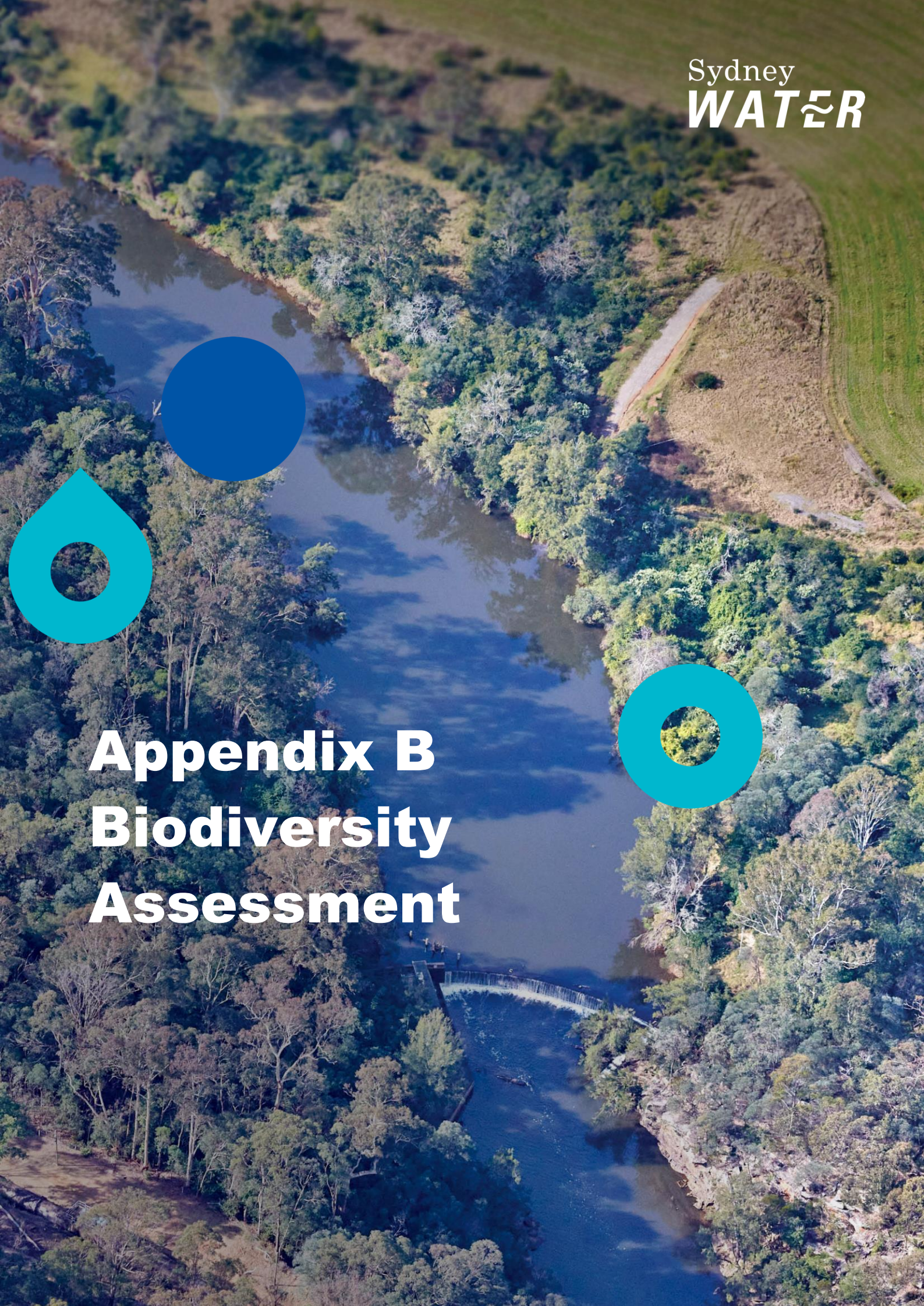

Sydney WATER

Appendix B Biodiversity Assessment

Upper South Creek Advanced Water Recycling Centre Project amendments: Biodiversity Assessment

FINAL REPORT

Prepared for Sydney Water

24 February 2022

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Biosis project no.:	31617
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Biosis staff involved in this project were:

- Lauren Harley and Astrid Mackgaard (GIS and mapping)

Contents

Tables

Figures

1 Introduction

1.1 Project background

Biosis Pty Ltd was commissioned by Sydney Water to undertake a biodiversity assessment and provide a Project Amendment Report for the Upper South Creek Advanced Water Recycling Centre (AWRC) (the project). This amendment report outlines the changes proposed to the impact area since the *Upper South Creek Advanced Water Recycling Centre Biodiversity Development Assessment Report* (USC AWRC BDAR) (Biosis 2021) was submitted with the project's Environmental Impact Statement (EIS), and provides an updated assessment of the project's impacts and offsetting requirements in accordance with the Biodiversity Assessment Methodology (BAM) (DPIE 2020).

This report covers the project amendments at the following seven locations:

- Bartley Street re-alignment, located off the intersection of Curtin Street and Cumberland Street in Cabramatta.
- Western Sydney Parklands re-alignment, located approximately 570 metres south-east of the intersection of Elizabeth Drive and Range Road in Kemps Creek.
- Kemps Creek re-alignment , located 250 metres south-west of the intersection of Elizabeth Drive and Mamre Road in Kemps Creek.
- South Creek re-alignment, located approximately 1.5 km north-west of the intersection of Elizabeth Drive and Western Road in Kemps Creek.
- M12 crossing, located approximately 1.8 km north-east of the intersection of Elizabeth Drive and Martin Road in Kemps Creek.
- The southern boundary of the AWRC site where the impact areas intersects with land that occurs within the M12 corridor.
- Northern Road crossing, located at the intersection of Elizabeth Drive and The Northern Road in Luddenham.

Figure 1 displays the location of these project amendments and the modified project impact area and impact assessment area.

1.2 Scope of amendments

The objectives of this investigation are to:

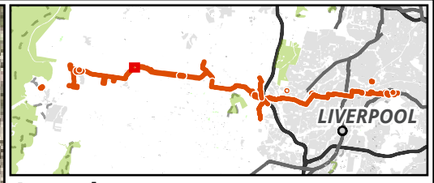
- Calculate the change in direct, indirect, prescribed and cumulative impacts resulting from the amended impact area. Address the BAM (DPIE 2020) and the Biodiversity Offset Scheme (BOS) in respect to these changes, as required under the NSW *Biodiversity Conservation Act 2016* (BC Act).
- Identify how the proponent has implemented the avoid and minimise principles with regards to modified impacts to biodiversity resulting from the impact area amendments.
- Identify any additional impacts that could be characterised as serious and irreversible.
- Provide updated biodiversity offset obligation for the project require to compensate for any unavoidable biodiversity impacts.

- Consider and assess the amended project in accordance with other relevant legislation such as the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.3 Impact area, impact assessment area, study area and subject land

To ensure consistency with the USC AWRC BDAR (Biosis 2021), the following terms have been used in this amendment report:

- Impact area: The area to be directly impacted by construction and operation of the project, including identified compound areas and access tracks. The impact area is generally 12.5 m either side of the pipeline alignments but is wider or narrower in certain areas. For the Water Recycling Centre site, this impact area comprises the entire 80 ha site.
- Impact assessment area: A wider area, generally 12.5 m either side of the impact area to allow for design flexibility after the EIS is approved.
- Study area: The broader area in which the impact area and impact assessment area is located, including all areas of direct and indirect impact, the required 500 m buffer on the impact area, and larger areas to provide context to the project.
- Subject land: The subject land is land to which Stage 1 of the BAM is applied to assess the biodiversity values of that land (DPIE 2020).The subject land occurs within the study area, and within the current assessment is synonymous with the impact area, and is referred to as such throughout this BDAR.
- Project alignment: A general term for the pipeline route from Lansdowne to Warragamba, including the AWRC site, and all ancillary areas and access tracks.



Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area

Figure 1.1 Overview of alignment changes, Northern Road crossing

0 10 20 30 40 50

Metres

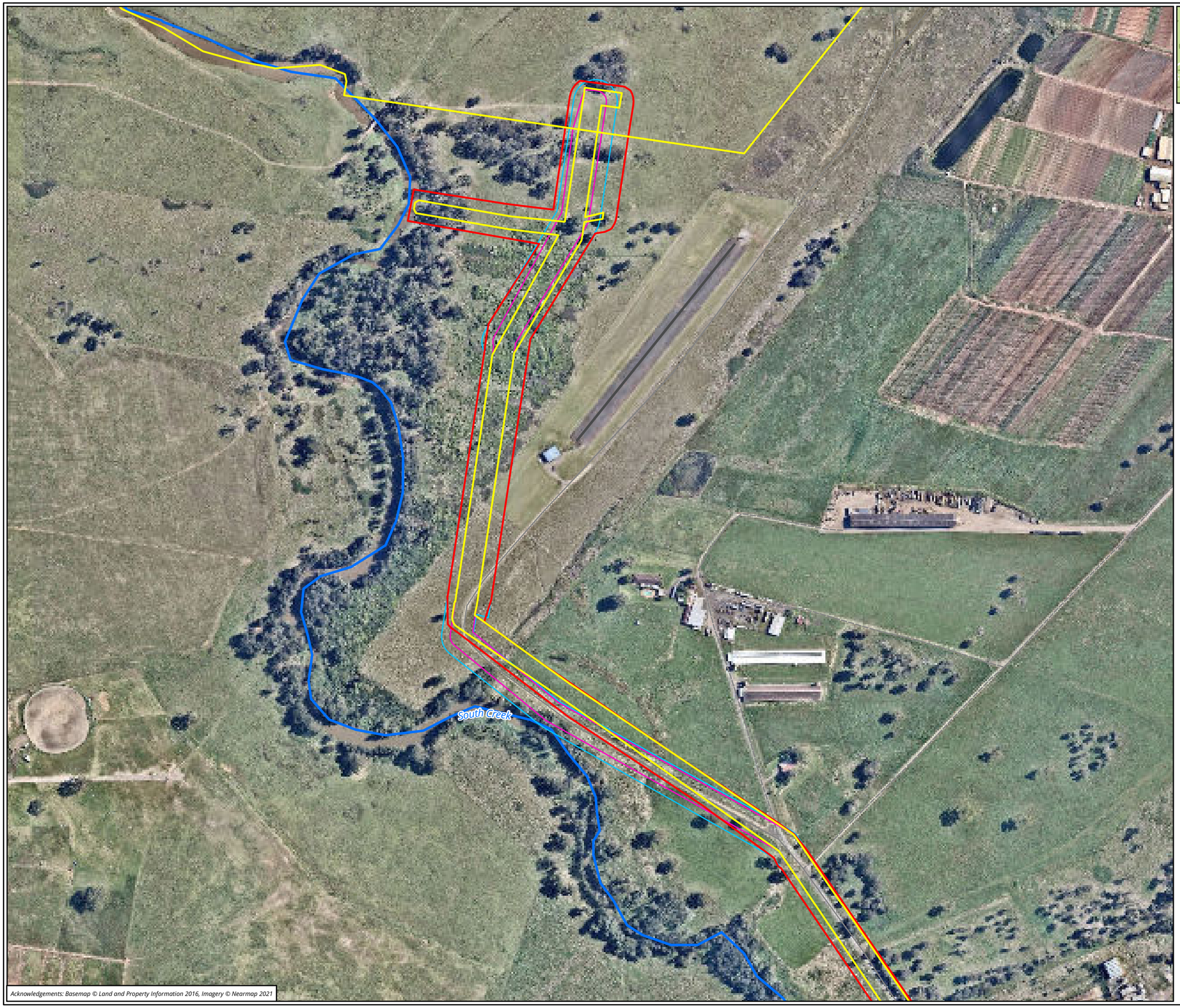
Scale: 1:2,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00



Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area

Figure 1.2 Overview of alignment changes, M12 crossing and South Creek re-alignment

0 30 60 90 120 150

Metres

Scale: 1:4,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

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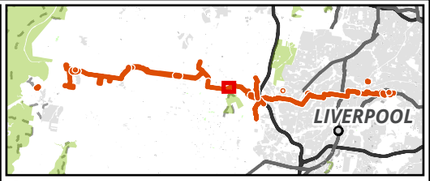
biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © Nearmap 2021



Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area

Figure 1.3 Overview of alignment changes, Kemps Creek re-alignment

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © Nearmap 2021

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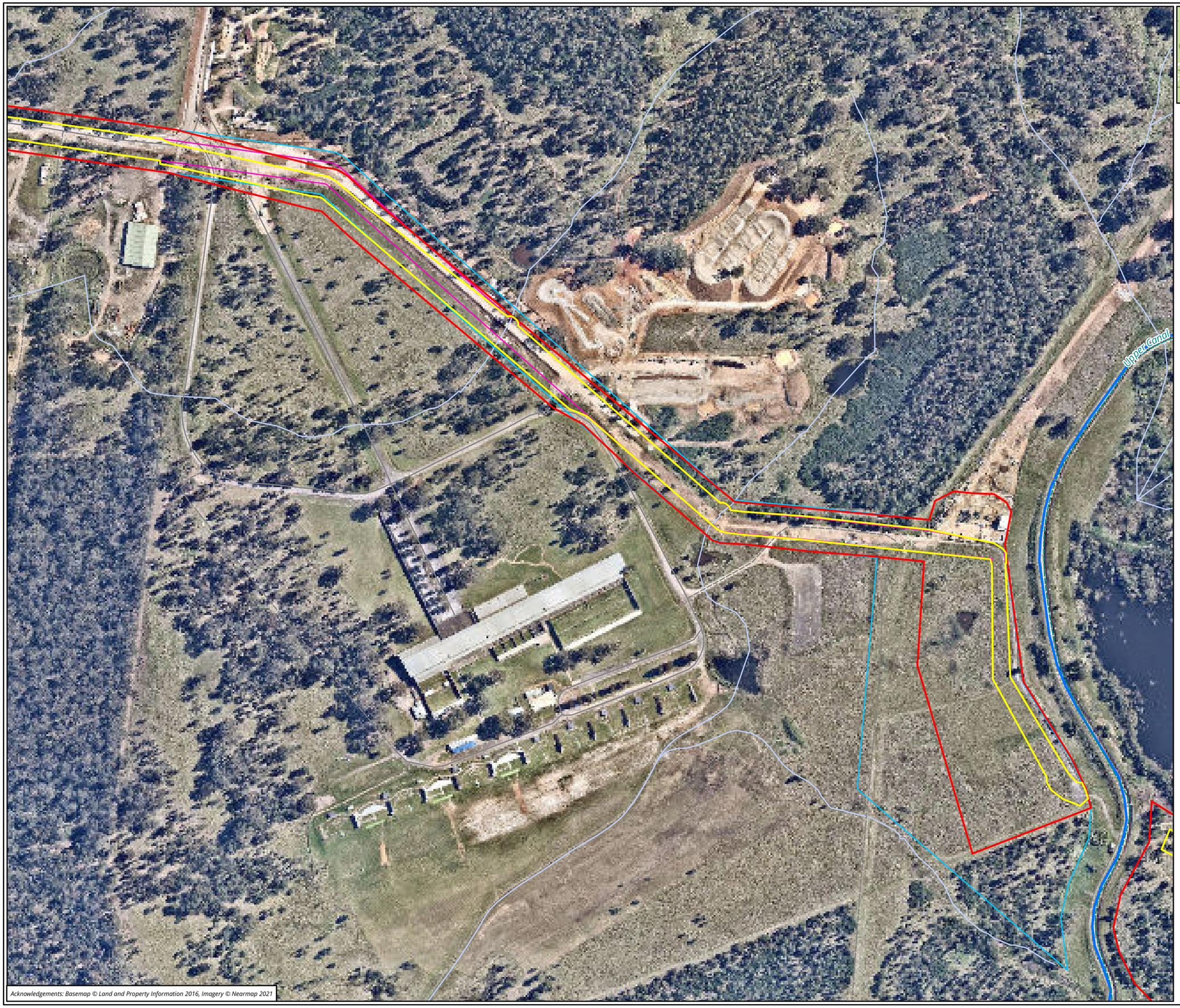

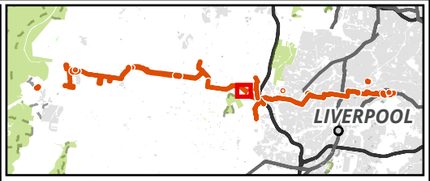

Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area

Figure 1.4 Overview of alignment changes, Western Sydney Parklands re-alignment

0 30 60 90 120 150

Metres

Scale: 1:4,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Figure 1.5 Overview of alignment changes, Bartley Street re-alignment


AWRC EIS impact area
Amended impact area
Amendment location
0 30 60 90 120 150
Metres
N
Scale: 1:4,178 @ A3
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biosis
Matter: 34189,
Date: 24 February 2022,
Checked by: Samantha McCann, Drawn by: BRAG, Last edited by: cwharfe
Location: P:\31600s\31617\Mapping\
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Acknowledgements: VicMap ©State of Victoria, Imagery NearMap 201#
© Department of Customer Service 2020

2 Methods

2.1 Database and literature review

This biodiversity assessment has been undertaken as a desktop assessment only, utilising data previously collected during the development of the USC AWRC BDAR (Biosis 2021). The following databases, information provided by Sydney Water and other key information was reviewed as part of this assessment:

- Commonwealth Department of Agriculture, Water and Environment (DAWE) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Environment, Energy and Science (EES) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- EES Vegetation Information System (VIS) mapping, including.
  - *Native Vegetation of Southeast NSW: A Revised Classification and Map for the Coast and Eastern Tablelands* (Tozer et al. 2010)
  - *Remnant Vegetation of the western Cumberland subregion, 2013 Update VIS_ID 4207* (DPIE 2015).
  - *The Native Vegetation of the Sydney Metropolitan Area - Version 3.1* (DPIE 2016).
- USC AWRC BDAR (Biosis 2021) including vegetation mapping, BAM plot data, and habitat assessment data.
- Recent Nearmap aerial imagery of the project area.

The implications for the project and project amendments have been assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999*.
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Biodiversity Conservation Act 2016*.
- *Fisheries Management Act 1994* (FM Act).
- *Biosecurity Act 2015* (Biosecurity Act).
- *National Parks and Wildlife Act 1974* (NPW Act).
- *Water Management Act 2000* (WM Act).
- *State Environmental Planning Policy No 19 – Bushland in Urban Areas 1986* (SEPP Bushland in Urban Areas)
- *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (SEPP Sydney Region Growth Centres) and the *Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.
- *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020*.
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*.
- *State Environmental Planning Policy (Coastal Management) 2018*.

- *State Environmental Planning Policy (Koala Habitat Protection) 2020*.
- *Cumberland Plain Conservation Plan* (State of NSW 2020).

It should be noted that not all of the above legislation and polices have been re-addressed herein, and only those specifically relevant to the project amendments are considered further.

2.2 BAM assessment requirements

This project amendment report has been prepared on the basis of the requirements of, and information provided under the BAM (DPIE 2020) and s6.15 of the NSW BC Act, and are certified by BAM Accredited Assessor Callan Wharfe (BAAS18138) as of 24 February 2022.

3 Results

This section details the amendments to the impact area and impact assessment area at each of the six locations, and details the change in impacts resulting from the proposed amendments.

3.1 Summary of project amendments

3.1.1 Bartley Street re-alignment

Previously at this location the pipeline travelled along Curtin Street before underboring Broomfield Street, the Cabramatta Regents Park Railway, Cabramatta Granville Railway and Railway parade. The pipeline then re-emerged within the Cabravale Memorial Park before continuing along Bartley Street. Additional impact area and impact assessment area locations were included within the Cabravale Memorial Park to allow for ancillary sites.

The amendment has the pipeline turning 90 degrees north at the intersection between Curtin Street and Cumberland Street and entering the car park of the Cabravale Leisure Centre. The pipeline then underbores Broomfield Street, the Cabramatta Regents Park Railway, Cabramatta Granville Railway and Railway parade before continuing along Bartley Street. The amendment includes an expanded impact area within the Cabravale Leisure Centre car park (Lot 1 DP433768 and Lot 1 DP203909) to allow for ancillary sites, as well as a slight extension along the eastern end of Bartley Street to the intersection with Railway Parade. The impact areas and impact assessment areas within the Cabravale Memorial Park have also been removed, avoiding impacts to vegetation in these areas.

3.1.2 Western Sydney Parklands re-alignment

Previously at this location the pipeline entered from the west, underboring Upper Canal, before tracking northwards along the eastern boundary of Lot 1 DP875790. The pipeline made a turn 90 degrees west and continued along the northern boundary of Lot 1 DP875790, making another 45 degree turn along its trajectory. The associated impact area and impact assessment area passed through native vegetation within the adjacent Lot 3 DP1087825. A large impact assessment area was also included in the south-west corner of Lot 1 DP875790 which also covered a roughly triangular patch of native vegetation in the corner of Lot 3 DP1087825, near the underbore crossing of Upper Canal.

The amendment has the pipeline entering from the west, underboring Upper Canal and continuing along the boundary of Lot 1 DP875790. However, north of the Sydney International Shooting Centre the pipeline has been shifted southwards to ensure the project will not result in increased impacts to biodiversity values outside of the existing easement already cleared of vegetation. The impact assessment area in the south-west corner of Lot 1 DP875790 has also been reduced and no longer intrudes into Lot 3 DP1087825, avoiding the native vegetation in this area.

3.1.3 Kemps Creek re-alignment

Previously at this location the pipeline travelled westwards along Range Road skirting along the northern boundary of Brandown Quarries before cutting south-west through vegetation to the north of the Kemps Creek Nature Reserve and crossing over Kemps Creek before continuing westwards along Cross Street.

The amendment has the impact area continuing westwards from the corner of Brandown Quarries before making a 90 degree turn southwards along the boundary of Lot 11 DP1146142. The impact area then makes another 90 degree turn to crossover Kemps Creek and connect with Cross Street before continuing along its previous alignment. These changes correspond with the Sydney Water Prospect South to Macarthur (ProMac)

project, taking advantage of this cleared corridor and thereby avoiding unnecessary impacts to native vegetation.

3.1.4 South Creek re-alignment

Previously at this location the pipeline travelled along an existing track in the area which caused the impact area and impact assessment area to intersect with South Creek and its associated riparian zone. The amendment shifts the pipeline to northwards so the associated impact area and impact assessment area no longer intersect with South Creek and avoid impacts to the associated riparian vegetation.

3.1.5 M12 crossing

The amendment at this location includes widening of the pipeline impact area and impact assessment area where it joins the Advanced Water Recycling Centre, to allow for the crossing of the future M12. This amendment also includes an additional westwards branch (with an impact assessment area of approximately 160 metres long by 37 metres wide) that connects to South Creek.

3.1.6 Southern boundary of AWRC site

The amendment location comprises a sliver of land along the southern boundary of AWRC site which has been removed from the impact area (including the associated construction compound). The amendment area occurs with the M12 corridor.

3.1.7 Northern Road crossing

Previously at this location the pipeline impact area entering from the east crossed southwards over Elizabeth Drive by underboring, and continued south-west, following the recently modified Elizabeth Drive into the new intersection with The Northern Road. The pipeline was then underbored westwards under The Northern Road before tracking south, along the western side of The Northern Road.

The amendment has the pipeline impact area entering from the east and continuing westwards along the previous footprint of Elizabeth Drive up to the previous intersection with The Northern Road which occurred at a roundabout. The pipeline is then underbored westwards under The Northern Road, emerging slightly north of its previous emergence, before tracking south, along the western side of The Northern Road.

3.2 Application of avoid and minimise principles

As outlined in Section 10.1 of the BDAR (Biosis 2021) the overall project design and alignment underwent multiple updates in consideration of the principles of avoidance and minimisation of impacts to biodiversity values. The project design phase occurred over three stages; 50 %, 80 % and 100 % percent design completion, with each update considering how impacts to biodiversity values could be minimised, based on field survey, and workshops with project designers to ensure workable commitments and outcomes.

Workshops were focussed on avoiding impacts to areas of higher biodiversity constraint such as Threatened Ecological Communities (TECs), high condition native Plant Community Types (PCTs), riparian areas, threatened species habitat etc., through alignment revisions and refinements. Multiple avoidance options were workshopped including underbores, moving the alignment to avoid impacts to vegetation, narrowing of the alignment, locating the alignment in the roadway, relocating/redesigning ancillary areas, considering alternative construction methods etc.

Further design revisions and alignment selection during the iterative project design process resulted in the following broad scale reduction of impacts to biodiversity values (further detailed provided in the project BDAR):

- Reduced impacts to Coastal Freshwater Wetlands, Cumberland Plain Woodland, River-flat Eucalypt Forest and Swamp Oak Floodplain Forest TECs at multiple locations along the alignment.
- Substantially reduced impacts to Downy Wattle and Native Pear individuals and habitat at Lansdowne Reserve, as well as avoidance of impact to Lansdowne Reserve Biodiversity Stewardship Site, via construction method re-design.
- Avoidance of direct impacts and minimisation of indirect impacts to the Grey-headed Fly-fox camp at Wallacia, as well as direct impacts to Camden White Gum.
- Avoidance of Existing Non-certified areas along Cross Street at Kemps Creek, and reduced impacts to Existing Certified land through alignment narrowing.
- Completely avoiding impact to Shale Sandstone Transition Forest through redesign of the project alignment.

Project amendments have continued to apply the principles of avoidance and minimisation of impact to biodiversity values, with the amendments resulting in the following additional reduction of impacts:

- Substantial redesign of the project alignment where the impact area and impact assessment area cross Kemps Creek, to locate the pipeline within an existing easement already cleared of vegetation. The EIS exhibited project alignment previously impacted upon the following biodiversity values, in this location:
  - PCT 835 (conforming to BC Act listed River-flat Eucalypt Forest TEC) – 0.55 hectares.
  - PCT 849 (conforming to BC Act and EPC Act listed Cumberland Plain Woodland) – 0.11 hectares.
  - Assumed present and expert mapped habitat for Netted Bottle *Dillwynia tenuifolia*. Juniper-leaved Grevillea, Native Pear, Matted Bush-pea, *Pimela spicata*, Cumberland Plain Land Snail and Southern Myotis.
  - As a result of the project amendment in this location, impacts to Netted Bottle Brush, Juniper-leaved Grevillea and Matted Bush-pea habitat are now completely avoided by the project.
- Re-alignment of the impact area at South Creek and along the southern boundary of the AWRC site has resulted in the avoidance of impact to a further approximately 0.24 hectares of PCT 835 (River-flat Eucalypt Forest TEC) vegetation.
- Amendments to the project alignment within Western Sydney Parklands, to the west of the M7 motorway, have ensured that the project will mainly be located within the existing easement already cleared of vegetation.
- The project amendments have however resulted in the following minor increases in impact to native vegetation and threatened species habitat at The Northern Road re-alignment, the M12 crossing and the Western Sydney Parklands re-alignment. Further details are provided in Table 1 below.

Overall the project amendments have further reduced impacts to biodiversity values resulting from the project, compared to the level of impact included in the project's BDAR (Biosis 2021). The most substantial of which is the reduction of impacts across Kemps Creek. This area supports intact PCT 835 vegetation representative of River-flat Eucalypt Forest TEC, lower condition PCT 849 vegetation (Cumberland Plain Woodland TEC), and supports potential habitat for a number of threatened species. The area is also listed as a Priority Conservation Area in the Cumberland Plain Recovery Plan (DECCW 2010), and mapped as Protected Lands under the Draft Growth Centres Conservation Plan (Growth Centres Commission 2007), being subject to Relevant Biodiversity Measure (RBM) 12 under the SEPP Sydney Region Growth Centres. RBM 12 states

that that within relevant lands mapped on the biodiversity certification maps (including the land surrounding Kemps Creek) existing native vegetation must not be cleared unless it is in accordance with a plan of management or unless such clearance has been agreed to by the Department of Environment and Climate Change (now Department of Planning, Industry and Environment). The project is now aligned with this requirements.

Ongoing minimisation of impacts during the construction and operational phases of the project will be ensured through implementation of the mitigation measures outlined in Section 11.5 of the BDAR (Biosis 2021).

3.3 Updated direct impacts

As detailed Section 11.1 of the BDAR (Biosis 2021), direct impacts arising from the project include:

- Removal of native vegetation and flora and fauna habitats.
- Removal of known habitat for threatened flora species, and individual plants.
- Removal of known and assumed habitat for threatened fauna species.
- Removal of BC Act listed TECs.
- Removal of EPBC Act listed TECs.
- Removal of habitats considered to be potential Serious and Irreversible Impacts (SAIIs).
- Removal of threatened flora habitat assumed present in unsurveyed section of the impact area at Kemps Creek.
- Removal of native vegetation, threatened flora, and TECs from 'Existing Certified' areas.

The six amendments detailed above in Section 3.1 have resulted in a change in the project's direct impacts to native vegetation, threatened flora and fauna species habitat, and BC Act and EPBC Act listed TECs. Table 1 provides a comparison of direct impacts at each of the six amendment location between those presented in the project's Environmental Impact Statement (EIS) and assessed in the USC AWRC BDAR (Biosis 2021) and those that will occur as a result of the proposed amendments. Table 2 provides a summary of the changes in the Project's overall direct impacts. The amended impacts to PCTs, vegetation zones and TECs are shown in Figure 2 whilst the amended impacts to threatened species impacts are shown in Figure 3.

Table 1 Changes in direct impacts as a result of project amendments

PCT / Species	Listing status	EIS impact	Amended design impact	Change in impacts
Northern Road crossing				
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 Ecological Community [CEEC], EPBC Act and BC Act) (Cumberland Plain Woodland CEEC)	849_Scattered trees: 0.00 ha	849_Scattered Treed: 0.03 ha	849_Scattered Treed: 0.03 ha
Southern Myotis *Myotis macropus*	Vulnerable (BC Act)	0.00 ha	0.03 ha	0.03 ha
M12 crossing				
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 Ecological Community [EEC], BC Act) (River-flat Eucalypt Forest EEC	835_Thinned: 0.14 ha	835_Thinned: 0.19 ha	835_Thinned: 0.05 ha
849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Cumberland Plain Woodland CEEC	849_Thinned: 0.04 ha	849_Thinned: 0.05 ha	849_Thinned: 0.01 ha
Cumberland Plain Snail *Meridolum corneovirens*	Endangered (BC Act)	0.18 ha	0.24 ha	0.06 ha
Southern Myotis *Myotis macropus*	Vulnerable (BC Act)	0.17 ha	0.24 ha	0.06 ha
South Creek re-alignment				
835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	River-flat Eucalypt Forest EEC	835_Thinned: 0.07 ha 835_Scattered Trees: 0.02 ha	835_Thinned: 0.00 ha 835_Scattered Trees: <0.01 ha	835_Thinned: -0.07 ha 835_Scattered Trees: -0.02 ha
Cumberland Plain Snail *Meridolum corneovirens*	Endangered (BC Act)	0.07 ha	0.00 ha	-0.07 ha

PCT / Species	Listing status	EIS impact	Amended design impact	Change in impacts
Southern Myotis *Myotis macropus*	Vulnerable (BC Act)	0.09 ha	<0.01 ha	-0.09 ha
AWRC southern boundary re-alignment				
835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	River-flat Eucalypt Forest EEC	835_Thinned: 0.15 ha	835_Thinned: 0.00 ha	835_Thinned: -0.15 ha
Cumberland Plain Snail *Meridolum corneovirens*	Endangered (BC Act)	0.15 ha	0.00 ha	-0.15 ha
Southern Myotis *Myotis macropus*	Vulnerable (BC Act)	0.15 ha	0.00 ha	-0.15 ha
Kemps Creek re-alignment				
835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	River-flat Eucalypt Forest EEC	835_Intact: 0.36 ha 835_Thinned: 0.19 ha	835_Intact: 0.00 ha 835_Thinned: 0.00 ha	835_Intact: -0.36 ha 835_Thinned: -0.19 ha
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 Ecological Community [CEEC], EPBC Act and BC Act) (Cumberland Plain Woodland CEEC)	849_Thinned: 0.11 ha	849_Thinned: 0.00 ha	849_Thinned: -0.11 ha
Netted Bottle Brush *Callistemon linearifolius*	Vulnerable, BC Act	6 individuals (assumed present)	0 individuals	-6 individuals (assumed present)
Dillwynia tenuifolia	Vulnerable, BC Act	0.05 ha	0.00 ha	-0.05 ha
Juniper-leaved Grevillea *Grevillea juniperina* subsp. *juniperina*	Vulnerable, BC Act	0.05 ha	0.00 ha	-0.05 ha
Marsdenia viridiflora* subsp. *viridiflora	Endangered population, BC Act	0.50 ha	0.00 ha	-0.50 ha
Spiked Rice-flower *Pimelea spicata*	Endangered, BC Act and EPBC Act	0.60 ha	0.00 ha	-0.60 ha
Matted Bush-pea *Pultenaea pedunculata*	Endangered, BC Act	0.05 ha	0.00 ha	-0.05 ha

PCT / Species	Listing status	EIS impact	Amended design impact	Change in impacts
Cumberland Plain Snail *Meridolum corneovirens*	Endangered (BC Act)	0.66 ha	0.00 ha	-0.66 ha
Southern Myotis *Myotis macropus*	Vulnerable (BC Act)	0.37 ha	0.00 ha	-0.37 ha
Western Sydney Parklands re-alignment				
849 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Cumberland Plain Woodland CEEC	849_Thinned: 0.34 ha 849_Scattered Trees: 0.12 ha	849_Thinned: 0.16 ha 849_Scattered Trees: 0.02 ha	849_Thinned: -0.18 ha 849_Scattered Trees: -0.10 ha
Cumberland Plain Snail *Meridolum corneovirens*	Endangered (BC Act)	0.34 ha	0.16 ha	-0.18 ha
Southern Myotis *Myotis macropus*	Vulnerable (BC Act)	0.41 ha	0.18 ha	-0.22 ha
Spiked Rice-flower *Pimelea spicata*	Endangered, BC Act and EPBC Act	0.15 ha	0.16 ha	0.01 ha
Bartely Street re-alignment				
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 EEC	724_Thinned: <0.01 ha	724_Thinned: 0.00 ha	-<0.01 ha
Cumberland Plain Snail *Meridolum corneovirens*	Endangered (BC Act)	<0.01 ha	0.00 ha	-<0.01 ha

*Note: Due to the nature of these updates often dealing with a small change in square meters of impact, some rounding errors may appear in the above table when changes in impacts are presented in hectares.

Table 2 Summary over overall changes in direct impacts

PCT / Species	Listing status	EIS impact	Amended design impact	Reduction in impacts
Plant community types				
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 Ecological Community [EEC], BC Act)	835_Intact: 0.58 ha 835_Thinned: 3.23 ha 835_Scattered trees: 0.75 ha **Total: 4.56 ha**	835_Intact: 0.22 ha 835_Thinned: 2.85 ha 835_Scattered trees: 0.74 ha **Total: 3.82 ha**	835_Intact: 0.36 ha (62 %) 835_Thinned: 0.37 ha (11 %) 835_Scattered trees: 0.01 ha (1 %) **Total: 0.74 ha (16 %)**
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 Ecological Community [CEEC], EPBC Act and BC Act)	849_Intact: 0.93 ha 849_Thinned: 2.68 ha 849_Scattered trees: 1.22 ha **Total: 4.83 ha**	849_Intact: 0.93 ha 849_Thinned: 2.40 ha 849_Scattered trees: 1.15 ha **Total: 4.48 ha**	849_Intact: 0 ha (0 %) 849_Thinned: 0.28 ha (11 %) 849_Scattered trees: 0.07 ha (6 %) **Total: 0.35 ha (7 %)**
Threatened flora				
Netted Bottle Brush *Callistemon linearifolius*	Vulnerable, BC Act	6 individuals (assumed present)	0 individuals	6 individuals (100 %)
Dillwynia tenuifolia	Vulnerable, BC Act	0.05 ha	0 ha	0.05 ha (100 %)
Juniper-leaved Grevillea *Grevillea juniperina* subsp. *juniperina*	Vulnerable, BC Act	0.05 ha	0 ha	0.05 ha (100 %)
Marsdenia viridiflora* subsp. *viridiflora	Endangered population, BC Act	0.54 ha	0.04 ha	0.50 ha (94 %)
Spiked Rice-flower *Pimelea spicata*	Endangered, BC Act and EPBC Act	2.99 ha*	1.64 ha	0.59 ha (26 %)*
Matted Bush-pea *Pultenaea pedunculata*	Endangered, BC Act	0.05 ha	0 ha	0.05 ha (100 %)
Threatened fauna				
Cumberland Plain Snail *Meridolum corneovirens*	Endangered (BC Act)	8.96 ha	7.95 ha	1.00 ha (11 %)
Southern Myotis *Myotis macropus*	Vulnerable (BC Act)	7.62 ha	6.88 ha	0.74 ha (10 %)

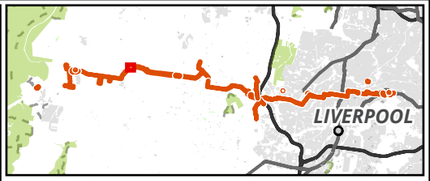
* See below for changes in impacts to Spiked Rice Flower

3.3.1 Spiked Rice-flower impacts

In undertaking impacts calculations for this amendment report it was discovered that the impacts to Spiked Rice-flower as a result of the project have been over-stated in the BDAR (Biosis 2021). This occurred as a result of including impacts to expert mapped habitat for the species within Existing Certified Land between Range Road and the western extent of Brandown Quarries in Kemps Creek.

The BDAR states the impact to the species as a total of 2.99 hectares within multiple sections relating to assessment of impact in accordance with the BAM, under the BC Act, and in Section 9 relating to assessment of impacts under the EPBC Act. As threatened species habitat present within areas of Existing Certified Land under SEPP Sydney Region Growth Centres do not require assessment under the BC Act or EPBC Act, the correct total area of impact that should have been assessed in the BDAR is 2.23 hectares.

Impacts presented in Table 1 and Table 2 above have corrected this error, with the total area of impact to Spiked Rice-flower habitat as result a project, incorporating the proposed project amendments and excluding all habitat present on Existing Certified Land, comprising 1.64 hectares.



Legend

- Amended impact assessment area
- Amended impact area
- EIS impact area
- EIS impact assessment area

Plant Community Types

- Urban Native / Exotic
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion

Figure 2.1 Vegetation impact within alignment changes, Northern Road crossing

0 10 20 30 40 50

Metres

Scale: 1:2,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Legend

- Amended impact assessment area
- Amended impact area
- EIS impact area
- EIS impact assessment area

Plant Community Types

- Urban Native / Exotic
- 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- 835 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley

South Creek

Figure 2.2 Vegetation impact within alignment changes, M12 crossing and South Creek re-alignment

0 30 60 90 120 150

Metres

Scale: 1:4,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

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Legend

- Amended impact assessment area
- Amended impact area
- EIS impact area
- EIS impact assessment area

Plant Community Types

- Urban Native / Exotic
- 835 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley

Figure 2.3 Vegetation impact within alignment changes, Kemps Creek re-alignment

0 25 50 75 100 125

Metres

N

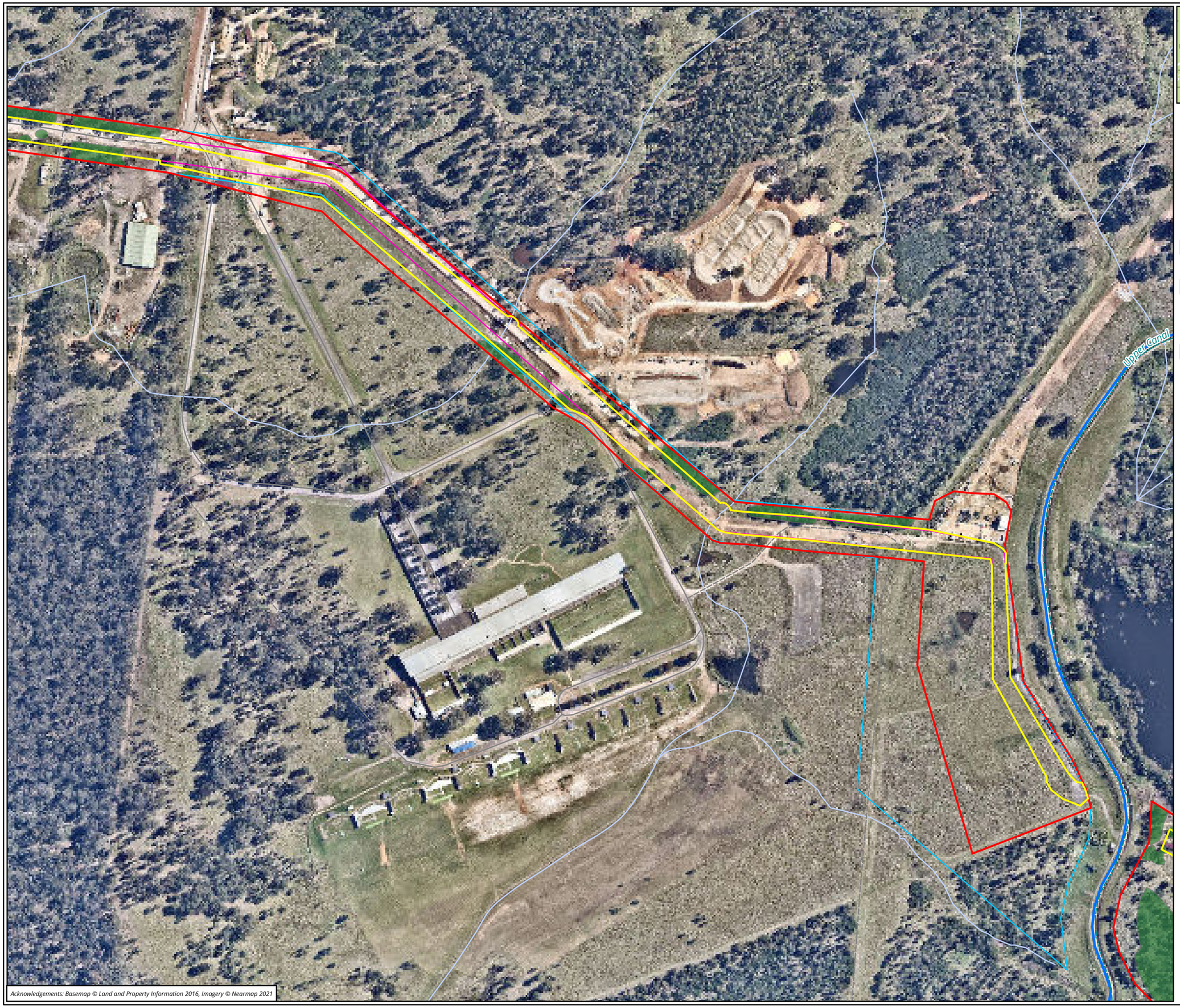
Scale: 1:3,000 @ A3

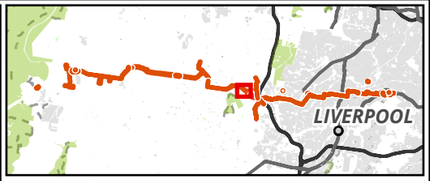
Coordinate System:
PCS: GDA 1994 MGA Zone 56

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © Nearmap 2021





Legend

- Amended impact assessment area
- Amended impact area
- EIS impact area
- EIS impact assessment area

Plant Community Types

- Urban Native / Exotic
- 835 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion

Figure 2.4 Vegetation impact within alignment changes, Western Sydney Parklands re-alignment

0 30 60 90 120 150

Metres

Scale: 1:4,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Legend

- Amended impact assessment area
- Amended impact area
- EIS impact area
- EIS impact assessment area

Plant Community Types

- Urban Native / Exotic

Figure 2.5 Vegetation impact within alignment changes, Bartley Street re-alignment

0 10 20 30 40 50

Metres

Scale: 1:2,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area
- Southern Myotis

Figure 3.1 Threatened species within alignment changes, Northern Road crossing

0 10 20 30 40 50

Metres

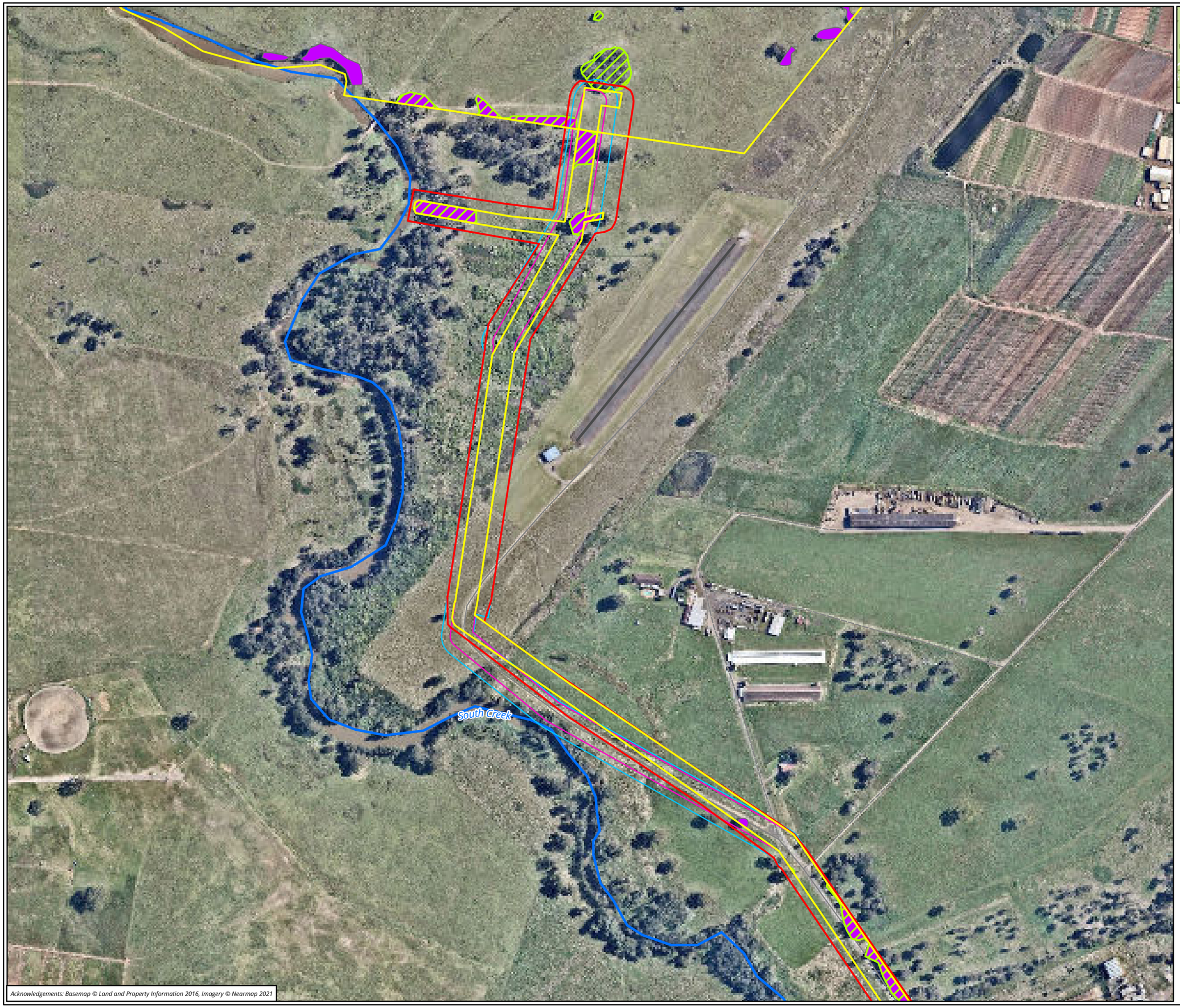
Scale: 1:2,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00



Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area
- Southern Myotis
- Cumberland Plain Land Snail

Figure 3.2 Threatened species within alignment changes, M12 crossing and South Creek re-alignment

0 30 60 90 120 150

Metres

Scale: 1:4,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area
- Southern Myotis
- Cumberland Plain Land Snail
- *Pimelea spicata* habitat

Figure 3.3 Threatened species within alignment changes, Kemps Creek re-alignment

0 25 50 75 100 125

Metres

Scale: 1:3,000 @ A3

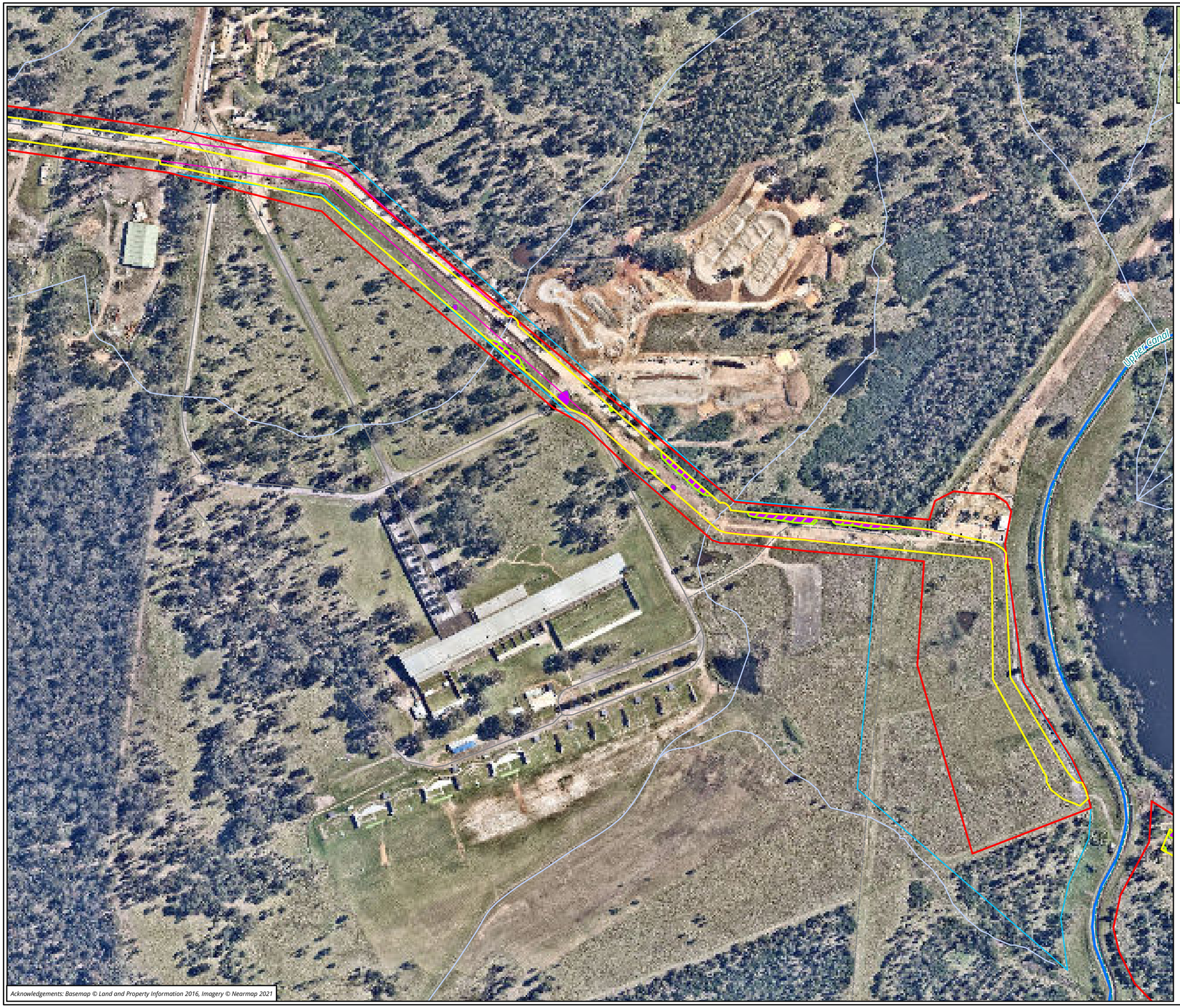
Coordinate System:
PCS: GDA 1994 MGA Zone 56

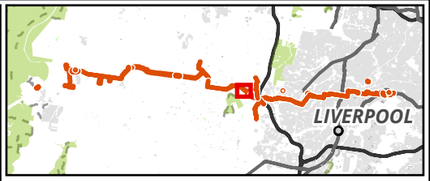
N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Acknowledgements: Basemap © Land and Property Information 2016, Imagery © Nearmap 2021





Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area
- Southern Myotis
- Cumberland Plain Land Snail
- *Pimelea spicata* habitat

Figure 3.4 Threatened species within alignment changes, Western Sydney Parklands re-alignment

0 30 60 90 120 150

Metres

Scale: 1:4,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

Legend

- Amended impact assessment area
- Amended impact area
- EIS impact assessment area
- EIS impact area

Figure 3.5 Threatened species within alignment changes, Bartley Street re-alignment

0 10 20 30 40 50

Metres

Scale: 1:2,000 @ A3

Coordinate System:
PCS: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617, 31617
Date: 15 November 2021,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Location: P:\31600s\31617\Mapping\31617_Working\31617_BDAR2020_AM 00

AWRC EIS impact area

Amended impact area

Amendment location

Southern Myotis

Cumberland Plain Land Snail

River-flat Eucalypt Forest

0 20 40 60 80 100

Metres

N

Scale: 1:2,752 @ A3

Coordinate System: GDA 1994 MGA Zone 56

biosis

Matter: 34189,
Date: 24 February 2022,
Checked by: Samantha McCann, Drawn by: BRAG, Last edited by: cwharfe
Location: P:\31600s\31617\Mapping\
31617_Amended_Figure_CW.mxd

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4 BAM assessment

This section includes an updated assessment of residual project impacts and SAIIs as a result of the amendments detailed in Section 3.1. The previous assessment of residual impacts was included in Section 11 of the BDAR (Biosis 2021) whilst SAIIs were detailed in Section 12.1.1.

4.1 Amended direct impacts

The amended direct impacts as a result of the changes outlined in Section 3.1 are detailed below in Table 3.

Table 3 Amended direct impacts summary

PCT / Species	Listing status	Amended total direct impacts
Plant community types		
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* (CEEC, EPBC Act and EEC, BC Act)	724_Intact: 0.40 ha 724_Thinned: 1.14 ha 724_Scattered trees: 0.04 ha **Total: 1.58 ha**
725 Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion	Not listed	725_Scattered trees: 0.01 ha **Total: 0.01 ha**
781 Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	*Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (EEC, BC Act)	781_Thinned: 0.02 ha **Total: 0.02 ha**
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* (EEC, BC Act)	835_Intact: 0.22 ha 835_Thinned: 2.85 ha 835_Scattered trees: 0.74 ha **Total: 3.82 ha**
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* (CEEC, EPBC Act and BC Act)	849_Intact: 0.93 ha 849_Thinned: 2.40 ha 849_Scattered trees: 1.15 ha **Total: 4.48 ha**
1083 Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	Not listed	1083_Thinned: 1.38 ha **Total: 1.38 ha**
1105 River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	Not listed	1105_Thinned: 0.40 ha **Total: 0.4 ha**
1181 Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	Not listed	1181_Intact: 0.07 ha **Total: 0.07 ha**

PCT / Species	Listing status	Amended total direct impacts
1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley	*Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (EEC, EPBC Act and BC Act)	1800_Thinned: 0.70 ha 1800_Scattered trees: 0.22 ha **Total: 0.92 ha**
Threatened flora		
Downy Wattle ***Acacia pubescens***	Vulnerable, EPBC Act and BC Act	0.16 ha
Marsdenia viridiflora* subsp. *viridiflora	Endangered population, BC Act	0.04 ha
Spiked Rice-flower ***Pimelea spicata***	Endangered, BC Act and EPBC Act	1.64 ha
Pultenaea parviflora	Vulnerable, EPBC Act and Endangered, BC Act	0.01 ha
Threatened fauna		
Large-eared Pied Bat ***Chalinolobus dwyeri***	Vulnerable, EPBC Act and BC Act	3.48 ha
Cumberland Plain Snail ***Meridolum corneovirens***	Endangered, BC Act	7.95 ha
Large Bent-winged Bat ***Miniopterus orianae oceanensis***	Vulnerable, BC Act	1.56 ha
Southern Myotis ***Myotis macropus***	Vulnerable, BC Act	6.88 ha
Dural Land Snail ***Pommerhelix duralensis***	Endangered, EPBC Act and BC Act	1.47 ha

4.2 Amended indirect and BAM prescribed impacts

The amended indirect and BAM prescribed impacts as a result of the changes outlined in Section 3.1 are detailed below in Table 4.

Table 4 Amended indirect and BAM prescribed impacts summary

Potential impact	Location / description of impact	Significance of impact
Indirect impacts		
Inadvertent impacts on adjacent habitat or vegetation within the impact assessment area.	Indirect impacts have the potential to occur to vegetation mapped within the project's impact assessment area, which encompasses a wider area, generally 12.5 metres either side of the impact area, primarily to allow for design flexibility after the EIS is approved. Inadvertent impacts that may occur within this wider area are expected to be most likely during the construction phase of the project, and include factors such as:	Whilst there is some potential that inadvertent impacts, such as those listed adjacent may occur, construction safeguards (as outlined in Section 11.5 of the BDAR) will be implemented and documented in a Construction Environmental Management Plan. It can be expected that these safeguards will be implemented by the professional contractors engaged to construct the project, and this will be sufficient to manage the potential for inadvertent impacts to adjacent habitats or vegetation.

Potential impact	Location / description of impact	Significance of impact
	• Clearing, or excavation, of vegetation and habitats (including threatened species habitats) outside the approved extents. • Impacts associated with soil compression, trampling and dumping via access to the impact area. • Stockpiling of materials outside approved areas. • Sedimentation of areas resulting from poor environmental controls surrounding excavations. • Introduction and/or spreading of exotic weed species.	The project amendments have further reduced the potential for these type of inadvertent impacts to adjacent retained vegetation by locating the alignment within areas of existing clearing at Western Sydney Parklands and Kemps Creek.
Inadvertent impacts on adjacent habitat or vegetation opposite and surrounding the environmental flows treated water outlet near the Warragamba Dam.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Inadvertent impacts on adjacent habitat or vegetation within the Lansdowne Reserve Stewardship Site.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Reduced viability of adjacent habitat due to edge effects.	Survey and mapping of vegetation and habitats within the impact assessment area has allowed for assessment of potential edge effects along the length of the linear project alignment. The impact area comprises 12.83 ha of native vegetation (excluding Existing Certified areas), which occurs generally within 12.5 metres either side of the pipeline alignments but is wider or narrower in certain areas, and across the entire 80 ha site at the AWRC. The impact assessment area comprises an additional 21.70 ha of native vegetation (excluding Existing Certified areas), which occurs generally within a further 12.5 m either side of the impact area. As linear infrastructure utilising mainly open	The potential for the project to significantly or substantially increase edge effects to adjacent vegetation and habitats is considered relatively low. Vegetation present within and adjacent to the project alignment is largely already subject to moderate to high levels of edge effects, and efforts have been made to minimise and avoid impact to vegetation in higher ecological condition and parts of large connected areas. The impact area was previously already located largely within already cleared areas of Western Sydney Parklands, with the project amendments further ensuring this is the case, and thus edge effects will not be increased in that location. Previously potential edge effects may have

Potential impact	Location / description of impact	Significance of impact
	trenching construction methods, the project has the potential to increase edge effects to the 21.70 ha of native vegetation with the impact assessment area, and potentially vegetation and habitats further again from the project's impact area.	occurred as a result of the requirement for the pipeline to cross through the intact vegetation at Kemps Creek (watercourse) utilising open trenching construction methods. However the project's impact area is now to be located within and existing easement already cleared of vegetation, and as such edge effects will not increase as a result of the project in that location. Further assessment of the potential for the project to increase edge effects on retained/avoided vegetation are included in the BDAR (Biosis 2021).
Reduced viability of adjacent habitat due to noise, dust or light spill.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Transport of weeds and pathogens to/from the site to/from adjacent vegetation.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Increased risk of starvation, exposure and loss of shade or shelter.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Loss of breeding habitats.	Potential breeding habitats associated with the project's impact area include hollow-bearing trees, and other large old trees that may provide raptor nesting opportunities. As outlined in Section 8.2.3 of the BDAR (Biosis 2021), targeted surveys for breeding habitats for those species considered likely to occur within the study area found such resources to be limited within the impact area.	Tree hollows of various sizes were recorded throughout the impact area and will be removed by the project. However, hollows suitable to support breeding of threatened owl and/or cockatoo species were however found to be highly limited. Tree hollows that may support potential breeding habitat for threatened microbat species also occur within the impact area and will be removed as a result of the project. The proportion of hollows removed by the project compared to those present within the broader landscape is not considered likely to be high, based on the hollows mapped during fieldwork completed for the BDAR. Indirect impacts associated with the loss of breeding habitats are not considered likely to be substantial or significant to any locally occurring

Potential impact	Location / description of impact	Significance of impact
		threatened, or non-threatened, species. Furthermore, it is expected that loss of tree hollows and habitat trees as a result of the project has been reduced with the avoidance of the need to clear vegetation at the Kemps Creek crossing.
Trampling of threatened flora species.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Inhibition of nitrogen fixation and increased soil salinity.	Project amendments will result in a small proportional decrease in the total area of vegetation to be removed as a result of re-alignment of the Kemps Creek crossing.	The significant of this indirect impact will not change as a result of the project amendments.
Fertiliser drift.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Rubbish dumping.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Wood collection.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Bush rock removal and disturbance.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Increase in predatory species populations.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Increase in pest animal populations.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Increased risk of fire.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Disturbance to specialist breeding and foraging habitat, e.g. Beach nesting for shorebirds.	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Fragmentation of movement corridors.	The impact area crosses a number of features that provide somewhat limited opportunities for movement of biodiversity values across the landscape. Major connectivity features associate with the impact area include:	Where these connectivity features are crossed via open trenching construction methods minor localised disruption to movement corridors will occur. Connectivity will be generally disrupted by the 15 m to 20 m wide pipeline easement. It is

Potential impact	Location / description of impact	Significance of impact
	• Prospect Creek and Lansdowne Reserve • Western Sydney Parklands, Kemps Creek and Hinchbrook Creek • South Creek and Badgerys Creek • Nepean River • Warragamba River and the Greater Blue Mountains Area	however noted in EPBC Act conservation advice documents that allowances can be made for "breaks" of up to 30 metres between areas of MNES habitat, and that such breaks, which may be the result of watercourses, tracks, paths, roads, etc., do not significantly alter the overall functionality of the ecological community, or habitat (DAWE 2020a). As such, breaks in connectivity caused by the future pipeline easement are not considered to be substantial in nature. Potential exceptions to this are less mobile threatened species such as Cumberland Plain Land Snail and Dural Land Snail. Under the exhibited project design, the movement corridor associated with the Kemps Creek riparian corridor was likely to be most substantially impacted, with the project impacting upon an approximately 15 m wide strip of intact native vegetation over approximately 230 m length. The project amendments have however avoided additional vegetation clearing in this location by locating the pipeline within an existing easement already cleared of vegetation. As such the project will not increase fragmentation of movement corridors along Kemps Creek. Connectivity through Western Sydney Parklands is already disrupted by existing easements and historically cleared vegetation, and the project will not increase fragmentation in the area. Connectivity impacts potentially relevant to the remaining connectivity features listed, are considered negligible due to either underboring, minimal vegetation clearing, or existing disturbances.
Prescribed impacts		
Karst, caves, crevices, cliffs, rocks and other geological features of significance	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Impacts to habitat associated with human-made	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).

Potential impact	Location / description of impact	Significance of impact
structures and non-native vegetation		
Impacts to connectivity of habitat for threatened entities	As outlined above, the impact area crosses a number of features that provide somewhat limited opportunities for movement of biodiversity values across the landscape. Larger connectivity features associated with the impact area include: • Prospect Creek and Lansdowne Reserve • Western Sydney Parklands, Kemps Creek and Hinchbrook Creek • South Creek and Badgerys Creek • Nepean River • Warragamba River and the Greater Blue Mountains Area All flora and fauna species and ecological communities recorded as present within the impact area and impact assessment area rely on habitat connectivity to some degree for persistence. Habitat connectivity is more important for species with reproductive strategies that require movement of individuals or reproductive material through the landscape. The project will not result in the creation of barriers which would prevent the movement of threatened species between habitats critical for the maintenance of their life cycle.	None of the connectivity features listed adjacent form key components that link areas of habitat for threatened species at a local or bioregional scale, and the project will not result in a permanent barrier to connectivity in any of the locations listed adjacent. Connectivity will be generally disrupted by the 15 m to 20 m wide pipeline easement, however this would only represent an obstacle to the least mobile of species, such as Cumberland Plain Land Snail and Dural Land Snail. The pipeline easement will be revegetated to ensure groundcover vegetation is, at a minimum, of the same ecological condition to that in the surrounding undisturbed areas, which will in turn alleviate connectivity impacts to ground-dwelling snails and other less mobile species. As permanent barriers to movement will not be created as a result of the project, the consequences of the potential impacts are considered to be minor when assessing the bioregional persistence of the suite of species and ecological communities that rely of the connectivity features relevant to the project. Impacts to connectivity a local or site scale have been reduced as a result of the project amendments with vegetation clearing previously proposed through the Kemps Creek riparian area no avoided by locating the pipeline within an existing easement already cleared of vegetation
Water quality, water bodies or any hydrological processes that sustain threatened entities	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).
Impacts of wind strikes on protected animals	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).

Potential impact	Location / description of impact	Significance of impact
Vehicle strikes on threatened fauna or fauna that are part of a TEC	No change as a result of project amendments	As per impact assessment outlined in the project BDAR (Biosis 2021).

4.3 Amendments to mitigation measures

Project amendments do not require the development of additional specific mitigation measures or strategies to ensure impacts to biodiversity values continue to be avoided and minimised though construction and operational phases of the project.

Relevant mitigation measures are outlined in Section 11.5 of the BDAR (Biosis 2021).

4.4 Amended cumulative impact assessment

As part of the environmental assessment of the USC AWRC project there is a requirement to consider the relevant cumulative impacts of the project taking into account other approved projects in the region.

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

Cumulative impacts would also be expected to occur in situations where projects are operating at a similar scale and location to the project. A cumulative impact assessment was previously included in Section 11.6 of the BDAR (Biosis 2021) as it was determined that there would be a cumulative impact to biodiversity from the project and other approved and proposed developments in the Western Sydney region. The projects included in the cumulative biodiversity impact assessment were:

- Western Sydney Airport (GHD 2016)
- Sydney Metro Western Sydney Airport (M2A 2020)
- M12 Motorway (Roads and Maritime 2019)
- The Northern Road Upgrade – Glenmore Road to Bringelly (Jacobs 2017)
- Warragamba Dam Raising (BMT WBM 2016).

A summary of each of these project's impact on NSW PCTs, TECs and species credit species (flora and fauna) is provided in Table 5. This table has been updated since the BDAR (Biosis 2021) to include the amended impacts for the USC AWRC.

The projects amendments have resulted in a reduction in the project's contribution to the regional scale impact to biodiversity values.

Table 5 Cumulative impact on ecological communities and threatened species (in non-certified lands)

Projects	Western Sydney Airport	Sydney Metro Western Sydney Airport	M12 Motorway	The Northern Road Upgrade – Glenmore to Bringelly	Warragamba Dam Rising k	Upper South Creek AWRC	Cumulative impact	Percent impacted by USC AWRC
Plant Community Type and fauna habitat (Ha) impacted								
PCT 724 Castlereagh Shale – Gravel Transition Forest	10.6	7.27	6.91		46.9	1.58	73.26	2%
PCT 725 Castlereagh Ironbark Forest						0.01	0.01	100%
PCT 781 Coastal Freshwater Wetland	35.4				907.42	0.02	942.84	<0.01%
PCT 835 Cumberland River-flat Forest	110.7	15.93	3.23	4.29	1215.56	3.28	1353.69	0.2%
PCT 849 Cumberland Shale Plains Woodland	250.9	33.32	6.09	6.67	182.56	4.48	484.02	1%
PCT 1083 Coastal Sandstone Ridgetop Woodland					28.63	1.38	30.01	5%
PCT 1105 River Oak Open Forest					67.31	0.4	67.71	1%
PCT 1181 Hinterland Sandstone Gully Forest					228.02	0.07	228.09	0.03%
PCT 1800 Cumberland Swamp Oak Riparian Forest		4.11	2.53	2.53	164.96	0.92	175.05	1%
Threatened ecological communities (Ha) impacted - BC Act								
Cumberland Plain Woodland in the Sydney Basin Bioregion (CEEC) (Cumberland Plain Woodland).	242.8	11.67	60.16	29.14	182.56	4	530.33	1%
Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (EEC) (Freshwater wetlands on coastal floodplains).					917.73	0.02	917.75	<0.01%

Projects	Western Sydney Airport	Sydney Metro Western Sydney Airport	M12 Motorway	The Northern Road Upgrade – Glenmore to Bringelly	Warragamba Dam Rising k	Upper South Creek AWRC	Cumulative impact	Percent impacted by USC AWRC
River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (EEC) (River-flat Eucalypt Forest).	42.1	6.64	3.23	4.29	1313.46	3.65	1373.53	0.3%%
Shale Gravel Transition Forest in the Sydney Basin Bioregion (EEC) (Shale Gravel Transition Forest).	5	7.27	6.91		46.9	1.54	67.62	2%
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (EEC) (Swamp Oak Floodplain Forest).		4.11	2.53			0.88	7.52	12%
Threatened ecological communities (Ha) impacted - EPBC Act								
Coastal Swamp Oak Casuarina glauca Forest of New South Wales and South East Queensland ecological community (EEC) (Coastal Swamp Oak Forest).	Not listed at time of assessment	3.67	Not listed at time of assessment	Not listed at time of assessment		0.22	3.89	6%
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CEEC).	158.4	6.12	38.48	16.37	229.46	1.44	450.27	0.3%
Known threatened flora impacted (Ha)								
Acacia pubescens	5	12.27			35.00	0.16	52.43	0.3%
Marsdenia viridiflora* subsp. *viridiflora	255.7	14.79		0.68	Medium	0.04	271.21	0.01%
Pimelea spicata		8.06			Medium	1.64	9.7	17%
Pultenaea parviflora		4.18		0.98	7.00	0.01	12.17	0.1%

Projects	Western Sydney Airport	Sydney Metro Western Sydney Airport	M12 Motorway	The Northern Road Upgrade – Glenmore to Bringelly	Warragamba Dam Rising k	Upper South Creek AWRC	Cumulative impact	Percent impacted by USC AWRC
Known threatened fauna impacts (Ha)								
Chalinolobus dwyeri				26.25	1203.02	3.48	1232.75	0.3%
Meridolum corneovirens	141.8	1.64	1.86	16.37	Medium	8.10	169.77	5%
Miniopterus orianae oceanensis						1.54	1.54	100%
Myotis macropus		9.83	0.92		863.79	7.04	881.58	1%

Notes on Warragamba Dam Raising assessment data

Impacts to PCTs and TECs are a combined total of upstream and downstream impacts. Downstream impacts are less certain due to the main vector of these impacts being altered flooding regimes only, rather than assumed permanent inundation as is the impact vector upstream of the dam.

Impacts to species upstream of the dam wall have been presented in the EIS as an area of impact based on assumed permanent inundation, impacts to species downstream of the dam wall have been presented in the EIS as "Impact risk" only. Where no impacts are expected to occur upstream of the dam, only the potential downstream impacts are presented above.

4.5 Amended Serious and Irreversible Impact assessment

As outlined in the project's BDAR (Biosis 2021), the project will result in impacts to a number of threatened entities considered to be at risk of Serious and Irreversible Impact (SAII), and as such a number of SAII assessments were prepared in accordance with Section 9.1 of the BAM (DPIE 2020).

Those entities include:

- Cumberland Plain Woodland TEC – direct impacts to 4.00 ha.
- Large-eared Pied Bat, Little Bent-winged Bat, and Large Bent-winged Bat– Direct impacts to low potential breeding habitats supported by natural rock cliff line habitat, and the man-made tunnel and vertical (vent) shaft at the treated water environmental flows outlet near Warragamba Dam.
- Large-eared Pied Bat, Little Bent-winged Bat, Large Bent-winged Bat and Sooty Owl – Indirect impacts associated with the removal of native vegetation from within the BAM prescribed 'breeding buffers' based on the presence for potential breeding habitat on the far side of the Warragamba River from the treated water environmental flows outlet.

As project amendments have altered the total area of impact to Cumberland Plain Woodland TEC, as well as aspects of potential fragmentation and impacts associated with edges effects, the SAII assessments prepared for the TEC in the BDAR (Biosis 2021), has been updated below.

- Updated SAII assessment for threatened fauna species outlined above have not been prepared as project amendments do not affect those species' habitat components potentially subject to SAIIs.

SAII assessment for Cumberland Plain Woodland

The *Cumberland Plain Woodland in the Sydney Basin Bioregion* (PCT 849) is listed under the NSW BC Act as a Critically Endangered Ecological Community. The CEEC is listed in the BioNet Threatened Biodiversity Data Collection (TBDC) as an entity subject to SAII in NSW. The CEEC is considered an entity at risk of SAII based on the following principles (DPIE 2019):

- Principle 1: an ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
- Principle 2: an ecological community that is observed, inferred or reasonably suspected to be severely degraded or disturbed.

Given the absence of definitive impact thresholds stated for the community, the potential for a SAII will be determined by the consent authority, guided by the additional assessment provided below.

Table A.1 Assessment of SAII for Cumberland Plain Woodland TEC

Information required (BAM Section 9.1.1)	Response
1. Impacts to the CEEC and the action and measures taken to avoid the direct and indirect impact on the CEEC at risk of an SAII.	The project will impact upon a total of approximately 4.86 ha of PCT 849 vegetation that meets the BC Act listing requirements for Cumberland Plain Woodland CEEC. However of this 4.86 ha, 0.86 ha occurs on Existing Certified land in Kemps Creek, and as such is not subject to this assessment. Thus the total area of Cumberland Plain Woodland impacted by the project, and subject to this assessment, comprises approximately 4.00 ha. The vegetation to be removed occurs in the following conditions: • Intact: 0.93 hectares – VI score of 60.5.

Information required (BAM Section 9.1.1)	Response
	• Thinned: 2.18 hectares – VI score of 37.9. • Scattered trees: 0.89 hectares – VI score of 24.9. Measures undertaken by the proponent to avoid and minimise impacts to the CEEC (PCT 849) are provided in Section 10 of the BDAR (Biosis 2021), with additional measures specific to project amendments detailed in Section 3.2 of this report. Specifically, substantial efforts have been made to ensure that impacts to Cumberland Plain Woodland have been avoided and minimised throughout the design phase of the project. Throughout the three major design stages of the project prior to EIS exhibition (50 %, 80 % and 100 % designs), ecological constraints information was developed and used to influence alignment design options, construction options, and avoidance opportunities. Ecological constraints were developed over time based on the level of ground-truthing that had been undertaken during each subsequent project design stage. Initial constraints were high level and based on existing vegetation mapping which were refined by rapid assessments to confirm PCTs and TECs, and then further developed by detailed BAM surveys to provide accurate data on vegetation (including TEC) type, extent and condition. Opportunities to avoid impacts to Cumberland Plain Woodland were a key focus at each stage of the project design, due to a desire to minimise impacts to the CEEC, minimise the potential need to refer the project to the Commonwealth, and to minimise the cost of offsets. Avoidance and minimisation of impacts were achieved at two broad scales, macro-scale avoidance achieved through alignment changes, and micro-scale avoidance achieved through measures such as minimisation of impact corridor widths, underbores, and placing open trenching in the roadway (rather than the road verge). An example of macro-scale avoidance to Cumberland Plain Woodland has been achieved at the Lansdowne Reserve Stewardship Site, where early design stages required pipe-stringing for underboring of Henry Lawson Drive and Prospect Creek, as well as open trenching between the two underbores, all of which would have impacted upon the TEC. This design would have resulted in impact to approximately 1.6 ha more Cumberland Plain Woodland than is impacted by the current project design. Commitments made in the development of the project design that have further minimised impacts to Cumberland Plain Woodland include: • Minimising the width of the impact area with in Western Sydney Parklands and at Cosgrove Creek. • Locating the underbore at Badgerys Creek to avoid adjacent vegetation. • Locating the open trenching within the roadway for 1.7 kilometres of Park Road, Wallacia. Project amendments have continued to apply the principles of avoidance and minimisation of impacts to biodiversity values, with the amendments resulting in the following additional reduction of impacts to Cumberland Plain Woodland: • Substantial redesign of the project alignment where the impact area and impact assessment area cross Kemps Creek, to the north of Kemps Creek Nature Reserve, to locate the pipeline within an existing easement already cleared of vegetation. This has resulted in a reduced impact to Cumberland Plain Woodland of 0.12 hectares. • Amendments to the project alignment within Western Sydney Parklands, to the west of the M7 motorway, to ensure that the project will continue to minimise impacts to Cumberland Plain Woodland by locating the alignment largely within the existing easement already cleared of native vegetation. This has resulted in a reduction in overall project specific impact to the TEC of 4.00 hectares, however it should be noted

Information required (BAM Section 9.1.1)	Response
	the previously reported impact in this location, already occurred partly within the easements subsequently cleared by another similar project. • It should be noted that the project amendments have however resulted in a minor increase in impacts to Cumberland Plain Woodland M12 Motorway crossing totalling 0.04 ha. Impacted PCT 849 at The Northern Road do not conform to Cumberland Plain Woodland due to poor and degraded vegetation condition..
2a. Evidence of reduction in geographic distribution, as the current total geographic extent of the TEC in NSW and the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal). (SAII Principle 1)	Species and ecological communities that have undergone large reductions or are likely to undergo large reductions in the future are considered to be at greater risk of extinction than those that have undergone or are likely to undergo smaller reductions (NSW TSSC 2018). To be considered under this principle, the ecological community should have been observed, estimated, inferred, or reasonably suspected to have undergone, or be projected to undergo, a very large reduction in distribution, being: • ≥80% reduction where the reduction is over a 50-year period (i.e. since 1970), either in the past, future, or any part of the past, present and future (DPIE 2019). Prior to European settlement, Cumberland Plain Woodland was extensive across the Western Sydney area, and is estimated to have covered approximately 125,446 ha (DEC 2005, NPWS 2004). Whilst formerly extensive, the community now mostly occurs as small patches within the Cumberland IBRA subregion, with some occurrences extending into neighboring subregions. It is known to occur within the following LGAs: Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly (Commonwealth of Australia 2010). Whilst there is no guidance as to the proportion of geographic distribution reduction that has occurred over the last 50 years (i.e. since 1970), the fact that the CEEC is noted in the SAII guidance document (DPIE 2019) as being subject to Principle 1, infers that it has occurred in recent times, and therefore at a rapid rate. According to *Remnant vegetation of the western Cumberland subregion, 2013 Update VIS_ID 4207* (DPIE 2015), and *The Native Vegetation of the Sydney Metropolitan Area* (DPIE 2016) and *Native Vegetation of Southeast NSW: A Revised Classification and Map for the Coast and Eastern Tablelands* (Tozer et al. 2010), the current extent of Cumberland Plain Woodland (PCT 849 and PCT 850) within NSW is approximately 22,774 ha. This is a total reduction of approximately 82 % of the geographic distribution.
2b. Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes. (SAII Principle 2)	Reduction in ecological function relates to the IUCN principle of "very small population size" which for ecological communities means communities have very high levels of either environmental degradation or disruption of biotic processes, and interactions have an increased risk of failure to sustain their characteristic native species assemblages (Bland et al. 2016). Ecological communities that are considered to have a very large degree of environmental degradation or disruption of biotic processes or interactions are those with: • ≥90% extent and severity where the disruption or impacts are measured since 1970. • ≥80% extent and severity where the disruption or impacts are over a 50-year period, either in the past, future, or any part of the past, present and future (as per (Bland et al. 2016). (DPIE 2019). **i. change in community structure, ii. change in species composition and iii. disruption of ecological processes** The initial reduction in Cumberland Plain Woodland was due to tree-felling for timber and

Information required (BAM Section 9.1.1)	Response
	clearing for crops and pastures. This decline has accelerated since World War II, where there was a marked acceleration in urban and industrial development in the region, which continues to present day. Now, almost all of the remaining areas of the community are either regrowth forest or degraded woodland impacted by past clearing activities (OEH 2019). The final determination for Cumberland Plain Woodland notes that changes in community structure contribute to a very large reduction in the overall ecological functioning of Cumberland Plain Woodland (OEH 2019). Large trees that were once common prior to European settlement now occur very sparsely within the remaining patches of woodland, or remain as isolated individuals within paddocks or urban areas. Loss of these large trees has contributed to the decline and extinctions in native bird and mammal species, once common throughout the Cumberland Plain., and the associated ecological processes they once supported Other structural changes include the removal of fallen woody debris and standing dead trees, removal of woody understorey plants. (OEH 2019). Changes in species composition over time have occurred a result of clearing vegetation for agricultural process and the selective retention of trees. The proportion of native and characteristic understorey grasses, forbs, shrubs etc. now present within the TEC as a whole has been reduced by this process, which has been further exacerbated by the invasion of understorey weed species. **iv. invasion and establishment of exotic species, v. degradation of habitat, and vi. fragmentation of habitat.** Invasion of remnant woodland by exotic species poses a major threat to Cumberland Plain Woodland, with very large numbers of weed species invading many different areas of the community. These species degrade the community through smothering of indigenous plants, reducing both reproduction and survival, and by inhibiting the emergence and establishment of new seedlings (OEH 2019). These exotic weed species are now rapidly changing the structure and composition of Cumberland Plain Woodland remnants and pose a major problem for management (Benson & Howell 2002). Fragmentation has also resulted in a very large reduction in the ecological function of Cumberland Plain Woodland, with the remaining areas of the community being severely fragmented. The final determination for the community states that more than half of the remaining tree cover mapped by Tozer (2003) occurs in patches of less than 80 ha, with half of all mapped patches being smaller than 3 ha (OEH 2019). Whilst there is no guidance as to the proportion of this degradation has occurred in the last 50 years (i.e. since 1970), the fact that the EEC is noted in the SAII guidance document (DPIE 2019) as being subject to Principle 2, infers that it has occurred in recent times.
2c. Evidence of restricted geographic distribution, based on the TEC's geographic range in NSW. (SAII Principle 3)	The geographic distribution of ecological communities is defined by the area of occupancy, sensu (Bland et al. 2016). Ecological communities with a very limited geographic distribution have an area of occupancy of less than or equal to two 10 x 10 km grid cells (200 km2) or an extent of occurrence of ≤1,000 km2, sensu (Bland et al. 2016), and one of the following: • An observed or inferred continuing decline in: – A measure of spatial extent appropriate to the ecological community. – A measure of environmental quality appropriate to characteristic biota of the ecological community. – A measure of disruption to biotic interactions appropriate to the characteristic biota of the ecological community.

Information required (BAM Section 9.1.1)	Response
	• Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years. • An ecological community that exists at one location (DPIE 2019). **i. extent of occurrence, ii. area of occurrence and iii. Number of threat-define locations** According to the final determination for the CEEC, Cumberland Plain Woodland is estimated to occur within an extent of occurrence of 2,810 km2 and an area of occupancy of just under 2,100 km2 based on 2 x 2 km grid cells (OEH 2019). There are no specific threat defined locations listed in the TBDC for the community. However, whilst the community is represented within conservation reserves, much of the remaining area occurs on private land or public easements, putting it at risk from small-scale clearing associated with housing, industrial development and transport infrastructure. Given the low area of occupancy and the facts that land-clearing is likely to remain a threatening process contributing to the decline of this community over the next twenty years, the CEEC can be considered a highly geographically restricted community. Based on the available information the CEEC does not currently meet the thresholds for consideration under SAII Principle 3.
2d. Evidence that the TEC is unlikely to respond to management. (SAII Principle 4)	This principle encompasses two components, firstly whether there are any particular traits of the community which limits its' response to management, and secondly whether there are any key threatening processes affecting the community which cannot be effectively managed (DPIE 2019). Conservation management of the community in areas subjected to historical clearing and agricultural grazing has resulted in some measurable recovery, provided the soil has not been disturbed by earthworks, cultivation, fertiliser application or other means of nutrient of moisture enrichment (OEH 2019). Conversely in areas that have been exposed to these soil disturbances, restoration has been proven to be problematic, with one abandoned pasture planting site showing no evidence of convergence in species composition with nearby remnant woodland stands over a 10 year period (OEH 2019). However, several management measures are detailed within the TBDC for this community. These include: • Community and land-holder liaison/ awareness and/or education. • Habitat management: Fire. • Habitat management: Ongoing EIA - Advice to consent and planning authorities. • Habitat management: Promote regeneration by avoiding mowing or prolonged or heavy grazing. • Habitat management: Protect habitat by controlling run-off entering the site if it would change water, nutrient or sediment levels or cause erosion. • Habitat management: Weed Control. • Habitat Rehabilitation/Restoration and/or Regeneration. Generally those entities which are listed as unlikely to respond to management (and thus are irreplaceable) tend to include species where the ability to control key threats is negligible and known reproductive characteristics that severely limit their ability to increase the existing population (DPIE 2019). Ecological communities as a whole do not typically align well with these criteria. The response to management practices of Cumberland Plain Woodland has been demonstrated to be based on site specific conditions and therefore it

Information required (BAM Section 9.1.1)	Response
	is does not meet SAII Principle 4.
3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC, the assessor must record this in the BDAR or BCAR.	Not applicable.
4a. The impact on the geographic extent of the TEC, by estimating the total area of the TEC to be impacted by the proposal.	As discussed above, the current extent of Cumberland Plain Woodland within NSW is approximately 22,774 ha. The CEEC is known to occur as small patches within the Cumberland IBRA subregion, with some occurrences extending into neighboring subregions. It is known to occur within the following LGAs: Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly (OEH 2019, Commonwealth of Australia 2010). **Direct impacts** The proposed development will result in the removal of approximately 4.00 ha of the CEEC from non-certified areas within the impact area. As such the total area of the CEEC to be impacted by the project equates to 0.02 % of the CEEC within NSW. The vegetation occurs in the following conditions: • Intact: 0.93 hectares – VI score of 60.5. • Thinned: 2.18 hectares – VI score of 37.9. • Scattered trees: 0.89 hectares – VI score of 24.9. The structure of these patches ranges from patches of woodland with full structural integrity across all stratum (intact condition), down to patches of scattered native trees where the middle stratum has been completely removed and there is a low level of native species in the understorey. These areas occur predominantly as roadside vegetation patches and scattered trees. However, several large patches of thinned vegetation do occur to the south of the Liverpool Offtake Reservoir in Kemps Creek, and intact vegetation occurs at the eastern end of the alignment adjacent to Boggabilla Reserve (near the intersection of Hume Highway and Henry Lawson Drive). **Indirect impacts** Indirect impacts to Cumberland Plain Woodland associated with factors such as increased edge effects, fragmentation, altered fire regimes, and transport of weeds and pathogens are not expected to be substantial or significant, largely due to the already degraded and edge effected nature of the TEC within the impact area and broader vicinity. Impacts associated with altered hydrological patterns as a result of increased water in the Nepean River system have the potential to impact upon Cumberland Plain Woodland where it occur in relatively close proximity to the river, however this is not expected to be a substantial level of impact. Where Cumberland Plain Woodland occurs within the impact assessment area (and outside Existing Certified land), and therefore most likely to suffer indirect impacts associated with construction and operational activities, the TEC occurs in the following condition: • Intact: 0.93 hectares – VI score of 60.5. • Thinned: 2.18 hectares – VI score of 37.9. • Scattered trees: 0.89 hectares – VI score of 24.9.

Information required (BAM Section 9.1.1)	Response
4b. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes of the TEC.	**i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500m of the development footprint or equivalent area for other types of proposals.** Cumberland Plain Woodland present in the wider landscape surrounding the project area occurs in an already highly fragmented state. GIS was used to determine the range and average size of mapped (OEH 2013, OEH 2016, Biosis 2021) occurrences of Cumberland Plain Woodland within a 500 m buffer of the impact area along the 35 km alignment. The results of which are provided below both for those patches intersected by the impact area (i.e. subject to vegetation removal) and those patches not intersected by the impact area (i.e. not directly impact by the project). **Mapped areas within 500m not directly impacted:** • Size range: <0.001ha to 67 ha • Average size: 1.31 ha • Total no. mapped polygons: 314 **Mapped areas within 500m directly impacted:** • Size range: <0.001ha to 115 ha • Average size: 1.44 ha • Total no. mapped polygons: 167 **ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:** • **distance between isolated areas of the TEC, presented as the average** • **distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and** • **estimated maximum dispersal distance for native flora species characteristic of the TEC, and** • **other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development** GIS was used to undertake a nearest neighbour analysis of mapped (OEH 2013, OEH 2016, Biosis 2021) occurrences of Cumberland Plain Woodland prior to and post vegetation to determine the distance between impacted areas of the CEEC before and after the proposed vegetating removal. The average distance between mapped occurrences of Cumberland Plain Woodland within a 500 m buffer of the impact area, include: • 41.7 m before development • 46.1 m after development. Based on the above there will be an average increase of 5 m separation between retained patches of Cumberland Plain Woodland within 500 m of the impact area, with a maximum increase in separation distance of up to 20 m. Native flora species characteristic of the TEC include a range trees, shrubs, grasses, forbs and other groundcover species, the majority of which are dispersed via wind or animal vectors, with some species primary method of dispersal likely to be via non-flying insects such as ants. The increase in average separation distance by 5 m for mapped Cumberland Plain Woodland within 500 m of the impact area, with a maximum increase of up to 20 m, is not expected to result in a significant or substantial impediment to the dispersal of native species between retained patches, in an already highly fragmented landscape.

Information required (BAM Section 9.1.1)	Response
	Furthermore the project will not result in the creation of barrier to movement across the pipeline corridor post-construction and revegetation work will help promote connectivity across the future easement. It is noted in EPBC Act conservation advice documents that allowances can be made for "breaks" of up to 30 metres between areas of MNES habitat, and that such breaks, which may be the result of watercourses, tracks, paths, roads, etc., do not significantly alter the overall functionality of the ecological community, or habitat (CoA 2020). As such, breaks in connectivity caused by the future pipeline easement, of up to 20 m are not considered to be substantial in nature. The project will result in some vegetation removal that splits patches of Cumberland Plain Woodland vegetation into two (or more) patches, which is likely to increase the area to perimeter ratio for smaller patches, which may in turn increase edge effects for those smaller, now isolated patches. However any increase in edge effects is unlikely to be significant or substantial to the vegetation immediately adjacent to the impact area, along the majority of the project alignment, due to the already disturbed and edge effected nature of the vegetation. **iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.** The TEC occurs in three conditions within the subject land: • Intact: – Composition condition score: 70.4 – Structure condition score: 68.7 – Function condition score: 45.8 – Presence of hollow-bearing trees: No – VI score: 60.5 • Thinned: – Composition condition score: 38.8 – Structure condition score: 48.1 – Function condition score: 29.1 – Presence of hollow-bearing trees: No – VI score: 37.9 • Scattered trees: – Composition condition score: 32.5 – Structure condition score: 11.0 – Function condition score: 42.9 – Presence of hollow-bearing trees: No – VI score: 24.9 The proposed works will result in the removal of 4.00 ha of the CEEC from non-certified areas of the subject land. This includes 0.93 ha in intact condition, 2.18 in thinned condition, and 0.89 ha in scattered trees condition.

5 Assessment against biodiversity legislation

5.1 EPBC Act assessment amendments

The project was declared a controlled action in December 2020, with threatened species and ecological communities, migratory species, World Heritage properties and National Heritage places deemed the relevant 'controlling provisions' (EPBC Act referral 2020/8816). The project will be assessed under the Bilateral agreement relating to environmental assessment between the Commonwealth of Australia and NSW.

Since the EPBC Referral was lodged the impact area has continued to be refined and consolidated for the EIS submission and further by the current project amendments, and detailed ecological investigations have been completed. On this basis, an updated likelihood of occurrence and impact assessment using current information about the impact area and its biodiversity values was prepared as part of the BDAR (Biosis 2021).

A list of biodiversity related Matter of National Environmental Significance (MNES) considered likely, or to be at some risk of being significantly impacted by the project was provided in the revised SEARs (DPIE 2021), based on the Project Referral (Biosis 2020b) and the DAWE Reporting Tool and is provided below:

- *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (Critically Endangered).
- Regent Honeyeater *Anthochaera phrygia* (Critically Endangered).
- Swift Parrot *Lathamus discolor* (Critically Endangered).
- Macquarie perch *Macquaria australasica* (Endangered).

One additional MNES, Camden White Gum, known to occur in the vicinity of the project's impact area, and along the banks of the Nepean River where impacts associated with altered hydrology as a result of the project may occur, which therefore has also been considered to be at risk of significant impact.

Assessments have been undertaken, and are presented in the BDAR (Biosis 2021), for relevant MNES including assessments in accordance with the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (CoA 2013), for *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*, Regent Honeyeater, Swift Parrot and Camden White Gum. An assessment of impacts to Macquarie Perch are included in the project's Aquatic Ecological Impact Assessment report (CTE 2021).

Significant impacts have been assessed as unlikely to occur to all relevant MNES as a result of the project this conclusion remains valid following the project amendments presented in this report, due to the overall reduction (or no change) in impacts to those MNES considered most at risk of potential significant impact.

As outlined in the BDAR (Biosis 2021) *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* was listed as Critically Endangered under the EPBC Act in December 2020 (DAWE 2020b), after the controlled action was referred and the determination was released for the project on 3 December 2020. As the TEC was not listed at the time of the controlled action decision, it is not considered part of the controlling provisions and therefore further consideration of significant impacts under the EPBC Act is not required.

5.2 EP&A Act amendments

5.2.1 SEPP (Sydney Region Growth Centres) 2006

The impact area crosses directly north of the future Western Sydney Aerotropolis Growth Area (WSAGA) and extends across Existing Certified and Existing Non-Certified land associated with the South West Growth Centre (SWGC) between Luddenham and Elizabeth Hills, all of which is regulated by SEPP (Sydney Region Growth Centres) 2006. Approximately 6.7 hectares of the impact area occurs on Existing Certified land and 12.1 hectares of the impact area occurs on Existing Non-certified land within the SWGC. The project will impact upon native vegetation on Existing Certified land and on Existing Non-Certified land, with all Existing Certified land having already undergone assessment and offsetting against the EPBC Act and former NSW *Threatened Species Conservation Act 1994* (BC Act) and therefore vegetation clearing associate with the project are not considered to be impacts under the BDAR (Biosis 2021) or this report. Specific Relevant Biodiversity Measures (RBMs) prescribed by the *Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (Biodiversity Certification Order) were addressed in the BDAR, however these require update as a result of project amendments. Specifically RBM 12 is no longer relevant to the project as a result of the alignment redesign, and the avoidance of clearing native vegetation where the impact area and impact assessment area cross Kemps Creek, to the north of Kemps Creek Nature Reserve.

Order to confer biodiversity certification on the SEPP (Sydney Region Growth Centres) 2006

The Biodiversity Certification Order outlines 41 conditions, known as the RBMs, to ensure consistency with the biodiversity certification for the growth centres during future development. A number of these RBMs are relevant to the project including:

- RBM 8 and RBM 11 pertaining to removal of vegetation in non-certified land.
- RBM 17 pertaining to potential population of Downy Wattle *Acacia pubescens.*

RBM 12 states that within lands marked by a red hatching on the biodiversity certification maps (including the land surrounding Kemps Creek) existing native vegetation must not be cleared unless it is in accordance with a plan of management or unless such clearance has been agreed to by the DECC (now DPIE). The project alignment included in the EIS, triggered RBM 12, however project amendments as detailed above mean this RBM is no longer relevant. The remaining RBMs are address in detail in the project's BDAR (Biosis 2021).

6 Biodiversity offset strategy

As outlined in the project's BDAR (Biosis 2021), and the sections above, residual impacts to biodiversity values as a result of the project will require biodiversity offsets to be secured in accordance with the NSW BOS. The BDAR (Biosis 2021) concluded that there will not be residual significant impacts to MNES listed under the Commonwealth EPBC Act, which has not changed as a result of project amendments, and therefore biodiversity offsets are not required to meet the criteria outlined in *EPBC Act Environmental Offsets Policy* (CoA 2012). Residual impacts to MNES will however be offset in accordance with the requirements of the NSW BOS.

Under the BOS Sydney Water has three main avenues for securing biodiversity offsets for the project, those being:

- Payment to the Biodiversity Conservation Fund managed by the Biodiversity Conservation Trust.
- Purchase (transfer) and retire credits from existing credit holders.
- Establish a Biodiversity Stewardship Site to generate credits required by the project.

Table 6 provides the project's updated biodiversity credit requirement, following project amendments detailed within this report, as well as like for like credit trading options for ecosystem credits. Table 7 provides the species credit requirement resulting from the project. The updated BAM Credit Summary Report based on the project amendments detailed within this report is included in Appendix 1.

Sydney Water is committed to securing the required number and type biodiversity credit to offset residual impact of the project, either through retirement of like for like credits via a combination of the above listed options, or if unavailable though implementation of the variation rules.

Table 6 Estimate of Upper South Creek AWRC ecosystem credit requirement and like for like trading options

PCT	Name of offset trading group	Trading group	Vegetation zone	HBT	Credits	IBRA region
724-Castlereagh shale - gravel transition forest	Shale Gravel Transition Forest in the Sydney Basin Bioregion This includes PCT's: 724, 808	-	724_Intact	No	14	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. Or, any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.
			724_Thinned	No	25	
			724_Scattered_trees	No	1	
725-Castlereagh Ironbark forest	Cumberland Dry Sclerophyll Forests This includes PCT's: 725	Cumberland Dry Sclerophyll Forests >=90%	725_Scattered_trees	No	1	
781-Coastal freshwater wetland	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 780, 781, 782, 828, 1071, 1735, 1736, 1737, 738, 1739, 1740, 1741, 1742, 1911	-	781_Thinned	No	0	
835-Cumberland riverflat forest	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 686, 828, 835, 839, 941, 971, 1064, 1108, 1109, 1212, 1228, 1232, 1293, 1318, 1326, 386, 1504, 1522, 1556, 1594, 1618, 1646, 1648, 720, 1794	-	835_Intact	No	7	
			835_Thinned	No	107	
			835_Scattered_trees	No	21	
849-Cumberland shale plains woodland	Cumberland Plain Woodland in the Sydney Basin Bioregion This includes PCT's: 849, 850	-	849_Intact	No	35	
			849_Thinned	No	57	
			849_Scattered_trees	No	18	
1083-Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1083_Thinned	No	19	

PCT	Name of offset trading group	Trading group	Vegetation zone	HBT	Credits	IBRA region
1105-River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	Eastern Riverine Forests This includes PCT's: 42, 84, 85, 485, 486, 1105, 1106, 1108, 1127, 1270, 1271, 1292, 1293, 1318, 1713, 1714, 1761	Eastern Riverine Forests <50%	1105_Thinned	No	3	
1181-Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion	Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787	Sydney Coastal Dry Sclerophyll Forests <50%	1181_Intact	No	1	
1800-Cumberland Swamp Oak riparian forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 915, 916, 917, 918, 919, 1125, 1230, 1232, 1234, 1235, 1236, 1726, 1727, 1728, 1729, 1731, 1800, 1808	-	1800_Thinned	No	13	
			1800_Scattered trees	No	2	

Table 7 Estimate of AWRC species credit requirement and like for like trading options

Species credit	Credits required	Like for like credit retirement options	IBRA subregion
***Acacia pubescens* - Downy Wattle**	4	*Acacia pubescens* - Downy Wattle	Any in NSW
***Marsdenia viridiflora* subsp. *viridiflora* - endangered population**	3	*Marsdenia viridiflora* subsp. *viridiflora* - endangered population	Any in NSW
***Pimelea spicata* - Spiked Rice-flower**	41	*Pimelea spicata* - Spiked Rice-flower	Any in NSW
***Pultenaea parviflora* - Sydney Bush-pea**	1	*Pultenaea parviflora* - Sydney Bush-pea	Any in NSW
***Chalinolobus dwyeri* - Large-eared Pied Bat**	137	*Chalinolobus dwyeri* - Large-eared Pied Bat	Any in NSW
***Meridolum corneovirens* - Cumberland Plain Land Snail**	226	*Meridolum corneovirens* - Cumberland Plain Land Snail	Any in NSW
***Miniopterus orianae oceanensis* - Large Bent-winged Bat**	41	*Miniopterus orianae oceanensis* - Large Bent-winged Bat	Any in NSW
***Myotis macropus* - Southern Myotis**	179	*Myotis macropus* - Southern Myotis	Any in NSW
***Pommerhelix duralensis* – Dural Land Snail**	27	*Pommerhelix duralensis* – Dural Land Snail	Any in NSW

7 Conclusion

Amendments to the project alignment for the Upper South Creek AWRC project have resulted in a reduction of impacts to biodiversity values from those assessed in the project's BDAR (Biosis 2021).

Additional avoidance of impact has been achieved by locating the project alignment within areas of existing easements, cleared of native vegetation within the localities of Kemps Creek and Western Sydney Parklands. In these locations a sizeable reduction in impacts to Cumberland Plain Woodland (PCT 849) and River-flat Eucalypt Forest (PCT 835) TECs has been realised, as well as habitat for numerous threatened species.

Amendments have resulted in a slight increase in impacts around the Northern Road crossing and a the M12 crossing locations and at the Northern Road crossing, however the amendments have resulted a net reduction in impact to all relevant biodiversity values assessed as present within the project's impact area.

This amendment reports supports the conclusions of the BDAR (Biosis 2021) and provides an updated biodiversity offset credit requirement for the project.

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Appendices

Appendix 1 Updated BAM Calculator Credit Report

BAM Credit Summary Report

Proposal Details

Assessment Id
00019910/BAAS18138/20/00023382

Proposal Name
Upper South Creek Advanced Water Recycling Centre - Cumberland - Amendment Report final updates Feb 2022

BAM data last updated *
24/11/2021

Assessor Name
Callan Wharfe

Report Created
24/02/2022

BAM Data version *
50

Assessor Number
BAAS18138

BAM Case Status
Finalised

Date Finalised
24/02/2022

Assessment Revision
6

Assessment Type
Major Projects

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

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

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

Castlereagh Ironbark forest											
16	725_Scattered_trees	Not a TEC	18.3	18.3	0.01	PCT Cleared - 95%	High Sensitivity to Potential Gain			2.50		1
											Subtotal	**1**
Castlereagh shale - gravel transition forest												
1	724_Intact	Shale Gravel Transition Forest in the Sydney Basin Bioregion	68.2	68.2	0.4	PCT Cleared - 75%	High Sensitivity to Potential Gain	Endangered Ecological Community	Critically Endangered	2.00		14
2	724_Thinned	Shale Gravel Transition Forest in the Sydney Basin Bioregion	44	44.0	1.1	PCT Cleared - 75%	High Sensitivity to Potential Gain	Endangered Ecological Community	Critically Endangered	2.00		25
3	724_Scattered_trees	Shale Gravel Transition Forest in the Sydney Basin Bioregion	33.7	33.7	0.04	PCT Cleared - 75%	High Sensitivity to Potential Gain	Endangered Ecological Community	Critically Endangered	2.00		1
											Subtotal	**40**

Coastal freshwater wetland												
4	781_Thinned	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	6.3	6.3	0.02	PCT Cleared - 74%	High Sensitivity to Potential Gain	Endangered Ecological Community	Not Listed	2.00		0
											Subtotal	**0**
Cumberland riverflat forest												
5	835_Intact	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	67.5	67.5	0.22	PCT Cleared - 93%	High Sensitivity to Potential Gain	Endangered Ecological Community	Not Listed	2.00		7

6	835_Thinned	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	75	75.0	2.8	PCT Cleared - 93%	High Sensitivity to Potential Gain	Endangered Ecological Community	Not Listed	2.00		107
7	835_Scattered_trees	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	56	56.0	0.74	PCT Cleared - 93%	High Sensitivity to Potential Gain	Endangered Ecological Community	Not Listed	2.00		21
											Subtotal	**135**
Cumberland shale plains woodland												
8	849_Intact	Cumberland Plain Woodland in the Sydney Basin Bioregion	60.5	60.5	0.93	PCT Cleared - 93%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	35

9	849_Thinned	Cumberland Plain Woodland in the Sydney Basin Bioregion	37.9	37.9	2.4	PCT Cleared - 93%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	57
10	849_Scattered_trees	Cumberland Plain Woodland in the Sydney Basin Bioregion	24.9	24.9	1.2	PCT Cleared - 93%	High Sensitivity to Potential Gain	Critically Endangered Ecological Community	Critically Endangered	2.50	TRUE	18
											Subtotal	**110**
Cumberland Swamp Oak riparian forest												
14	1800_Thinned	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	36.1	36.1	0.7	PCT Cleared - 60%	High Sensitivity to Potential Gain	Endangered Ecological Community	Endangered	2.00		13
15	1800_Scattered_trees	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	22.3	22.3	0.22	PCT Cleared - 60%	High Sensitivity to Potential Gain	Endangered Ecological Community	Endangered	2.00		2

											Subtotal	**15**
Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion												
11	1083_Thinned	Not a TEC	37.1	37.1	1.4	PCT Cleared - 17%	High Sensitivity to Potential Gain			1.50		19
											Subtotal	**19**
River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion												
12	1105_Thinned	Not a TEC	23	23.0	0.4	PCT Cleared - 40%	High Sensitivity to Potential Gain			1.50		3
											Subtotal	**3**
Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion												
13	1181_Intact	Not a TEC	33.6	33.6	0.07	PCT Cleared - 20%	High Sensitivity to Potential Gain			1.50		1
											Subtotal	**1**
											Total	**324**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Acacia pubescens / Downy Wattle (Flora)									
849_Intact	60.5	60.5	0.02			Vulnerable	Vulnerable	False	1
849_Thinned	37.9	37.9	0.14			Vulnerable	Vulnerable	False	3
								Subtotal	**4**
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
835_Intact	67.5	67.5	0.15			Vulnerable	Vulnerable	True	8
835_Thinned	75.0	75.0	1.4			Vulnerable	Vulnerable	True	76
835_Scattered_trees	56.0	56.0	0.06			Vulnerable	Vulnerable	True	3
849_Thinned	37.9	37.9	0.09			Vulnerable	Vulnerable	True	3
849_Scattered_trees	24.9	24.9	0.01			Vulnerable	Vulnerable	True	1
1083_Thinned	37.1	37.1	1.4			Vulnerable	Vulnerable	True	38
1105_Thinned	23.0	23.0	0.37			Vulnerable	Vulnerable	True	6
1181_Intact	33.6	33.6	0.07			Vulnerable	Vulnerable	True	2
								Subtotal	**137**
Marsdenia viridiflora subsp. viridiflora - endangered population / Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas (Flora)									
849_Intact	60.5	60.5	0.02			Endangered Population	Not Listed	False	1
849_Thinned	37.9	37.9	0.01			Endangered Population	Not Listed	False	1

849_Scattered_trees	24.9	24.9	0.01			Endangered Population	Not Listed	False	1
								Subtotal	**3**
Meridolum corneovirens / Cumberland Plain Land Snail (Fauna)									
724_Intact	68.2	68.2	0.4			Endangered	Not Listed	False	14
724_Thinned	44.0	44.0	1.1			Endangered	Not Listed	False	25
835_Intact	67.5	67.5	0.22			Endangered	Not Listed	False	7
835_Thinned	75.0	75.0	2.8			Endangered	Not Listed	False	107
849_Intact	60.5	60.5	0.93			Endangered	Not Listed	False	28
849_Thinned	37.9	37.9	2.4			Endangered	Not Listed	False	45
								Subtotal	**226**
Miniopterus orianae oceanensis / Large Bent-winged Bat (Fauna)									
1083_Thinned	37.1	37.1	1.4			Vulnerable	Not Listed	True	38
1105_Thinned	23.0	23.0	0.13			Vulnerable	Not Listed	True	2
1181_Intact	33.6	33.6	0.05			Vulnerable	Not Listed	True	1
								Subtotal	**41**
Myotis macropus / Southern Myotis (Fauna)									
724_Thinned	44.0	44.0	1			Vulnerable	Not Listed	False	22
724_Scattered_trees	33.7	33.7	0.03			Vulnerable	Not Listed	False	1
781_Thinned	6.3	6.3	0.02			Vulnerable	Not Listed	False	1
835_Intact	67.5	67.5	0.19			Vulnerable	Not Listed	False	6
835_Thinned	75.0	75.0	2.4			Vulnerable	Not Listed	False	89

835_Scattered_trees	56.0	56.0	0.42			Vulnerable	Not Listed	False	12
849_Intact	60.5	60.5	0.04			Vulnerable	Not Listed	False	1
849_Thinned	37.9	37.9	1.1			Vulnerable	Not Listed	False	21
849_Scattered_trees	24.9	24.9	0.48			Vulnerable	Not Listed	False	6
1105_Thinned	23.0	23.0	0.29			Vulnerable	Not Listed	False	3
1181_Intact	33.6	33.6	0.02			Vulnerable	Not Listed	False	1
1800_Thinned	36.1	36.1	0.7			Vulnerable	Not Listed	False	13
1800_Scattered_trees	22.3	22.3	0.22			Vulnerable	Not Listed	False	2
725_Scattered_trees	18.3	18.3	0.01			Vulnerable	Not Listed	False	1
								Subtotal	**179**
Pimelea spicata / Spiked Rice-flower (Flora)									
849_Intact	60.5	60.5	0.85			Endangered	Endangered	False	26
849_Thinned	37.9	37.9	0.79			Endangered	Endangered	False	15
								Subtotal	**41**
Pommerhelix duralensis / Dural Land Snail (Fauna)									
1083_Thinned	37.1	37.1	1.4			Endangered	Endangered	False	26
1181_Intact	33.6	33.6	0.07			Endangered	Endangered	False	1
								Subtotal	**27**

Pultenaea parviflora / Pultenaea parviflora (Flora)									
849_Scattered_trees	24.9	24.9	0.01			Endangered	Vulnerable	False	1
								Subtotal	**1**