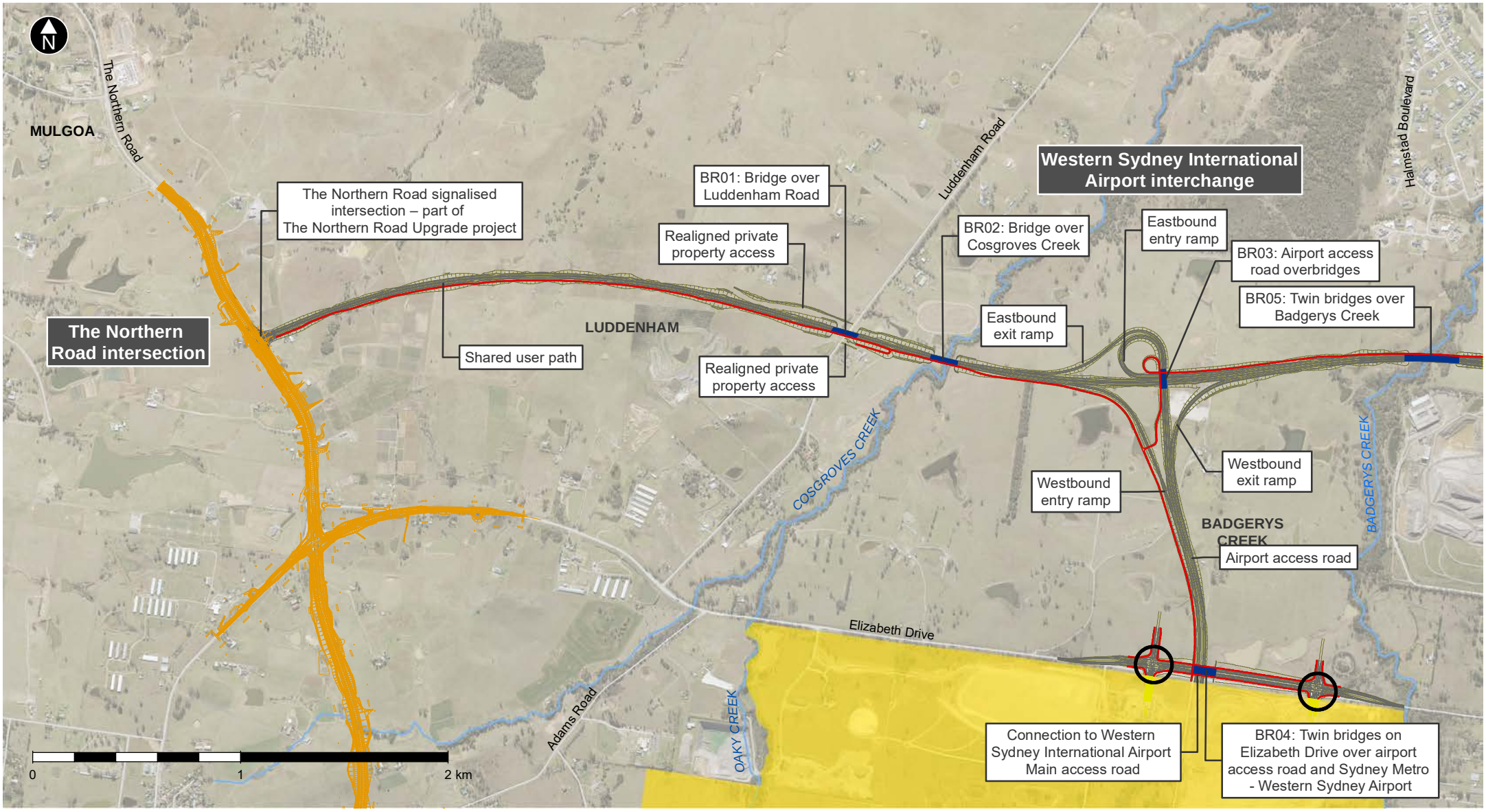
1.3.2 Key features of the amended project

The key features of the amended project are listed below. Where the description of the proposed amended project key features differs from the description listed in the EIS (see Section 1.1 of the amendment report), those changes are shown in **bold** text:

- A new dual-carriageway motorway between the M7 Motorway and The Northern Road with two lanes in each direction with a central median allowing future expansion to six lanes
- Motorway access via three interchanges/intersections:
  - A motorway-to-motorway interchange at the M7 Motorway and associated works (extending about four kilometres within the existing M7 Motorway corridor) **with the following options:**
    - Option 1 – without connection between the M12 Motorway and Elizabeth Drive
    - Option 2 – with connection between the M12 Motorway and Elizabeth Drive
  - A grade-separated interchange referred to as the Western Sydney International Airport interchange, including a dual-carriageway four-lane airport access road (two lanes in each direction for about 1.5 kilometres) connecting with the Western Sydney International Airport Main Access Road
  - A signalised intersection at The Northern Road with provision for grade separation in the future
- Bridge structures across Ropes Creek, Kemps Creek, South Creek, Badgerys Creek and Cosgroves Creek
- A bridge structure across the M12 Motorway into the Western Sydney Parklands to maintain access to utilities, including the existing water tower and mobile telephone/other service towers on the ridgeline in the vicinity of Cecil Hills, to the west of the M7 Motorway
- Bridge structures at interchanges and at Clifton Avenue, Elizabeth Drive, Luddenham Road and other local roads to maintain local access and connectivity
- Inclusion of active transport (pedestrian and cyclist) facilities through provision of pedestrian bridges and an off-road shared user path, including connections to existing and future shared user path networks.
- Modifications to the local road network, as required, to facilitate connections across and around the M12 Motorway including:
  - Realignment of Elizabeth Drive at the Western Sydney International Airport, with Elizabeth Drive overpassing the airport access road and rail infrastructure
  - Two new signalised intersections from Elizabeth Drive into the Western Sydney International Airport, with provisions for future connection to potential developments to the north
  - Widening of Elizabeth Drive under the M7 Motorway and approaches
  - Realignment of Clifton Avenue over the M12 Motorway, with associated adjustments to nearby property access
  - Relocation of the Salisbury Avenue cul-de-sac, on the southern side of the M12 Motorway
  - Realignment of Wallgrove Road to connect to Cecil Road, including a connection between Elizabeth Drive and Wallgrove Road via Cecil Road with a signalised intersection with Elizabeth Drive

- Adjustment, protection or relocation of existing utilities
- Ancillary facilities to support motorway operations, smart motorways operation in the future and the existing M7 Motorway operation, including gantries, electronic signage and ramp metering
- Other roadside furniture, including safety barriers, signage and street lighting
- Adjustments of waterways, where required, including Kemps Creek, South Creek and Badgerys Creek
- Permanent water quality management measures including swales and basin
- Establishment and use of temporary ancillary facilities, temporary construction sedimentation basins, access tracks and haul roads during construction
- Permanent and temporary property adjustments and property access refinements as required.

An overview of the amended project is shown in **Figure 1-1**.



The amended project

Part of The Northern Road upgrade project

Shared user path

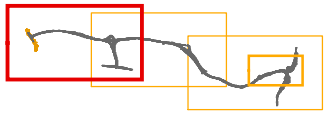
Bridges

Existing roads

Waterways

Western Sydney International Airport

Signalised intersections into the Western Sydney International Airport
Note: Indicative, subject to detailed design



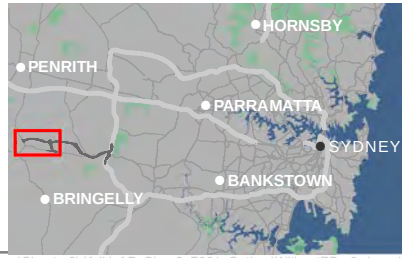


Figure 1-1 Key features of the amended project

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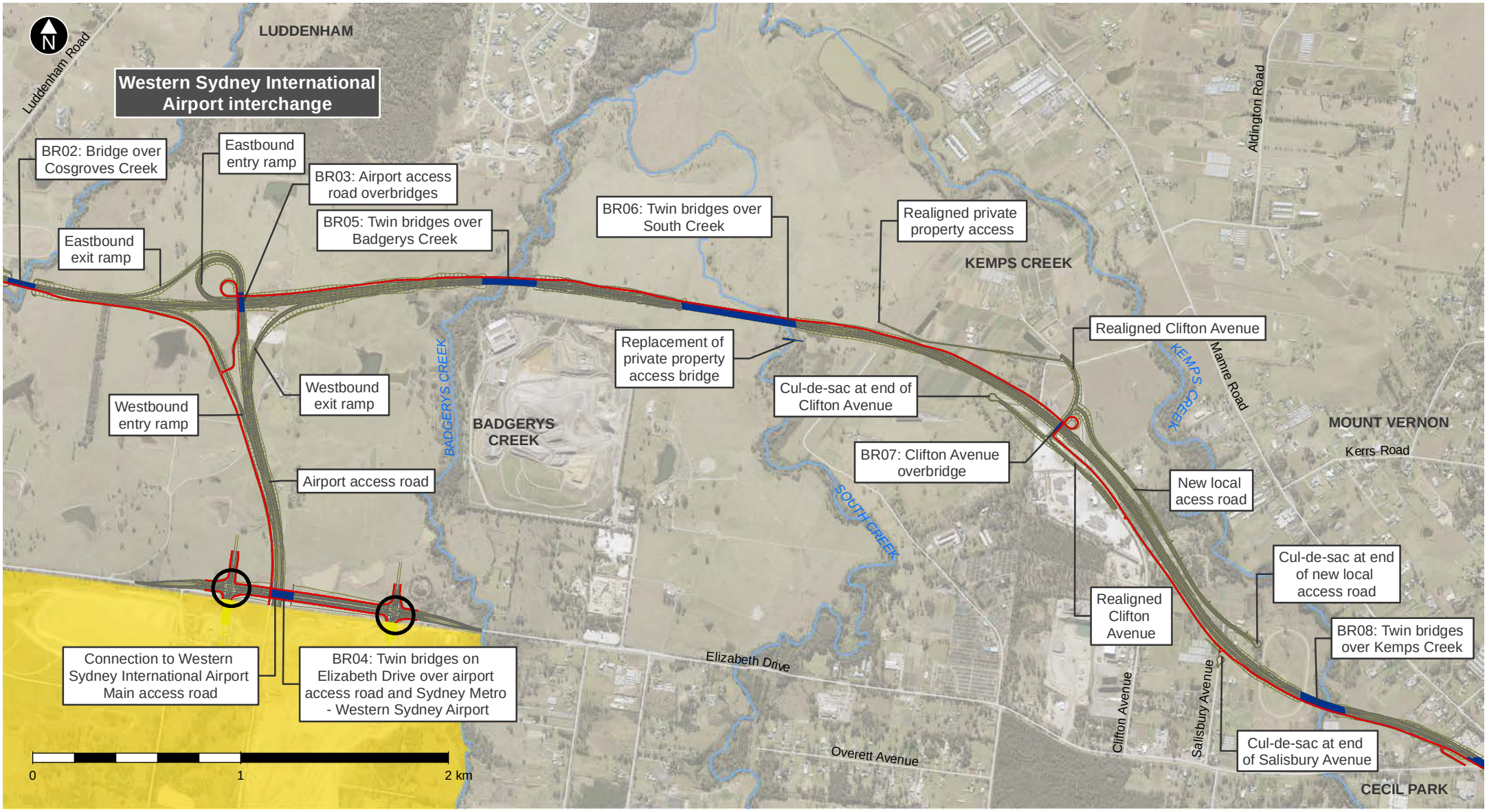
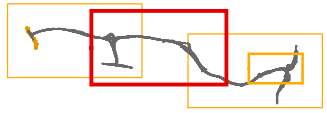


The amended project
Shared user path
Bridges
Existing roads
Waterways
Western Sydney International Airport
Signalised intersections into the Western Sydney International Airport
Note: Indicative, subject to detailed design



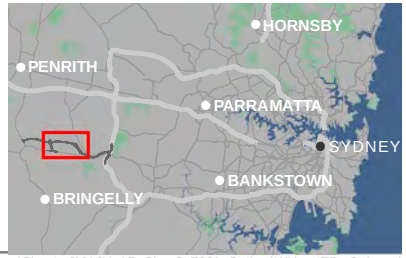


Figure 1-1 Key features of the amended project

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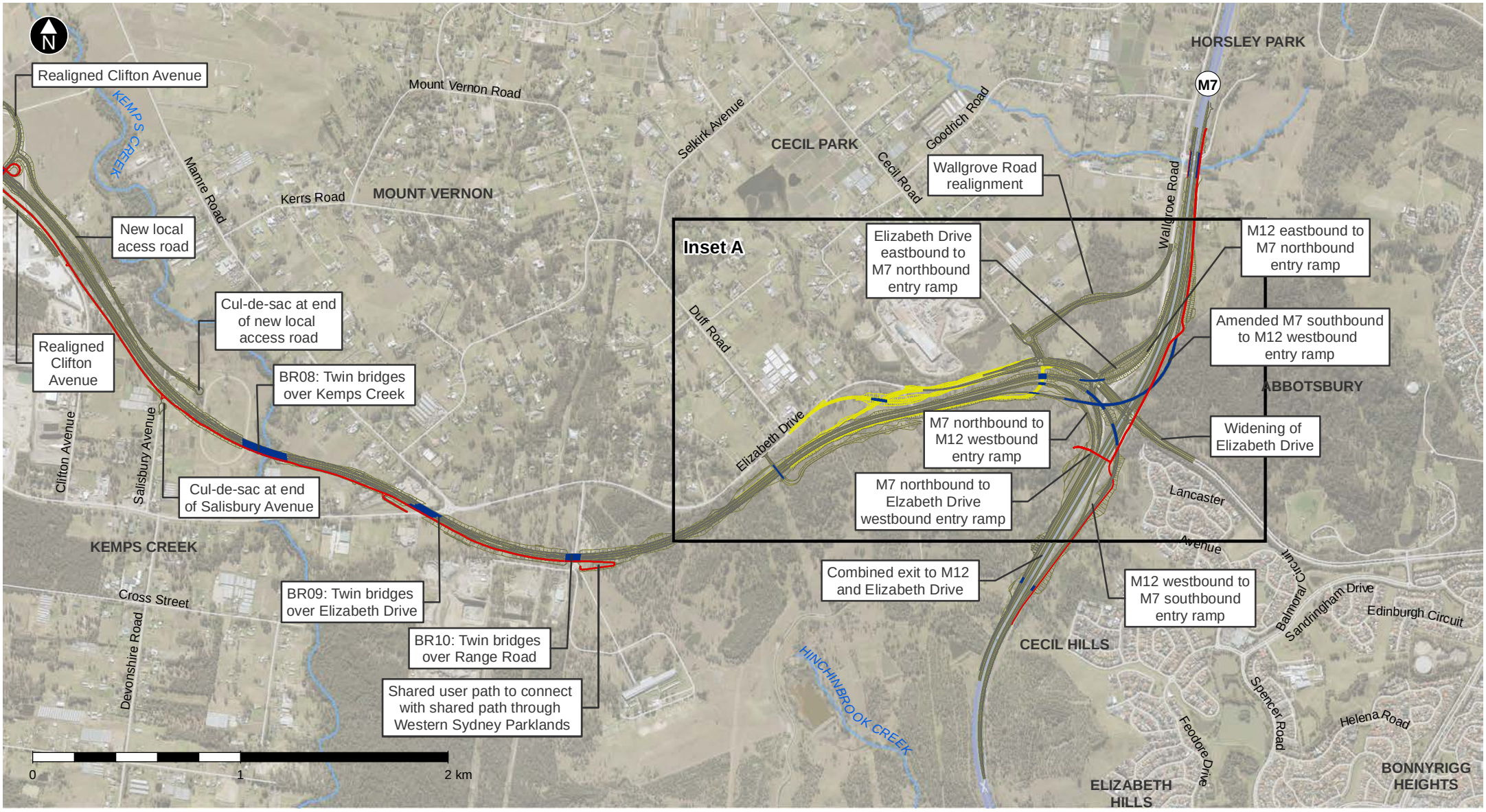


The amended project

The amended project (Elizabeth Drive connection)

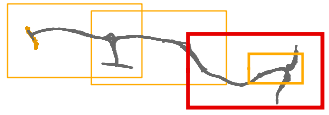
Shared user path

Bridges

Motorway

Existing roads

Waterways



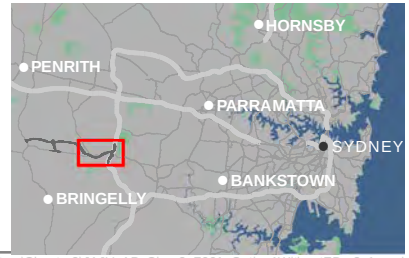


Figure 1-1 Key features of the amended project

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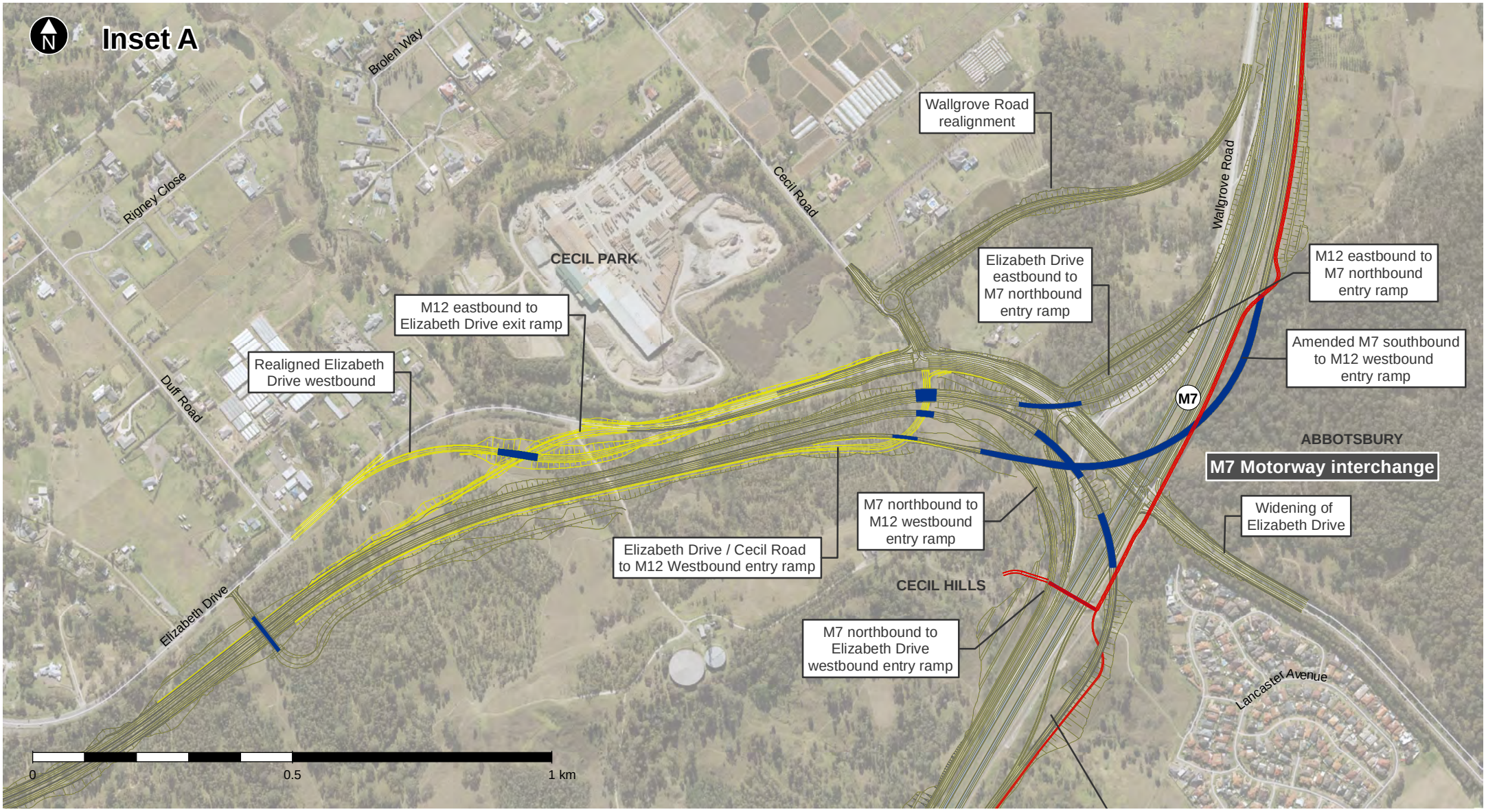
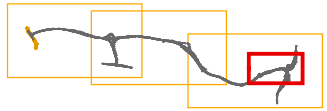


- The amended project
- The amended project with Elizabeth Drive connection
- Shared user path
- Bridges
- Motorway
- Existing roads



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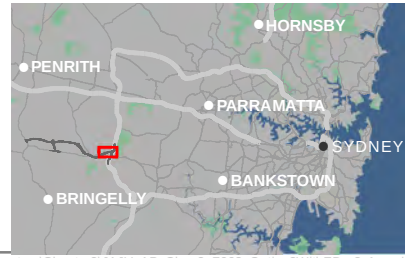

Figure 1-1 Key features of the amended project

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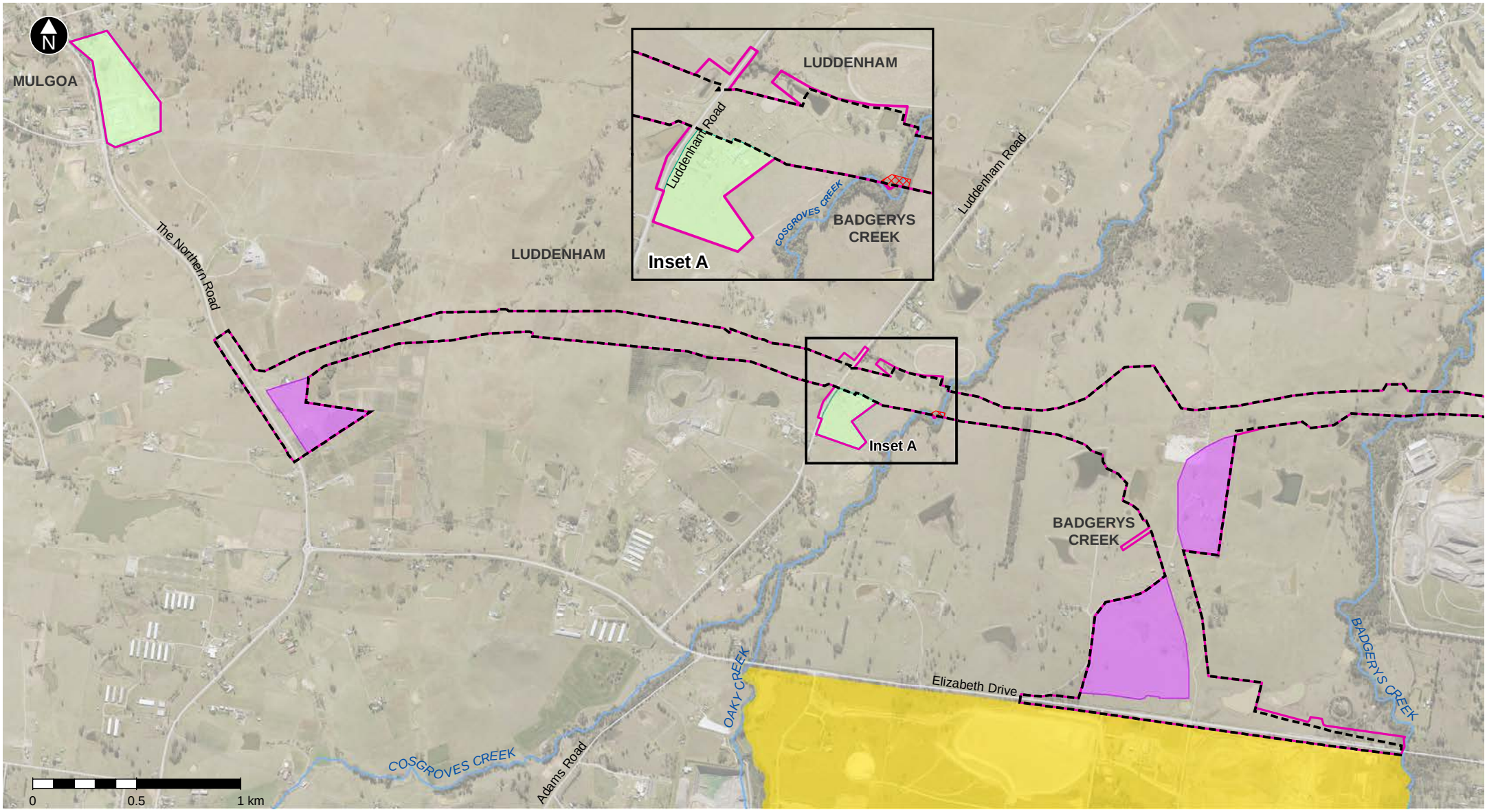

Figure 1-2 Construction footprints of the amended project and the project as described in the EIS

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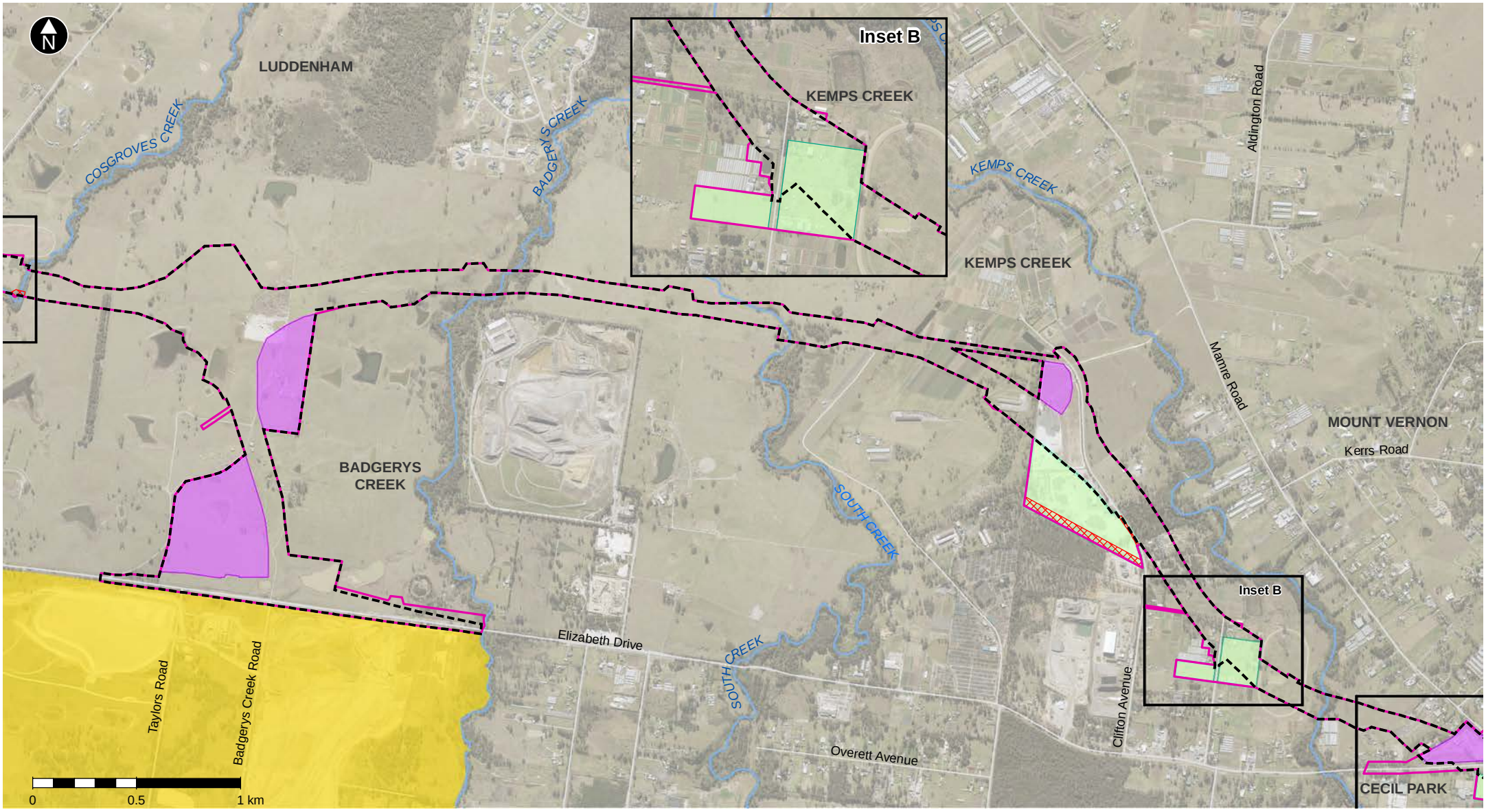


The project construction footprint as per the EIS

The amended project construction footprint

The amended project exclusion zones

Ancillary facilities as per the EIS

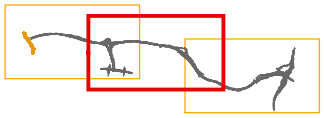
Additional ancillary facilities

Western Sydney International Airport

Waterways

Motorway

Existing roads



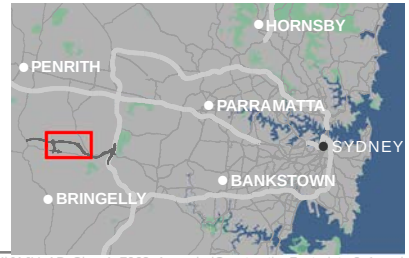


Figure 1-2 Construction footprints of the amended project and the project as described in the EIS

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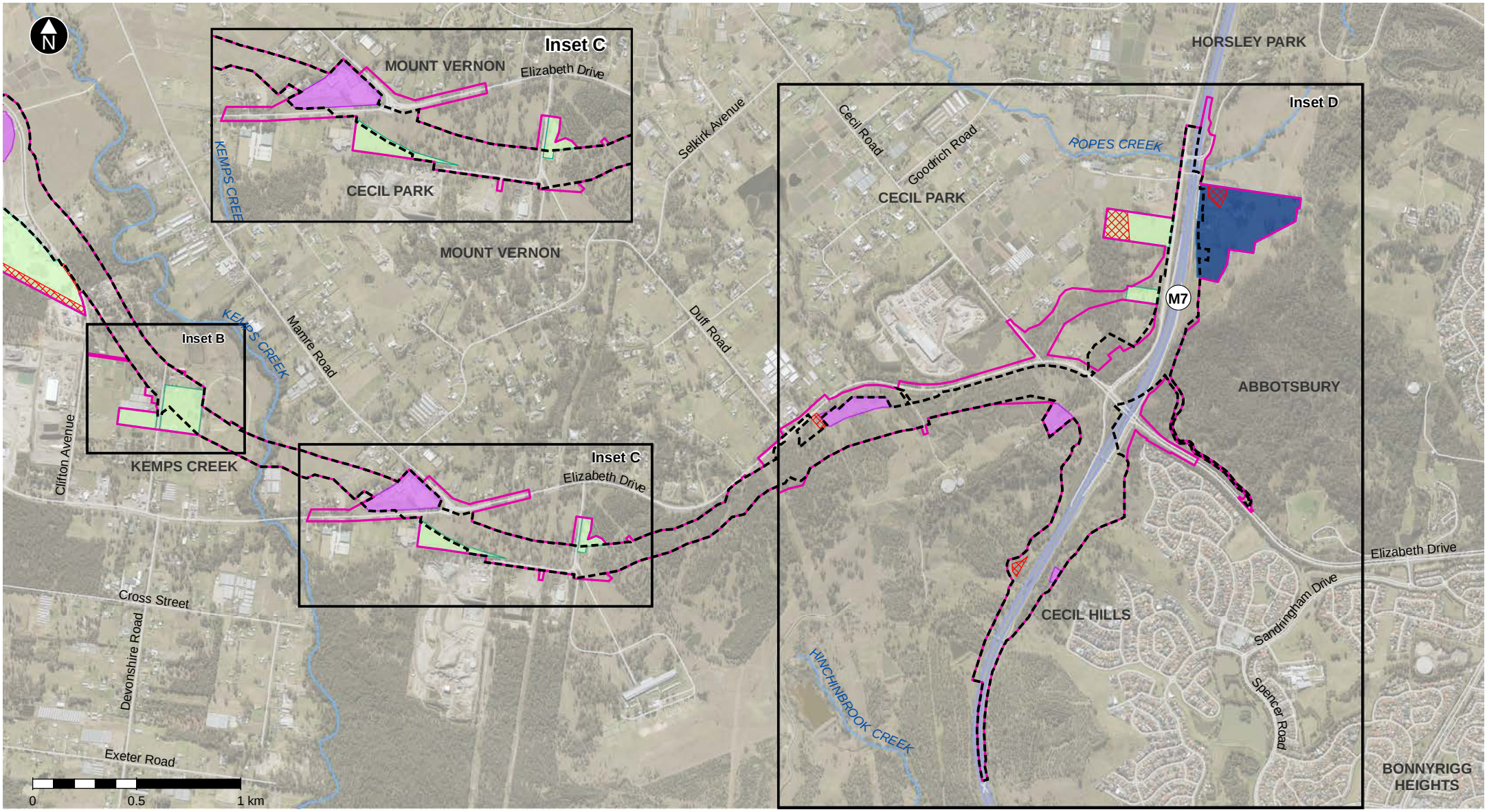


The project construction footprint as per the EIS

The amended project construction footprint

The amended project exclusion zones

Ancillary facilities as per the EIS

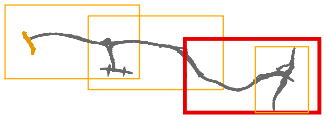
Additional ancillary facilities

Amended ancillary facilities

Waterways

Motorway

Existing roads



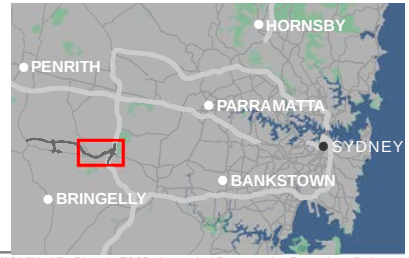


Figure 1-2 Construction footprints of the amended project and the project as described in the EIS

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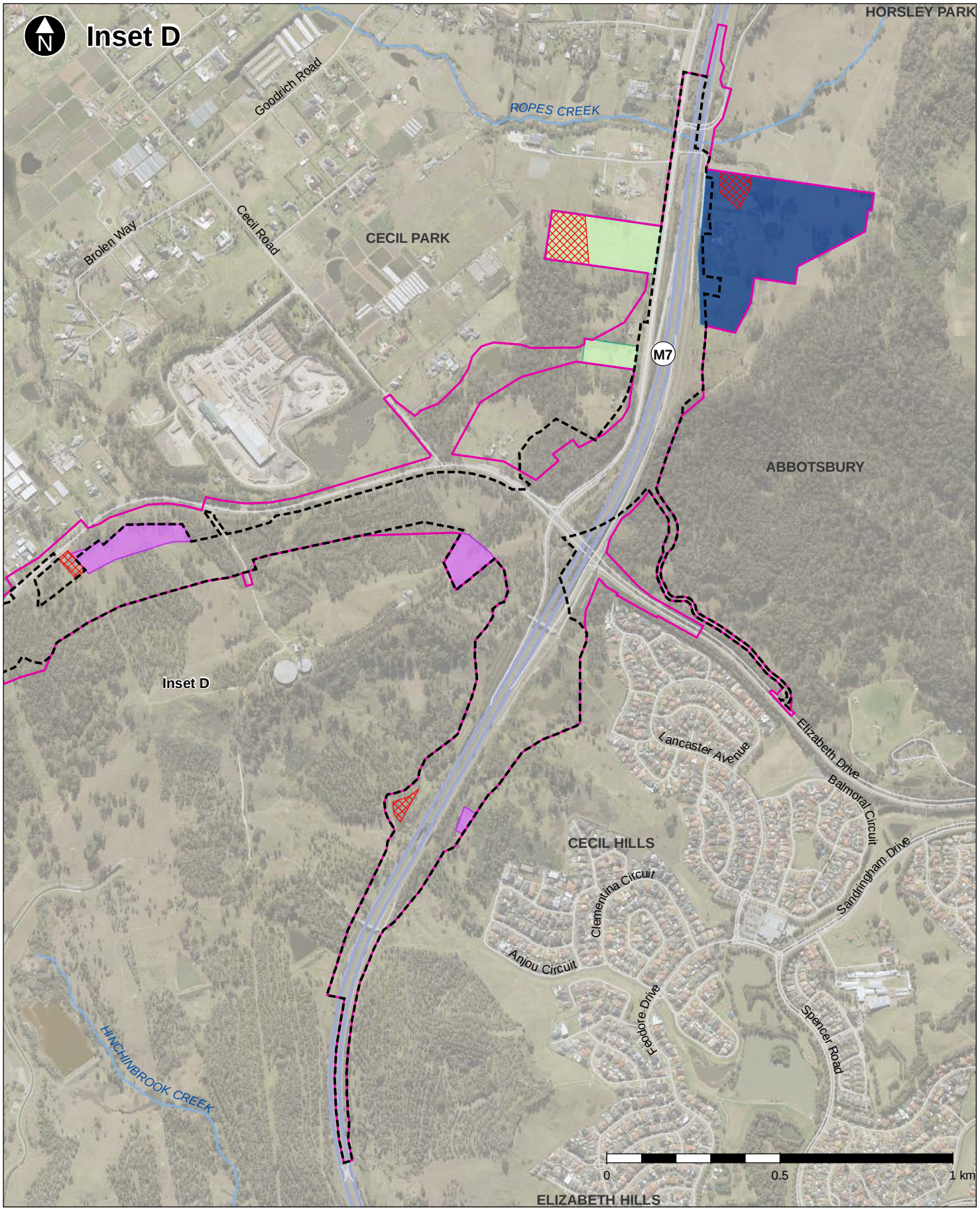


The project construction footprint as per the EIS

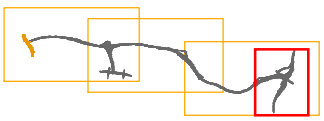
The amended project construction footprint

The amended project exclusion zones

Ancillary facilities as per the EIS

Additional ancillary facilities

Amended ancillary facilities



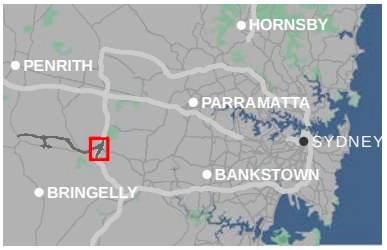


Figure 1-2 Construction footprints of the amended project and the project as described in the EIS

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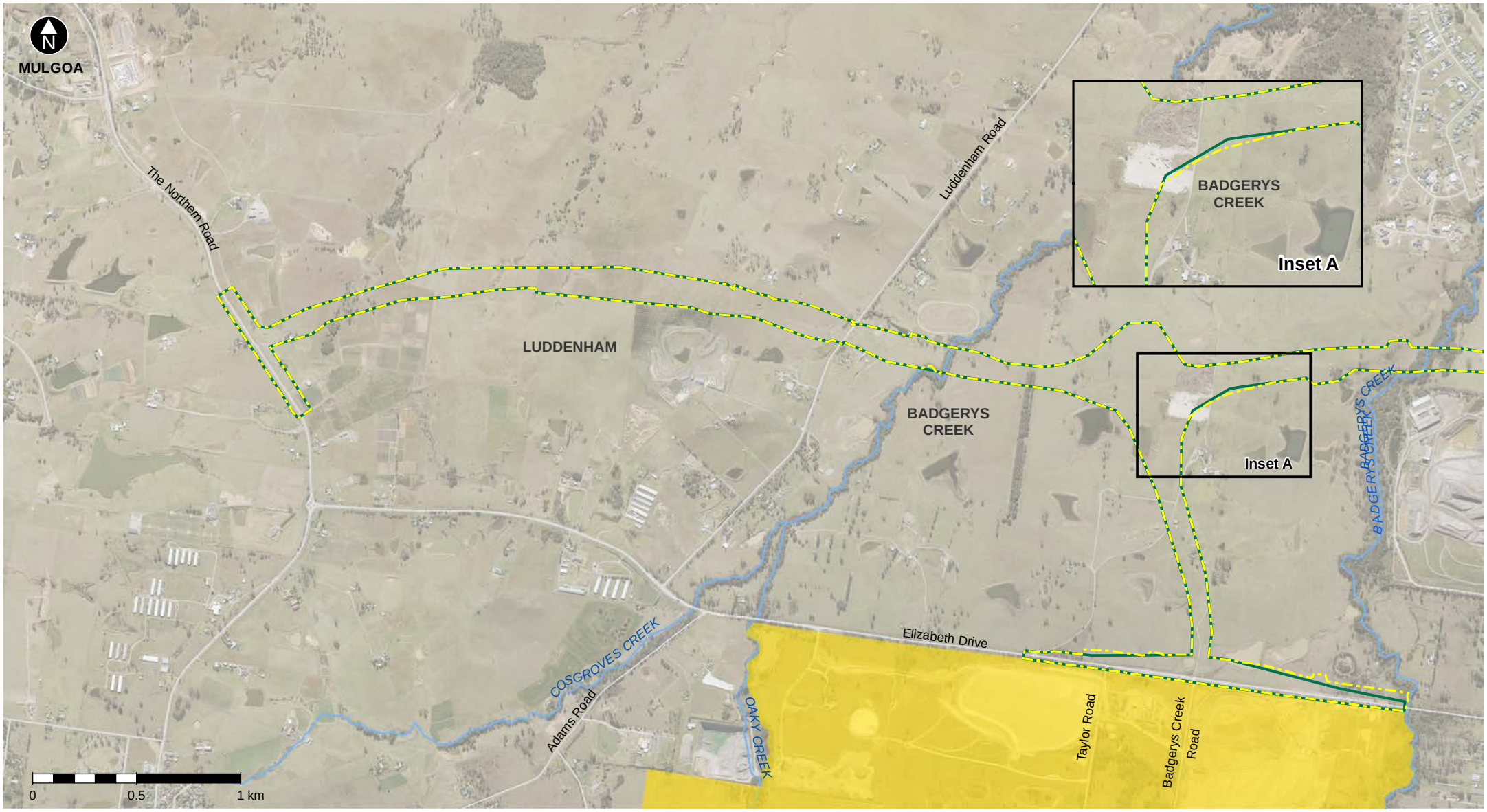


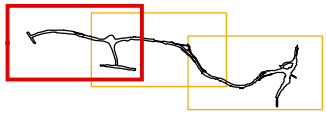
The project operational footprint as per the EIS

The amended project operational footprint

Waterways

Western Sydney International Airport

Existing roads



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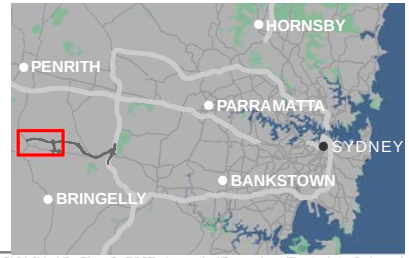

Figure 1-3 Operational footprints of the amended project and the project as described in the EIS

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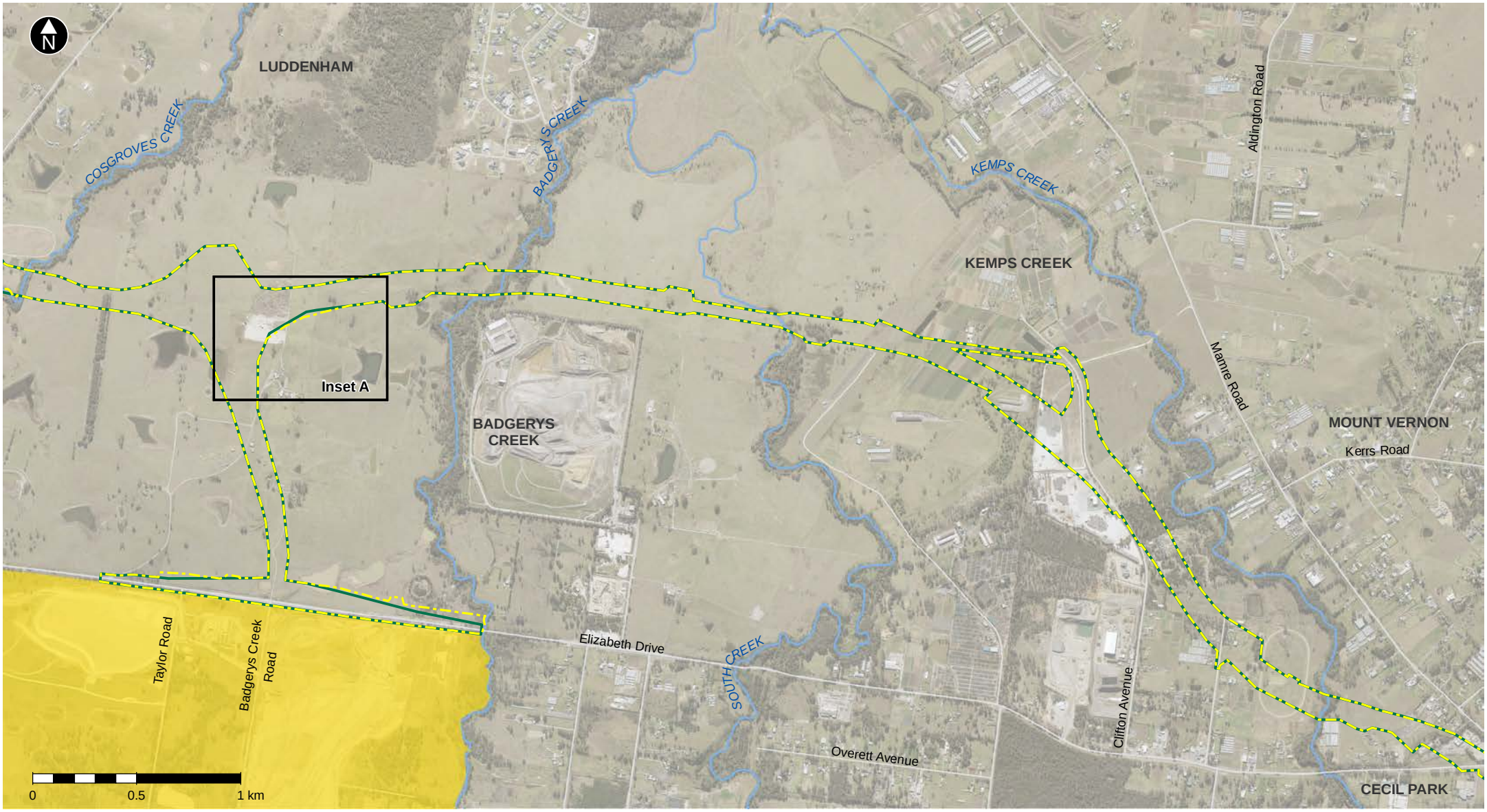

Figure 1-3 Operational footprints of the amended project and the project as described in the EIS

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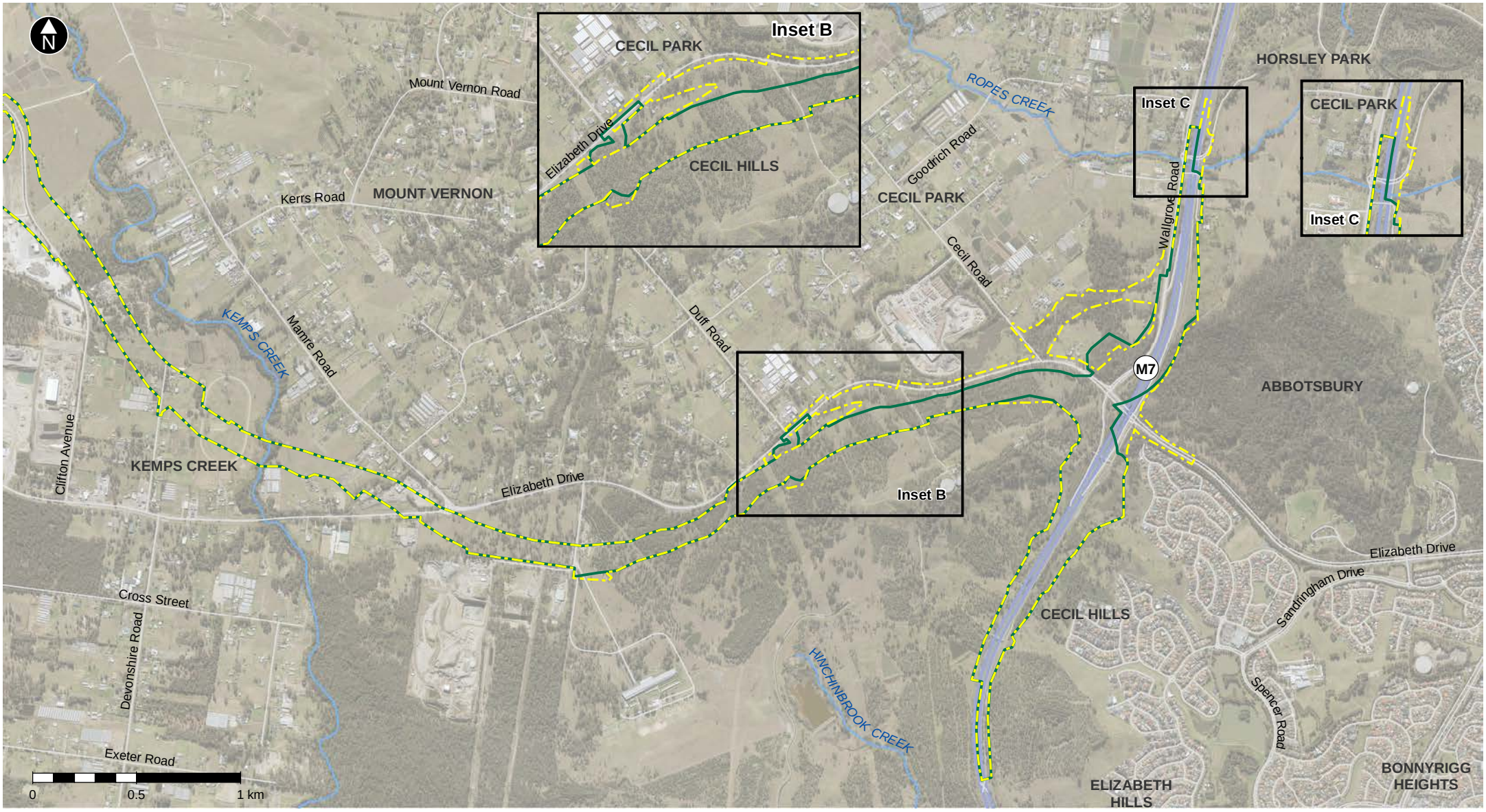


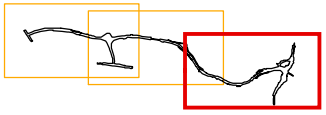
The project operational footprint as per the EIS

The amended project operational footprint

Waterways

Motorway

Existing roads



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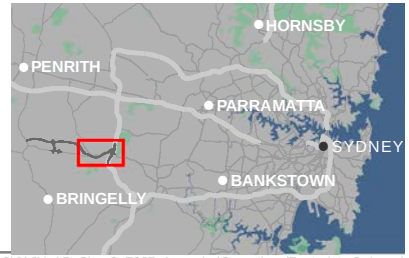

Figure 1-3 Operational footprints of the amended project and the project as described in the EIS

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1.4 Purpose and scope of this report

This biodiversity supplementary technical report has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued 30 October 2018 to support the amendment report. The purpose of this report is to present an assessment of the construction and operational activities for the amended project that have the potential to impact biodiversity. To achieve this, the scope of the report is therefore to provide:

- A review of threatened species and ecological communities that occur within the amended construction footprint
- Report on results of additional surveys of the amended construction footprint
- A revised assessment of biodiversity impacts and comparison of impacts between the project as described in the EIS and the amended project
    - Updated calculations for biodiversity offsets.

This supplementary technical report should be read in conjunction with the *M12 Motorway Environmental Impact Statement Appendix E Biodiversity Assessment Report* (Roads and Maritime Services, 2019) (EIS BAR).

1.5 SEARs

The Secretary of the NSW Department of Planning, Industry and Environment (Planning and Assessment; DPIE) issued the SEARs for the M12 Motorway EIS to inform TfNSW's assessment of the project. The project was determined to be a controlled action under the *Environment Protection and Biodiversity Act 1999* (Commonwealth) (EPBC Act). As such, the SEARs included the Commonwealth assessment requirements under the Act. A request to amend the project was submitted to DPIE on 20 May 2020. In response, DPIE confirmed on 28 May 2020 that an amendment report is appropriate to address the environmental impacts associated with the amended project. No additional or updated SEARs were issued by DPIE.

Table 1-1 in the EIS BAR lists the SEARs requirements relating specifically to the assessment of the project's potential impacts on biodiversity, with a reference to the chapter or section of the EIS BAR where each requirement was addressed. Similarly, Table 1-2 in the EIS BAR lists the Commonwealth requirements that were amended to the SEARs after review by the Department of the Environment and Energy (DoEE; now the Department of Agriculture, Water and the Environment (DAWE)).

2. Policy and planning setting

Section 7.1.1 of the EIS described the policy and planning setting of the project, including relevant NSW legislative requirements and guidelines and has not changed as a result of the amended project.

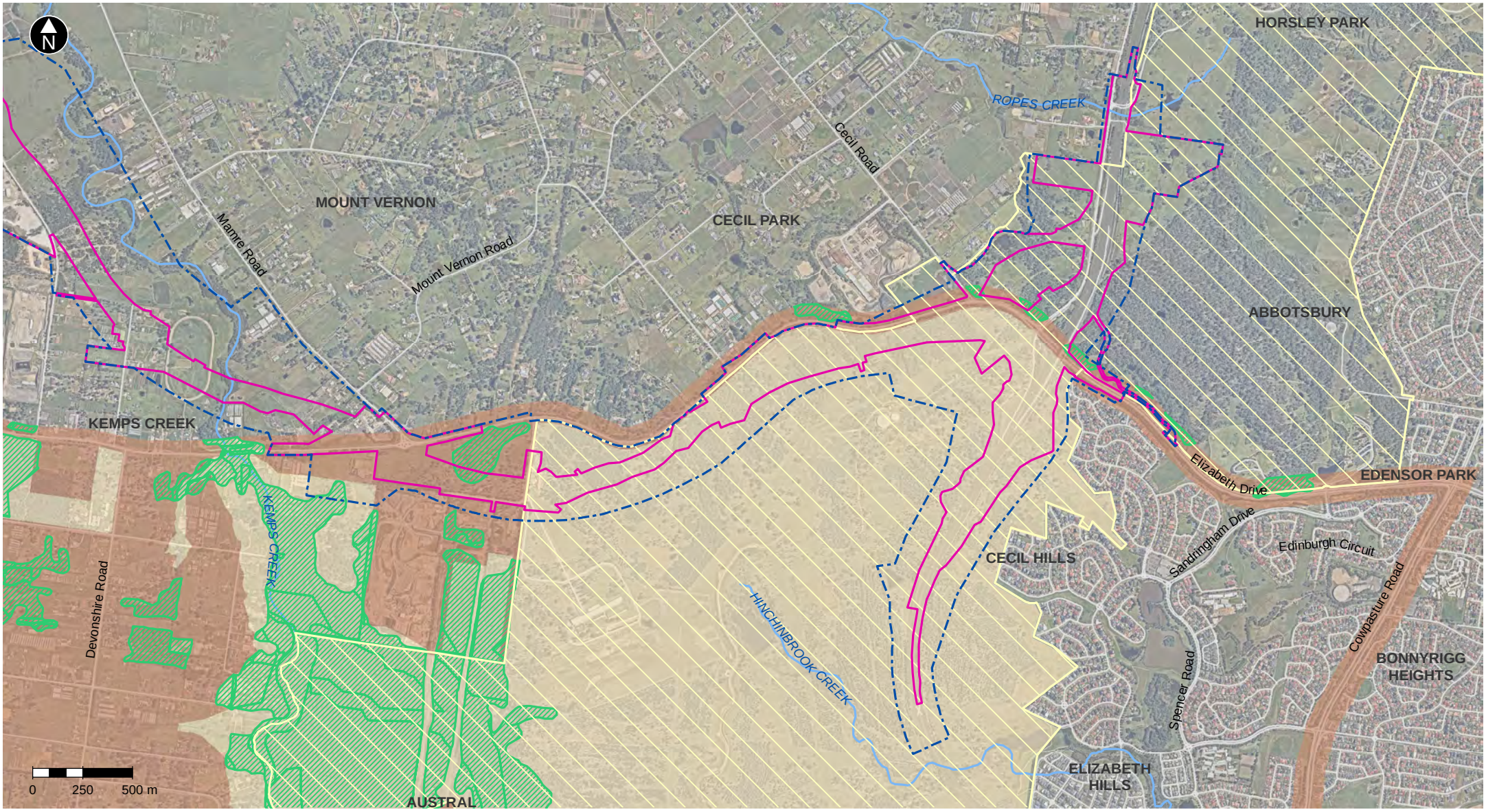
It is noted that TfNSW applied to have the project defined as a 'pending or interim planning application' under Clause 27(1) of the Biodiversity Conservation (Savings and Transitional) Regulation 2017 based on having undertaken 'substantial environmental assessment' prior to the commencement of the *Biodiversity Conservation Act 2016* (NSW) (BC Act) which came into effect in August 2017. This application was granted by a delegate of the Secretary of the DPIE (Planning and Assessment) on 5 April 2018.

Accordingly, the former planning provisions (being the *Threatened Species Conservation Act 1995* (NSW) (TSC Act), the NSW Biodiversity Offsets Policy for Major Projects (2014) and the Framework for Biodiversity Assessment 2014 (FBA) continue to apply to the amended project.

2.1 Cumberland Plain Conservation Plan

The Cumberland Plain Conservation Plan (CPCP) is part of the Government's commitment to delivering a sustainable Western Parkland City. It is designed to protect region's threatened plants and animals and support the needs of the community through the creation of conservation lands and green spaces close to homes. The aims of the CPCP is to use strategic conservation planning to avoid and minimise impacts on threatened species at a landscape scale. Detailed information on how the project would avoid and minimise impacts is provided in the EIS BAR and revised impacts and offsets are addressed in **Section 5** of this report.

The amended project falls within the area of the CPCP but is not covered by it. However, the aims of the M12 Motorway project are also to balance conservation with the provision of infrastructure for western Sydney communities and, as such, this report provides detailed information on impacts to biodiversity, as well as offset requirements. The project, therefore, aligns with the objectives of the CPCP.



The amended project construction footprint
Amended study area corridor
Waterways
Western Sydney Parklands
Existing Native Vegetation (ENV)
South West Growth Centre Biodiversity Certification
Certified areas
Non-certified areas

*Entire map extent is covered by the IBRA 7 Region - Sydney Basin,and IBRA 7 Subregion - Cumberland. No SEPP 14 Coastal Wetlands or Ramsar Wetlands are present in the entire map extent.

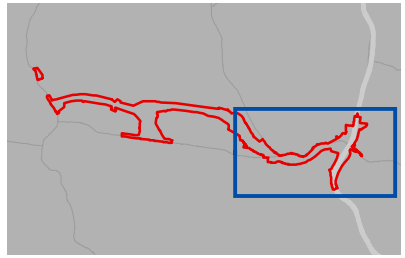


Figure 2-1 Location of project in relation to South West Growth Centre Biodiversity Certification

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3. Assessment methodology

The methodology for this assessment is consistent with the methodology outlined in Section 7.1.2 of the EIS and Section 3.1 and Chapter 4 of the EIS BAR. This assessment should be read in conjunction with these methodologies which contain detailed descriptions and explanations on the assessment guidelines and assessment methods used.

3.1 Amended project study area

The study area presented in the EIS BAR has been increased to accommodate the proposed design changes described in **Section 1.2**. The amended study area is shown in **Figure 3-1**.

The amended construction footprint includes exclusion zones. These exclusion zones are defined as no-go areas and are to be protected for the duration of construction in that particular footprint area. The vegetation within these exclusion zones, amounting to about 0.62 hectares, would not be cleared as part of the project, therefore this biodiversity supplementary technical report has updated all vegetation calculations to remove areas mapped within the exclusion zones.

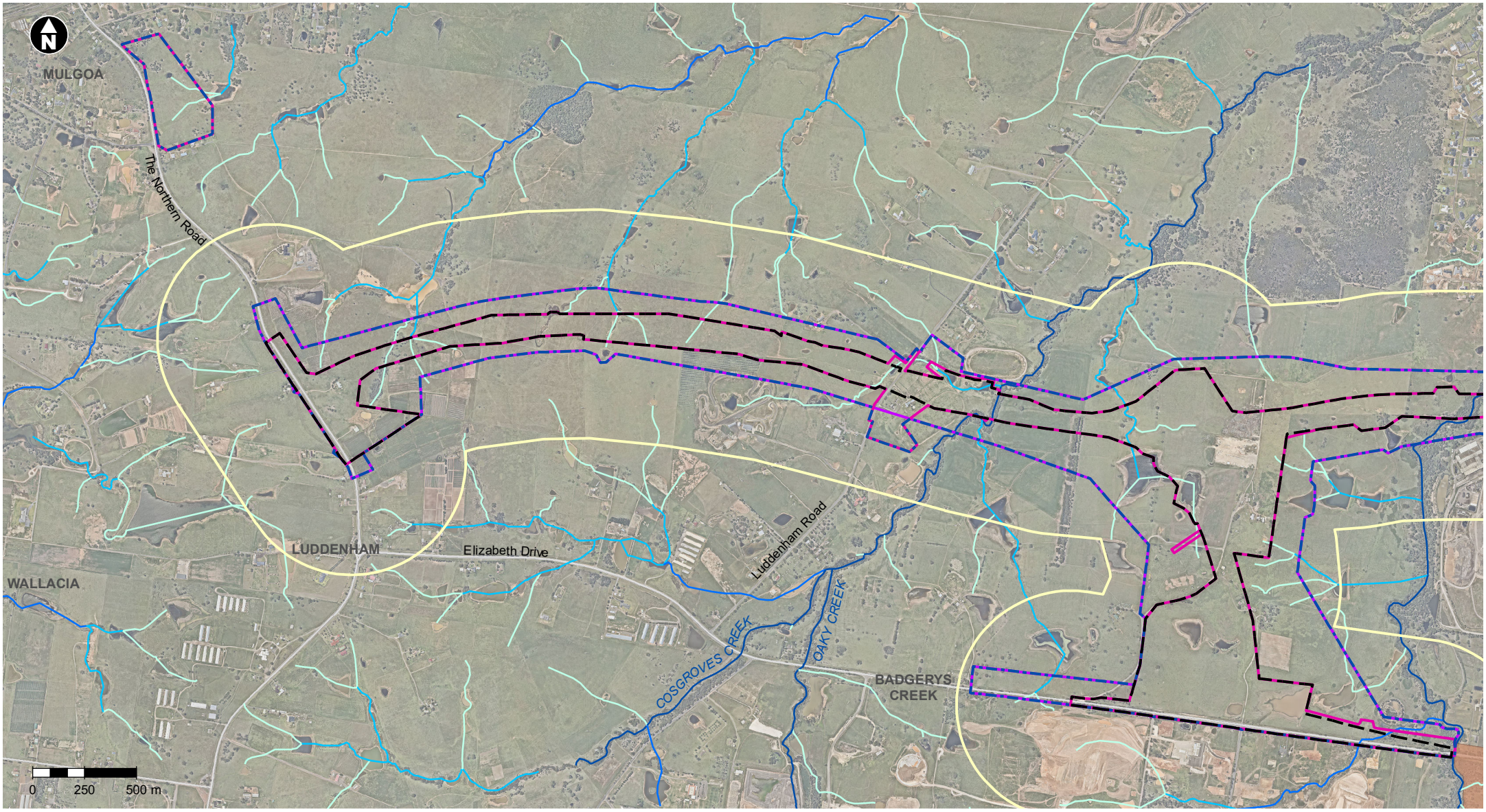
3.2 Database searches

Database searches for the EIS BAR were undertaken in mid-2017 and updated twice in August 2018 and in April 2019 following amendments to the project design.

Database searches were re-updated in January 2020 to identify State and Commonwealth records of threatened entities and Commonwealth Matters of National Environmental Significance (MNES) that occur or have the potential to occur within 10 kilometres of the amended project footprint. Databases and reports interrogated for the amended project are listed below in **Table 3-1**.

Table 3-1 Database interrogations carried out for the amended project

Database	Purpose of search	Date of database search
NSW BioNet Species Sightings data collection, managed by DPIE (Environment, Science and Energy)	Used to compile a list of threatened species records listed under the TSC Act to within 10 kilometres of the study area.	09 January 2020 (updated)
Protected Matters Search Tool (PMST), managed by the Commonwealth Department of the Environment (DoE)	Used to compile a list of potentially occurring MNES listed under the EPBC Act to within 10 kilometres of the study area (BAR Annexure E).	09 January 2020 (updated)
BioNet Vegetation Classification data collection managed by DPIE (Environment, Science and Energy)	Information on Plant Community Types (PCTs) and their relationship to a vegetation formation and vegetation class is managed and maintained in the BioNet Vegetation Classification data collection.	Referenced throughout
BioNet Threatened Species data collection, managed by DPIE (Environment, Science and Energy)	Contains information for all listed threatened species, populations and communities.	Referenced throughout
NSW WeedWise, managed by DPI	Identifies species listed as priority weeds for a weed control area and their control requirements.	Referenced throughout
Fisheries NSW Spatial Data Portal	Maps threatened fish species distribution in NSW.	09 January 2020 (updated)



Project construction footprint as per EIS

The amended project construction footprint

EIS BAR study area corridor

Amended study area corridor

550m landscape assessment buffer

Biodiversity certified land

Waterways (Strahler)

First order

Second order

Third order

Fourth order, and above

Figure 3-1 Amended project study area

Date: 3/04/2020 Path: M:\GIS\MXDs\Figures\Technical_reports\BAR\Amendment_Report\JAJV_BAR_Amendment_F003-1_AmendedProjectStudyArea_v2.mxd
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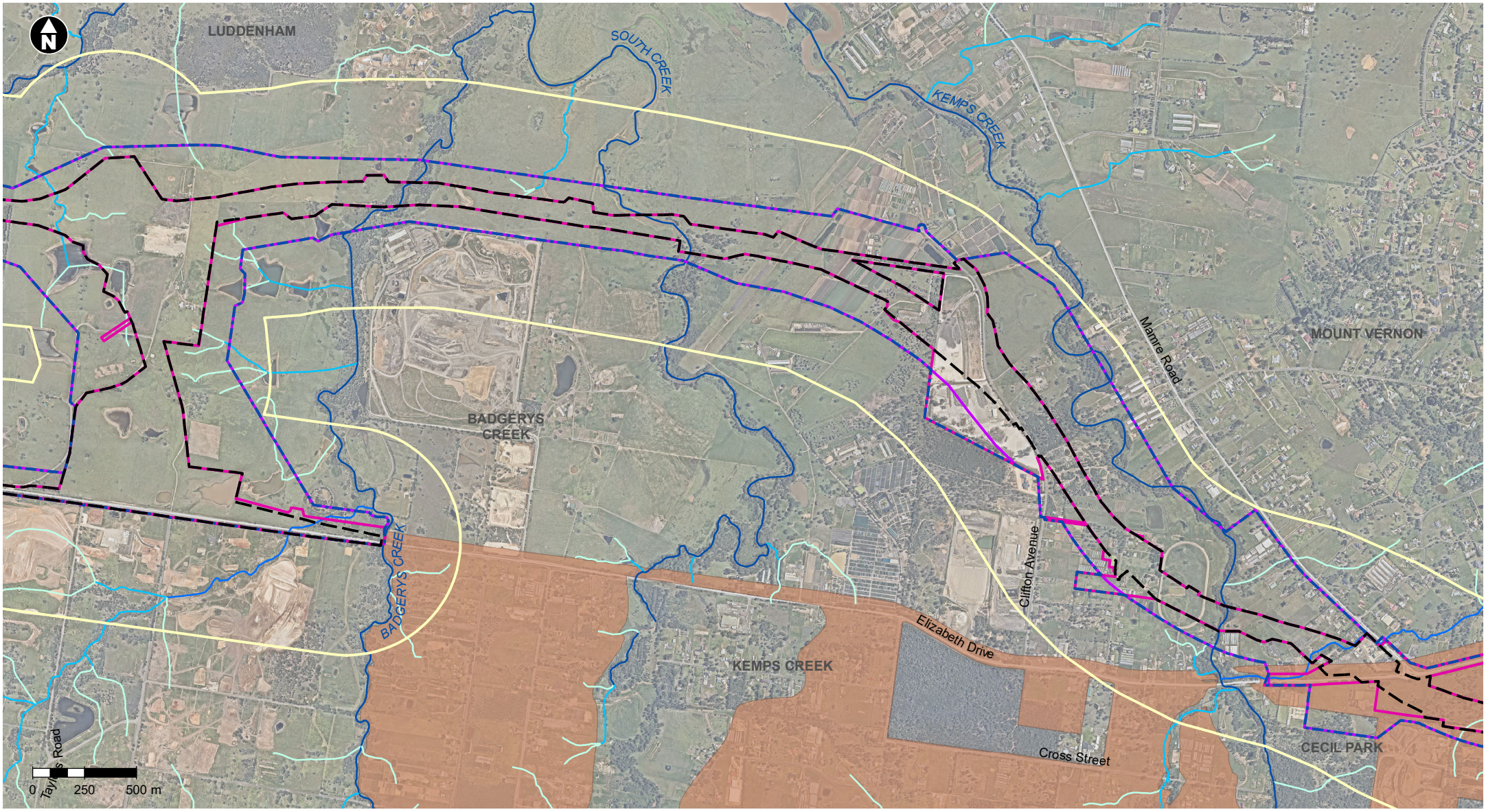

Project construction footprint as per EIS

The amended project construction footprint

EIS BAR study area corridor

Amended study area corridor

550m landscape assessment buffer

Biodiversity certified land

Waterways (Strahler)

First order

Second order

Third order

Fourth order, and above

Figure 3-1 Amended project study area

Date: 3/04/2020 Path: M:\GIS\MXDs\Figures\Technical_reports\BAR\Amendment_Report\JAJV_BAR_Amendment_F003-1_AmendedProjectStudyArea_v2.mxd
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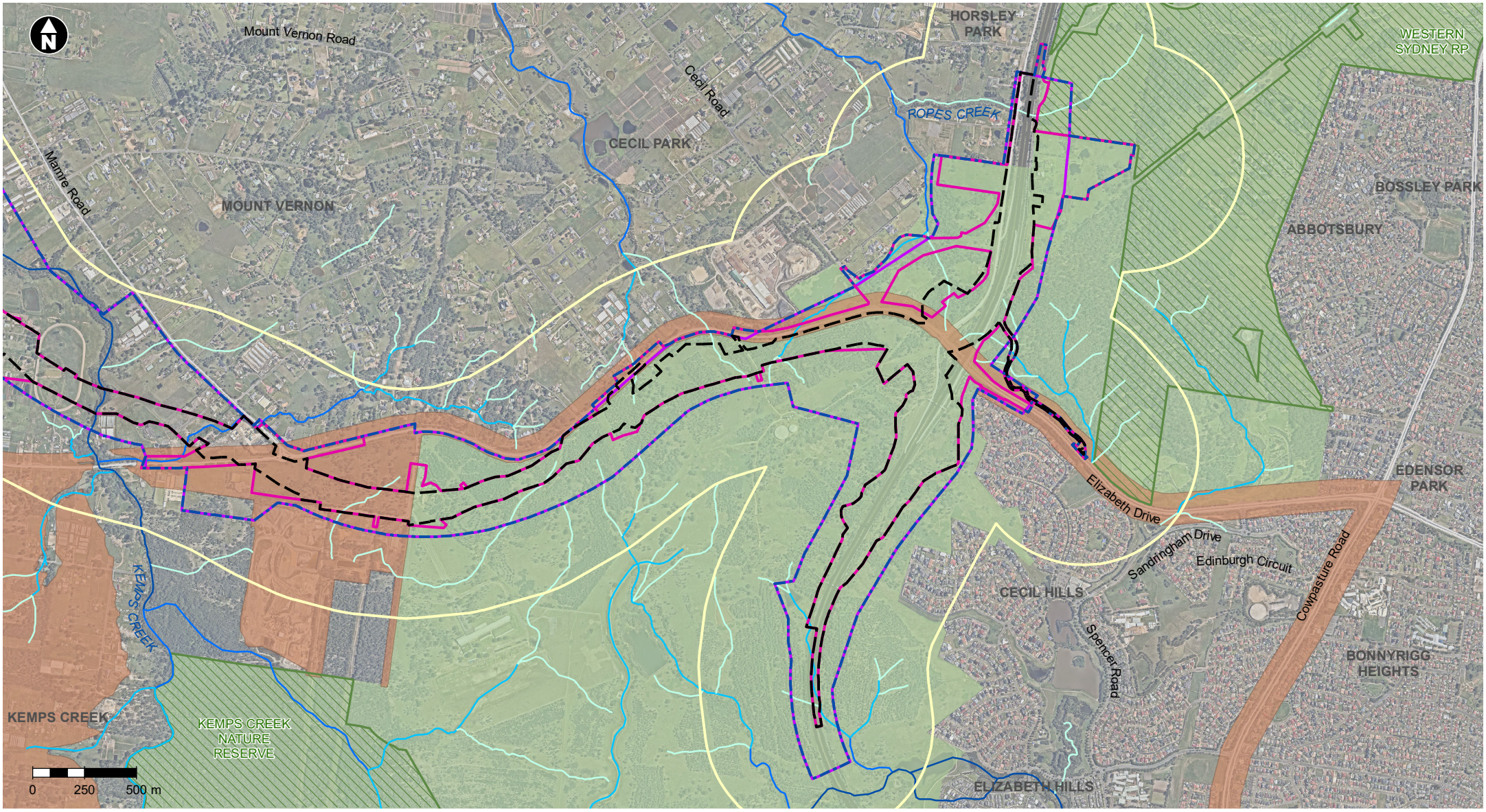

Project construction footprint as per EIS

The amended project construction footprint

EIS BAR study area corridor

Amended study area corridor

550m landscape assessment buffer

Biodiversity certified land

NPWS Reserves

Western Sydney Parklands

Waterways (Strahler)

First order

Second order

Third order

Fourth order, and above

Figure 3-1 Amended project study area

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3.3 Field surveys

As a result of the amended project, a net total of about seven hectares of additional native vegetation was incorporated into the amended construction footprint. As a result, three additional days of field surveys were conducted for the amended project between 16 January and 29 January 2020. In total, three additional vegetation plots (**Figure 3-2**), two Cumberland Plain Land Snail (*Meridolum corneovirens*) surveys and one terrestrial fauna habitat assessment were completed for the amended project (**Figure 3-3**). Surveys for the amended project are detailed below in **Table 3-2**.

Table 3-2 Field surveys undertaken for the amended project (January 2020)

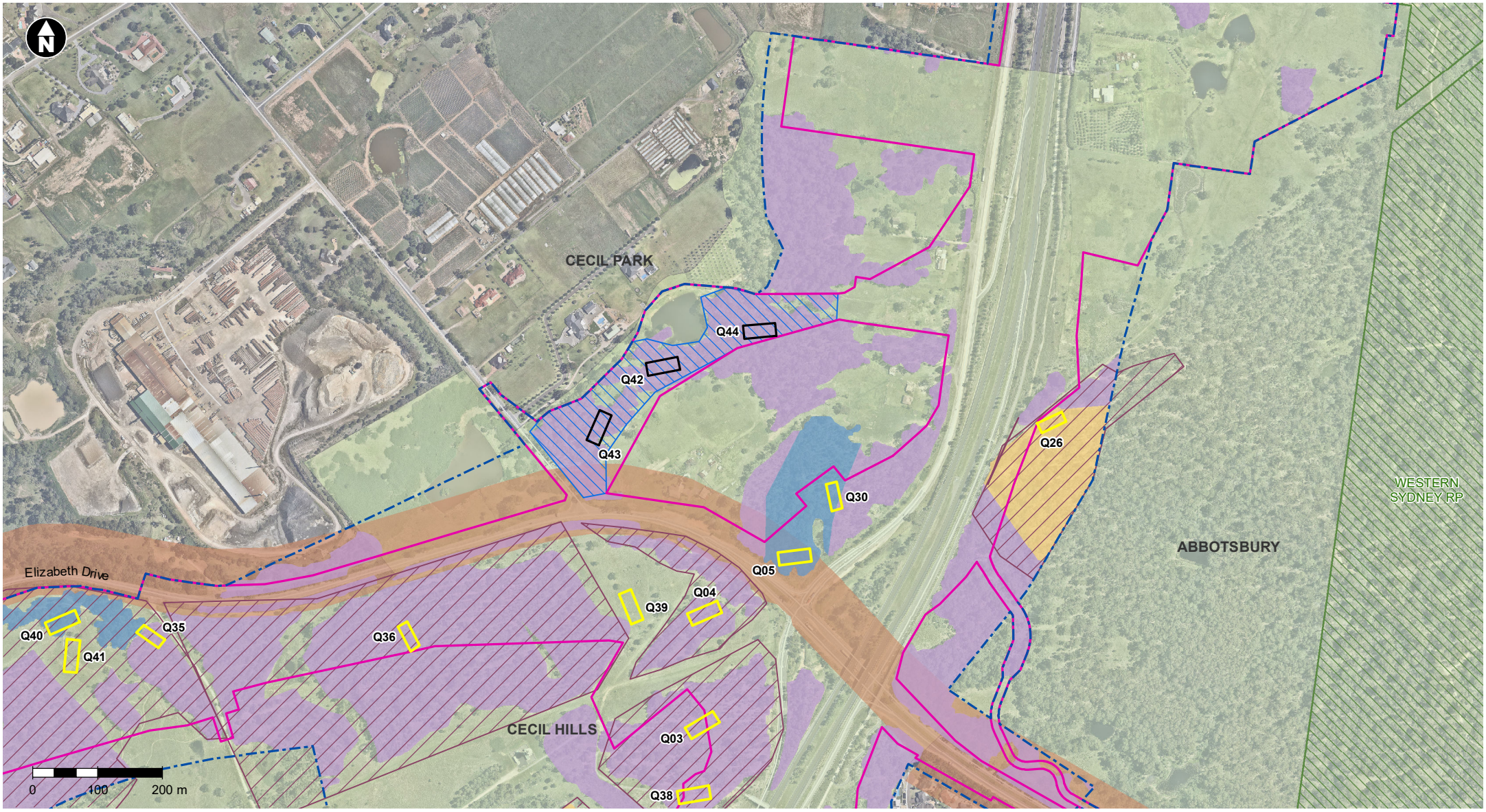
Survey type	Survey details	Data collected	Number completed
Plot based floristic survey	Plot surveys were undertaken in accordance with the methodology outlined by the FBA. In total, three plots were carried out for the amended project. Each plot consisted of a 20 metre x 20 metre floristic plot nested inside a 20 metre x 50 metre transect. The floristic plot measures five attributes which inform the assignment of PCTs and assess the expected environmental variation. Ten site value attributes are measured in the larger 50 metre x 20 metre transect.	• Floristic attributes: stratum and layer, growth form, species name, cover and abundance. • Site value data: indigenous plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover, number of trees with hollows, regeneration and total length of fallen logs.	Three
Cumberland Plain Land Snail survey	Targeted searches for live snails or empty shells within all suitable Woodland and Riparian Forest fauna habitats. Searches at the base of trees and beneath rocks and debris.	• Presence/absence of the species • Presence/absence of important habitat features, including density of sheltering habitat, density of leaf litter and/or tussock grasses, patch size, connectively, shrub-layer and ground cover.	Two
Terrestrial fauna habitat assessment	A terrestrial fauna habitat assessment was undertaken at one site for the amended project to gather information on the type and condition of fauna habitat present. This assessment would also establish fauna habitat stratification units, refine the likelihood of occurrence for threatened fauna and determine any additional areas that should be targeted for fauna surveys.	• Type and structure of vegetation present • Presence and relative abundance of large mature trees • Presence, abundance and landscape setting of hollow-bearing trees • Presence and abundance of fallen logs and coarse woody debris	One

Survey type	Survey details	Data collected	Number completed
		• Presence of significant keystone species (eg apex predators such as large forest owls) and critical habitat elements for threatened fauna • Disturbance regimes, both past and ongoing including grazing and weed abundance • Density of each vegetation strata (structural diversity) • Presence and quality of wet areas or waterbodies, and significant aquatic habitats where present • Size of remnant patches and extent of connectivity, movement corridors and refuge value.	

Weather conditions at the time of surveys for the amended project were generally warm, clear and still. The weather records from the Horsley Park Equestrian Centre Automatic Weather Station (AWS; station 067119), about one kilometre from the eastern edge of the amended construction footprint, for the dates of surveys for the amended project are detailed below in **Table 3-3**.

Table 3-3 Weather conditions for amended project field surveys (January 2020) (BOM, 2020)

Date	Temperature		Rain	Wind Speed at 3pm	
	Min (°C)	Max (°C)	mm	Direction	Speed (km/h)
16 January 2020	20.1	30.3	4.8	NNE	7
22 January 2020	17.5	35.5	0.0	E	17
29 January 2020	22.2	29.9	0.4	ESE	17



The amended project construction footprint
Amended study area corridor
Western Sydney Parklands
NPWS Reserves
Biodiversity certified land

As per the EIS

Targeted flora survey
Vegetation plot

January 2020

Additional targeted flora survey
Additional vegetation plot

Plant Community Type (PCT)

Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion

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

Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion

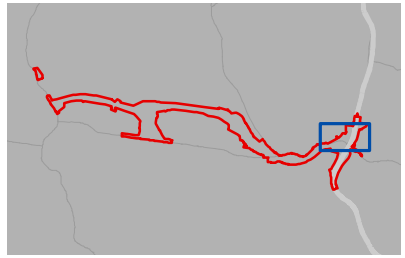


Figure 3-2 Vegetation survey locations for the amended project

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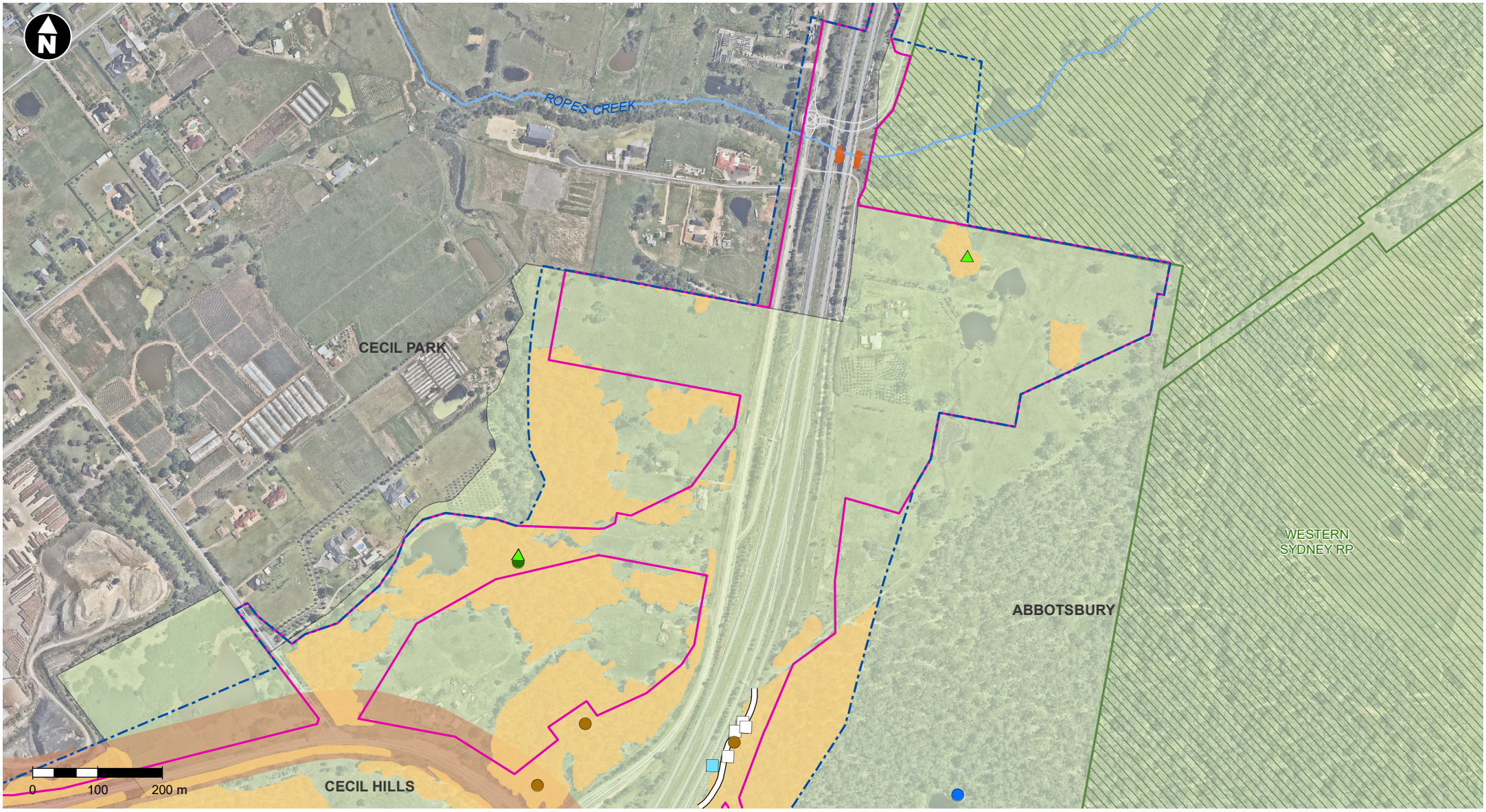

Figure 3-3 Threatened species survey locations for the amended project

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4. Existing environment

The following sections provide a comparison of landscape features and values, native vegetation and fauna habitat, Groundwater Dependent Ecosystems (GDEs) and aquatic habitat between the construction footprint as described in the EIS and the amended construction footprint.

4.1 Landscape values and features

Section 7.1.3 of the EIS and Section 2.4 of the EIS BAR describe the landscape features of the project.

The landscape values in the revised 550 metres landscape buffer were calculated in accordance with the methodology described in Section 2.4 of the BAR, with values for native vegetation cover, connectivity value, patch size and area to perimeter ratio reviewed and recalculated where necessary. The resultant landscape value score for the amended project is 24.75, which is the same as the landscape value score for the construction footprint as described in the EIS.

As a result of the amended project, about seven hectares of additional native vegetation was incorporated into the amended construction footprint. **Table 4-1** compares identified landscape features between the EIS BAR study area and amended project study area.

Table 4-1 Revised landscape features

Identified landscape feature	EIS BAR project study area	Amended project study area (refer to Section 3.1)
Interim Biogeographic Rationalisation for Australia (IBRA) bioregions and subregions	Sydney Basin IBRA Bioregion Cumberland sub-region	No change.
NSW Landscape Regions (Mitchell landscapes)	Cumberland Plain Mitchell Landscape Hawkesbury – Nepean Channels and Floodplains	No change.
Soils and geology	Four soil landscape types: • Luddenham • Picton • Blacktown • South Creek. Disturbed Terrain also present.	Amended ancillary facilities between Clifton Avenue and Salisbury Avenue are within the Berkshire Park soil landscape type which has not been previously identified for the EIS BAR. The Berkshire Park soil landscape is associated with dissected, gently undulating low rises on the Tertiary terraces of the Hawkesbury/Nepean River system. Soils are weakly pedal orange heavy clays and clayey sands, often mottled. Ironstone nodules are also common and large (up to 20cm) silcrete boulders occur in sand/clay matrices. Solods, yellow and red podzolic soils, chocolate soils, structured plastic clays and structured clays are common.

Identified landscape feature	EIS BAR project study area	Amended project study area (refer to Section 3.1)
Rivers and streams	Within the construction footprint as described in the EIS: • Unnamed tributary of Cosgroves Creek – second order stream • Cosgroves Creek – fourth order stream and Key Fish Habitat (KFH; DPI, 2020) • Unnamed tributary of Badgerys Creek – first order stream • Badgerys Creek – fourth order stream and KFH • South Creek – fifth order stream and KFH • Unnamed tributary of South Creek – first order stream • Kemps Creek – fourth order stream and KFH • Unnamed tributary of Kemps Creek – third order stream • Ropes Creek – first order stream • Unnamed tributary of Ropes Creek – first order stream. Within the EIS BAR study area but outside construction footprint as described in the EIS: • Hinchinbrook Creek – fourth order stream • Unnamed tributary of Hinchinbrook Creek – second order stream and KFH.	No change.
Wetlands	Within the EIS BAR study area: • Artificial wetlands (ie farm dams, detention basins, roadside drains, effluent treatment systems) including 28 dams	Additional ancillary facilities and revised construction footprint as a result of the amended project are likely to impact additional dams and dam areas including: • One additional small farm dam in the north-western extent of the amended project, east of The Northern Road

Identified landscape feature	EIS BAR project study area	Amended project study area (refer to Section 3.1)
	• Coastal Wetland (ID 117) listed under the State Environmental Planning Policy (Coastal Management SEPP) 2018. In addition, the Unnamed tributary of Hinchinbrook Creek passes through the southern extent of the EIS BAR study area and flows into a Coastal Wetland (ID 276) about 1.8 kilometres to the southeast of the EIS BAR study area. Hinchinbrook Creek, about 330 metres south of the construction footprint as described in the EIS, also flows into this Coastal Wetland. Doujon Lake and two other Coastal Wetlands (ID 113 and ID 114) lie in proximity to the EIS BAR study area on a tributary of Hinchinbrook Creek.	• One additional small farm dam in the central extent of the amended project, east of Salisbury Avenue • Two additional small farm dams in the north-eastern extent of the amended project, east of the M7 Motorway • A greater impact area for one farm dam in the west of the amended project, between Luddenham Road and Cosgroves Creek.
State or regionally significant biodiversity links	No State significant biodiversity links in the EIS BAR study area. Riparian buffers 20 metres either side of six creeks within the EIS BAR study area meet the criteria for regionally significant biodiversity links (FBA, 2014): • Badgerys Creek (4th order stream) • Kemps Creek (4th order stream) • Cosgroves Creek (4th order stream) • Hinchinbrook Creek (4th order stream) • South Creek (5th order stream) • Ropes Creek (1st order stream).	No change.

4.2 Native vegetation and habitat

4.2.1 Plant Community Types

The EIS identified seven Plant Community Types (PCTs) in the construction footprint as described in the EIS. No additional PCTs were identified in the amended construction footprint.

There are some minor differences in the areas of most PCTs within the amended construction footprint compared with the construction footprint as described in the EIS, as presented in **Table 4-2**. There is an additional 6.60 hectares of PCT 850 in the amended construction footprint when compared with the construction footprint as described in the EIS. Most of the additional area of PCT 850 in the amended construction footprint is located in the area to the north-west of the intersection of the M7 Motorway and Elizabeth Drive.

Table 4-2 PCTs identified with the project construction footprint

PCT No.	PCT Name	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
724	Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	6.91	6.89	-0.02
830	Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	0.44	0.44	0.00
835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	3.23	3.01	-0.22
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	6.09	6.24	+0.15
850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (includes revegetation within Western Sydney Parklands and derived grasslands in Low condition)	54.07	60.67	+6.60
883	Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion	0.38	0.57	+0.19

PCT No.	PCT Name	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
1800	Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	2.53	2.82	+0.29
Total		**73.65**	**80.64**	**+6.99**

4.2.2 Vegetation zones

Fourteen vegetation zones were identified within the seven PCTs in the construction footprint as described in the EIS (refer to Section 3.2.3 of the EIS BAR). One additional vegetation zone has been identified in the amended construction footprint, 850 - Moderate/Good_Poor, which occurs to the north-west of the intersection of the M7 Motorway and Elizabeth Drive (**Figure 4-1**).

The areas of and site values for each vegetation zone within the construction footprint as described in the EIS and the amended construction footprint are listed in **Table 4-3**.

Table 4-3 Vegetation zones

Veg zone	Vegetation zone code	PCT Name	Site value score	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
1	724 - Moderate/ Good_High	Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	74.64	3.50	3.49	-0.01
2	724 - Moderate/ Good_Medium		55.07	2.96	2.95	-0.01
3	724 - Moderate/ Good_Poor		28.99	0.45	0.45	0.00
4	830 - Moderate/ Good_Poor	Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	35.94	0.44	0.44	0.00

Veg zone	Vegetation zone code	PCT Name	Site value score	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
5	835 - Moderate/ Good_Poor	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	35.76	3.23	3.01	-0.22
6	849 - Moderate/ Good_Medium	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	45.65	3.54	3.54	0.00
7	849 - Moderate/ Good_Poor		22.46	2.07	2.22	+0.15
8	849 - Moderate/ Good_Other (Derived Shrubland)		26.09	0.48	0.48	0.00
9	850 - Moderate/ Good_High	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	50.97	3.21	3.21	0.00
10	850 - Moderate/ Good_Medium		42.03	10.14	13.75	+3.61
11	850 - Moderate/ Good_Other (Revegetation)		57.97	22.65	24.31	+1.66
12	850 - Moderate/Good_Poor		31.88	0.00	1.34	+1.34
13	850 - Low		13.77	18.07	18.06	-0.01
14	883 - Poor	Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion	N/A	0.38	0.57	+0.19

Veg zone	Vegetation zone code	PCT Name	Site value score	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
15	1800 - Moderate/ Good_Poor	Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	27.26	2.53	2.82	+0.29
Total				**73.65**	**80.64**	**+6.99**

4.2.2.1 Zone 12: Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion – Moderate/Good_Poor

Vegetation formation: KF_CH3 Grassy Woodlands

Vegetation class: Coastal Valley Grassy Woodlands

PCT: 850 **BVT:** HN529

Conservation status: TSC Act: critically endangered – forms Cumberland Plain Woodland in the Sydney Basin Bioregion; EPBC Act: critically endangered – some patches meet the condition threshold to form Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.

Estimate of per cent cleared: 88 per cent

Condition: Moderate/Good_Poor

Extent in the construction footprint (excluding biodiversity certified areas): 1.34 hectares

Plots completed in vegetation zone: One (Q44)

Structure	Average height and height range (m)	Average cover	Typical species
Trees	15 (10-22)	19	*Eucalyptus moluccana, Corymbia maculata, Eucalyptus tereticornis*
Small trees	3 (2-5)	0.5	*Ligustrum sinense*
Shrubs	1 (0.5-2)	70	*Lantana camara*, Olea europaea subsp. cuspidata**
Ground covers	0.3 (0.1-0.5)	8	*Microlaena stipoides, Brunoniella australis, Entolasia stricta, Cayratia clematidea, Ehrharta erecta**
Vines & climbers	N/A	6	*Parsonsia straminea*

Description: Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion in Moderate/Good_Poor condition occurs in the north-east of the amended construction footprint.

This vegetation zone consists of woodland with a canopy of *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum) and *Corymbia maculata* (Spotted Gum) with a dense midstorey layer dominated by the invasive exotic shrub *Olea europaea* subsp. *cuspidata* (African Olive) and *Lantana camara* (Lantana). The native shrub layer is largely absent.

The ground layer is sparse, with scattered grasses including the native grass *Microlaena stipoides* (Weeping Grass) and *Entolasia stricta* (Wiregrass) and the exotic grass *Ehrharta erecta* (Panic Veldt-grass). Native forb species including *Brunoniella australis* (Blue Trumpet), *Cayratia clematidea* (Native Grape) and *Dichondra repens* (Kidney Weed) feature in low abundance in the ground layer. The native vine *Parsonsia straminea* (Common Silkpod) is also abundant in this vegetation zone.

Plate 1: Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion – Moderate/Good_Poor

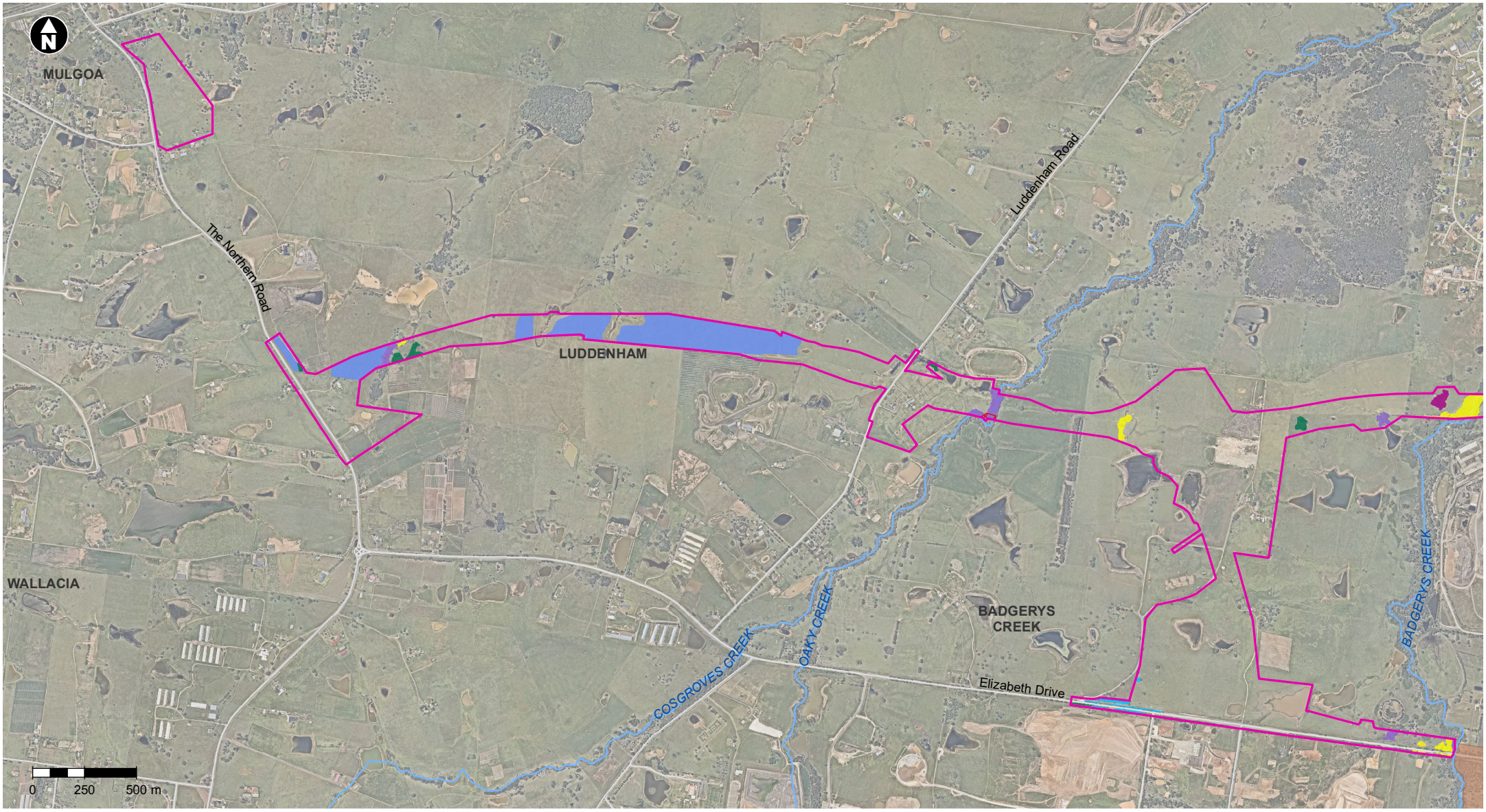
4.2.3 Threatened ecological communities under the TSC Act

Six of the PCTs in the construction footprint as described in the EIS were found to meet the criteria for five TECs listed under the TSC Act. One PCT (PCT 883) was excluded from further assessment as it did not meet the description of the associated TEC as defined under the TSC Act. No additional TECs were identified in the amended construction footprint.

The amended construction footprint contains some minor differences in areas in comparison to the construction footprint as described in the EIS for most TECs, as presented in **Table 4-4** and **Figure 4-2.** There is an additional 6.75 hectares of the TEC Cumberland Plain Woodland in the Sydney Basin Bioregion in the amended construction footprint when compared with the construction footprint as described in the EIS.

Table 4-4 Threatened ecological communities listed under the TSC Act

TEC Name	TSC Act Status	PCT(s)	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
Shale Gravel Transition Forest in the Sydney Basin Bioregion	Endangered	724	6.91	6.89	-0.02
Moist Shale Woodland in the Sydney Basin Bioregion	Endangered	830	0.44	0.44	0.00
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	835	3.23	3.01	-0.22
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	849 850	60.16 (includes about 22.65 ha of revegetation and about 18.07 ha of derived native grassland in Low condition)	66.91 (includes about 24.31 ha of revegetation and about 18.06 ha of derived native grassland in Low condition)	+6.75 (includes an increase of about 1.66 ha of revegetation and a reduction of about 0.01 ha of derived native grassland in Low condition)
Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions	Endangered	1800	2.53	2.82	+0.29
Total			**73.27**	**80.07**	**+6.80**



The amended project construction footprint
The amended project exclusion zones
Biodiversity certified land
Waterways

Vegetation zones

835 - Moderate/Good_Poor
849 - Moderate/Good_Poor
849 - Moderate/Good_Other (Derived Shrubland)
850 - Low
850 - Moderate/Good_Medium
1800 - Moderate/Good_Poor

Figure 4-1 Vegetation zones

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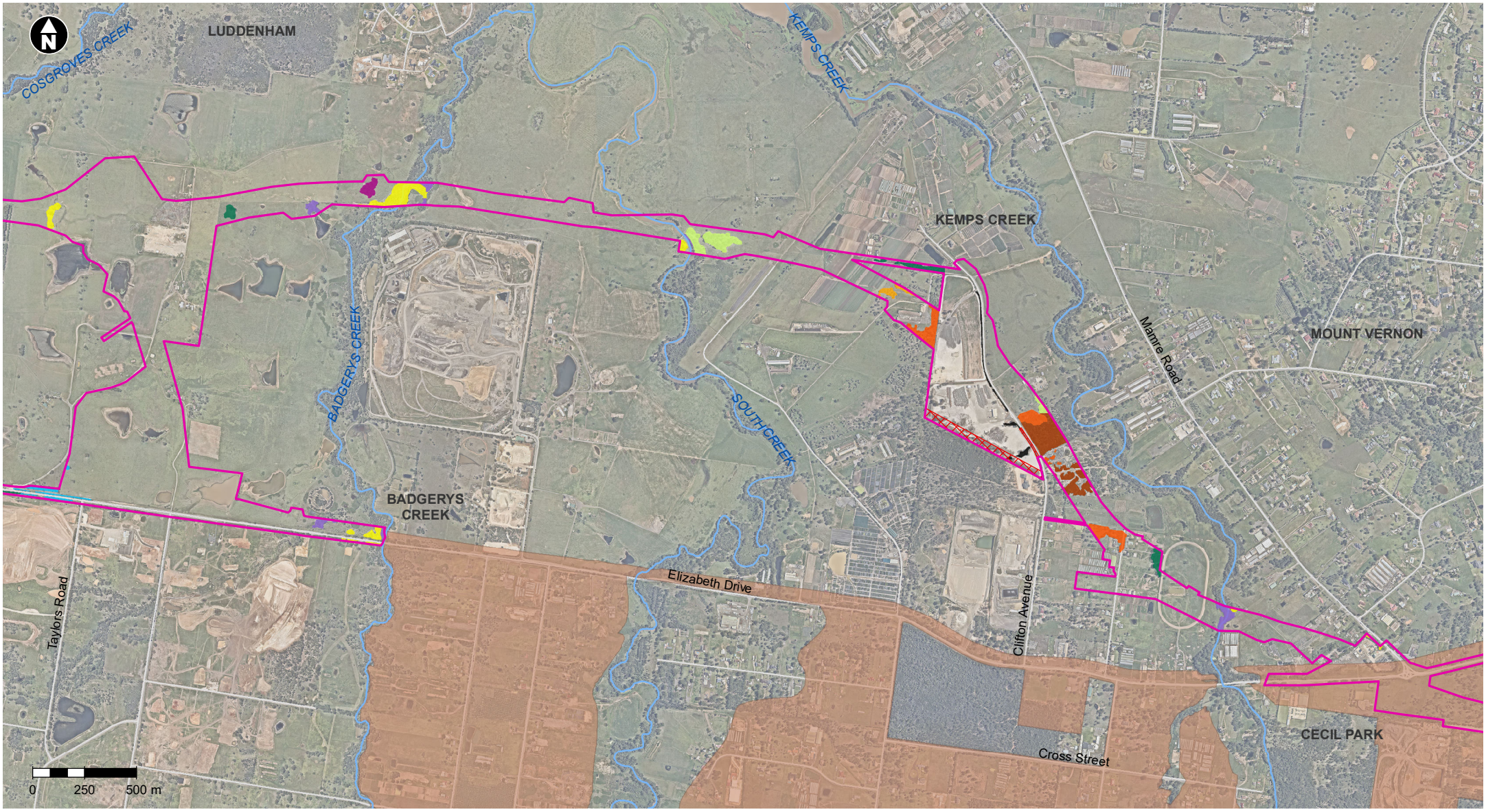

The amended project construction footprint
The amended project exclusion zones
Biodiversity certified land
Waterways

Vegetation zones

724 - Moderate/Good_High
724 - Moderate/Good_Medium
724 - Moderate/Good_Poor
835 - Moderate/Good_Poor
849 - Moderate/Good_Medium
849 - Moderate/Good_Poor
849 - Moderate/Good_Other (Derived Shrubland)
850 - Moderate/Good_Medium
883 - Poor
1800 - Moderate/Good_Poor

Figure 4-1 Vegetation zones

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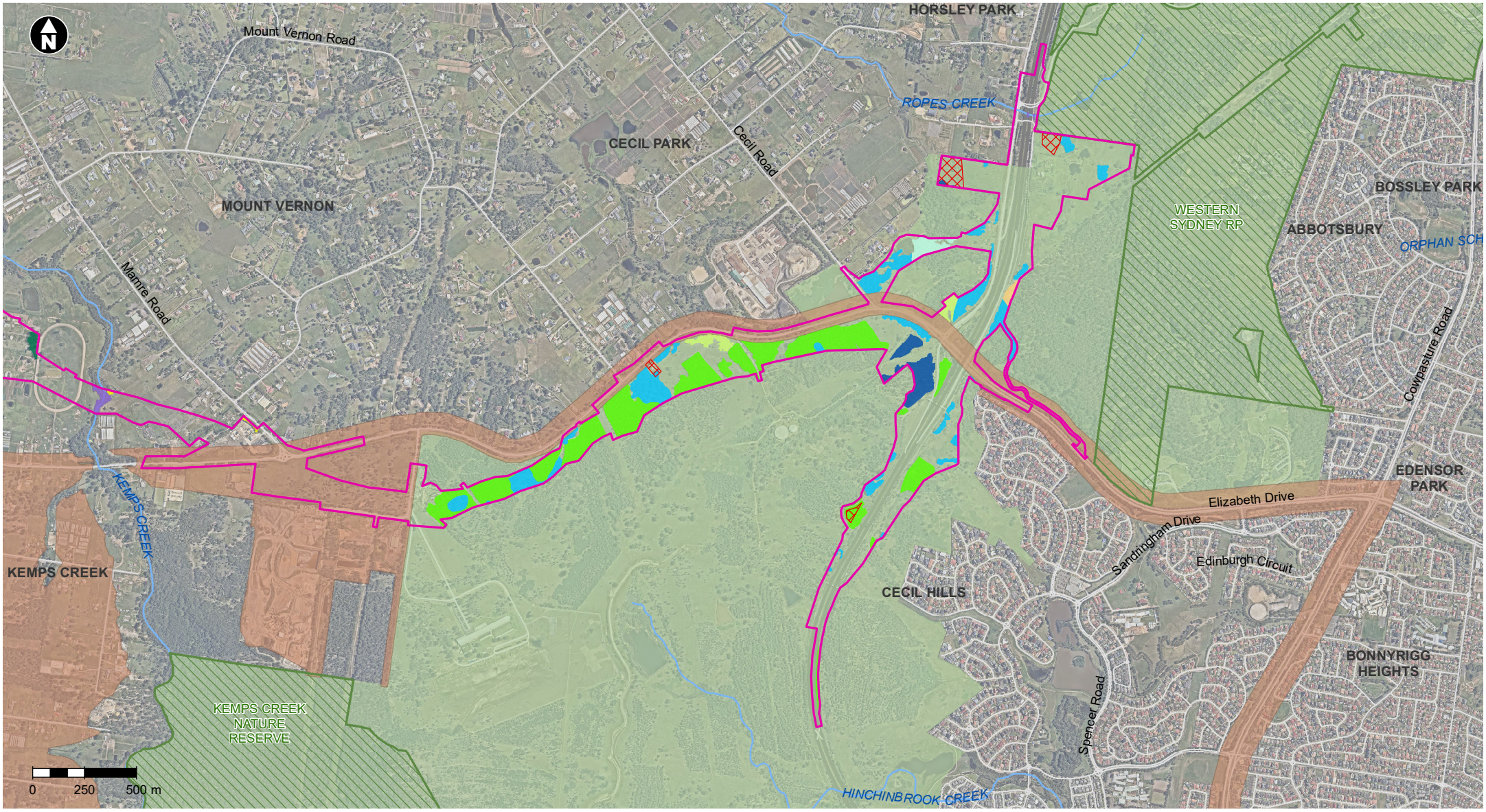

The amended project construction footprint
The amended project exclusion zones
Biodiversity certified land
NPWS Reserves
Western Sydney Parklands
Waterways

Vegetation zones

724 - Moderate/Good_Medium
830 - Moderate/Good_Poor
835 - Moderate/Good_Poor
849 - Moderate/Good_Medium
849 - Moderate/Good_Poor
850 - Moderate/Good_High
850 - Moderate/Good_Medium
850 - Moderate/Good_Other (Revegetation)
850 - Moderate/Good_Poor
1800 - Moderate/Good_Poor

Figure 4-1 Vegetation zones

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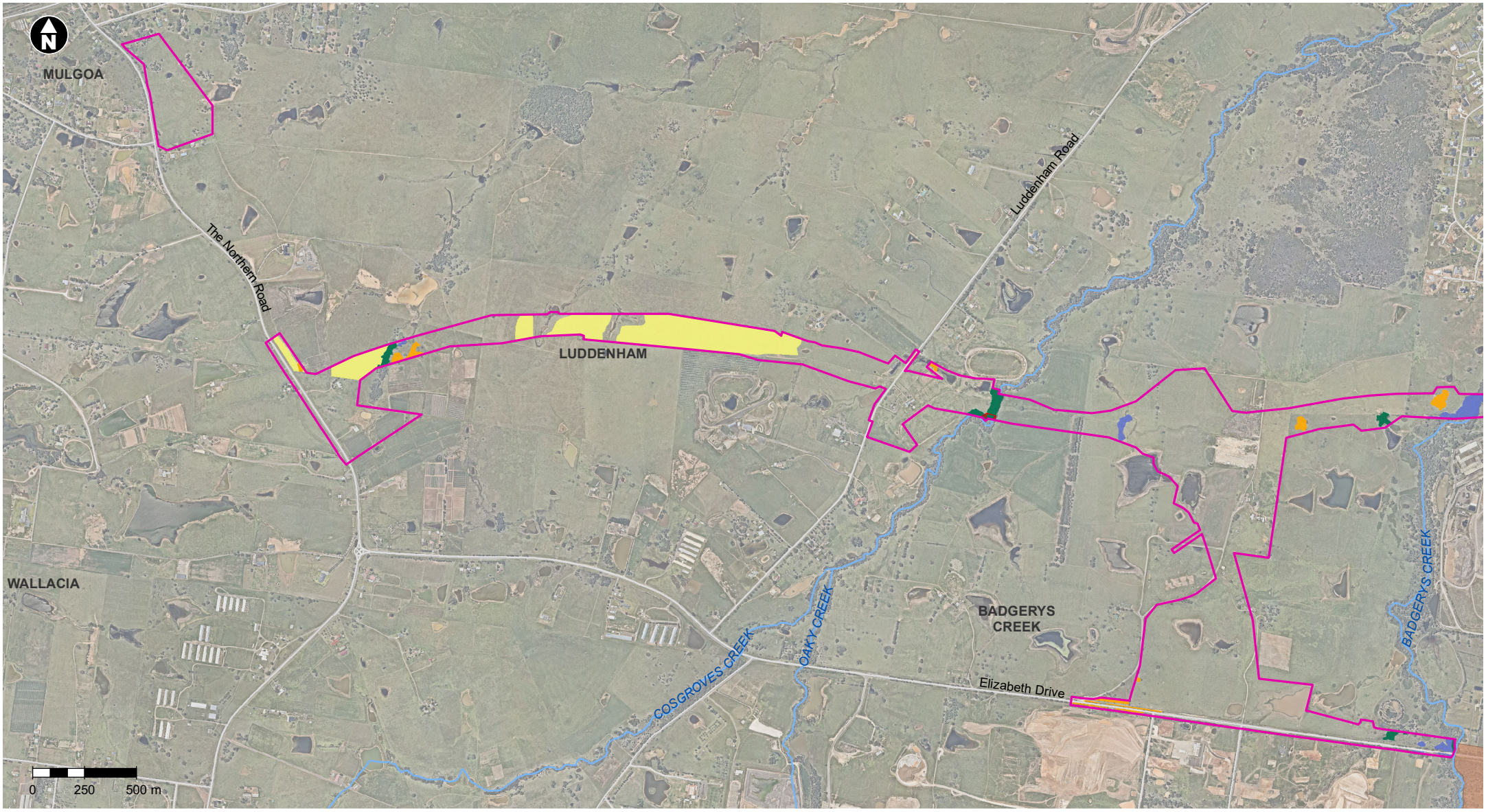

The amended project construction footprint
The amended project exclusion zones
Biodiversity certified land
Waterways

Threatened ecological communities (TSC Act)

Cumberland Plain Woodland in the Sydney Basin Bioregion
Cumberland Plain Woodland in the Sydney Basin Bioregion (derived grassland form)
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Figure 4-2 Threatened ecological communities

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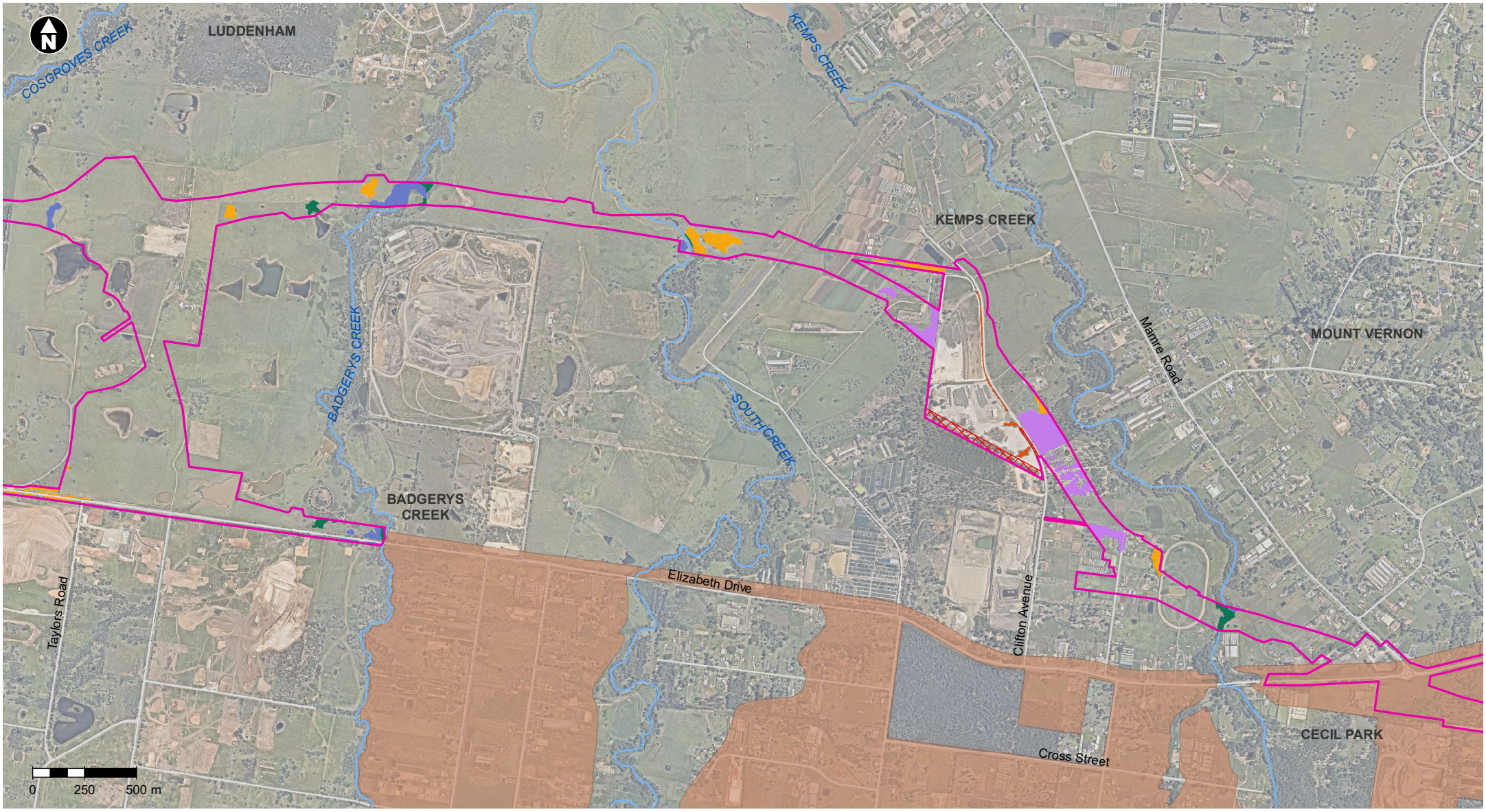

The amended project construction footprint

The amended project exclusion zones

Biodiversity certified land

Waterways

Threatened ecological communities (TSC Act)

Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion

Cumberland Plain Woodland in the Sydney Basin Bioregion

River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Shale Gravel Transition Forest in the Sydney Basin Bioregion

Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Figure 4-2 Threatened ecological communities

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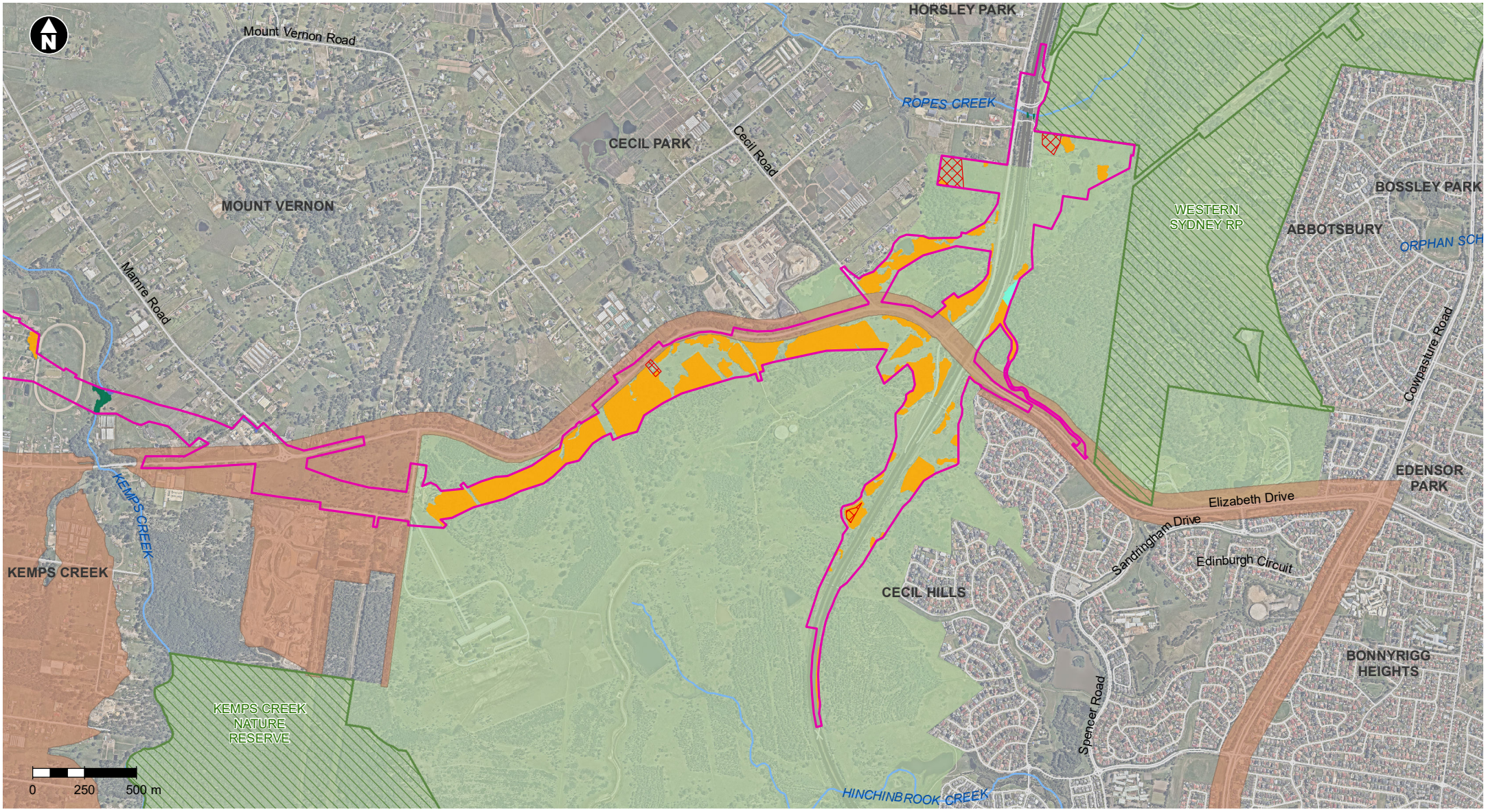

The amended project construction footprint
The amended project exclusion zones
Biodiversity certified land
NPWS Reserves
Western Sydney Parklands
Waterways

Threatened ecological communities (TSC Act)

Cumberland Plain Woodland in the Sydney Basin Bioregion
Moist Shale Woodland in the Sydney Basin Bioregion
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
Shale Gravel Transition Forest in the Sydney Basin Bioregion
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions

Figure 4-2 Threatened ecological communities

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4.2.4 Fauna habitat types

Vegetation communities within the construction footprint as described in the EIS were consolidated into broader fauna habitats based on general similarities in vegetation type, geology, landscape setting, habitat connectivity and fauna habitat values. Four fauna habitats were identified: Woodland, Riparian forest, Grassland and Wetlands and watercourses. **Table 4-5** below compares fauna habitat in the construction footprint as described in the EIS and amended construction footprint. **Figure 3-3** above shows fauna habitat within the amended construction footprint.

Table 4-5 Fauna habitat identified in the construction footprint as described in the EIS and amended construction footprint

Habitat type	Habitat description	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
Woodland	All mature and regenerating grassy, shrubby and heathy woodland vegetation within the study area not associated with riparian corridors on alluvial flats	49.82 (PCTs 724, 830, 849, 850 and 883)	56.75 (PCTs 724, 830, 849, 850 and 883)	+6.93
Riparian forest	All mature and regenerating forest/woodland vegetation associated with drainage lines on alluvial flats	5.76 (PCTs 835 and 1800)	5.83 (PCTs 835 and 1800)	+0.07
Grassland	All native and exotic grasslands, pastures and parklands. Scattered trees and landscape plants may also be present	275.05 (no associated PCTs)	277.04 (no associated PCTs)	+1.99
Wetlands and watercourses	All naturally occurring and constructed permanent or ephemeral dams, ponds, creeks and drainage channels	3.69 (no associated PCTs)	4.53 (no associated PCTs)	+0.84
Total		**334.32**	**344.15**	**+9.83**

4.2.5 Groundwater Dependent Ecosystems

The Bureau of Meteorology's (BOM's) Groundwater Dependent Ecosystems (GDEs) Atlas was reviewed to determine the occurrence of GDEs within and surrounding the study area as described in the EIS and amended project study area.

No changes to GDEs were identified between the study area as described in the EIS and amended project study area, and no additional impacts to GDEs are expected as a result of the amended project.

4.3 Threatened Species

4.3.1 Candidate species

A total of 12 candidate threatened flora species and 32 candidate threatened fauna species were considered to have a moderate to high likelihood of occurrence within the study area as described in the EIS.

No candidate species were added or removed as a result of the amended project.

4.3.2 Threatened flora species results

Five threatened flora species were recorded within and/or adjacent to the EIS BAR study area during targeted surveys:

- *Dillwynia tenuifolia* (listed as vulnerable under the TSC Act; also forms part of the *Dillwynia tenuifolia* Kemps Creek endangered population under the TSC Act)
- *Grevillea juniperina subsp. juniperina* (Juniper-leaved Grevillea) (listed as vulnerable under the TSC Act)
- *Marsdenia viridiflora subsp. viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith Local Government Areas (listed as an endangered population under the TSC Act)
- *Pimelea spicata* (Spiked Rice-flower) (listed as endangered under the TSC Act and EPBC Act)
- *Pultenaea parviflora* (listed as endangered under the TSC Act and vulnerable under the EPBC Act).

Out of these five species, two were recorded within the construction footprint as described in the EIS:

- *Dillwynia tenuifolia*: 244 individuals within the construction footprint as described in the EIS
- *Pultenaea parviflora*: 90 individuals within the construction footprint as described in the EIS.

No additional threatened flora species were recorded in the amended construction footprint. There are additional records of *Dillwynia tenuifolia* and *Pultenaea parviflora* within the amended construction footprint, however, impacts to these plants have mostly been avoided through proposed exclusion zones. Additional recorded threatened flora species within the amended construction footprint are shown in **Figure 4-3**.

Dillwynia tenuifolia

Targeted surveys identified a total of 464 plants of *Dillwynia tenuifolia* were recorded in the road reserve and adjacent properties at 81 Clifton Avenue, 316 Clifton Avenue and 382-393 Clifton Avenue. Of the 464 individuals recorded around Clifton Avenue, 244 were located within the construction footprint as described in the EIS, excluding certified areas. These 244 plants are all located within the amended construction footprint.

The amended construction footprint incorporates additional areas to the west of Clifton Avenue, including a strip of road reserve containing about 44 plants of *Dillwynia tenuifolia.* Although located within the amended construction footprint, these 44 plants would be retained and protected within an exclusion zone.

The amended construction footprint also includes the land at 90-145 Clifton Avenue. The Vegetation Management Plan prepared by Ecoplanning (2015) identified 1,146 individuals of *Dillwynia tenuifolia* on this land, of which 757 were located within a conservation zone proposed as part of development of the site. The other 389 plants have been cleared for the approved development. The conservation zone extending across the southern edge of 90-145 Clifton Avenue, as shown on the maps in Ecoplanning (2015), is located entirely within an exclusion zone as part of the amended project.

Pultenaea parviflora

Targeted surveys identified 278 plants of *Pultenaea parviflora* in two locations in the study area assessed in the EIS BAR. Of these, 260 were recorded in the road reserve and adjacent properties at 316 Clifton Avenue and 382-393 Clifton Avenue. A second patch of 18 *Pultenaea parviflora* was recorded in Western Sydney Parklands. Of these 278 individuals of *Pultenaea parviflora,* 90 were located within the construction footprint as described in the EIS, excluding certified areas.

The amended construction footprint incorporates additional areas to the west of Clifton Avenue, including a strip of road reserve containing about 139 plants of *Pultenaea parviflora.* Although located within the amended construction footprint, these 139 plants would be retained and protected within an exclusion zone.

Ecoplanning (2015) identified four individuals of *Pultenaea parviflora* on this land, of which three were located within a conservation zone proposed as part of development of the site. The conservation zone is located entirely within an exclusion zone as part of the amended project.

The 18 plants of *Pultenaea parviflora* previously recorded in Western Sydney Parklands are located within the certified area. This population was reinspected in January 2020 to confirm that the population was within the certified area. This inspection found only 10 plants of *Pultenaea parviflora* in the same location.

All plants were recorded within the certified area, however these records are all within five metres of the certification boundary. As this is within the margin of GPS error, it is possible that the plants are not within the certified area, and they are assumed to require impact assessment and offsetting on a precautionary basis. The location of these plants in relation to the certification boundary could be verified by a surveyor.

4.3.3 Threatened fauna species results

Seven threatened fauna species were recorded within the EIS BAR study area during targeted surveys (as described in Section 4.2.5 of the BAR):

- Eastern Coastal Free-tailed Bat (formerly Eastern Freetail-bat) (*Micronomus norfolkensis*) (listed as vulnerable under the TSC Act)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) (listed as vulnerable under the TSC Act)
- Grey-headed Flying-fox (*Pteropus poliocephalus*) (listed as vulnerable under the TSC Act and EPBC Act)
- Large Bent-winged Bat (formerly Eastern Bentwing-bat) (*Miniopterus orianae oceanensis*) (listed as vulnerable under the TSC Act)
- Little Bent-winged Bat (formerly Little Bentwing-bat) (*Miniopterus australis*) (listed as vulnerable under the TSC Act)
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*) (listed as vulnerable under the TSC Act)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*) (listed as vulnerable under the TSC Act).

An additional three threatened fauna species were assumed present within the EIS BAR study area (as described in Section 4.2.5 of the BAR), based on the presence of suitable habitat and nearby, recent species records:

- Cumberland Plain Land Snail (*Meridolum corneovirens*) (listed as endangered under the TSC Act)
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) (listed as vulnerable under the TSC Act)
    - Southern Myotis (*Myotis macropus*) (listed as vulnerable under the TSC Act).

One live individual Cumberland Plain Land Snail was identified during targeted surveys for the amended project in Woodland habitat (PCT 850) northwest of the M7 Motorway interchange (**Figure 3-3**, **Figure 4-3**). This was in addition to another individual of the species recorded within Riparian forest habitat along Badgerys Creek 135 metres south of the study area as described in the EIS BAR during subsequent surveys for a separate project in October 2018. It is assumed that the Cumberland Plain Land Snail is highly likely to occur in Woodland and Riparian forest habitat with connectivity to the habitat where the species was identified.

The species polygon for the Cumberland Plain Land Snail was created for the EIS BAR and amended for this report based on this assumption (**Figure 4-3**). The associated PCTs 835, 849 and 850 with connected habitat to identified individuals were included in the species polygon and cover a total area of 5.82 hectares, of which 5.22 hectares is located within non-certified areas and outside of exclusion zones. Vegetation with an absence of specific habitat components that the species relies upon (ie well developed leaf litter and bark accumulations) were excluded from the species polygon.

There were no other changes to threatened fauna species results as a result of the amended project. Recorded additional threatened fauna species within the amended construction footprint are shown below in **Figure 4-3**.

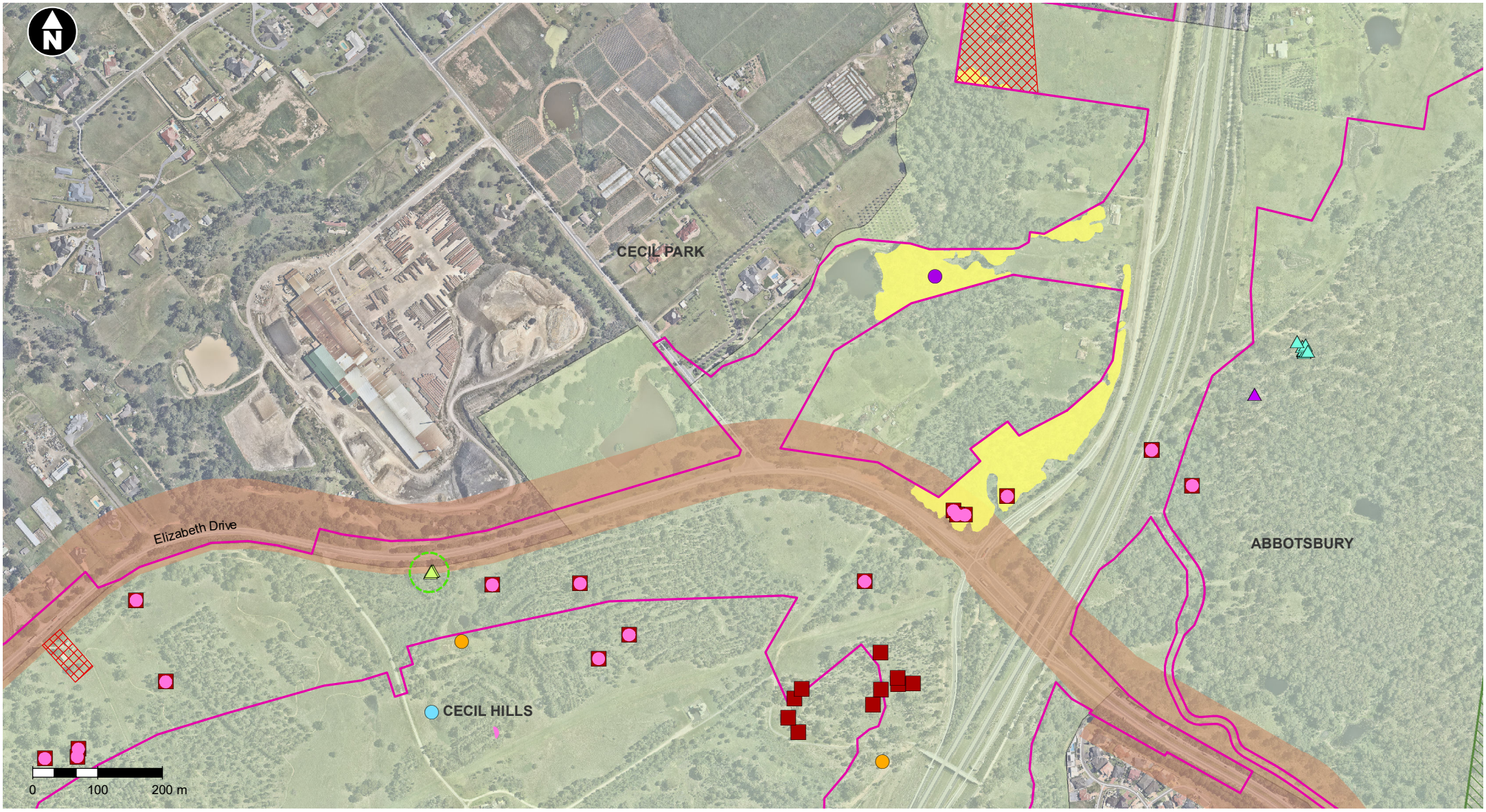

Figure 4-3 Additional recorded threatened species

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4.4 Aquatic habitat

No additional areas of aquatic habitat (as outlined in Section 4.3 of the BAR) were identified for the amended project.

4.5 Matters of National Environmental Significance

Section 7.1.3 of the EIS and Section 5 of the BAR considered all potential MNES, especially those entities likely to occur within the EIS BAR study area (ie threatened species, ecological communities and migratory species).

Database searches of all records within 10 kilometres were updated for the amended project, but the MNES for consideration and occurrence remained the same (summarised in **Table 4-6** below). Further detail can be found in Section 5.4.2 of the EIS BAR. In addition, **Section 5.5** below provides further discussion of impacts to MNES within the project as described in the EIS and amended construction footprints.

Table 4-6 Summary of MNES assessed as potentially occurring within the construction footprint as described in the EIS and amended construction footprint

MNES	Number recorded or likely to occur within 10 km of the project as described in the EIS	Number requiring detailed assessment as described in the EIS BAR	Number impacted or potentially impacted by the construction footprint as described in the EIS	Number impacted or potentially impacted by the amended construction footprint
TECs listed under the EPBC Act	Eight EPBC Act listed TECs	Four EPBC Act listed TECs were assessed against condition, composition and area of coverage criteria in the BAR	Two – Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest and Western Sydney Dry Rainforest and Moist Woodland on Shale	Two – Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest and Western Sydney Dry Rainforest and Moist Woodland on Shale
Threatened flora	26 species	Eight species	One – *Pultenaea parviflora*	One – *Pultenaea parviflora*
Threatened fauna	21 species	Six species	One – Grey-headed Flying-fox is present within the construction footprint as described in the EIS (foraging habitat only)	One – Grey-headed Flying-fox is present within the amended construction footprint (foraging habitat only)
Migratory species	16 species	Eight species	None – low likelihood of important habitat present within the construction footprint as described in the EIS	None – low likelihood of important habitat present within the amended construction footprint

MNES	Number recorded or likely to occur within 10 km of the project as described in the EIS	Number requiring detailed assessment as described in the EIS BAR	Number impacted or potentially impacted by the construction footprint as described in the EIS	Number impacted or potentially impacted by the amended construction footprint
Commonwealth land	The construction footprint as described in the EIS and amended construction footprint are adjacent to the Western Sydney International Airport situated on Commonwealth land. No direct impacts to Commonwealth land are assessed under this EIS. Tie in works to roads within the Airport site are required as part of the M12 Motorway project, however these works would be carried out under the Commonwealth EIS for the Airport. Standard environmental measures (see **Section 5.5** and **Chapter 7**) mean that indirect impacts are unlikely. No further assessment of Commonwealth Land is included in this report			

5. Assessment of potential impacts

Impact assessment of the amended project are described within this chapter. The assessment of potential impacts described in this section relates to both options presented in **Section 1.3** unless stated otherwise.

5.1 Avoidance and minimisation

Additional biodiversity impacts resulting from the amended project, as compared for the project as described in the EIS are primarily due to three design changes:

- Realignment of Wallgrove Road to connect to Cecil Road, including a connection between Elizabeth Drive and Wallgrove Road via Cecil Road with a signalised intersection with Elizabeth Drive. This change would improve intersection performance at the existing signalised intersection of Wallgrove Road and Elizabeth Drive.
- Direct connection between the M12 Motorway and Elizabeth Drive at the motorway-to-motorway interchange at the M7 Motorway. This change would allow road users to access the M12 Motorway from Elizabeth Drive and provide a toll-free option for motorway access to the Western Sydney International Airport from the east. This is a positive social impact for nearby residents and will improve travel experiences and encourage the use of the new airport, reducing congestion at Sydney Airport.
- Additional construction ancillary facilities required to facilitate division of the project into separate construction packages. Separate construction packages are required to meet timeframes for the opening of Western Sydney International Airport.

Avoidance and minimisation measures that have been considered during development of these design changes are described in Table 5-1. Where avoidance of additional biodiversity impacts is not practicable due to other constraints, a description of these constraints has been provided.

Table 5-1 Consideration of measures to avoid and minimise biodiversity impacts of the proposed design changes

Design change	Avoidance and minimisation measures
Realignment of Wallgrove Road to connect to Cecil Road, including a connection between Elizabeth Drive and Wallgrove Road via Cecil Road	Avoidance of biodiversity impacts for this design change has not been practicable. The location of the design change has been determined to minimise impact on existing residential properties and land that is currently the subject of a proposed State Significant Development. The location of the design change has aimed to minimise property and land use impacts. Consultation with landowners has been undertaken and the design would continue to be refined in detailed design to minimise biodiversity impacts.
Direct connection between the M12 Motorway and Elizabeth Drive at the motorway-to-motorway interchange at the M7 Motorway.	Avoidance of biodiversity impacts for this design change has not been practicable, due to the location of areas of vegetation to be impacted between Elizabeth Drive and the M12 Motorway alignment, the two roads that would be connected. All the additional areas of vegetation to be impacted are areas that were already subject to fragmentation, or that would have been indirectly impacted by the project as described in the EIS.

Design change	Avoidance and minimisation measures
Additional and expanded construction ancillary facilities	Where practicable, additional ancillary facilities have been proposed for locations that are more than 50 metres from a waterway and do not require vegetation clearing beyond that already required for the project as described in the EIS. One of the additional ancillary facilities contains a population of threatened flora species *Dillwynia tenuifolia* and *Pultenaea parviflora.* The population at this location would be protected within an exclusion area to minimise impacts to these species.

5.2 Areas not requiring further assessment

As described in Chapter 8.1 of the EIS BAR, areas that do not require further assessment consist of:

- Impacts on PCTs that have a site value score of less than 17
- Biodiversity values within certified areas within the Growth Centres SEPP.

5.2.1 FBA assessment thresholds

Section 8.1.1 of the EIS BAR identifies areas that do not require further assessment or offsetting under the FBA. One vegetation zone within the construction footprint, Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion – Low condition, was identified as not requiring further assessment as it has a site value score of less than 17 (13.77).

The amended construction footprint does not contain any additional vegetation zones with site value scores below the FBA assessment threshold.

5.2.2 Biodiversity certified land

The amended construction footprint includes 33.57 hectares of certified land (an increase from 17.38 hectares as described in the EIS). Certified areas within the Growth Centres SEPP, which have already been subject to assessment as part of the certification of this area, are mapped in **Figure 2-1**. This portion consists of a linear corridor adjoining Elizabeth Drive, as well as the land south of Elizabeth Drive and west of Range Road. While the certified areas are included in the biodiversity study area, they have been excluded from impact assessment calculations under the FBA.

The areas of each PCT identified in the certified areas within the amended construction footprint are listed below in **Table 5-2**. This would result in a total of about 10.71 hectares of PCTs mapped within certified land located within the amended construction footprint, an increase of about 2.52 hectares from the 8.19 hectares for the project as described in the EIS.

Table 5-2 Plant Community Types mapped within certified land

TEC Name	TSC Act Status	EPBC Act status*	Area within construction footprint as described in the EIS and within certified areas (ha)	Area within amended construction footprint and within certified areas (ha)	Change in area within certified areas (ha)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	Critically Endangered	Critically Endangered	0.50	0.66	+0.16
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	Critically Endangered	Critically Endangered	7.69 (includes 0.09 ha of revegetation)	10.04 (includes 0.12 ha of revegetation)	+2.35
Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley (PCT 1800)	Endangered	Endangered	0.00	0.01	+0.01
Total			**8.19**	**10.71**	**+2.52**

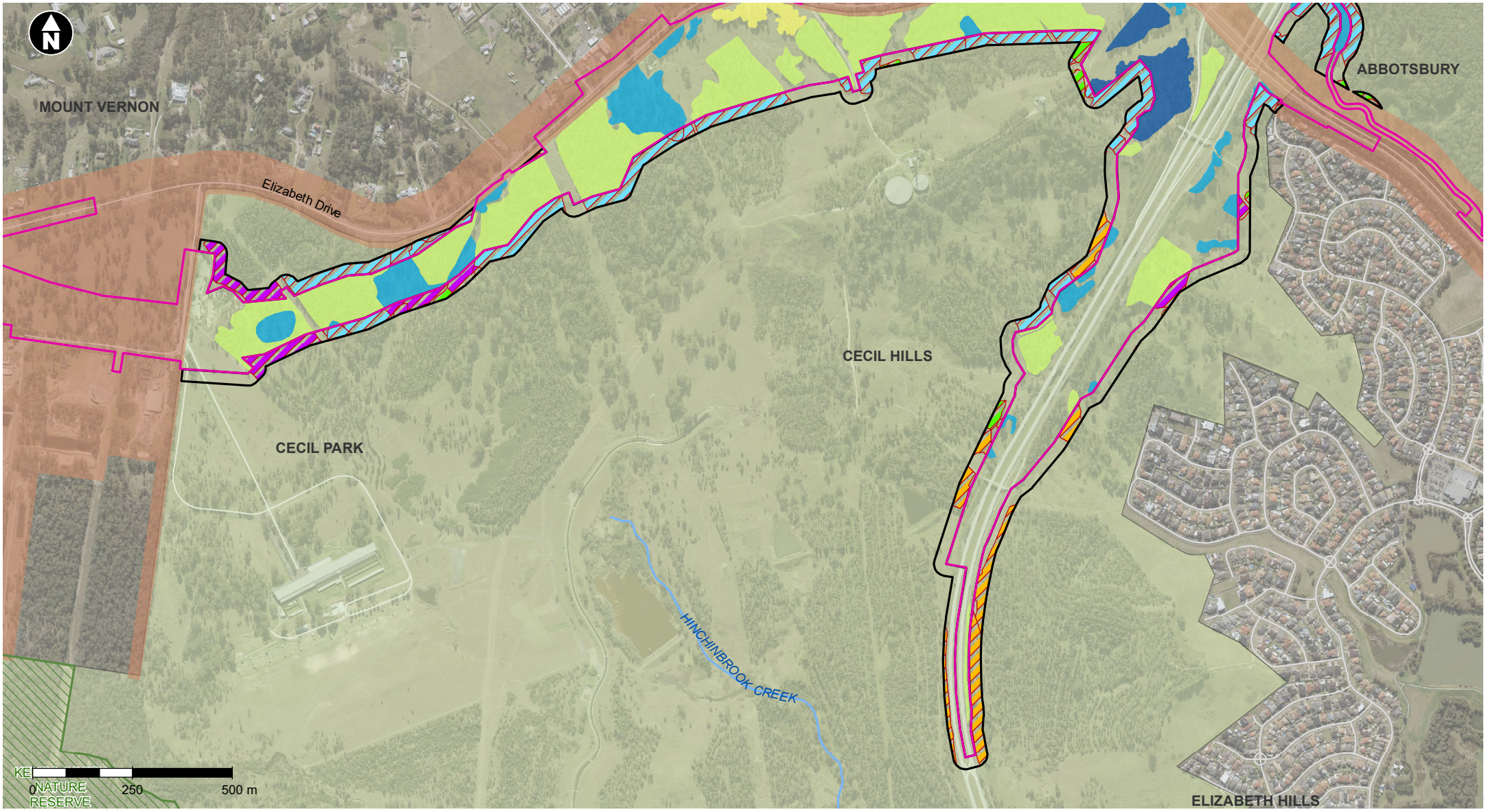
**Not all areas meet the criteria for the listed EPBC TEC*

According to the definitions in schedule 1 of the biodiversity certification order:

> *"existing native vegetation" means areas of indigenous trees (including any sapling) that:*
>
> *(a) had 10 per cent or greater over-storey canopy cover present,*
>
> *(b) were equal to or greater than 0.5 ha in area, and*
>
> *(c) were identified as "vegetation" on maps 4 and 5 of the draft Growth Centres Conservation Plan*

Most of the 10.71 hectares of native vegetation identified in the certified areas of the South West Growth Centre meets criteria (a) and (b) for existing native vegetation (ENV), however only 1.67 hectares within the construction footprint were identified as 'vegetation' on maps 4 and 5 of the draft Growth Centres Conservation Plan (ELA, 2007). All of the areas of ENV as mapped by ELA (2007) within the amended construction footprint are located within certified areas.

Impacts to areas of ENV within certified areas are offset using funds from special infrastructure contributions that apply within the Growth Centres, as determined during precinct planning. Offsets are therefore not required for the biodiversity impacts of the project within the certified areas. Indirect impacts to native vegetation in Western Sydney Parklands is shown in **Figure 5-1** below.



The amended project construction footprint
30 m buffer around construction footprint, excluding certified areas
NPWS Reserves
Western Sydney Parklands
Biodiversity certified land
Waterways

Potential for edge effects

Existing edge
Existing edge set back
Fragmented and disturbed
New edge
Non-viable fragment

Vegetation zones

849 - Moderate/Good_Medium
850 - Moderate/Good_High
850 - Moderate/Good_Medium
850 - Moderate/Good_Other (Revegetation)

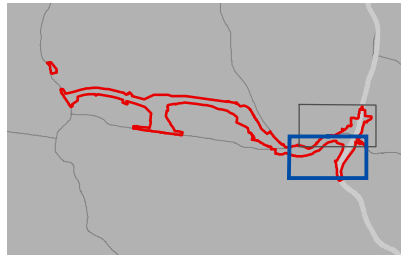


Figure 5-1 Indirect impacts to native vegetation in Western Sydney Parklands

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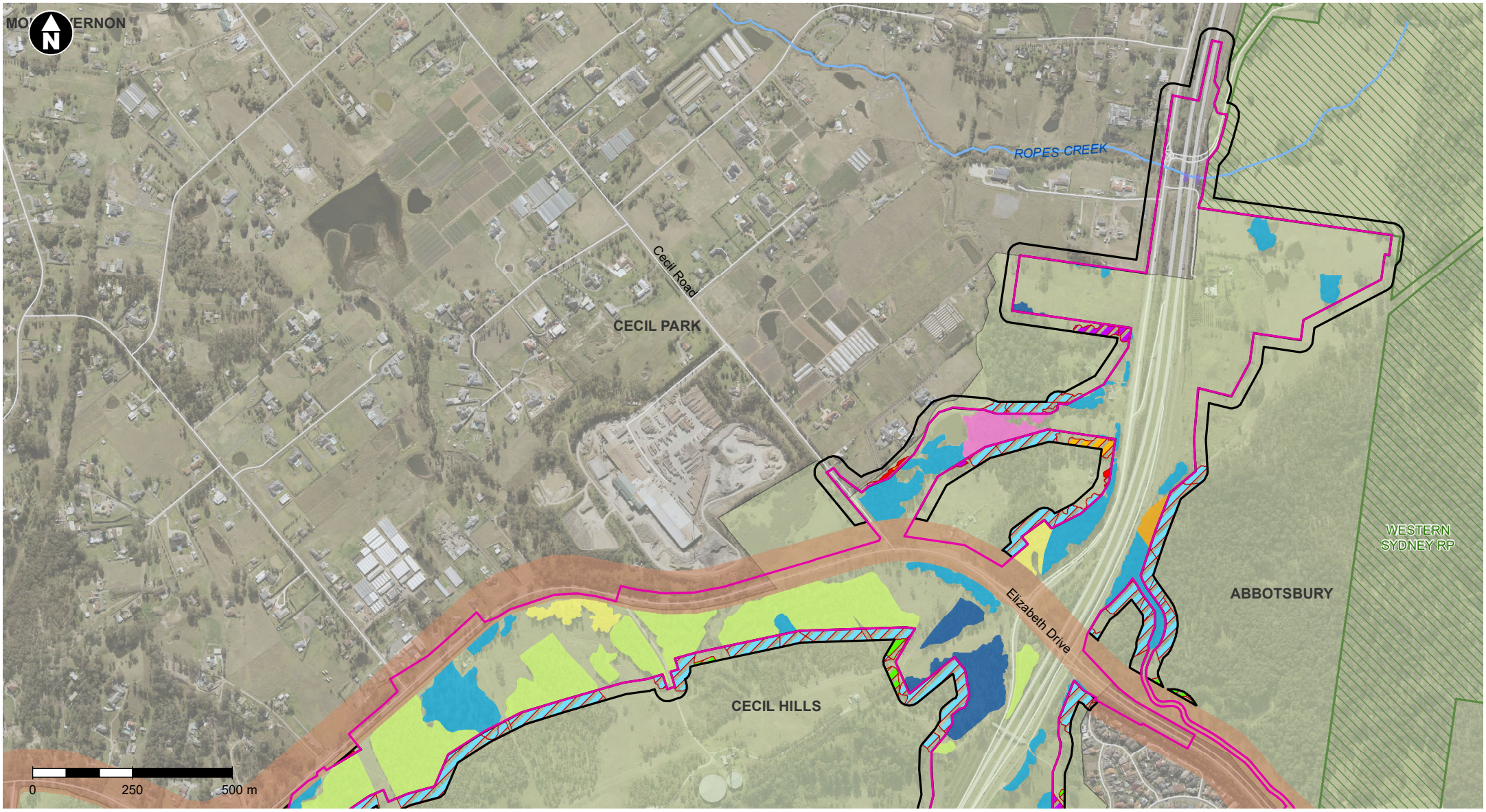

The amended project construction footprint
30 m buffer around construction footprint, excluding certified areas
NPWS Reserves
Western Sydney Parklands
Biodiversity certified land
Waterways

Potential for edge effects

Existing edge
Existing edge set back
Fragmented and disturbed
New edge
Non-viable fragment

Vegetation zones

830 - Moderate/Good_Poor
849 - Moderate/Good_Medium
850 - Moderate/Good_High
850 - Moderate/Good_Medium
850 - Moderate/Good_Other (Revegetation)
850 - Moderate/Good_Poor
1800 - Moderate/Good_Poor

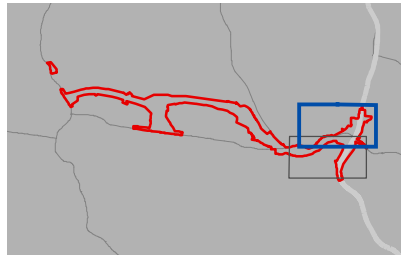

Figure 5-1 Indirect impacts to native vegetation in Western Sydney Parklands

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5.3 Areas requiring assessment

The following sections identify the impacts that require assessment under the Framework for Biodiversity Assessment (OEH, 2014).

5.3.1 Removal of native vegetation

5.3.1.2 Direct impacts

The amended construction footprint, excluding certified areas, contains about 80.64 hectares of PCTs. This is an increase of about 9.5 per cent when compared to direct impacts to native vegetation within the construction footprint as described in the EIS (73.65 hectares). The areas of each vegetation zone that would be directly impacted by the amended project and the change in area impacted from what was described in the EIS are listed below in **Table 5-3**.

Table 5-3 Direct impacts to native vegetation within the amended construction footprint

PCT Name	Condition	Per cent cleared	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion (PCT 724)	Moderate/ Good_High	75	3.49	-0.01
	Moderate/ Good_Medium	75	2.95	-0.01
	Moderate/ Good_Poor	75	0.45	0.00
Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 830)	Moderate/ Good_Poor	75	0.44	0.00
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 835)	Moderate/ Good_Poor	93	3.01	-0.22
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	Moderate/ Good_Medium	93	3.54	0.00
	Moderate/ Good_Poor	93	2.22	+0.15
	Moderate/ Good_Other (Derived Shrubland)	93	0.48	0.00

PCT Name	Condition	Per cent cleared	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	Moderate/ Good_High	88	3.21	0.00
	Moderate/ Good_Medium	88	13.75	+3.61
	Moderate/ Good_Other (Revegetation)	88	24.31	+1.66
	Moderate/ Good_Poor	88	1.34	+1.34
	Low	88	18.06	-0.01
Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion (PCT 883)	Poor	50	0.57	+0.19
Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley (PCT 1800)	Moderate/ Good_Poor	60	2.82	+0.29
Total			**80.64**	**+6.99**

All areas of native vegetation to be removed, except for PCT 883, fall within the criteria of TECs listed under the TSC Act and/or the EPBC Act. The areas of each TEC that would be directly impacted as a result of the amended project and the change in area impacted from what was described in the EIS are listed below in **Table 5-4**.

5.3.1.3 Indirect impacts

The project would also result in indirect impacts to some areas of native vegetation adjoining the amended construction footprint, mainly due to fragmentation of vegetation and creation of new edges, which may result in edge effects. The methodology for analysis of indirect impacts to native vegetation is described in Chapter 8.2.1 of the EIS BAR.

A 30 metre buffer was applied from the edge of the amended construction footprint and an analysis of native vegetation mapped within the buffer zone was conducted. The areas of each of the five categories for potential edge effects from the amended project and the change in impact from the EIS are listed in **Table 5-5**, and the categories were mapped (**Figure 5-2**).

Table 5-4 Direct impacts to TECs within the amended construction footprint

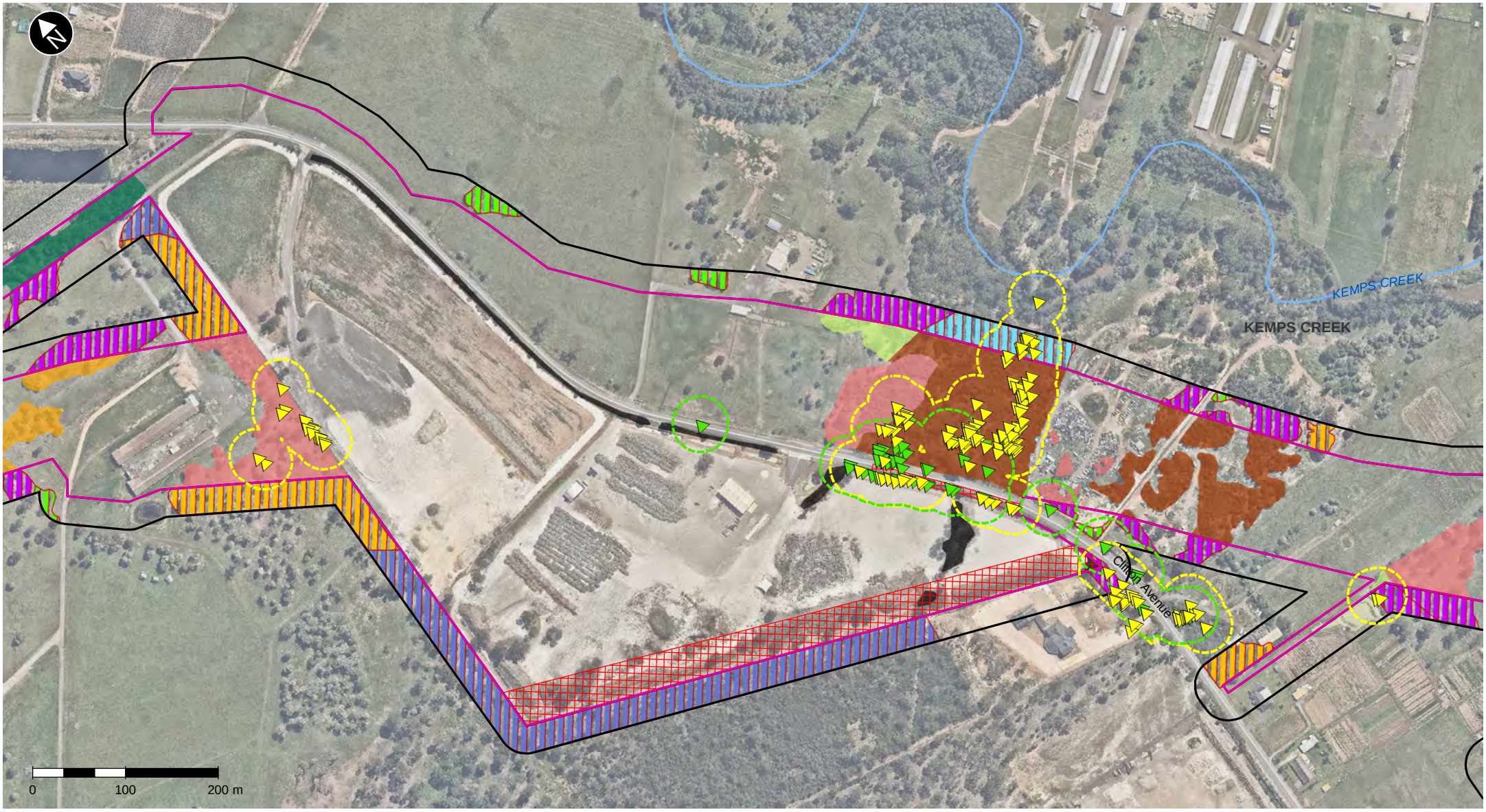
PCT No.	PCT Name	Equivalent TECs	Total area directly impacted excluding certified areas (ha)	Change in area excluding certified areas (ha)	Area impacted meeting EPBC TEC criteria excluding certified areas (ha)	Change in area impacted meeting EPBC TEC criteria excluding certified areas (ha)
724	Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion	Shale Gravel Transition Forest in the Sydney Basin Bioregion (Endangered, TSC Act) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered, EPBC Act)	6.89	-0.02	4.86	0.00
830	Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Moist Shale Woodland in the Sydney Basin Bioregion (Endangered, TSC Act; Critically Endangered, EPBC Act)	0.44	0	0.44	0.00
835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered, TSC Act)	3.01	-0.22	N/A – not listed	N/A
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered, TSC Act) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Critically Endangered, EPBC Act)	6.24	+0.15	1.60	-0.01
850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion		60.67	+6.60	36.01	+4.00

PCT No.	PCT Name	Equivalent TECs	Total area directly impacted excluding certified areas (ha)	Change in area excluding certified areas (ha)	Area impacted meeting EPBC TEC criteria excluding certified areas (ha)	Change in area impacted meeting EPBC TEC criteria excluding certified areas (ha)
1800	Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (Endangered, TSC Act and EPBC Act)	2.82	+0.29	0	0.00
Total			**80.07**	**+6.80**	**42.91**	**+3.99**

Table 5-5 Potential for edge effects in vegetation within 30 metres of the amended construction footprint in Western Sydney Parklands and adjoining Clifton Avenue

Category	Area of vegetation within 30 metre buffer excluding certified areas (ha) - WSP	Area of vegetation within 30 metre buffer excluding certified areas (ha) – Clifton Avenue	Total	Change in area excluding certified areas (ha)
Non-viable fragment	0.21	0	0.21	-0.10
New edge	12.86	0.45	13.31	+0.89
Existing edge	3.35	1.53	4.88	+0.41
Existing edge set back	0.69	0.27	0.96	+0.34
Fragmented and disturbed	2.88	4.57	7.45	+5.56*
Total	**19.99**	**6.82**	**26.81**	**+7.32**

**Note: this change includes fragmented and disturbed patches in Clifton Avenue that were not included in the equivalent value in the BAR.*



The amended project construction footprint

30 m buffer around construction footprint, excluding certified areas

The amended project exclusion zones

Waterways

Threatened flora

Dillwynia tenuifolia

Pultenaea parviflora

Pultenaea parviflora area of occupancy

Dillwynia tenuifolia area of occupancy

Vegetation zones

724 - Moderate/Good_High

724 - Moderate/Good_Medium

724 - Moderate/Good_Poor

849 - Moderate/Good_Medium

849 - Moderate/Good_Poor

883 - Poor

Potential for edge effects

Existing edge

Existing edge set back

Existing edge/Fragmented and disturbed

Fragmented and disturbed

New edge

Figure 5-2 Direct and indirect impacts to threatened flora species

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The analysis of potential for edge effects found:

- The amended project would increase the area of vegetation subject to indirect impacts by about six per cent when compared to the project as described in the EIS BAR
- A total of 0.21 hectares of native vegetation (including 0.03 hectares of revegetation) within Western Sydney Parklands would be subject to increased edge effects to the extent they would become unviable due to the small size of the remaining patches
- A total of 13.31 hectares of native vegetation (including 5.99 hectares of revegetation) within Western Sydney Parklands and east of Clifton Avenue would be subject to increased edge effects as a result of the project due to the creation of one or more new edges within previously unfragmented vegetation.

All areas of indirect impact meet the criteria for TSC Act listed TECs, and 12.38 hectares of the total 13.52 hectares indirectly impacted meets the criteria for the EPBC Act listed TEC. The indirect impacts of the project on native vegetation and the change in impact from the EIS are detailed in **Table 5-6**. Offsets for these impacts are considered in **Chapter 9.**

Table 5-6 Native vegetation subject to indirect impacts (potential edge effects)

Location	PCT	Condition	Area of indirect impacts as described in the EIS excluding certified areas (ha)	Area of indirect impacts of amended project (ha)	Change in area excluding certified areas (ha)
Western Sydney Parklands (excluding certified areas)	**Non-viable fragments**				
	Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	Moderate/ Good_Medium	0.01	0.18	+0.17
		Moderate/ Good_Other (Revegetation)	0.30	0.03	-0.27
	New edges				
	Forest Red Gum – Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 830)	Moderate/ Good_Poor	0.54	0.61	+0.07
	Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	Moderate/ Good_Medium	0.24	0.57	+0.33

Location	PCT	Condition	Area of indirect impacts as described in the EIS excluding certified areas (ha)	Area of indirect impacts of amended project (ha)	Change in area excluding certified areas (ha)
	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	Moderate/ Good_High	1.06	1.24	+0.18
		Moderate/ Good_Medium	3.33	3.31	-0.02
		Moderate/Good_ Poor	0	1.14	+1.14
		Moderate/ Good_Other (Revegetation)	6.73	5.99	-0.74
	Total Western Sydney Parklands		**12.21**	**13.07**	**+0.86**
East of Clifton Avenue	Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion (PCT 724)	Moderate/ Good_High	0.52	0.45	-0.07
	Total East of Clifton Avenue		**0.52**	**0.45**	**-0.07**
Grand total			**12.73**	**13.52**	**+0.79**

5.3.1.4 Impacts to native vegetation within M7 Biobank site

The amended construction footprint overlaps a Biobank site in Western Sydney Parklands, located to the south-west of the M7 Motorway / Elizabeth Drive intersection. The impacts on native vegetation within the area of overlap between the amended construction footprint and the M7 Motorway Biobank site are as described in Section 8.2.1 of the EIS BAR; the amended construction footprint has not changed in this area.

5.3.2 Removal of threatened fauna habitat

Detailed description and assessment of impacts to fauna habitat and examples of the type of habitat found can be found in Section 3.4 of the EIS BAR. The four types of fauna habitat to be removed are Woodland, Riparian Forest, Grassland (much of which is disturbed, exotic grasses and contains hard stand areas) and Wetlands and watercourses. See **Table 4-5** for detailed comparison of construction footprint as described in the EIS and current construction footprints.

The amended project requires the removal of about seven hectares of additional native vegetation in the eastern part of the footprint, which is primarily additional woodland (49.82 hectares in the construction footprint as described in the EIS and 56.75 hectares in the amended construction footprint).

Riparian Forest is now 5.83 hectares, compared with 5.76 hectares in the construction footprint as described in the EIS. This habitat provides resources for the Grey-headed Flying-fox and Cumberland Plain Land Snail and potential habitat for other threatened species that may occasionally use the site and surrounds.

For species credit species under the FBA, there are increases in habitat to be removed (**Table 5-7**). Cumberland Plain Land Snail was detected during surveys for the amended project, and an additional 3.58 hectares area of species credit habitat falls within the amended construction footprint to the north-west of the intersection of the M7 Motorway and Elizabeth Drive (**Figure 5-3**). For Southern Myotis, impacts to both foraging habitat and breeding habitat are unchanged compared to the impacts of the construction footprint as described in the EIS.

Table 5-7 Summary of impacts to species credit threatened fauna

Threatened fauna species	Status		Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Change in area excluding certified areas (ha)
	TSC Act	EPBC Act			
Cumberland Plain Land Snail	E	Not listed	1.86	5.22	+3.36
Southern Myotis	V	Not listed	0.92 (breeding habitat)	0.96 (breeding habitat)	+0.04

For Ecosystem credit species, no additional species are impacted under the amended project footprint. Habitat removal for these seven bat species has increased from 55.58 hectares to 62.58 hectares (Woodland and Riparian Forest).

The construction footprint as described in the EIS required the removal of 54 hollow-bearing trees within non-certified areas. No additional hollow-bearing trees were recorded during surveys for the amended project, and the impacts of the amended project on hollow-bearing trees are the same as described in the EIS.

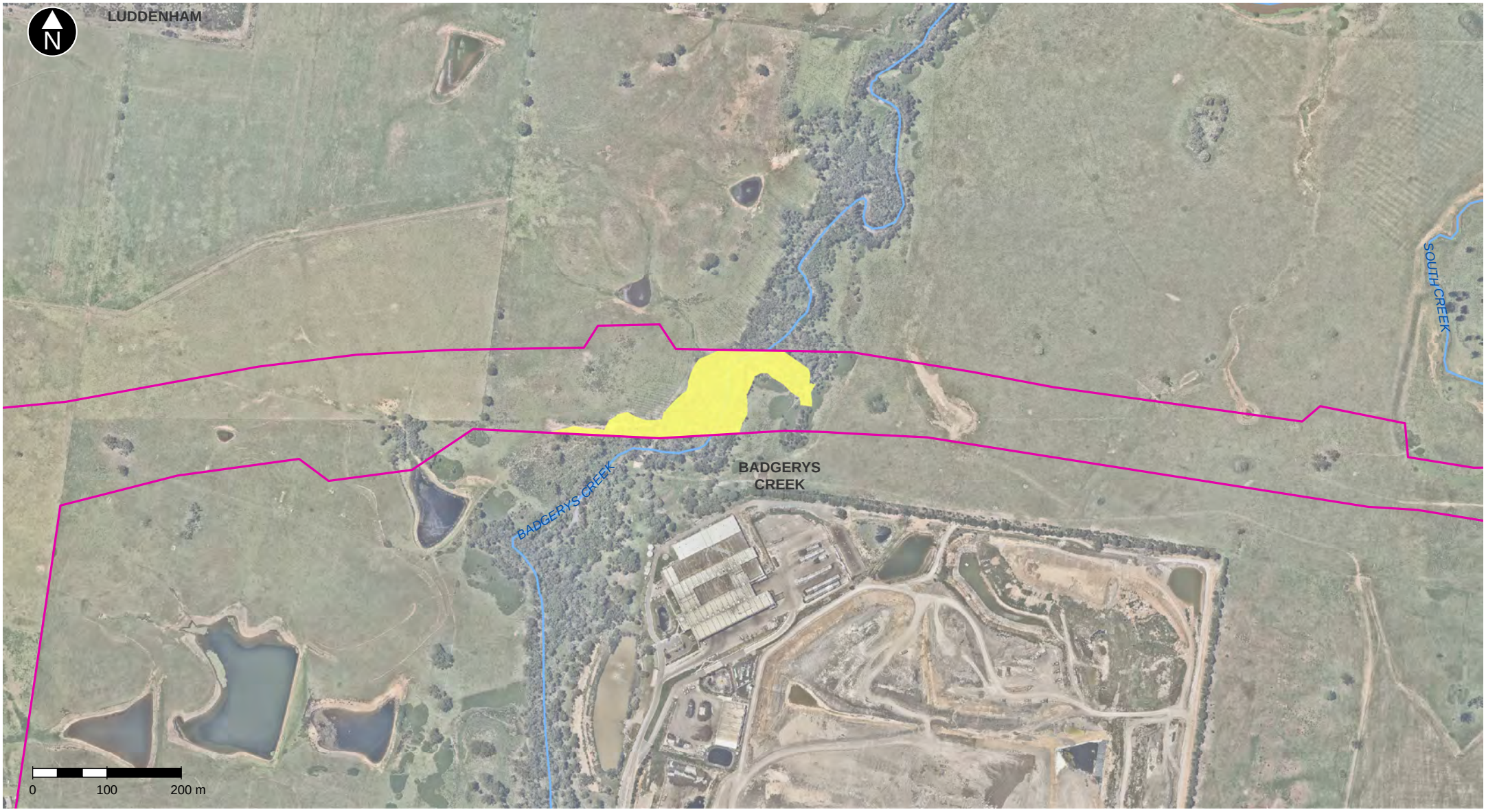
5.3.3 Removal of threatened flora

The project would result in direct impacts to two threatened plant species: *Pultenaea parviflora* (listed as Endangered under the TSC Act and Vulnerable under the EPBC Act) and *Dillwynia tenuifolia* (listed as Vulnerable under the TSC Act).

Dillwynia tenuifolia

Of the 288 plants of *Dillwynia tenuifolia* recorded within the amended construction footprint:

- 244 plants recorded in the road reserve of Clifton Avenue and adjacent properties would be removed
- 44 plants in the road reserve on the western side of Clifton Avenue would be retained and protected within an exclusion zone
- 49 plants within 30 metres of the eastern edge of the amended construction footprint may be indirectly impacted, due to their location.



The amended project construction footprint

Waterways

Threatened fauna species (January 2020)

Cumberland Plain Land Snail habitat

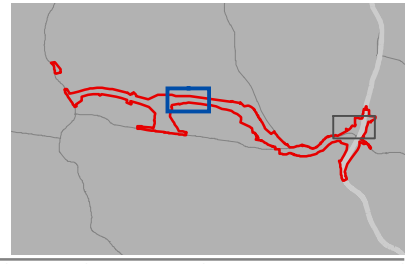


Figure 5-3 Cumberland Plain Land Snail habitat

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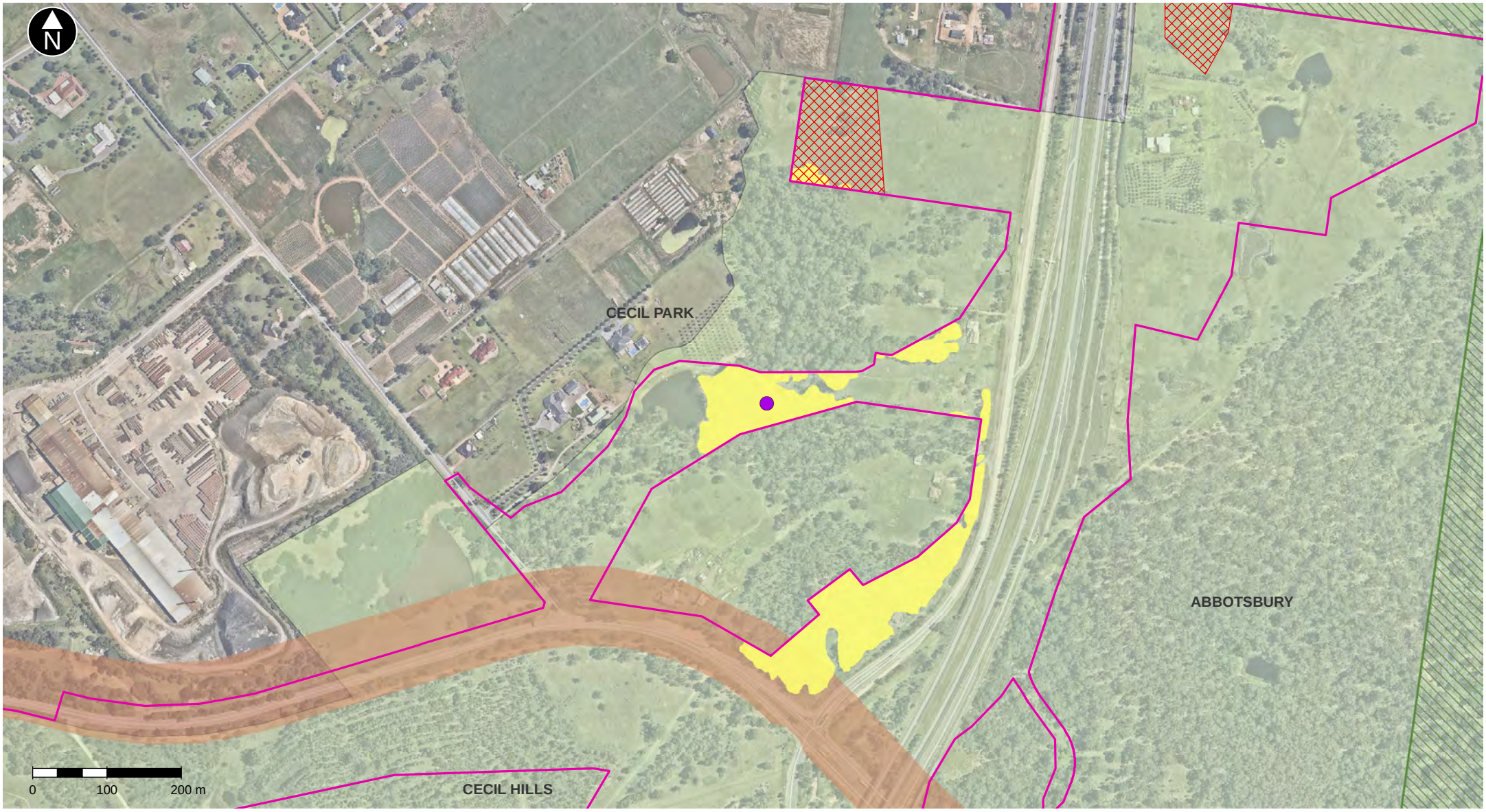

The amended project construction footprint
The amended project exclusion zones
Western Sydney Parklands
NPWS Reserves
Biodiversity certified land

Threatened fauna species (January 2020)

Cumberland Plain Land Snail habitat
Cumberland Plain Land Snail 2020

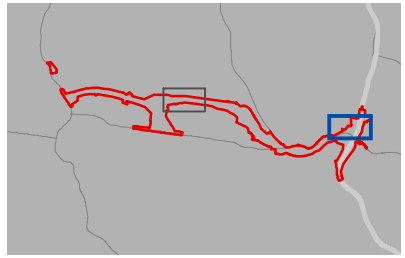

Figure 5-3 Cumberland Plain Land Snail habitat

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An additional number of plants of *Dillwynia tenuifolia* is known to occur in the amended construction footprint, within the conservation zone along the southern boundary of 90-145 Clifton Avenue (**Figure 5-2**). A total of 757 plants were recorded within this area by Ecoplanning (2015); the current number of plants in this area is unknown. The conservation zone is located entirely within an exclusion zone as part of the amended project, and no *Dillwynia tenuifolia* in this area would be directly impacted.

Pultenaea parviflora

Of the 239 plants of *Pultenaea parviflora* recorded within the amended construction footprint:

- 90 plants recorded in the road reserve of Clifton Avenue and adjacent properties would be removed.
- 139 plants in the road reserve on the western side of Clifton Avenue would be retained and protected within an exclusion zone.
- 10 plants in Western Sydney Parklands would be removed; these plants were recorded within a certified area, but only five metres from the certification boundary. Until the location of these plants in relation to the certification boundary can be confirmed, it is assumed they require further assessment and offsetting.

An additional three plants of *Pultenaea parviflora* is known to occur in the amended construction footprint, within the conservation zone along the southern boundary of 90-145 Clifton Avenue (**Figure 5-2**). The conservation zone is located entirely within an exclusion zone as part of the amended project, and no *Pultenaea parviflora* in this area would be directly impacted.

5.3.4 Potential habitat for threatened flora

The areas of potential habitat for each threatened flora species has increased within the amended construction footprint when compared to the EIS construction footprint. The BAR (Appendix E of the EIS) adopted a conservative approach to the area of potential habitat for threatened flora species for the purpose of targeted seasonal surveys, with potential habitat being defined as PCTs listed as associated vegetation types for each threatened species in the Threatened Biodiversity Profile Data Collection, maintained in the NSW BioNet Atlas database (DPIE (EES) 2020).

Areas of potential habitat for threatened flora species within the amended construction footprint when compared to the EIS construction footprint, include:

- *Dillwynia tenuifolia* – additional 0.32 hectares (increase from 13.38 hectares to 13.70 hectares)
- *Pultenaea parviflora* – additional 0.17 hectares (increase from 7.29 hectares to 7.46 hectares)
- *Grevillea juniperina subsp. juniperina* – additional 6.94 hectares (increase from 49.38 hectares to 56.32 hectares)
- *Marsdenia viridiflora subsp. viridiflora* in the Bankstown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith Local Government Areas – additional 7.38 hectares (increase from 55.20 hectares to 62.58 hectares)
- *Pimelea spicata* – additional 6.77 hectares (increase from 42.53 hectares to 49.30 hectares).

5.4 Matters for further consideration

Matters for further consideration under the Framework for Biodiversity Assessment (OEH, 2014) are shown in the EIS BAR and any changes are discussed below. Matters for further consideration within the amended study area are mapped in **Figure 5-4**. Local and regional fauna connectivity is also shown below in **Figure 5-5**.

5.4.1 Riparian corridors

As per Section 8.5 of the BAR, the project would result in impacts to the riparian buffers of the following four creeks that are fourth order streams according to the Strahler (1952) classification system:

- Cosgroves Creek
- Badgerys Creek
- South Creek
- Kemps Creek.

No additional fourth order streams would be directly impacted by the amended project and therefore there is no change to impacts on riparian corridors.

5.4.2 Native vegetation

An assessment of the impact to Cumberland Plain Woodland in the Sydney Basin Bioregion critically endangered ecological community (CEEC) under the TSC Act, based on Framework for Biodiversity Assessment requirements, was included in Section 8.3.2 of the EIS BAR.
This assessment has been updated for the amended project and is presented below.

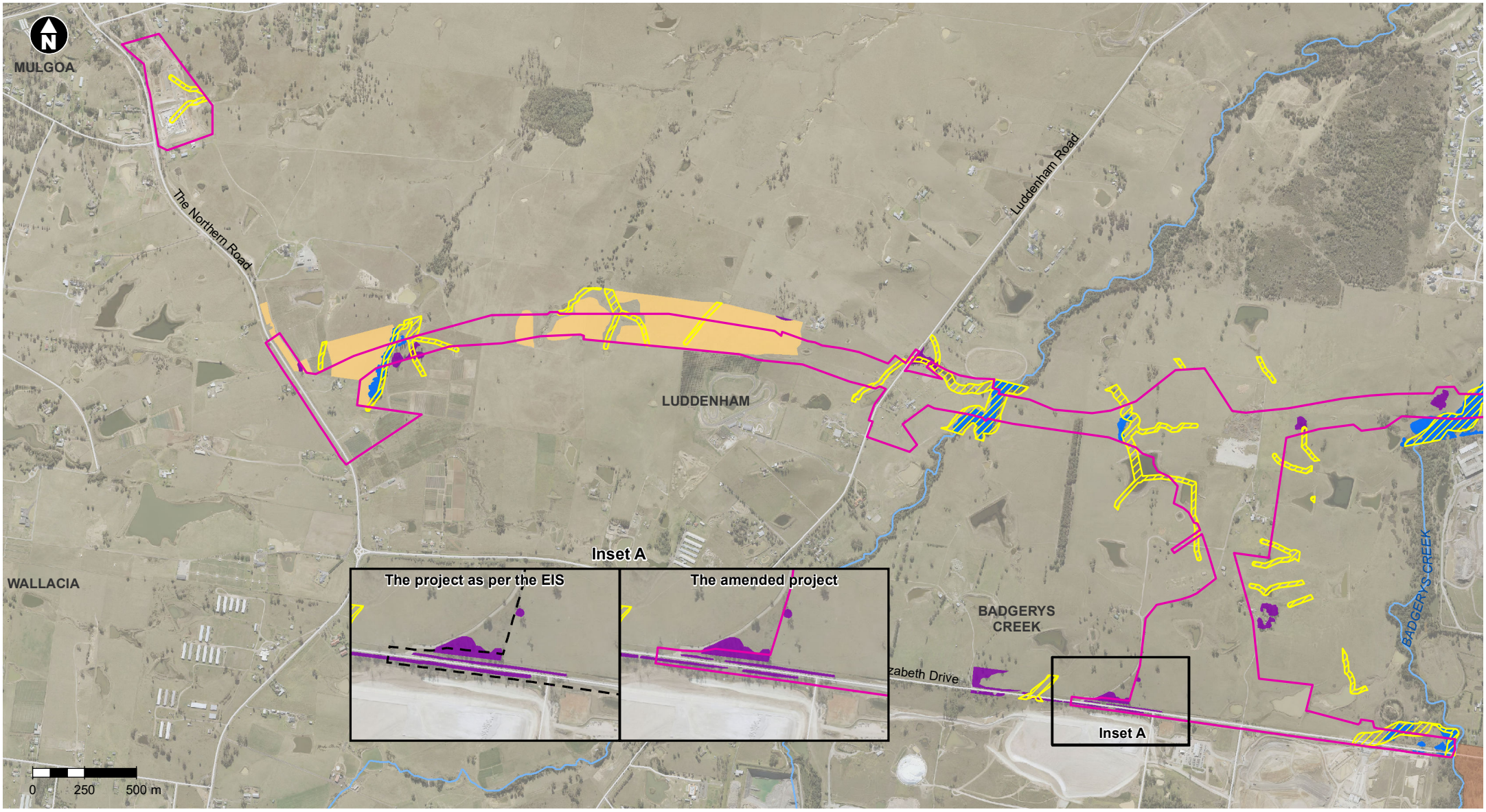
(a) the area and condition of the CEEC or EEC to be impacted directly and indirectly by the project

About 66.91 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion lies within the construction footprint (excluding areas certified under the strategic assessment) and would be directly impacted by the project. Of this area, about 48.85 hectares of the community is in Moderate/Good condition and about 18.06 hectares is in Low condition, comprising derived native grassland in the west of the construction footprint.

As described in the EIS BAR, the site value score calculated for areas of Cumberland Plain Woodland in the Sydney Basin Bioregion within the construction footprint is generally quite low when compared to benchmark values, and most patches are small, fragmented and currently subject to considerable edge effects.

An analysis of the potential for additional edge effects on vegetation within the study area was undertaken by placing a buffer of 30 metres around the construction footprint. This buffer was used to identify a total of 12.46 hectares of Cumberland Plain Woodland (including 6.02 hectares of revegetation) that may be further impacted by edge effects from the project. This area was mainly within Western Sydney Parklands.

The condition and site value of areas of Cumberland Plain Woodland in the Sydney Basin Bioregion, associated areas to be directly and indirectly impacted due to the amended project and the change in impact from the EIS are outlined in **Table 5-8**.



The project construction footprint as per the EIS

The amended project construction footprint

Biodiversity certified land

Waterways

Riparian buffer area

Riparian vegetation

Threatened ecological communities (TEC)

Cumberland Plain Woodland in the Sydney Basin Bioregion

Cumberland Plain Woodland in the Sydney Basin Bioregion (derived grassland form)

Figure 5-4 Matters for further consideration

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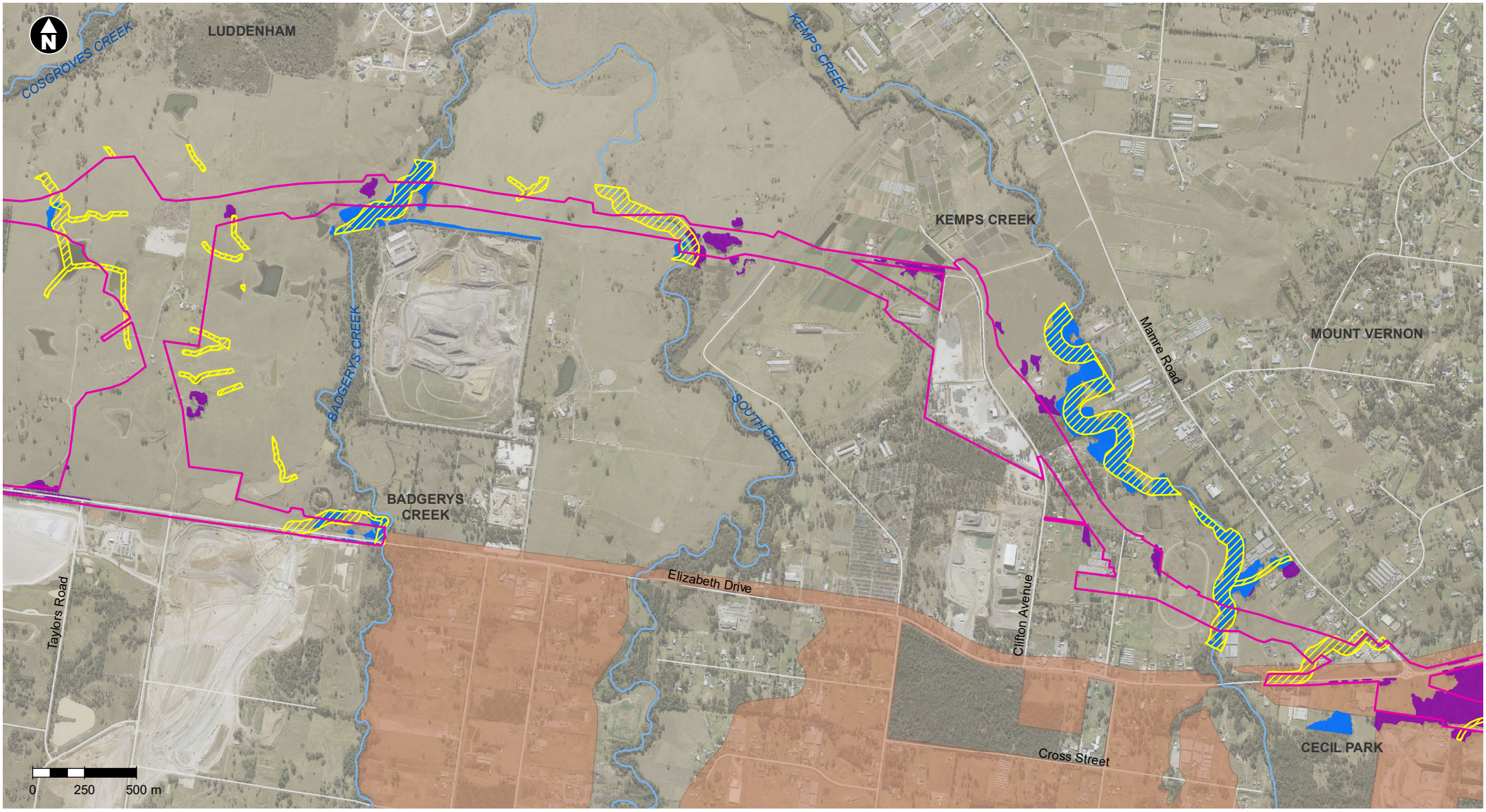

The amended project construction footprint
Biodiversity certified land
Waterways
Riparian buffer area
Riparian vegetation

Threatened ecological communities (TEC)

Cumberland Plain Woodland in the Sydney Basin Bioregion

Figure 5-4 Matters for further consideration

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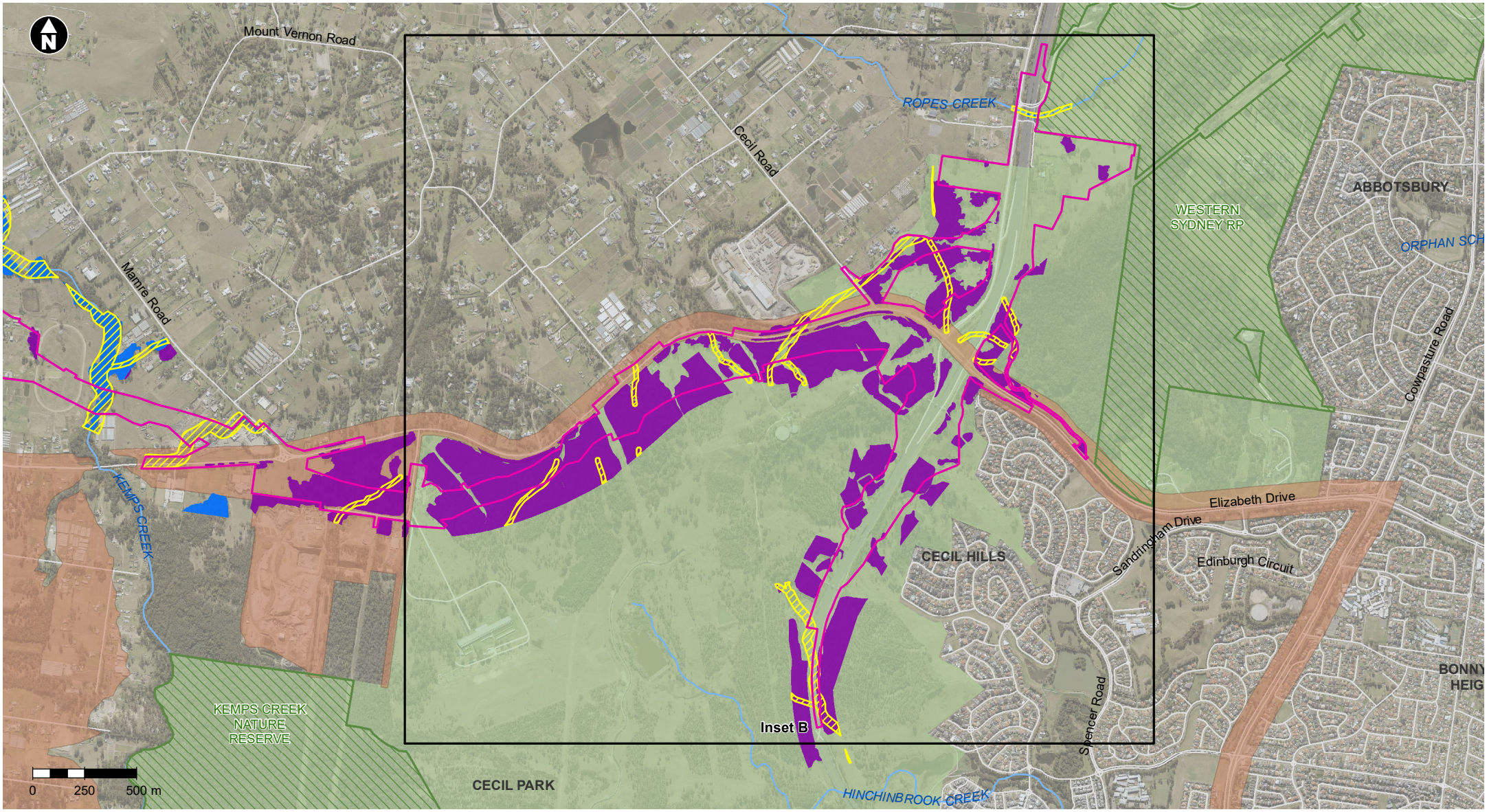

The amended project construction footprint

Biodiversity certified land

NPWS Reserves

Western Sydney Parklands

Waterways

Riparian buffer area

Riparian vegetation

Threatened ecological communities (TEC)

Cumberland Plain Woodland in the Sydney Basin Bioregion

Figure 5-4 Matters for further consideration

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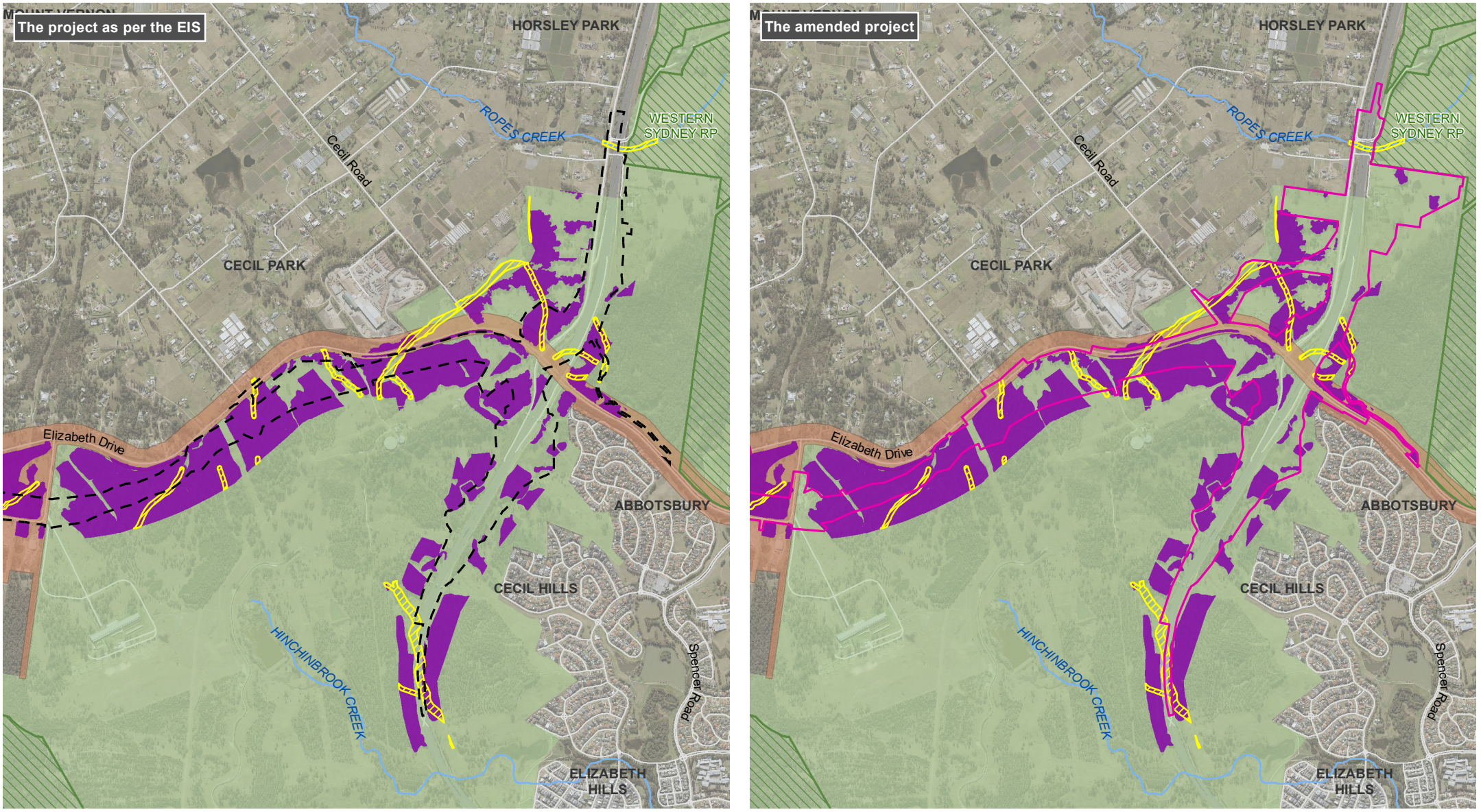

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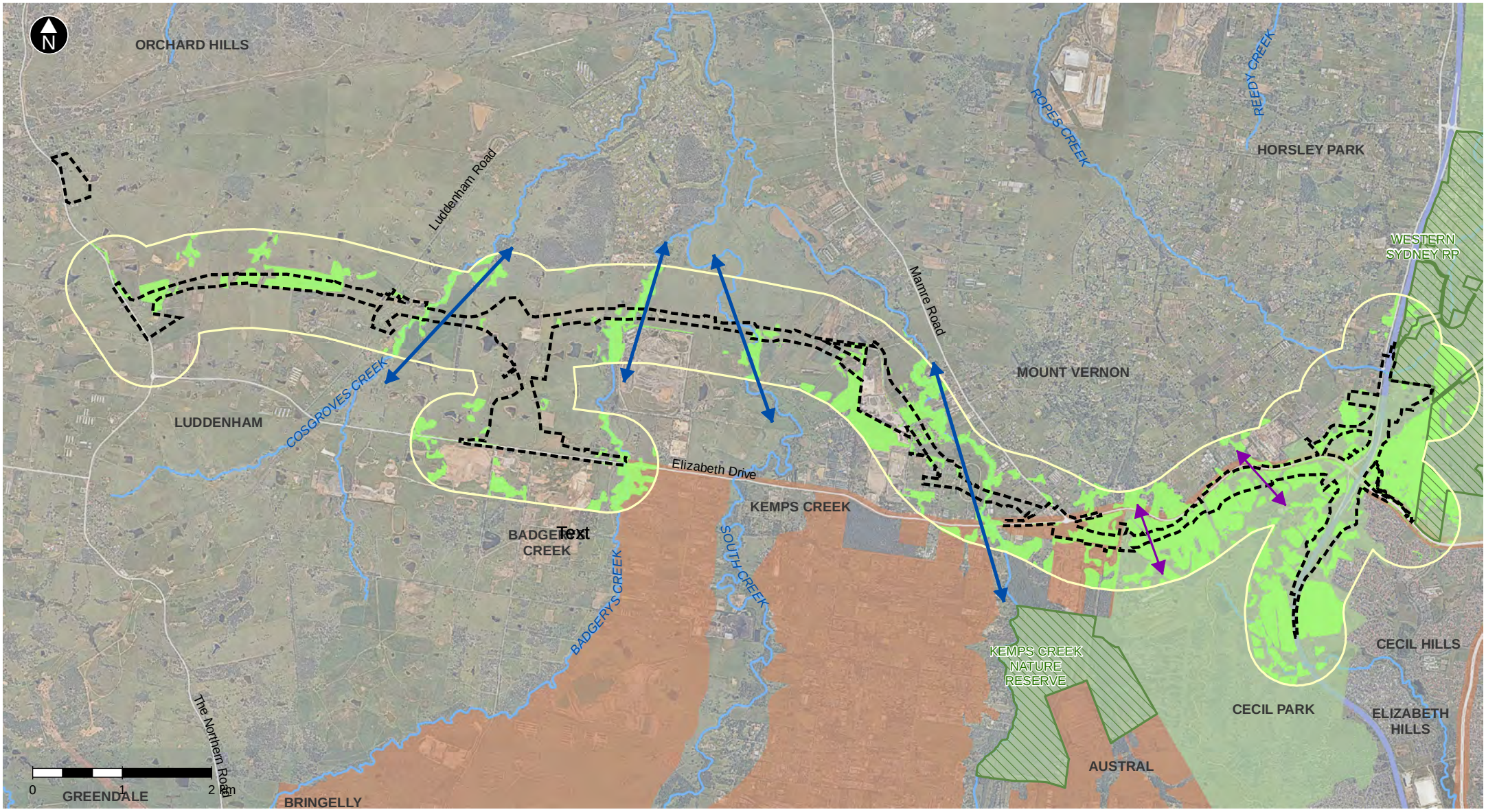
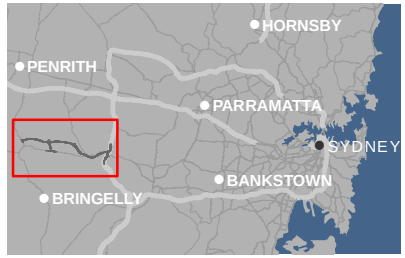


Text

Amended project construction footprint
550m landscape assessment buffer
Local area biodiversity link
Regionally significant biodiversity link
Waterways
Native vegetation
NPWS Reserves
Western Sydney Parklands
Biodiversity certified land

Note: the local and regional biodiversity links are in the same locations as in the EIS/BAR



*Entire map extent is covered by the IBRA 7 Region - Sydney Basin,and IBRA 7 Subregion - Cumberland. No SEPP 14 Coastal Wetlands or Ramsar Wetlands are present in the entire map extent.

Figure 5-5 Local and regional fauna connectivity

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Table 5-8 Direct impacts on Cumberland Plain Woodland in the Sydney Basin Bioregion

PCT corresponding with Cumberland Plain Woodland in the Sydney Basin bioregion	Condition (vegetation zone)	Site value score	Area to be directly impacted by the amended construction footprint excluding certified areas (ha)	Change in area of direct impact excluding certified areas (ha)	Area to be indirectly impacted by the amended construction footprint excluding certified areas (ha)	Change in area of indirect impact excluding certified areas (ha)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (PCT 849)	Moderate/ Good_Medium	45.65	3.54	0.00	0.57	+0.33
	Moderate/ Good_Poor	22.46	2.22	+0.15	0.00	0.00
	Moderate/ Good_Other (Derived Shrubland)	26.09	0.48	0.00	0.00	0.00
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (PCT 850)	Moderate/ Good_High	50.97	3.21	+0.00	1.24	+0.18
	Moderate/ Good_Medium	42.03	13.75	+3.61	3.49	+0.16
	Moderate/ Good_Other (Revegetation)	57.97	24.31	+1.66	6.02	-1.01
	Moderate/ Good_Poor	31.88	1.34	+1.34	1.14	+1.14
	Low	13.77	18.06	-0.01	0.00	0.00
Total area of Cumberland Plain Woodland in the Sydney Basin Bioregion to be impacted (excluding certified areas)			**66.91**	**+6.75**	**12.46**	**+0.8**
Total area of Cumberland Plain Woodland in the Sydney Basin Bioregion in Moderate/Good condition to be impacted (excluding certified areas)			**48.85**	**+6.76**	**12.46**	**+0.8**

(b) the extent and overall condition of the CEEC or EEC within an area of 1000 hectares and then 10,000 hectares surrounding the proposed development footprint

The extent and overall condition of Cumberland Plain Woodland within a 1000 hectare and 10,000 hectare buffer was calculated using GIS and regional vegetation mapping (OEH, 2013, OEH, 2016). These extents do not include the area within the construction footprint and as such represent the Cumberland Plain Woodland that would be unaffected by the project. The 1000 hectare buffer was created using a 200 metre radius from the construction footprint while the 10,000 hectare buffer used a 2150 metre radius from the construction footprint.

Vegetation which had a canopy cover of greater than 10 per cent was considered to be in moderate/good condition while vegetation with a canopy cover of less than 10 per cent was considered to be in moderate/poor condition. These areas are outlined in **Table 5-9**.

It should be noted that the areas listed in **Table 5-9** mostly do not include areas of native revegetation within the Western Sydney Parklands, as these are generally not mapped as PCTs in the vegetation mapping (OEH, 2013, OEH, 2016), as they are regrowth vegetation. Derived native grassland is also generally not included in the regional mapping. Areas of revegetation account for 24.31 hectares of the total 48.8585 hectares of Moderate/Good condition Cumberland Plain Woodland identified in the construction footprint. In order to provide a "like for like" comparison with vegetation within the surrounding area and that within the construction footprint, revegetation areas must be removed from the calculation. The values shown in the last column of **Table 5-9** have been calculated based on the percentage of the total area of Cumberland Plain Woodland within the amended construction footprint plus the buffer zones, excluding revegetation areas.

Table 5-9 Condition and associated area of Cumberland Plain Woodland in 1000 hectares and 10,000 hectares buffers surrounding the construction footprint

Buffer area surrounding construction footprint	Area of Cumberland Plain Woodland (ha) within buffer area (excluding construction footprint)			Area of Moderate/Good CPW within construction footprint (excluding revegetation and derived grassland)	Percentage of Cumberland Plain Woodland removed
	Moderate/Poor	Moderate/Good	Total		
1000 ha	76.02	46.08	122.1	24.54	20%
10,000 ha	705.54	429.93	1135.47	24.54	2%

(c) an estimate of the extant area and overall condition of the CEEC or EEC remaining in the IBRA subregion after the impact of the project has been taken into consideration

The area and overall condition of extant Cumberland Plain Woodland within the Cumberland subregion was calculated using a GIS and regional vegetation mapping (OEH, 2013, OEH, 2016). A total of 32,730 hectares of PCTs 849 and 850 were mapped in the Cumberland subregion. Of this, 14,503 hectares is mapped as higher canopy cover and/or less disturbed condition classes, while 18,227 hectares is mapped as lower canopy cover and/or more disturbed condition. When the removal of about 48.8585 hectares of Cumberland Plain Woodland for the project is taken into consideration, about 32,681 hectares of extant Cumberland Plain Woodland would exist within the Cumberland subregion based on vegetation mapping (OEH, 2013, OEH, 2016).

The regional vegetation mapping (OEH, 2013, OEH, 2016) has identified 32,730 hectares of PCTs that correspond to Cumberland Plain Woodland in the Sydney Basin bioregion in the Cumberland subregion. However, the final determination for this TEC states that the total extent of woody vegetation referred to as Cumberland Plain Woodland was estimated at 11,054 (±1,564) hectares in 2003, based on interpretation of aerial photography dating from 1998, and that by 2007 the extent of the TEC had declined by 442 (±46) hectares.

This discrepancy is likely due to improvements in the resolution of vegetation mapping between 1998 and 2013 leading to smaller and more fragmented patches of the community being captured in

the 2013 and 2016 mapping. The higher resolution mapping areas have therefore been used in the calculations above.

The extant area of Cumberland Plain Woodland within the Sydney Basin is known to decreasing (due to ongoing clearing for development). The proposed loss of 48.8585 hectares of this community as a result of the project constitutes 0.15 per cent of the total remaining area of Cumberland Plain Woodland identified in the regional vegetation mapping and 0.45 per cent of the total remaining area of Cumberland Plain Woodland identified in the Final Determination for this community.

(d) the project's impact on:

(i) abiotic factors critical to the long-term survival of the CEEC or EEC. For example, would the impact lead to a reduction of groundwater levels or substantial alteration of surface water patterns?

The maximum potential groundwater drawdown associated with cut dewatering is predicted to be about 1.6 metres and is unlikely to cause impacts at surrounding registered bores or sensitive environmental receptors (JAJV, 2018).

The construction of the project would involve a range of activities that may affect surface water patterns in the locality, including earthworks, construction of drainage infrastructure, construction of bridges over waterways and minor creek adjustment.

Adjustment of small sections of creeks where bridge crossings are proposed could result in a decline in ecosystem function downstream due to habitat removal and alteration/fill materials into existing waterways (Jacobs, 2018). Minor creek adjustment of Badgerys Creek, South Creek and Kemps Creek is proposed. Adjustments are designed to reduce erosion around bridge piers, provide adequate flood pathways and reduce disturbance of creeks during construction. Vegetation adjoining these creeks downstream of the construction footprint is degraded and often absent, but some fragmented patches of Cumberland Plain Woodland in the Sydney Basin bioregion may be impacted. Cumberland Plain Woodland in the Sydney Basin bioregion is typically located outside of the riparian corridors, on slopes and flats and therefore has only a low level of interaction with existing surface water flow regimes.

Unmanaged construction activities associated with the project could result in alteration of surface water patterns as soil erosion, siltation and off-site movement of eroded sediments by stormwater into adjacent areas of TEC. appropriate management measures would be installed prior to and maintained throughout the construction period to prevent these impacts. These would be detailed in a construction environmental management plan for the project (see Section 9 of the EIS for further details).

(ii) characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants

Most of the Cumberland Plain Woodland in the Sydney Basin Bioregion within and adjoining the construction footprint is located in the Western Sydney Parklands and is managed for conservation and/or recreational purposes. It is unlikely that the project would result in removal of understorey species or harvesting of plants from retained areas of Cumberland Plain Woodland in the Western Sydney Parklands.

(iii) the quality and integrity of an occurrence of the CEEC or EEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the CEEC or EEC.

Invasive exotic plant species, including priority weeds and Weeds of National Significance (WoNS) are widespread in the study area. The dispersal of weeds from infested areas to relatively intact retained patches of Cumberland Plain Woodland in the Sydney Basin Bioregion adjoining the construction footprint is possible through the movement of plant and weed-laden sediment. These potential impacts would likely be mitigated through implementing management measures during construction to minimise the risk of introduction and spread of weeds.

Pest fauna species are already well established in the study area. Consequently, while pest species are likely to capitalise on the disturbance associated with construction and development activities, the project is unlikely to significantly increase the overall impact of pest species within the study area. Areas of vegetation at the north-eastern extent of the study area were recorded as having high abundance of the native Bell Miner (*Manorina melanophrys*) and increased dieback during surveys. Given that the project would result in further vegetation clearing and localised fragmentation, it could increase the prevalence and severity of Bell Miner Associated Dieback (BMAD) in the locality. However, impacts are likely to be insignificant when compared to the broad-scale clearing that has occurred in the past as a result of agriculture and urban development.

(e) direct or indirect fragmentation and isolation of an important area of the CEEC or EEC

Much of the Cumberland Plain Woodland in the Sydney Basin Bioregion in the construction footprint is currently fragmented by historical clearing, rural/residential and industrial land uses, as well as roads and bike tracks. The larger patches of Cumberland Plain Woodland in the Sydney Basin Bioregion in the study area are situated in the Western Sydney Parklands. However, the vegetation here is regrowth or revegetation from historical agricultural lands, and as such the patches are still fragmented. The project would involve the clearing of some of these areas and as a result, further fragment this CEEC and reducing its connectivity within the locality.

New edge effects would also be created as a result of the project. The clearing of vegetation would create a new edge which would likely be subject to increased run-off, dumping of rubbish and the establishment and spread of weeds. Most of the Cumberland Plain Woodland in the study area and construction footprint comprises small, fragmented patches that are already situated adjacent to an existing cleared edge, often a road. As such, many of the areas of vegetation within and directly adjacent to the construction footprint are already subject to considerable edge effects. In some areas of Western Sydney Parklands, the construction footprint crosses through some larger patches of Cumberland Plain Woodland in Moderate/Good condition, including revegetated areas. Within these larger areas it is likely that the project would increase the potential for edge effects to occur.

Management measures would be implemented to minimise the risk of the introduction and spread of weeds (**Chapter 7**).

(f) the measures proposed to contribute to the recovery of the CEEC or EEC in the IBRA subregion

The estimated 48.85 hectares of Cumberland Plain Woodland in the Sydney Basin Bioregion in Moderate/Good condition to be removed would be offset in accordance with the FBA, allowing in-perpetuity conservation of an alternative area of Cumberland Plain Woodland.

5.5 Matters of National Environmental Significance

MNES identified within **Section 4.5** were assessed for impacts and comparisons with those for the construction footprint as described in the EIS were made.

Table 5-10 below provides a comparison of threatened species, ecological communities, migratory species and Commonwealth land respectively between the construction footprint as described in the EIS and amended construction footprint.

In summary, no additional MNES will be impacted as a result of the amended project. However, there are some changes to the impacts of the amended project on the MNES assessed as part of the EIS BAR:

- An additional 3.99 hectares of the TEC Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest would be cleared
- Up to 10 additional plants of the threatened flora species *Pultenaea parviflora* would be cleared
    - An additional 7.38 hectares of foraging habitat for the threatened fauna species Grey-headed Flying-fox would be cleared.

MNES within the amended study area have also been mapped in **Figure 5-6** below. Appropriate significant impact criteria (as per DoE 2013) were used to assess the significance of impact to the MNES entities listed in **Table 5-9** as part of impact assessment for the BAR. Additional impacts (where they occurred) were then assessed for the amended project. No changes to significant impact assessment for any MNES was found (**Table 5-10**).

5.6 Other impacts

Section 8.5 of the EIS BAR details other impacts present within the construction footprint as described in the EIS, including impacts to aquatic habitat, GDEs, hydrology, biodiversity links and habitat corridors, edge effects, injury and mortality of fauna, invasion and spread of weeds, pests and pathogens, noise, light and vibration and adjoining land.

Table 5-11 below compares other impacts between the construction footprint as described in the EIS and amended construction footprint. If there are no differences between the two, impacts have been described as no change.

5.7 Impact summary

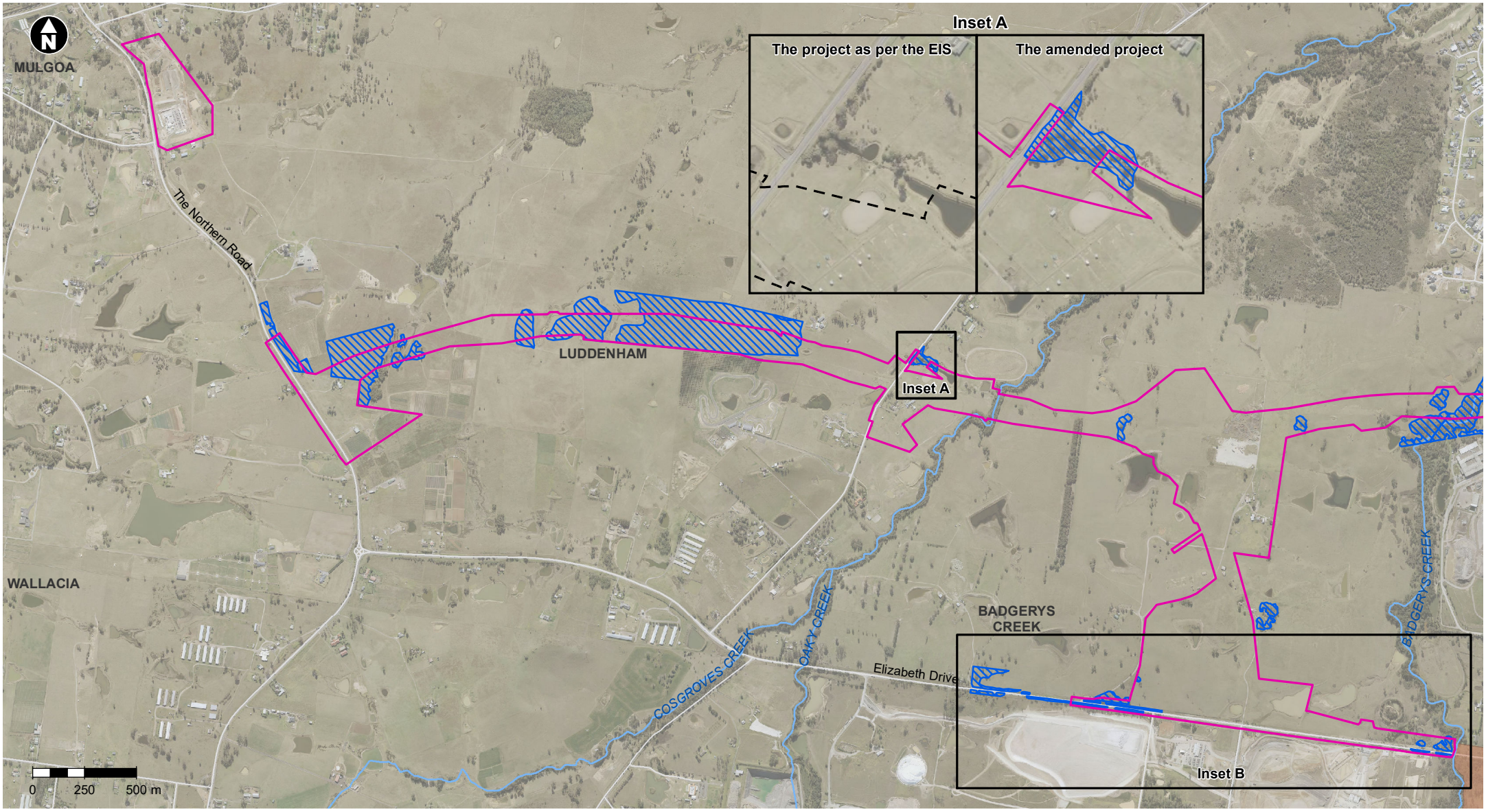
Thirteen impacts were identified as part of this assessment and the details of these impacts for the amended project construction footprint, compared with the project as described in the EIS is shown in **Table 5-12**.

Table 5-10 Comparison of MNES for the construction footprint as described in the EIS and amended construction footprint

MNES	Number or area (ha) within construction footprint as described in the EIS excluding certified areas	Number or area (ha) within amended construction footprint excluding certified areas	Significant impact assessment in EIS BAR?	Change in area excluding certified areas (ha)	Comments	Any change to significant impact assessment for amended project?
Ecological communities						
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	38.48 ha (includes 22.21 ha of revegetation)	42.47 ha (includes 22.04 ha of revegetation)	Yes	+3.99 ha	Most areas of the TEC are located within Western Sydney Parklands.	No. Still significantly impacted.
Western Sydney Dry Rainforest and Moist Woodland on Shale	0.44 ha	0.44 ha	No	0	The small area of this TEC to be cleared is located in Western Sydney Parklands and is already fragmented and edge-affected.	No. There is no change in impact. Still not significant.
Threatened flora						
Pultenaea parviflora	90 individuals	Up to 100 individuals	Yes	+10 individuals	Recorded in Shale Gravel Transition Forest in the study area, in areas adjoining Clifton Avenue, and also in the Western Sydney Parklands. See **Section 5.3.3** of this report for further details on impacts to this species.	No. Still significantly impacted.
Pimelea spicata	0	0	No.	0	Recorded 70 metres from both the construction footprint as described in the EIS and amended construction footprints.	No. There is no change in impact. Still not significant.

MNES	Number or area (ha) within construction footprint as described in the EIS excluding certified areas	Number or area (ha) within amended construction footprint excluding certified areas	Significant impact assessment in EIS BAR?	Change in area excluding certified areas (ha)	Comments	Any change to significant impact assessment for amended project?
Threatened fauna						
Grey-headed Flying-fox	55.20 ha (foraging)	62.58 ha (foraging)	No. Foraging habitat is impacted, but this will be offset and no breeding habitat is affected.	+7.38 ha	All Woodland and Riparian forest habitat is considered suitable foraging habitat for the species. No breeding camps were recorded (nearest camp is about seven kilometres from the amended project in Wetherill Park; DoE, 2020a).	No. Still not considered significant.
Migratory species						
Migratory species	N/A no migratory species recorded	N/A no migratory species recorded	No significant.	N/A	The White-throated Needletail (*Hirundapus caudacutus*) and Fork-tailed Swift (*Apus pacificus*) often occur in the airspace above a location. As they are aerial foragers and do not breed in Australia (DoE, 2018), project impacts are likely to be negligible, even if the species occur. While the White-bellied Sea-Eagle is a listed marine species under the EPBC Act, it is no longer considered a migratory species and therefore was not assessed as a migratory species. The site is not within a marine area.	No change. Not significant.

MNES	Number or area (ha) within construction footprint as described in the EIS excluding certified areas	Number or area (ha) within amended construction footprint excluding certified areas	Significant impact assessment in EIS BAR?	Change in area excluding certified areas (ha)	Comments	Any change to significant impact assessment for amended project?
Commonwealth land						
Commonwealth land	0	0	Not significant.	0	Commonwealth land (ie the Western Sydney International Airport) is located adjacent to the construction footprint as described in the EIS (detailed in Section 5.6 and Section 8.4.5 of the BAR) and amended construction footprint. A significant impact on the environment of *Commonwealth land as defined in the Significant Impact Guidelines, Section 1.2 (Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies)* (SEWPaC, 2013), is not expected. Potential indirect impacts from the project on the environment of Commonwealth land include air, noise and visual impacts.	No change. Not significant.



The project construction footprint as per the EIS
The amended project construction footprint
Biodiversity certified land
Waterways

EPBC Habitat
Grey-headed Flying-fox

Figure 5-6 Matters of National Environmental Significance

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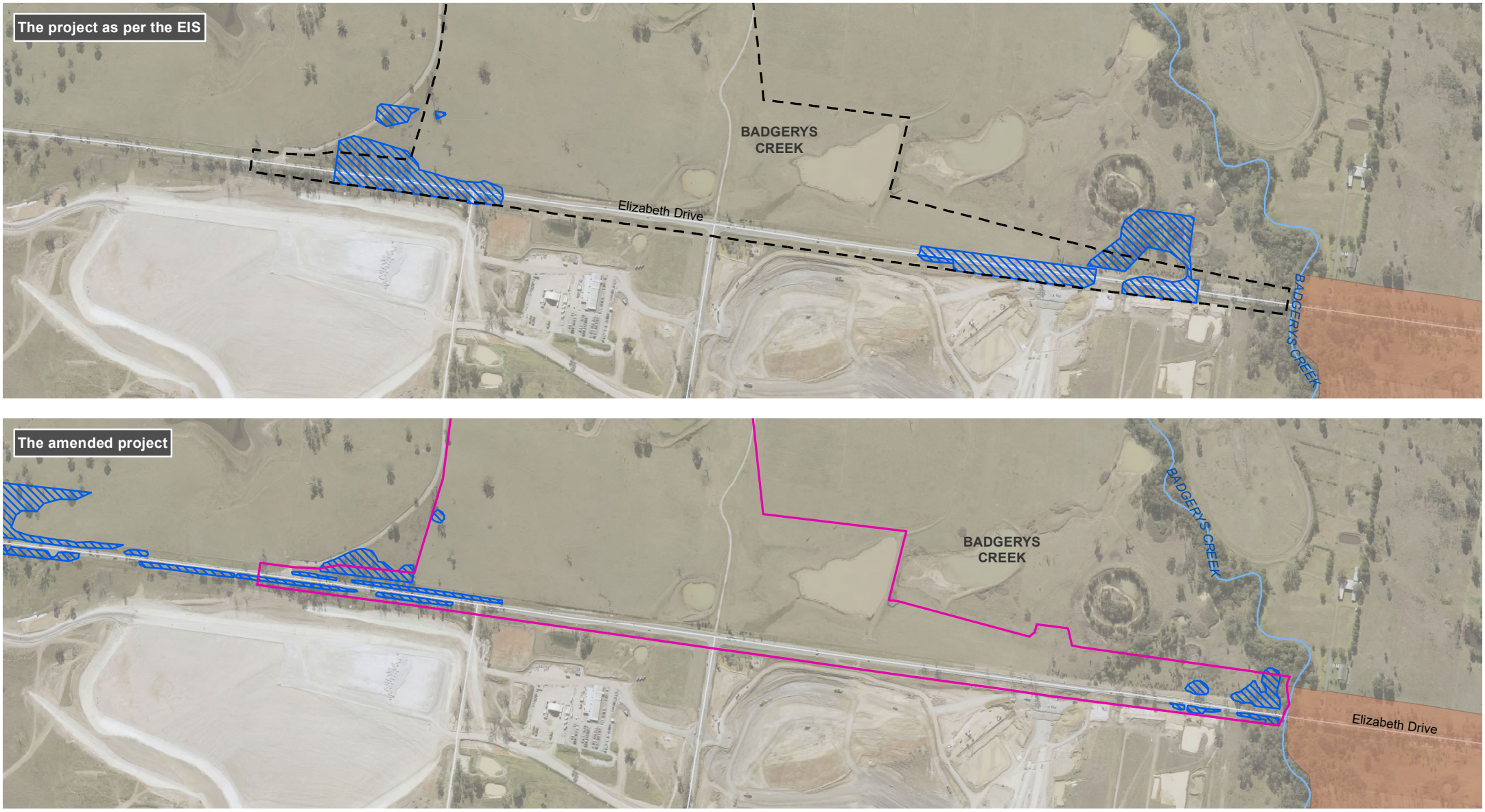

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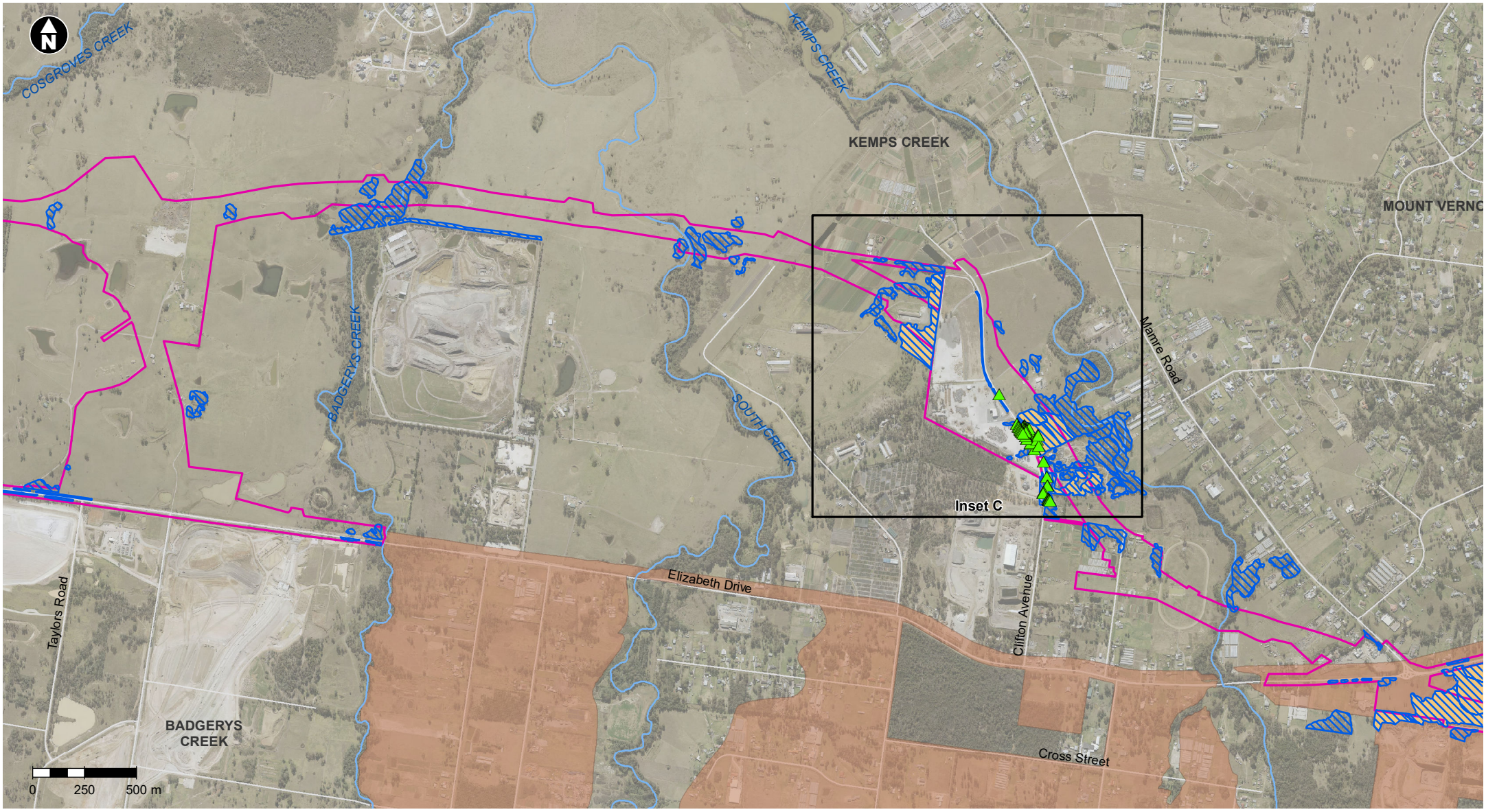

The amended project construction footprint

Biodiversity certified land

Waterways

EPBC Habitat

Grey-headed Flying-fox

Threatened ecological communities (EPBC Act)

Cumberland Plain Shale Woodlands and Shale/Gravel Transition Forest

Threatened flora species

Pultenaea parviflora

Figure 5-6 Matters of National Environmental Significance

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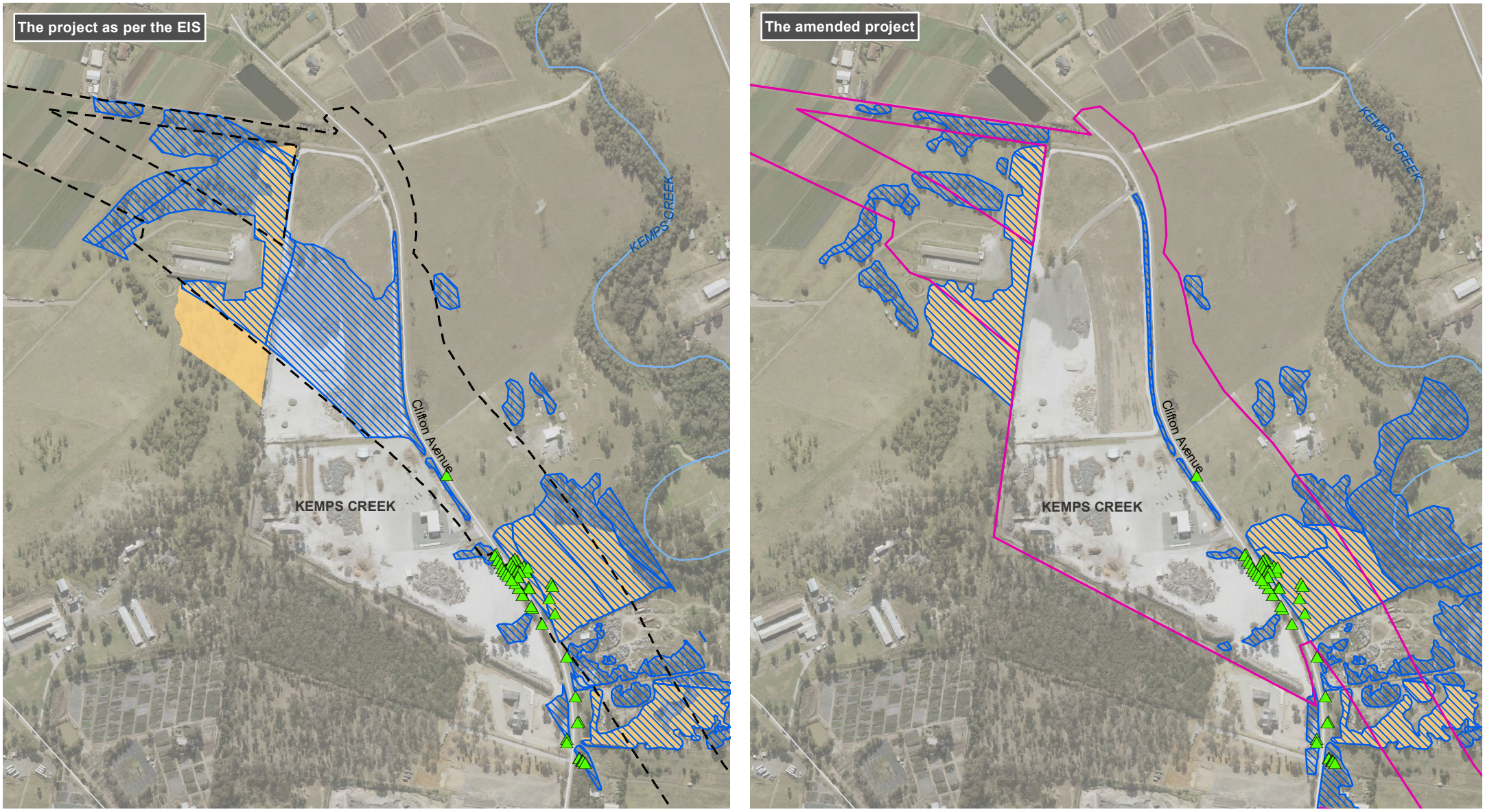

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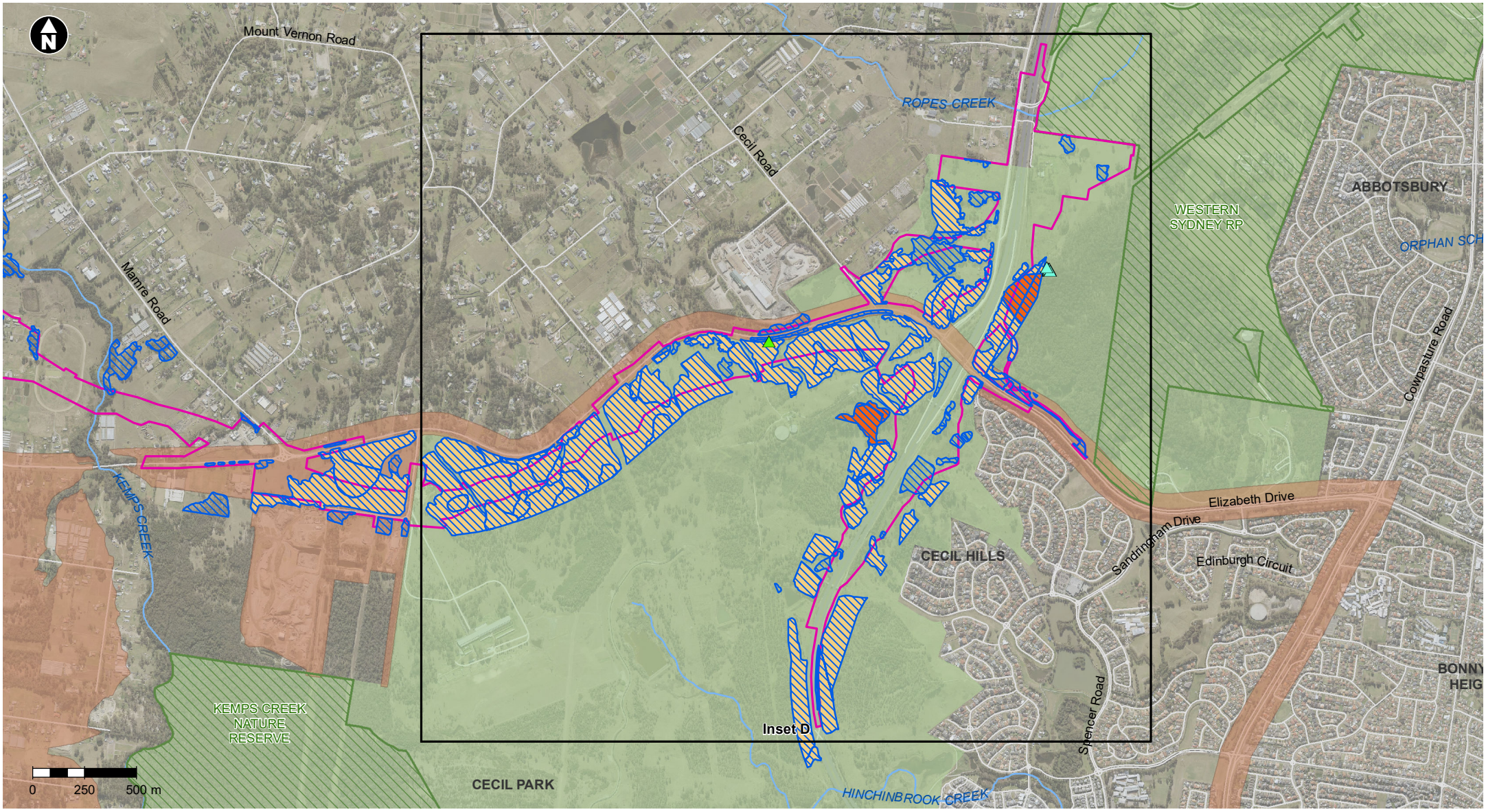

The amended project construction footprint

Biodiversity certified land

NPWS Reserves

Western Sydney Parklands

Waterways

EPBC Habitat

Grey-headed Flying-fox

Threatened flora species

Pultenaea parviflora

Pimelea spicata

Threatened ecological communities (EPBC Act)

Cumberland Plain Shale Woodlands and Shale/Gravel Transition Forest

Western Sydney Dry Rainforest and Moist Woodland on Shale

Figure 5-6 Matters of National Environmental Significance

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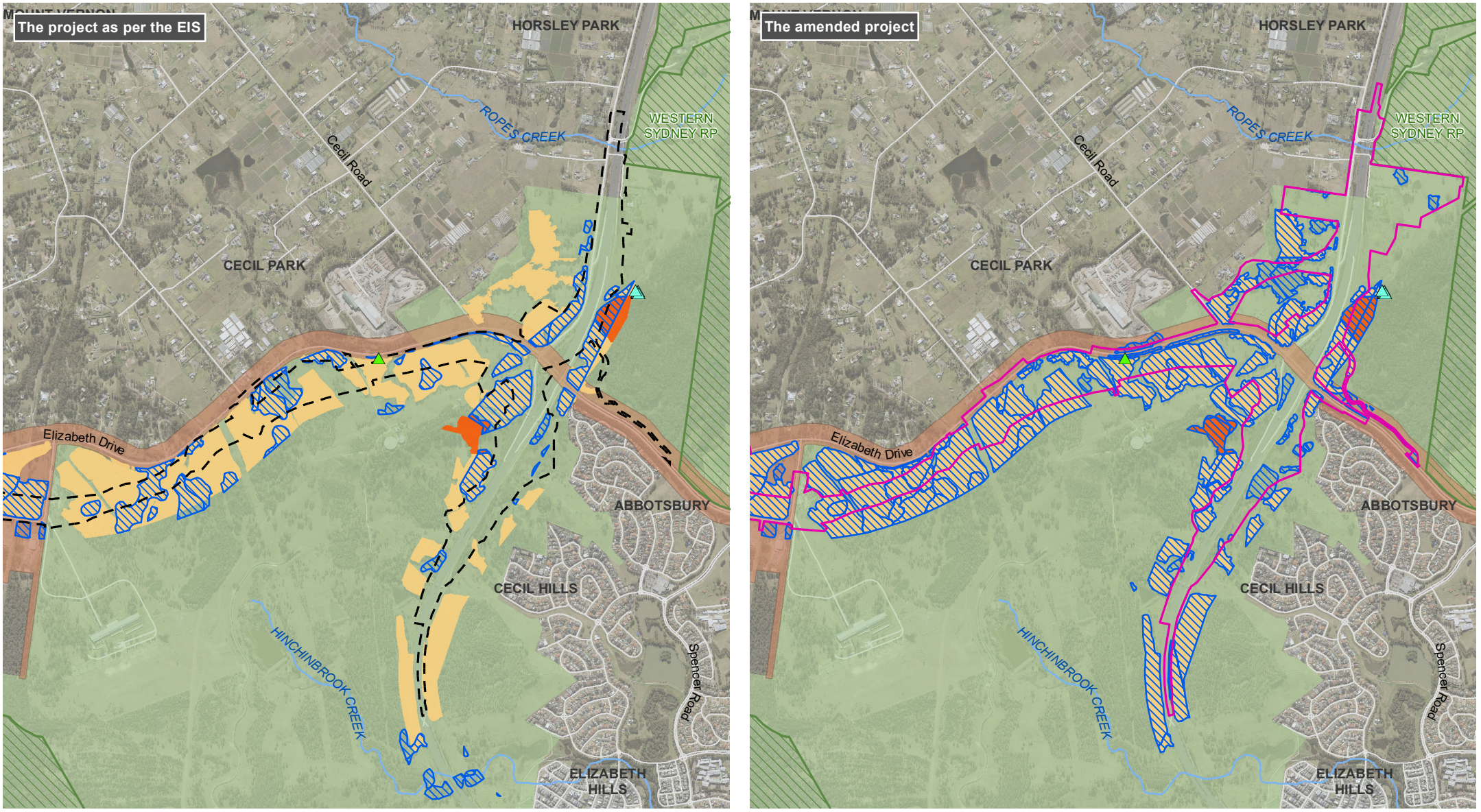

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Table 5-11 Comparison of other impacts between the construction footprint as described in the EIS and amended construction footprint

Other impact	Biodiversity values	Nature of impact	Impacts within construction footprint as described in the EIS	Impacts within amended construction footprint
Aquatic habitat	Waterway modification	Direct	Proposed permanent waterway crossings at 10 waterways within the construction footprint, including bridges at Cosgroves Creek, Badgerys Creek, South Creek, Kemps Creek and Ropes Creek. Pipe culverts proposed at three waterways (unlikely fish habitat) and open drain at an unnamed tributary of Kemps Creek (also unlikely fish habitat). Temporary waterway crossings and work platforms may be required. Permanent creek adjustments required at Badgerys Creek, South Creek and Kemps Creek; adjusted over a distance of 64 metres, 200 metres and 84 metres respectively. Creek adjustments are not proposed at Cosgroves Creek or Ropes Creek.	No additional waterways would be impacted.
	Threatened fish and fish passage		No potential habitat for threatened fish listed under the FM Act and EPBC Act occurs within the study area, therefore no impacts to threatened fish are anticipated to occur as a result of the project. Fish passage would be maintained at all creek crossings during the construction period. Bridge construction is unlikely to obstruct or alter fish passage. Impacts from creek adjustments are likely to be minor. Culvert construction is unlikely to impact fish passage as the locations of all impacted waterways are unlikely to provide fish habitat. Temporary creek crossings have the potential to impact fish by temporarily altering the hydrological regimes of the waterways, reducing stream width	No threatened fish are likely to occur or be impacted as a result of the amended project. Potential impacts (specifically removing flow through this section of the creek) would result in minor impacts to non-threatened fish species. Recommended mitigation measures as a result of this impact for the amended project are outlined in **Table 7-1**.

Other impact	Biodiversity values	Nature of impact	Impacts within construction footprint as described in the EIS	Impacts within amended construction footprint
			and reducing water quality from an increase in sedimentation and turbidity from the placement of material instream and vehicle/plant use of the crossing. Though fish passage would be altered, it would not be blocked for the construction of the waterway crossings.	
	Riparian habitat		Riparian vegetation would be removed over an approximate area of 4.35 ha. The majority of the vegetation to be removed is in poor condition. Removal of riparian vegetation would be minimised, and vegetation connectivity retained across the riparian zone where possible. Upon completion of construction, riparian vegetation near creek works would be rehabilitated.	Riparian vegetation would be removed over an approximate area of 5.83 ha. The majority of the vegetation to be removed is still in poor condition. Minimisation of clearing, retention of connectivity and rehabilitation would be as per the EIS.
	Water quality		Potential for sedimentation and spills to affect water quality in the waterways during the construction process. Impacts are likely to be highest from creek adjustments, bridge construction works, temporary creek crossing construction and demolition of the existing bridge at South Creek. Water quality mitigation measures during construction would minimise the likelihood and extent of potential impacts to creeks using appropriate sediment and erosion control procedures and keeping high risk activities such as concrete pouring and earth works away from creek lines where practicable.	Additional potential water quality impacts from the operation of additional construction ancillary sites, and construction works associated with Ropes Creek bridge widening (southbound) and the extension of airport access roads at Elizabeth Drive and connection to Western Sydney International Airport Main Access Road. However, these impacts would be managed via surface water quality environmental management measures already outlined in the project EIS.
	Shading and temperature		Shading regimes would be altered at the creek crossings as a result of bridge and culvert structures over small and limited areas of creeks along the footprint. This shading would not be significantly above what fish would encounter in riparian forest	No change.

Other impact	Biodiversity values	Nature of impact	Impacts within construction footprint as described in the EIS	Impacts within amended construction footprint
			areas and it is likely to have only minor impacts to fish movements. Water temperature would be reduced in these areas compared with unshaded areas; however, this reduction would also be minor and form part of a mosaic of micro differences in water temperature along the creek lines.	
Groundwater Dependent Ecosystems	Vegetation Fauna habitat	Indirect	The project's groundwater drawdown is unlikely to contribute to impacts on vegetation and/or fauna habitat (JAJV, 2018), although much of the vegetation that may be groundwater dependent will be cleared as part of the project. Potential impacts are considered local and manageable.	No change.
Changes to hydrology	Waterways	Indirect	Construction of bridges and culverts at waterways and creek adjustments would alter flow patterns at each waterway in the immediate vicinity of the crossings. In addition to creek adjustments along the project, there would be minor redirection of localised drainage lines as part of construction of the road, to facilitate flow through culverts and the introduction of specific discharge points from sediment basins (construction only) and water quality basins (operation). Potential impacts are considered minor, local and manageable.	No change.

Other impact	Biodiversity values	Nature of impact	Impacts within construction footprint as described in the EIS	Impacts within amended construction footprint
Fragmentation of identified biodiversity links and habitat corridors	Wildlife Corridors	Direct and Indirect	Potential impacts are considered moderate and manageable.	No change.
Edge effects on adjacent native vegetation and habitat	Vegetation to be fragmented	Indirect	12.73 ha of native vegetation (including 7.03 ha of revegetation) within Western Sydney Parklands and east of Clifton Avenue.	13.88 of native vegetation (including 6.02 ha of revegetation) within Western Sydney Parklands and east of Clifton Avenue.
Injury and mortality of fauna	Potentially all fauna species present	Direct	Injury and mortality of fauna may occur at both construction stage (eg vegetation clearing) and operation stage (eg vehicle collisions). Potential impacts are considered local and manageable.	No change.
Invasion and spread of weeds	All vegetation adjacent to works	Indirect	Large areas of the study area have a high abundance of exotic species. The dispersal of weeds from these areas to relatively intact areas is therefore possible through the movement of plant across the study area. Potential impacts are considered local and manageable.	No change.
Invasion and spread of pests	All vegetation adjacent to works	Indirect	Within the study area and construction footprint, most patches of vegetation are small and fragmented, and pest species are already well established. As such, many of the areas of vegetation and fauna habitat within and directly adjacent to the construction footprint are impacted by pest fauna. Potential impacts are considered local and manageable.	No change.

Other impact	Biodiversity values	Nature of impact	Impacts within construction footprint as described in the EIS	Impacts within amended construction footprint
Invasion and spread of pathogens and disease	All vegetation adjacent to works	Indirect	The project may increase the risk of dispersal of Phytophthora and Myrtle rust as a result of construction activities which involve the disturbance of soil and the movement of plant across the study area. Potential impacts are considered local and manageable.	No change.
Noise, light and vibration	All local fauna species	Direct/indirect	Vegetation clearing, ground disturbance, machinery, vehicle movements and general human presence would increase noise and vibration within the study area and surrounding area during both construction and operational phases of the project. The project would increase artificial lighting within the study area and surrounds during the operation phase and night work lighting during construction. As such, the project may potentially affect nocturnal fauna by interrupting their life cycle or impacting on species that can be more vulnerable to predation (eg some small mammals). Potential impacts are considered local and manageable.	No change.
Adjoining land managed by DPIE (Environment, Science and Energy)	Western Sydney Regional Park (WSRP)	Indirect	Potential impacts to erosion and sediment, stormwater runoff, wastewater, pests, weeds and edge effects, fire and asset protection and boundary encroachments and access. Potential impacts are considered local and manageable. Impacts will be managed in accordance with the *Guidelines for developments adjoining land managed by the Office of Environment and Heritage* (OEH, 2013).	No change.

Table 5-12 Impact summary and comparison of impacts between the construction footprint as described in the EIS and amended construction footprint

Impact	Biodiversity values	Nature of impact	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Changes to impacts
Removal of native vegetation	Total native vegetation	Direct	73.65	80.64	Much of the change in total native vegetation clearance occurs for PCT 850 Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain in the eastern portion of the amended construction footprint.
	Cumberland Plain Woodland CEEC (TSC Act)		60.16 (including 22.65 ha of revegetation and 18.07 of derived native grassland in Low condition)	66.91 (including 24.31 ha of revegetation and 18.06 ha of derived native grassland in Low condition)	Increase of 6.75 ha in impacts - most of the change in impacts to native vegetation is to this TEC.
	Moist Shale Woodland EEC (TSC Act)		0.44	0.44	No change.
	River-flat Eucalypt Forest on Coastal Floodplains EEC (TSC Act)		3.23	3.01	Minor reduction in impacts.
	Shale Gravel Transition Forest EEC (TSC Act)		6.91	6.89	Negligible reduction in impacts.
	Swamp oak floodplain forest EEC (TSC Act)		2.53	2.82	Minor increase in impacts.
	Total TECs (TSC Act)		**73.27**	**80.07**	Net increase in impacts of 6.81 ha.

Impact	Biodiversity values	Nature of impact	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Changes to impacts
	Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest CEEC (EPBC Act)	Direct	38.48	42.47	Increase of 3.99 ha in impact.
	Western Sydney Dry Rainforest and Moist Woodland on Shale CEEC (EPBC Act)		0.44	0.44	No change.
	Total TECs (EPBC Act)		**38.92**	**42.91**	Increase of 3.99 ha in the clearing of CPW, mostly in the eastern part of the amended construction footprint.
Removal of threatened fauna species habitat and habitat features	Cumberland Plain Land Snail	Direct	1.86	5.22	Due to the discovery of a live Cumberland Plain Land Snail, additional areas of habitat for this species were identified.
	Eastern Coastal Free-tailed Bat (formerly Eastern Freetail-bat)		55.58 (foraging)	62.58 (foraging)	Additional areas of mainly woodland habitat in the eastern section of the amended construction footprint.
	Eastern False Pipistrelle		55.58 (foraging)	62.58 (foraging)	
	Greater Broad-nosed Bat		55.58 (foraging)	62.58 (foraging)	
	Grey-headed Flying-fox		55.20 (foraging)	62.58 (foraging)	

Impact	Biodiversity values	Nature of impact	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Changes to impacts
	Large Bent-winged Bat (formerly Eastern Bentwing-bat)		55.58 (foraging)	62.58 (foraging)	
	Little Bent-winged Bat (formerly Little Bentwing-bat)		55.58 (foraging)	62.58 (foraging)	
	Southern Myotis		0.92 (breeding) 3.69 (foraging)	0.96 (breeding) 3.69 (foraging)	Minor increase in potential breeding places due to slight increase to hollow-bearing trees, no increase to aquatic, foraging habitat.
	White-bellied Sea-Eagle		One nest (breeding) 3.69 (foraging)	One nest (breeding) 3.69 (foraging)	No change.
	Yellow-bellied Sheathtail-bat		55.58 (foraging)	62.58 (foraging)	Additional areas of mainly woodland habitat in the eastern section of the amended construction footprint.
Removal of threatened flora species	*Dillwynia tenuifolia*	Direct	244 individuals Area of occupancy 3.63 Potential habitat 13.38	244 individuals Area of occupancy 4.17 Potential habitat 13.70	No change in direct impacts. Small increase in impacts to potential habitat.

Impact	Biodiversity values	Nature of impact	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Changes to impacts
	Grevillea juniperina subsp. *juniperina*		0 individuals Area of occupancy 0.00 Potential habitat 49.38	0 individuals Area of occupancy 0.00 Potential habitat 56.32	No change in impact to individuals. Increase in impacts to potential habitat.
	Marsdenia viridiflora subsp. *viridiflora* in the Bankstown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith Local Government Areas		0 individuals Area of occupancy 0.00 Potential habitat 55.20	0 individuals Area of occupancy 0.00 Potential habitat 62.58	No change in impact to individuals. Increase in impacts to potential habitat.
	Pimelea spicata		0 individuals Area of occupancy of 0.00 Potential habitat 42.53	0 individuals Area of occupancy of 0.00 Potential habitat 49.30	No change in impact to individuals. Increase in impacts to potential habitat.
	Pultenaea parviflora		90 individuals Area of occupancy of 1.65 Potential habitat 7.29	Up to 100 individuals Area of occupancy 2.35 Potential habitat 7.46	Up to 10 additional plants may be directly impacted.
Aquatic habitat	Waterway modification	Direct	Temporary localised disturbance and potential loss of riparian habitat	Temporary localised disturbance and potential loss of riparian habitat Increased turbidity and nutrients	No change.
	Water quality				
	Removal of woody debris				

Impact	Biodiversity values	Nature of impact	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Changes to impacts
	Instream barriers Pond dewatering		Increased turbidity and nutrients Impediment of fish movements	Impediment of fish movements	
Groundwater Dependent Ecosystems	Vegetation Fauna habitat	Indirect	Local	Local	No change.
Changes to hydrology	Waterways	Indirect	N/A.	N/A	Minor change. Diversion that will have a minor impact on unnamed tributary of Kemps Creek.
Fragmentation of identified biodiversity links and habitat corridors	Wildlife Corridors	Direct and Indirect	Moderate and manageable	Minor increase in area of native vegetation to be cleared.	No change to significance of impacts.
Edge effects on adjacent native vegetation and habitat	Vegetation to be fragmented	Indirect	12.73 of native vegetation (including 7.03 of revegetation) within Western Sydney Parklands and east of Clifton Avenue	13.52 of native vegetation (including 6.02 of revegetation) within Western Sydney Parklands and east of Clifton Avenue	Increase of 0.79 ha in area of indirect impact.
Injury and mortality of fauna	Potentially all fauna species present	Direct	Local	Local	No change.

Impact	Biodiversity values	Nature of impact	Area within construction footprint as described in the EIS excluding certified areas (ha)	Area within amended construction footprint excluding certified areas (ha)	Changes to impacts
Invasion and spread of weeds	All vegetation adjacent to works	Indirect	Local in area of disturbance		
Invasion and spread of pests	All vegetation adjacent to works	Indirect	Local		
Invasion and spread of pathogens and disease	All vegetation adjacent to works	Indirect	Local		
Noise, light and vibration	All local fauna species	Direct/indirect	Local		

6. Cumulative impacts

Cumulative biodiversity impacts may arise from the interaction of construction and operation activities of the project and other approved or proposed projects in the area. When considered in isolation, specific project impacts may be considered minor, but when considered with the impact of multiple projects, they may be considered more substantial. As such, the EIS assessed biodiversity impacts in consideration of the following recently completed, ongoing and proposed projects:

- Western Sydney International Airport
- Sydney Metro – Western Sydney Airport
- The Northern Road Upgrade
  - Stage 5 (Littlefields Road to Glenmore Park)
  - Stage 6 (Littlefields Road to Eaton Road)
- Other existing road network upgrades and potential road projects, including:
  - Elizabeth Drive Upgrade
  - Mamre Road Upgrade
  - Outer Sydney Orbital
- Major land releases, including:
  - Western Sydney Aerotropolis
  - South West Growth Area
  - Western Sydney Employment Area.

The above projects are in varying stages of delivery and planning. Chapter 7 of the EIS presents a detailed description of each project, and Section 7.1.5 of the EIS provides a summary of the cumulative biodiversity impacts of each project. **Table 6-1** presents a summary of cumulative biodiversity impacts and identifies where these cumulative impacts have changed as a result of the project.

In summary, changes to the cumulative biodiversity impacts as described in the EIS are minor. Amended cumulative biodiversity impacts include an increase in cleared native vegetation of around eight hectares, and corresponding similar increases in fauna habitat impacts. These biodiversity impacts are consistent whether the option of an Elizabeth Drive connection goes ahead as the assessment is based on a worst-case scenario footprint.

Table 6-1 Cumulative impacts

Project and status	Cumulative impacts	Amended cumulative impacts
Western Sydney International Airport Approved. Under construction	During construction, the Western Sydney International Airport footprint is predicted to impact on about 280.8 hectares of native vegetation (GHD, 2016a). When considered alongside about 81 hectares of native vegetation in moderate to good condition to be removed for the project, the projects would together remove over 340 hectares of native vegetation, including threatened ecological communities and habitat for threatened species. There would be significant cumulative biodiversity impacts associated with the construction of the project and the Western Sydney International Airport. The Western Sydney International Airport and the project would be	Minor change associated with an increase in native vegetation clearing from the project as described in the EIS.

Project and status	Cumulative impacts	Amended cumulative impacts
	operational at the same time. As a result, impacts such as injury and mortality of fauna and noise, light and vibration may be greater than if the projects were operating in isolation. There would likely be, at minimum, moderate cumulative biodiversity impacts associated with the operation of the project and the Western Sydney International Airport.	
Sydney Metro – Western Sydney Airport Not yet approved	Construction timeframes for the Sydney Metro – Western Sydney Airport are likely to have some overlap with the construction of the project. During any timeframes when construction activities are concurrent, increased biodiversity impacts are likely. This would depend on the specific construction locations and the different construction activities, and the extent of biodiversity impacts. Although there are no details available on the biodiversity impacts of the Sydney Metro – Western Sydney Airport, given that the impacts of the project would be significant, it is likely that there would be significant cumulative biodiversity impacts associated with the construction of the project and the Sydney Metro – Western Sydney Airport. The Sydney Metro – Western Sydney Airport and the project would both be operational in the longer term (ie opening of the Metro may occur after the opening of the project). It is likely that there would be, at minimum, moderate cumulative biodiversity impacts associated with the operation of the project and the Sydney Metro – Western Sydney Airport.	No change.
The Northern Road upgrade Approved. Construction has begun	It is anticipated that about 2.4 hectares of remnant native vegetation and up to 3.9 hectares of planted vegetation along the M4 Motorway would be impacted for The Northern Road upgrade (Roads and Maritime, 2017a). A further 59.2 hectares of native vegetation is likely to be impacted between Narellan and Bringelly. When considered alongside the 63 hectares of native vegetation in moderate to good condition to be removed for the project, the projects would together remove almost 130 hectares of native vegetation, including threatened ecological communities and habitat for threatened species. Given that the impacts of the project are significant, there would be significant cumulative biodiversity impacts associated with the construction of the project and The Northern Road upgrade Stages 5 and 6. The Northern Road upgrade and the project would be operational at the same time. As a result, impacts such as injury and mortality of fauna and noise, light and vibration may be greater than if the projects were operating in isolation. It is likely that there would be, at minimum, moderate cumulative biodiversity impacts associated with the operation of the project and The Northern Road upgrade Stages 5 and 6.	Minor increase to vegetation clearing as a result of the amended project.

Project and status	Cumulative impacts	Amended cumulative impacts
Other existing road network upgrades and potential road projects, including: • Elizabeth Drive upgrade • Mamre Road upgrade • Outer Sydney Orbital Not yet approved	The timing for construction of these projects has not yet been announced. However, there is potential for overlaps in construction timing between the project and some of these road upgrade works. Although there are no details available on the biodiversity impacts of the other road network upgrades, given that the impacts of the project would be significant, it is likely that there would be significant cumulative biodiversity impacts associated with the construction of the project and other road projects. It is likely that there would be, at minimum, moderate cumulative biodiversity impacts associated with the operation of the project and other road projects	No change.
Major land releases, including: • Western Sydney Aerotropolis • South West Growth Area • Western Sydney Employment Area. Future strategic government project	The timing for the construction of developments within these growth areas has not yet been announced. There would be potential of overlaps in construction timing between some developments and the project. It is likely that there would be significant cumulative biodiversity impacts associated with the construction of the project and the development associated with the nearby growth areas. It is likely that there would be, at minimum, moderate cumulative biodiversity impacts associated with the operation of the project and the development associated with the nearby growth areas.	No change.

7. Revised environmental management measures

This chapter provides a summary of the environmental management measures that would be required to minimise, avoid or mitigate the impacts of the amended project on biodiversity in the amended project study area.

The environmental management measures that will be implemented to minimise the biodiversity impacts of the project, along with the responsibility and timing for those measures, were described in Section 7.1.6 of the EIS and Chapter 10 of the BAR.

The amended biodiversity environmental management measures are presented in **Table 7-1**. Underlined text has been used to indicate new biodiversity environmental management measures for the amended project, while plain text indicates environmental management measures as described in the EIS/BAR. These measures are consistent between the two options.

Table 7-1 Biodiversity environment management measures

Impact	Reference	Environmental management measure	Responsibility	Timing
Edge effects on adjacent native vegetation and habitat	B24	Exclusion zones will be set up at the limit of clearing in accordance with *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (RTA, 2011) (Guide 2: Exclusion zones). Exclusion zones will be set up for all areas of environmental value. Particularly, exclusion zones will be set up to protect potential indirect impacts to threatened flora (**Figure 1-2**).	Contractor	During construction

8. Offsetting required

Section 7.1.7 of the EIS presented the biodiversity offsets that would be required for the project. In summary, under the FBA, any residual impacts that cannot be avoided, minimised or mitigated, must be offset, with the offset requirements quantified as biodiversity credits.

For the project as described in the EIS, ecosystem credits were calculated for six PCTs, all of which correspond with TECs under the TSC Act and/or EPBC Act. A total of 2,568 ecosystem credits were identified as being required for the project as described in the EIS, comprising 2,414 credits for direct impacts and 154 for indirect impacts. The amended project would require a total of 2,829 ecosystem credits, comprising 2,674 credits for direct impacts and 155 for indirect impacts.

Under the FBA, species can be either ecosystem species where their habitat is offset by the appropriate PCT credits, or species credit species requiring specific credits suitable for that species. For the project as described in the EIS, species credits were calculated for two threatened flora species (*Dillwynia tenuifolia*, *Pultenaea parviflora*) and two threatened fauna species (Cumberland Plain Land Snail, Southern Myotis) listed under the TSC Act and/or EPBC Act. A total of 5,786 species credits were identified as being required for the project as described in the EIS. The amended project would require a total of 5,981 species credits.

Table 8-1, Table 8-2 and **Table 8-3** provide a comparison of the ecosystem and species credits calculated for the amended construction footprint with the credit requirements for the project as described in the EIS presented in the EIS BAR.

Table 8-1 Ecosystem credit offset requirements: direct impacts

PCT name	All impacts (including EPBC TEC impacts)				Change in credits required	EPBC TEC impacts only				Change in credits required
	Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas			Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas		
	Area (ha)	Credits	Area (ha)	Credits		Area (ha)	Credits	Area (ha)	Credits	
Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion PCT: 724 BVT: HN512	6.91	372	6.89	370	-2	4.86	276	4.86	275	-1
Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion PCT: 830 BVT: HN524	0.44	15	0.44	15	0	0.44	15	0.44	15	0
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion PCT: 835 BVT: HN526	3.23	107	3.01	99	-8	N/A – not listed	N/A	N/A – not listed	N/A	N/A

PCT name	All impacts (including EPBC TEC impacts)				Change in credits required	EPBC TEC impacts only				Change in credits required
	Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas			Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas		
	Area (ha)	Credits	Area (ha)	Credits		Area (ha)	Credits	Area (ha)	Credits	
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion PCT: 849 BVT: HN528	6.09	203	6.24	206	+3	1.61	65	1.60	65	0
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion PCT: 850 BVT: HN529	54.07	1650	60.67	1909	+259	32.01	1469	36.01	1639	+170
Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley PCT: 1800 BVT: HN674	2.53	67	2.82	75	+8	0.00	0	0.00	0	0
Total	**73.27**	**2414**	**80.07**	**2674**	**+260**	**38.92**	**1825**	**42.91**	**1994**	**+169**

Table 8-2 Ecosystem credit offset requirements: indirect impacts

PCT name	All indirect impacts				Change in credits required	EPBC TEC impacts only				Change in credits required
	Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas			Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas		
	Area (ha)	Credits	Area (ha)	Credits		Area (ha)	Credits	Area (ha)	Credits	
Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion PCT: 724 BVT: HN512	0.52	7	0.45	6	-1	0.52	7	0.45	6	-1
Forest Red Gum - Grey Box shrubby woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion PCT: 830 BVT: HN524	0.54	5	0.61	6	+1	0.54	5	0.61	6	+1
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion PCT: 849 BVT: HN528	0.24	3	0.57	6	+3	0.24	3	0.57	6	+3

PCT name	All indirect impacts				Change in credits required	EPBC TEC impacts only				Change in credits required
	Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas			Construction footprint in EIS excluding certified areas		Amended construction footprint excluding certified areas		
	Area (ha)	Credits	Area (ha)	Credits		Area (ha)	Credits	Area (ha)	Credits	
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion PCT: 850 BVT: HN529	11.43	139	11.89	137	-2	11.33	138	10.75	125	-13
Total	**12.73**	**154**	**13.52**	**155**	**+1**	**12.63**	**153**	**12.38**	**143**	**-10**

Table 8-3 Species credit offset requirements

Species name	Loss of habitat (ha) or individuals within construction footprint as described in the EIS excluding certified areas	Species credits required for impacts of construction footprint as described in the EIS	Loss of habitat (ha) or individuals within amended construction footprint excluding certified areas (ha)	Species credits required for impacts of amended construction footprint	Change in credits required
Dillwynia tenuifolia	244 individuals	4392	244 individuals	4392	0
Pultenaea parviflora Sydney Bush-pea	90 individuals	1350	Up to 100 individuals	1500	+150
Meridolum corneovirens Cumberland Plain Land Snail	1.86	24	5.22	68	+44
Myotis macropus Southern Myotis	0.92	20	0.96	21	+1
Total species credits		**5786**		**5981**	**+195**

9. Summary and conclusions

The proposed M12 Motorway between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham is expected to be open to traffic prior to the opening of the Western Sydney International Airport. As part of the approval process for the project, an EIS was prepared and placed on public exhibition in October 2019. TfNSW proposes to amend the project as described in the EIS (see **Section 1.1** of the amendment report), following further design development since the exhibition of the EIS. This biodiversity supplementary technical report has been prepared to support the amendment report and provide information on further surveys and assessments that have been carried out since the EIS.

The main areas relevant to biodiversity where the amended project differs from the project as described in the EIS are around the connection to the M7 Motorway, and in the addition of ancillary facilities for construction contractors. These changes have resulted in an increase of about seven hectares in the amount of native vegetation clearing, about four hectares of which constitutes a critically endangered EPBC listed community, *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*. This increase in native vegetation removal means minor increases to the habitat removal for candidate species such as the Grey-headed Flying-fox, Cumberland Plain Land Snail and a number of threatened microbat species. Additional individuals of the threatened flora species, *Pultenaea parviflora* may also be impacted.

Significant impacts for EPBC listed entities Cumberland Plain Woodland and *Pultenaea parviflora* and for TSC Act listed *Dillwynia tenuifolia* were expected at the conclusion of the assessment carried out on the project as described in the EIS. Offsets for these impacts, and minor impacts on other entities were proposed. The amended project is consistent with this finding, with no significant changes to the impact assessment found and an increase (8,810 up from 8,354) in offsets required for the amended project.

Revised management measures are generally consistent with the measures proposed for the project as described in the EIS, with further detail on the use of exclusion zones and an additional measure to protect soil and water included.

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