Upper South Creek Advanced Water Recycling Centre – Response to Request for Information

1 July 2022

Attachment A – Sydney Region Growth Centres biodiversity mapping
Attachment B – DECCW NOx exemption response
Attachment C – Additional NO_2 air quality information

Table 1 Department of Planning and Environment (DPE) – Environment and Heritage Group (EHG)

Issue	Response
Sydney Region Growth Centres Biodiversity Certification – conditions of approval Requests several recommended conditions in relation to impacts on existing native vegetation (ENV) in red hatched land and rehabilitation around Kemps Creek.	Sydney Water considers these are matters for DPE's Water Assessments team and has no further information to add.
Sydney Region Growth Centres Biodiversity Certification - mapping Seeks additional information in the form of maps that depict the location of impacts to ENV (certified and non-certified) from the development in the Growth Centres covered by the Biodiversity Certification Order. The maps should also include the red and black hatched areas. This mapping is required to ensure that impacts within the Growth Centres can be adequately assessed as well as reconciled as part of the annual reporting required under the Order.	Attachment A (Figure 1) includes the requested maps. These maps show all project infrastructure in the area covered by the Biodiversity Certification Order, including where there is no impact on ENV. These maps include insets that show where the project's impact area overlaps with ENV mapped in the Biodiversity Certification Order. The only locations where the project impacts on verified ENV (based on Biosis' ground-truthing) are: • page 1 – 1.3 m^2 of PCT 849 in a certified area. • page 10 – 6 m^2 of PCT 849 in a non-certified area. This vegetation is located adjacent to an existing access track which is proposed for use during construction. This track has vegetation on its eastern edge and the WaterNSW Upper Canal to the west. Sydney Water needs to ensure construction vehicles can use this access track which may require this minor clearing or trimming of ENV. Sydney Water will consider during detailed design and construction planning whether impact to this ENV can be avoided.
Sydney Region Growth Centres Biodiversity Certification - offsets EHG seeks a Growth Centres Offset Strategy detailing how it is proposed to meet requirements specified in RBM 8.	As noted above, Sydney Water will consider if these impacts can be avoided during detailed design. If impacts cannot be avoided, Sydney Water would include any offsets required by RBM 8 in the project's overall Biodiversity Offset Strategy (management measure TB10 in Appendix B of the Submissions Report).

Table 2 NSW Environment Protection Authority

Issue	Response
Air quality – cogeneration performance The EPA recommends the proponent evaluate the feasibility of installing	As outlined in the Submissions Report, Sydney Water adopted the upper limit of 450 mg/m^3 NOx emissions as a worst-case scenario in the Air Quality Impact

Issue	Response
cogeneration engines that are consistent with Best Available Technology in regard to NOx emissions and advise whether the proposal will be amended to improve NOx emission rates below the currently modelled performance. Where a lower NOx emission technology is proposed, the expected change in NOx impacts from currently modelled should be discussed. Should the adopted emission performance of 450 mg/m^3, or marginally below 450 mg/m^3, continue to be proposed, the EPA will require a more robust assessment of nitrogen oxides be performed in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants. The assessment must: • Include a worst-case operating scenario for NO_2 impacts • Present all predicted incremental and cumulative impacts of NO_2 for each modelled scenario at all existing and future receptors • Consider the 2021 one hour and annual average NO2 AAQ NEPM standards.	Assessment to show compliance with the Protection of the Environment Operations (Clean Air) Regulation 2010 (Clean Air Regulation), as required by the project SEARs and the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants*. Sydney Water has several co-generation engines at existing wastewater treatment plants. These units have NOx emissions of between 400-450 mg/m^3 and Sydney Water is proposing comparable units for this project. In 2010, Sydney Water had discussions and correspondence with the then NSW Department of Environment and Climate Change which confirmed that the policy position of NOx emissions from natural gas fired cogeneration units does not apply to Sydney Water's cogeneration units because they are fired on biogas and not natural gas. This correspondence is provided in Attachment B. Best available technology for biogas fired cogeneration units is 450 mg/m^3 NOx emissions. Natural gas co-generation units are able to achieve NOx emissions of 250 mg/m^3 due to a higher methane content. Biogas is about 60% methane versus natural gas which is about 90% methane. Attachment C of this report provides further technical information in response to EPA's comments on NO_2 impacts from the adopted emissions performance of 450 mg/m^3. Sydney Water is committed to reducing air pollution from the AWRC, and will continue to look at opportunities to reduce NOx emissions from co-generation units as outlined in management measure AQ01 in Appendix B of the Submissions Report.
Noise and vibration The EPA's comments on the EIS noted that the project is likely to have significant noise and vibration impacts on communities adjacent to works during the construction phase, and that all reasonable and feasible mitigation measures should be implemented prior to the commencement of these construction activities to address these impacts. The RtS has generally addressed the EPA's comments on the EIS regarding noise and vibration impacts from the project	Sydney Water considers no further comment is required on this issue.

Issue	Response
in its current design.	
Contaminated land - accredited auditor The EPA recommends that Sydney Water engage an EPA-accredited Site Auditor throughout the duration of works to ensure that any work required in relation to contamination is appropriately managed.	Sydney Water remains of the view that because the Soils and Contamination impact assessment did not identify any major contamination risks requiring remediation, an EPA-accredited site auditor is not required. Section 5.10.45 in the Submissions Report noted identified risks can be managed by measures CLS01 – CLS04 in Appendix B. These measures commit to preparing and implementing remedial and sampling quality plans in accordance with the EPA guidelines including 'Consultants Reporting on Contaminated Land'. This means consultants preparing and submitting reports required to comply with the requirements of the Contaminated Land Management Act 1997 must also be certified under the EPA's 'Contaminated Land Consultant Certification' policy. This measure will ensure any works related to contamination are appropriately managed.
Contaminated land - SAQP Given some intrusive site investigation has been conducted to inform the EIS and that Sydney Water committed in the RtS to submit SAQP to inform further sampling, the EPA considers it acceptable for Sydney Water to submit the SAQP as part of a condition of approval. To formalise this commitment, the EPA recommends that SAQP should be required for the SSI project as part of conditions of approval, should the project be approved in its current form.	Sydney Water considers these are matters for DPE's Water Assessments team and has no further information to add.
Surface water The EPA notes that trenching Kemps Creek for the purposes constructing the brine pipeline will no longer be undertaken as described in the EIS. As such, a justification for trenching of the creek is no longer an issue. The EPA further notes the proposed management measures to address the impacts of trenching across South Creek for the purposes of the construction of the treated water pipeline in Table 15-3 of the EIS, and the justification provided for these trenching impacts.	Sydney Water considers no further comment is required on this issue.

Table 3 Department of Planning and Environment - Water

Issue	Response
DPE Water notes the proponent must ensure sufficient water entitlement is held in a water access licence/s (WAL) to account for the maximum predicted take for each water source prior to the take occurring. • Ensure that relevant nomination of work dealing applications for WALs proposed to account for water take by the project have been completed prior to the water take occurring, under s71W of the Water Management Act 2000 (WMA). • DPE Water notes that water supply works that are part of an SSI project (and assessed accordingly) are exempt from requiring a water supply work and/or use approval. Should works be required and not assessed as part of the SSI process, a water supply work and/or use approval under the WMA will be required unless another exemption applies. • The proponent should note that even if it is exempt from holding a water supply work and/or use approval there will still be further impact assessment required for the dealing application process to nominate the work on the WAL(s) under s71W of the WMA. Approval of the dealing is not guaranteed by the SSI assessment process, however early assessment of potential impacts through or parallel to the SSI assessment may reduce the uncertainty.	Section 5.5.1 of the Submissions Report notes that Sydney Water holds a Water Access Licence (WAL) for the Sydney Basin Central Groundwater Source. Sydney Water purchased 29 unit shares (29 ML) from the Sydney Basin Central Groundwater Source under the Controlled Allocation Order (Various Groundwater Sources) 2021. Sydney Water is also in the process of applying for a WAL for the Sydney Basin Nepean Groundwater Source. Construction for the project is not expected to commence until early 2023. Whilst the project scope described in Chapter 4 of the EIS includes the environmental flows pipeline, the timing and need for this pipeline is not yet determined, and it may not be built. On this basis, ensuring water availability for extraction from the Nepean Basin Groundwater Source is not required at this time. Sydney Water has other projects that depend on water availability for extraction from Sydney Basin Central Groundwater Source and intends to secure further water shares under future Controlled Allocations. In the event of a shortfall across its projects, Sydney Water has previously successfully secured temporary trade allocations under s71T of the Water Management Act (WMA) and will do this again if required to ensure the project needs can be met prior to dewatering works. Sydney Water will be exempt from obtaining a water supply/use approval for the project because it is designated critical State significant infrastructure, however assessments to support the dealing application process for nominating work on the relevant WAL are described section 5.5.1 and Appendix H of the Submissions Report. Construction water requirements are also described in the EIS and in section 5.5.12 in the Submissions Report including a potential 14 ML from the Nepean River for tunnelling works associated with the environmental flows pipeline. If detailed design and construction of the environmental flows pipeline progresses, Sydney Water will confirm construction water sources and water take at that time, including the use of

Issue	Response
	alternatives such as tankered water. If a dealing application under s71W of the WMA is required, Sydney Water can apply for a WAL for the Hawkesbury and Lower Nepean Rivers Source and can provide additional assessment including confirmation of pumps at that time. Sydney Water will ensure that nomination of work dealings on the relevant WAL for each source is completed prior to any water take for the project.
DPE Water notes that the geomorphic monitoring should not be only to detect impacts at overbank flow stage, but extend to bench inundation (usually at 1:3 or 1:4 month Average Recurrence Interval) DPE Water recommends flow event monitoring is conducted for South Creek during operation of the treated wastewater discharge plant. The recommended actions of WW25-29 of Table 15.4 of the Environmental Impact Statement should be adopted as standard monitoring requirements for the proposal. The monitoring parameters should focus on alteration of channel form and renewal of geomorphic features that would otherwise be present in a watercourse of similar River Style to South Creek at the proposed site. Sydney Water proposes to monitor channel state only following overbank flow events. The flow heights at which monitoring should occur when incipient benches are inundated and sediment drapes add to bench shape and level. The heights of benches along South Creek should be reviewed and channel monitoring designed to determine whether benches are renewing and in-channel and riparian vegetation is establishing.	Sydney Water will monitor both the riverbed and riverbanks as part of its monitoring program as proposed by management measures WW25 to WW28 (as updated in Appendix B of the Submissions Report). Sydney Water acknowledges DPE Water's comments regarding monitoring parameters. As noted in management measure WW25, a qualified geomorphologist will be engaged to design the monitoring program and report on findings. Monitoring will include appropriate methods to establish potential impacts from the project. Measures WW26 and WW28 relate directly to South Creek. As required by management measure WW26, monitoring of flow related impacts downstream of the release structure at South Creek will occur every six months for a minimum of two years. This frequency of monitoring will allow impacts to be identified. Further review will be undertaken at the two year mark to determine the need for any on-going monitoring.
A flow gauge adjacent to the wastewater treatment facility is highly recommended to provide data needed for analysing hydraulic factors and any necessary armouring or other reinforcement/protection needed to protect banks and benches for impacted reaches of South Creek.	Sydney Water has relied on flow data from two sites in South Creek, including at the Elizabeth Drive crossing (located about 1.7 km upstream) and at the Great Western Highway crossing (located about 14.3 km downstream of the site) to undertake the geomorphic assessment. Sydney Water's geomorphologist did not recommend the installation of a flow gauge and recommended that more can be gained from repeated bank and bed surveys, as proposed by

Issue	Response
	management measures WW25 to WW28. Sydney Water will use available upstream and downstream flow data and apply relevant design standards to the design of in-stream structures at the release point. This will minimise the risk of erosion in South Creek.

Attachment A Sydney Region Growth Centres biodiversity mapping

1 July 2022

Elissa Howie
Lead Environmental Scientist - Asset Lifecycle
Sydney Water

Dear Elissa

Upper South Creek AWRC - Biodiversity assessment clarification

Our Ref: Matter 31617

Please find below the Upper South Creek AWRC biodiversity impact summaries for the amended project based on information requested from DPE 21 June 2022. Note all impacts exclude areas mapped as Existing Certified.

Table 1 provides a summary of impacts to PCTs and BAM species credit species as a result of the amended project alignment.

Table 1 Biodiversity values impacted by the amended project and total credit requirement

Biodiversity value	Area (ha) / Count (indiv.)	Credit requirement
Native vegetation (PCTs) – Ecosystem credits		
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 TEC)	1.58	40
725: Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain	0.01	1
781: Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion (Freshwater wetlands on coastal floodplains TEC)	0.02	0
835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (River-flat Eucalypt Forest TEC)	3.82	135
849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Cumberland Plain Woodland TEC)	4.48	110
1083: Red Bloodwood - scribbly gum heathy woodland on sandstone plateaux of the Sydney Basin Bioregion	1.38	19
1105: River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion	0.40	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	0.07	1

Biodiversity value	Area (ha) / Count (indiv.)	Credit requirement
1800: Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley (Swamp Oak Floodplain Forest TEC)	0.92	15
Threatened species – Species credits		
Downy Wattle *Acacia pubescens*	0.16	4
***Marsdenia viridiflora* subsp. *viridiflora* - endangered population**	0.04	3
Spiked Rice-flower *Pimelea spicata*	1.64	41
Sydney Bush-pea *Pultenaea parviflora*	0.01	1
Cumberland Plain Land Snail *Meridolum corneovirens*	7.95	226
Dural Land Snail *Pommerhelix duralensis*	1.45	27
Large Bent-winged Bat *Miniopterus orianae oceanensis*	1.56	41
Large-eared Pied Bat *Chalinolobus dwyeri*	3.48	137
Southern Myotis *Myotis macropus*	6.88	179

Table 2 provides a summary of impacts to BC Act and EPBC Act TECs as a result of the amended project alignment.

Table 2 TECs impacted by the amended project

TEC name	Listing status	Area impacted (Ha)
BC Act TECs		
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	Endangered	0.00
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	4.00
River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	3.65
Shale Gravel Transition Forest in the Sydney Basin Bioregion	Endangered	1.54
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	0.88
Sydney Freshwater Wetlands in the Sydney Basin Bioregion	Endangered	0.02
EPBC Act TECs		
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	0.22
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	0.00
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	1.44

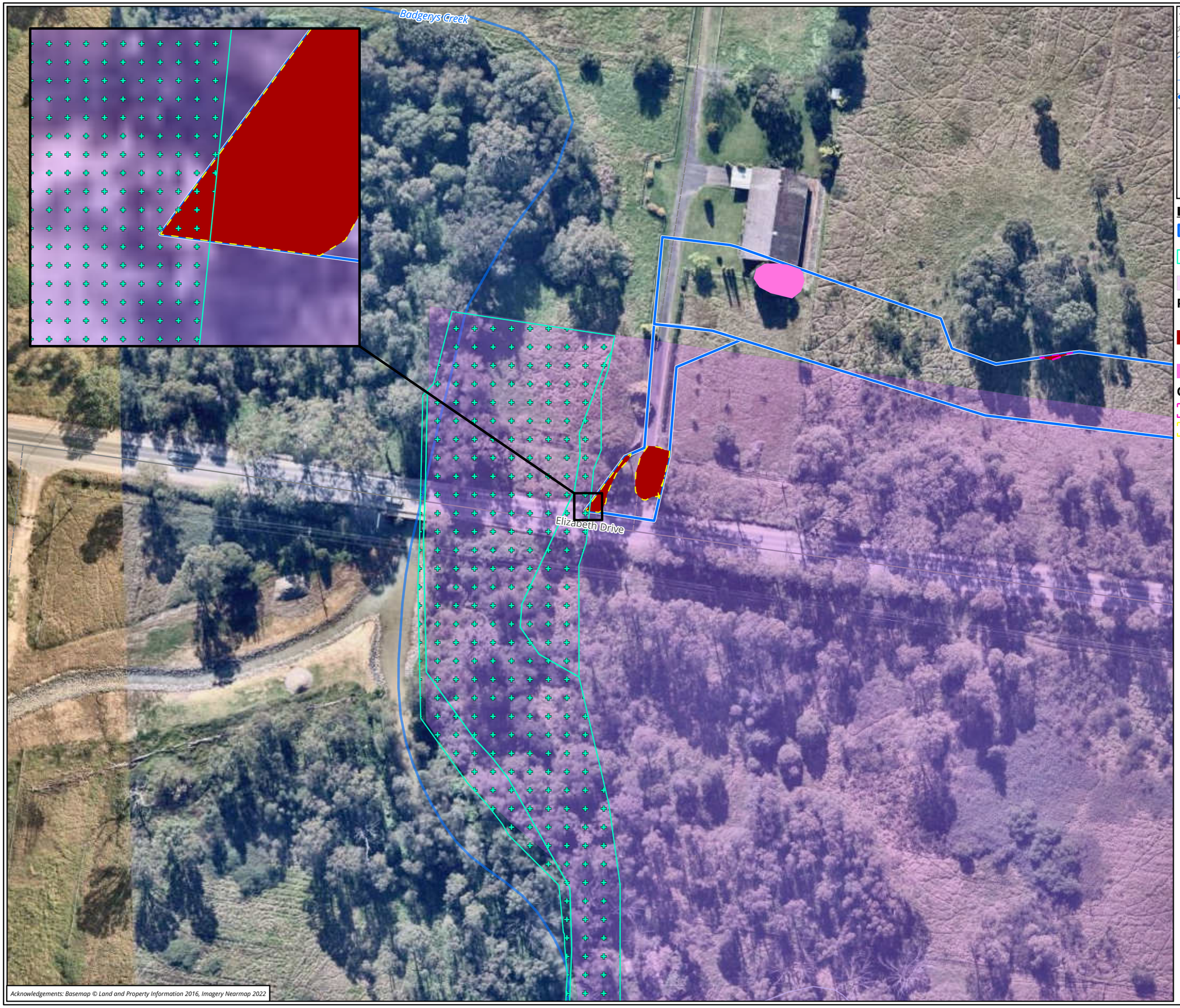
The total area of direct impact from the amended project alignment to native vegetation on 'Existing Non-certified' land is 1.43 hectares, of which a total of 6 square metres is considered verified ENV. This is illustrated on the attached figure.

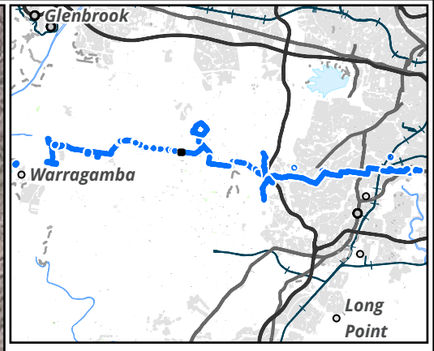
Table 3 provides a summary of impacts to EPBC Act listed threatened species as a result of the amended project alignment.

Table 3 EPBC Act listed threatened species impacted by the amended project

EPBC Act listed threatened species	Area (ha)
Broad-headed Snake *Hoplocephalus bungaroides*	1.56
Brush-tailed Rock Wallaby *Petrogale penicillata*	1.56
Camden White Gum *Eucalyptus benthamii*	Indirect impacts only (as assessed in BDAR)
Downy Wattle *Acacia pubescens*	0.16
Dural Land Snail *Pommerhelix duralensis*	1.45
Grey-headed Flying-fox *Pteropus poliocephalus*	12.68
Koala *Phascolarctos cinereus*	12.68
Large-eared Pied Bat *Chalinolobus dwyeri*	3.48
Regent Honeyeater *Anthochchaera phrygia*	12.68
Spiked Rice-flower *Pimelea spicata*	1.64
Swift Parrot *Lathamus discolor*	12.68
Sydney Bush-pea *Pultenaea parviflora*	0.01

Figure 1 – Impacts to ENV





Legend

- Amended impact area
- Biodiversity Certification Order Mapped ENV
- Existing Certified

Plant Community Type

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

Condition class

- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 1

0 10 20 30 40 50

Metres

Scale: 1:1,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617,
Date: 30 June 2022 ,
Prepared for: CW, Prepared by: AM, Last edited by: lharley
Layout: 31617_ImpactsToENV
Project: P:\31600s\31617\Mapping\31617_WaterFactory.aprx

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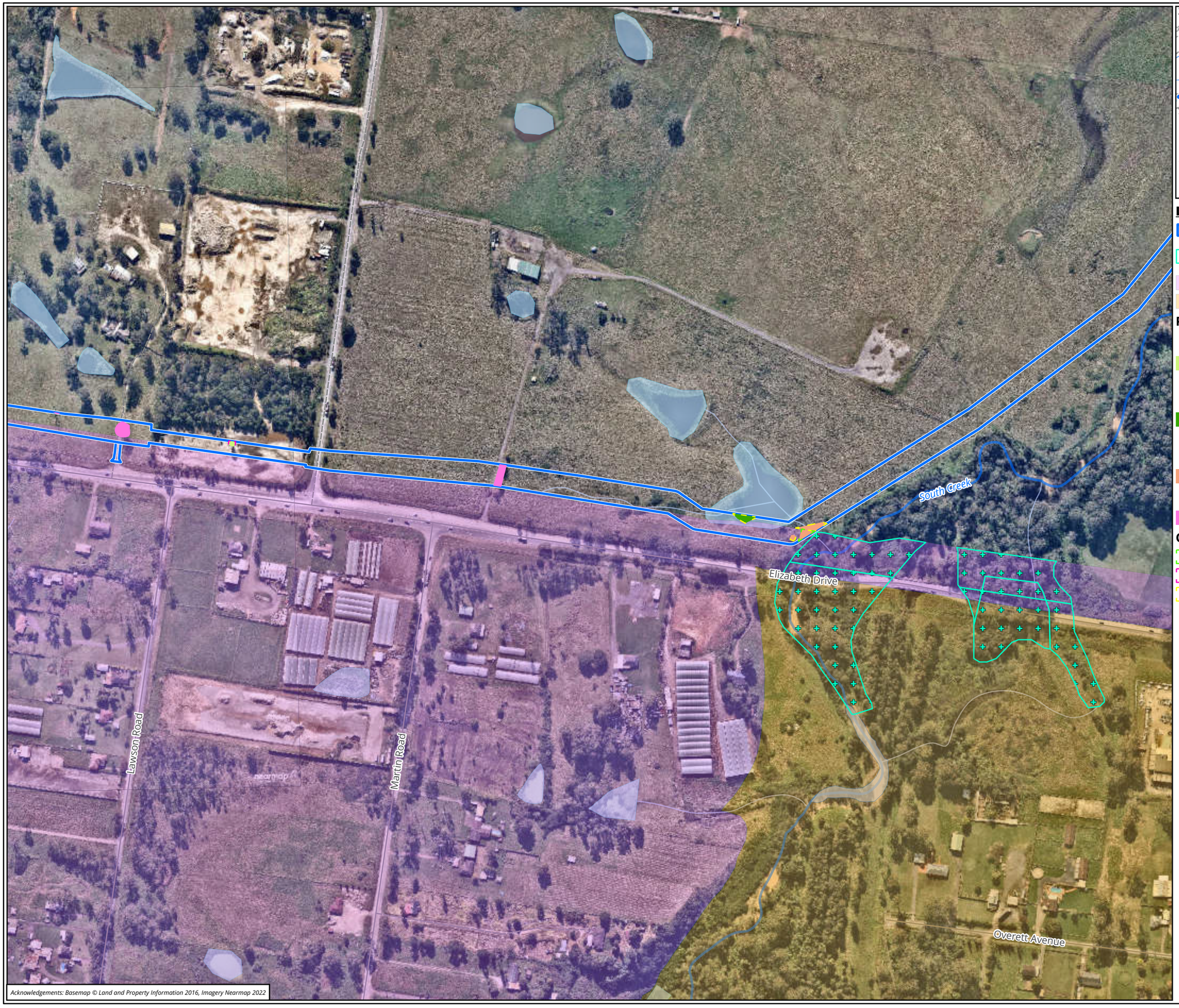

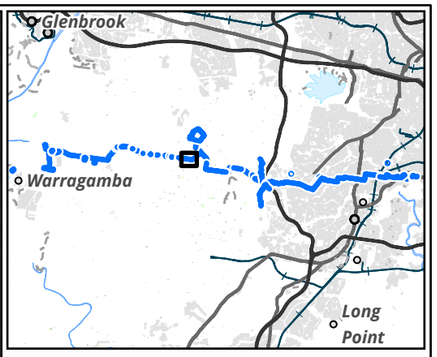

Legend

- Amended impact area
- Biodiversity Certification Order Mapped ENV
- Existing Certified
- Existing Non Certified

Plant Community Type

- 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
- 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion
- 835 - Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- Exotic vegetation

Condition class

- Intact
- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 2

0 40 80 120 160 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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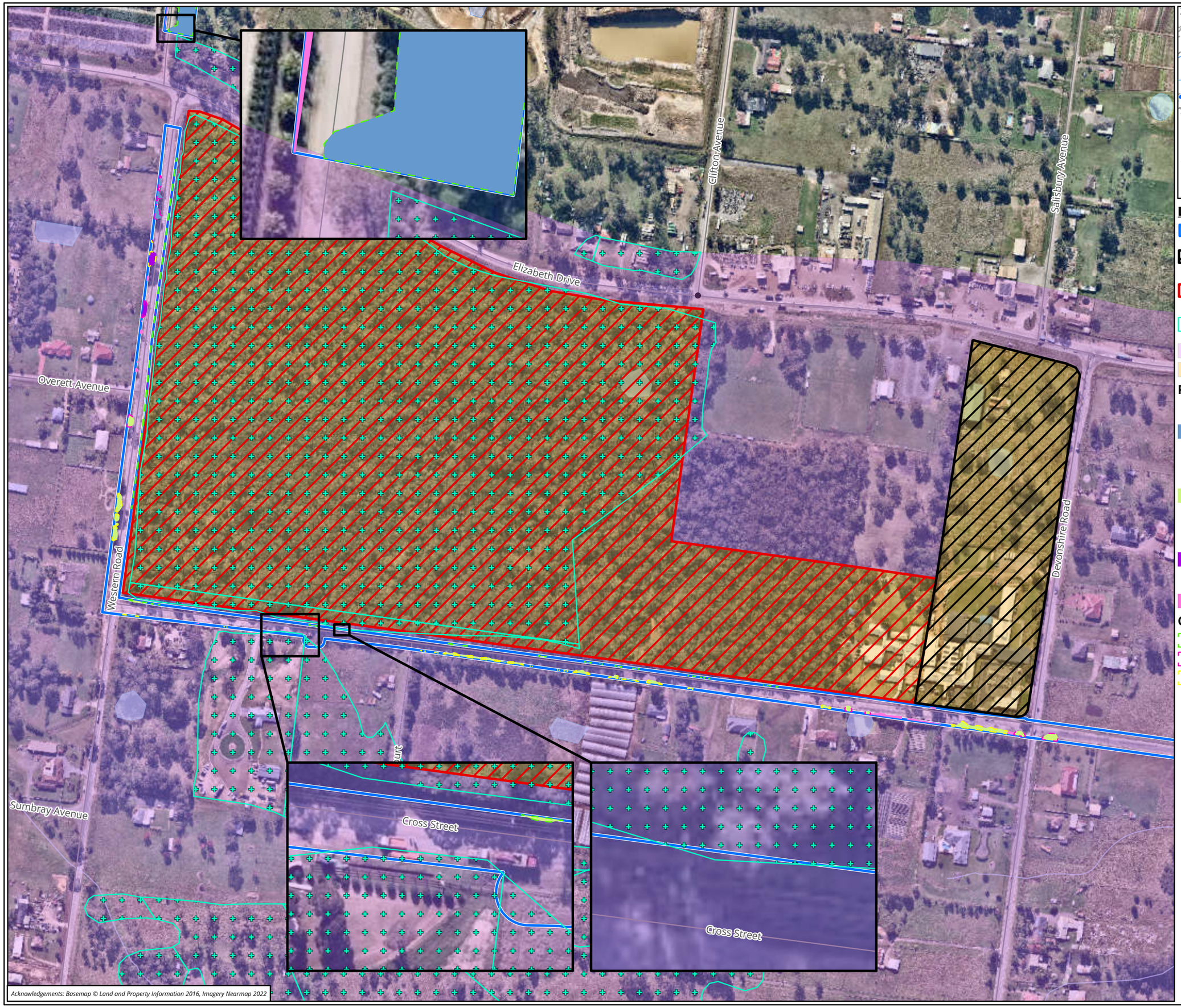

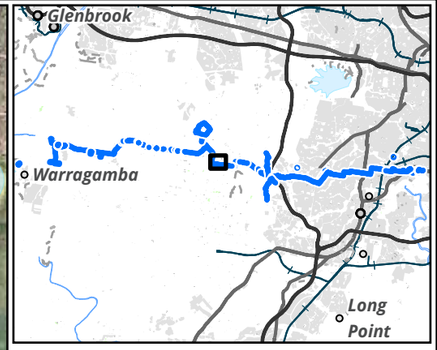

Legend

- Amended impact area
- Biodiversity Certification Order - Black hatched
- Biodiversity Certification Order - Red hatched
- Biodiversity Certification Order Mapped ENV
- Existing Certified
- Existing Non Certified

Plant Community Type

- 724 - Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion
- 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
- 883 - Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion
- Exotic vegetation

Condition class

- Intact
- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 3

0 40 80 120 160 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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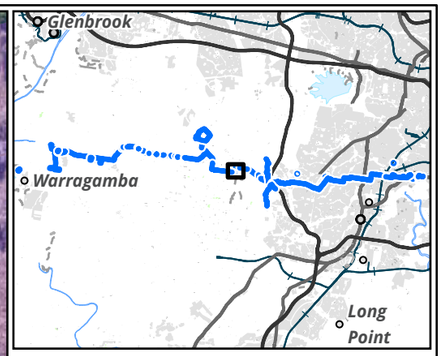

Legend

- Amended impact area
- Biodiversity Certification Order - Red hatched
- Biodiversity Certification Order Mapped ENV
- Existing Certified
- Existing Non Certified

Plant Community Type

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

Condition class

- Intact
- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 4

0 40 80 120 160 200

Metres

Scale: 1:4,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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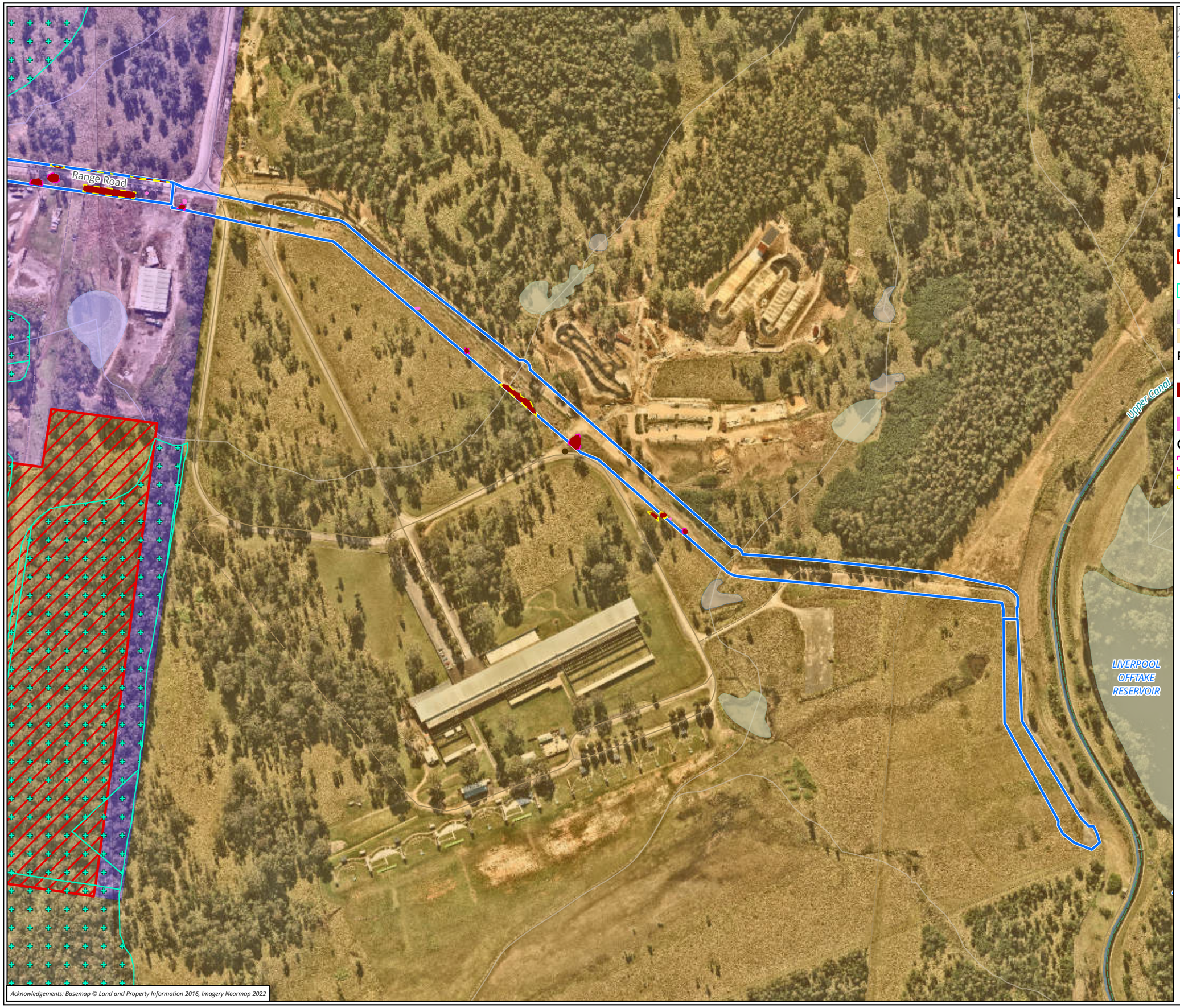

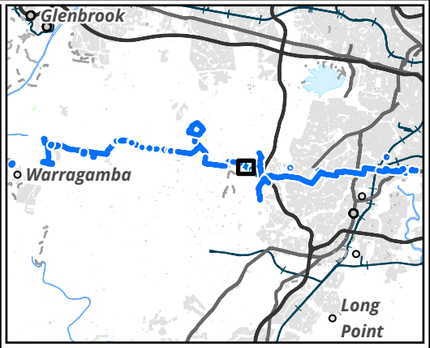

Legend

- Amended impact area
- Biodiversity Certification Order - Red hatched
- Biodiversity Certification Order Mapped ENV
- Existing Certified
- Existing Non Certified

Plant Community Type

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

Condition class

- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 5

0 40 80 120 160 200

Metres

Scale: 1:4,000 @ A3

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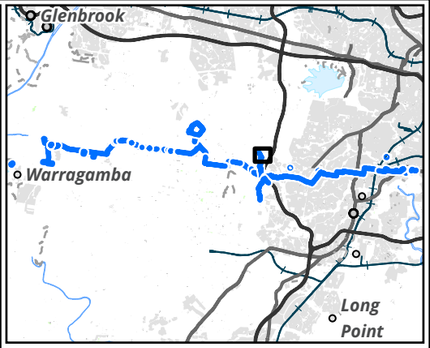

Legend

- Amended impact area
- Biodiversity Certification Order Mapped ENV
- Existing Certified
- Existing Non Certified

Plant Community Type

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

Condition class

- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 6

0 40 80 120 160 200

Metres
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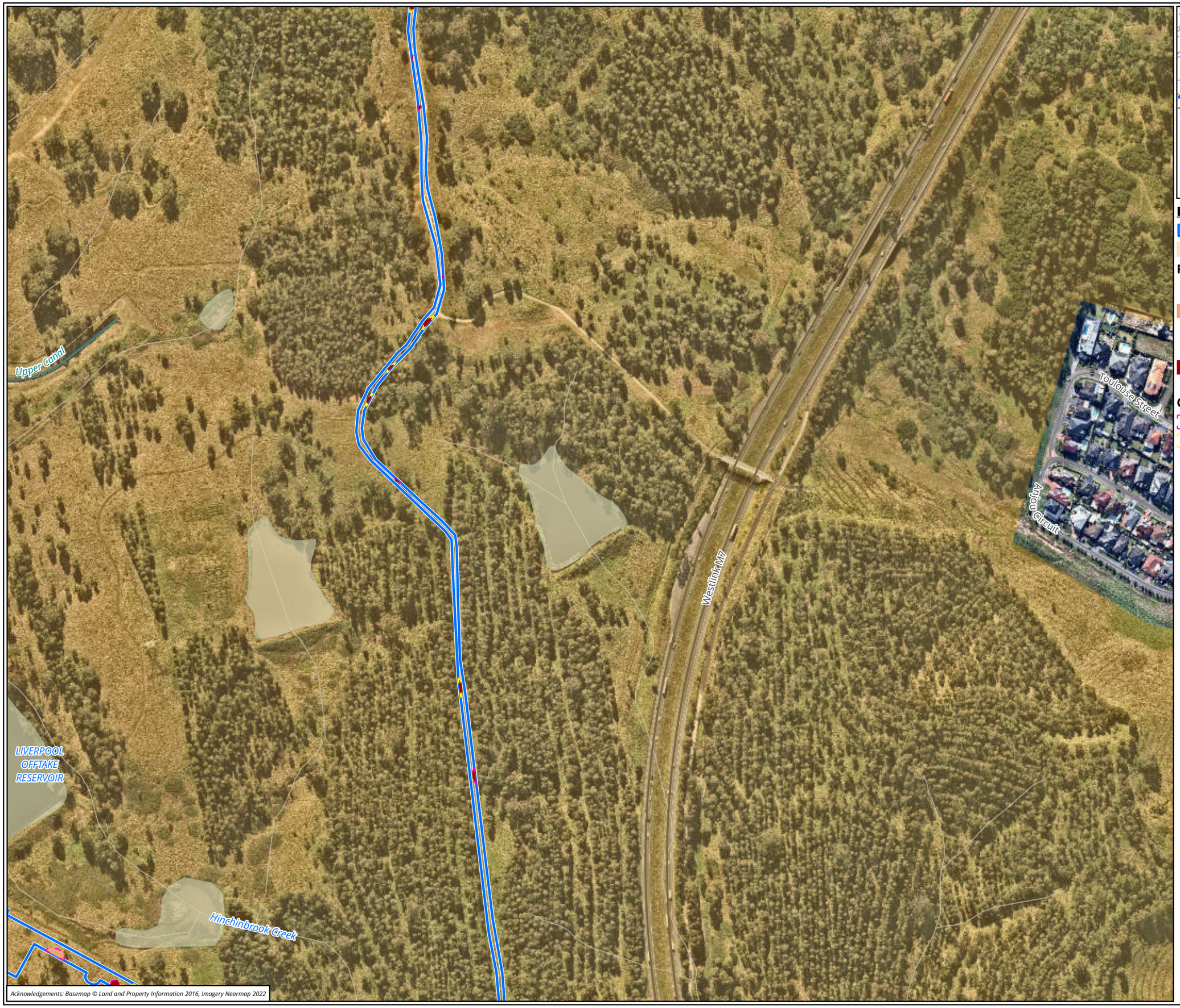

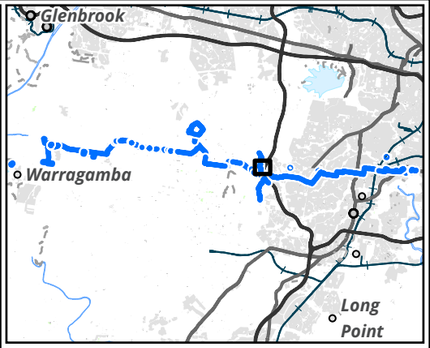

Legend

- Amended impact area
- Existing Non Certified

Plant Community Type

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

Condition class

- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 7

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31617_WaterFactory.aprx

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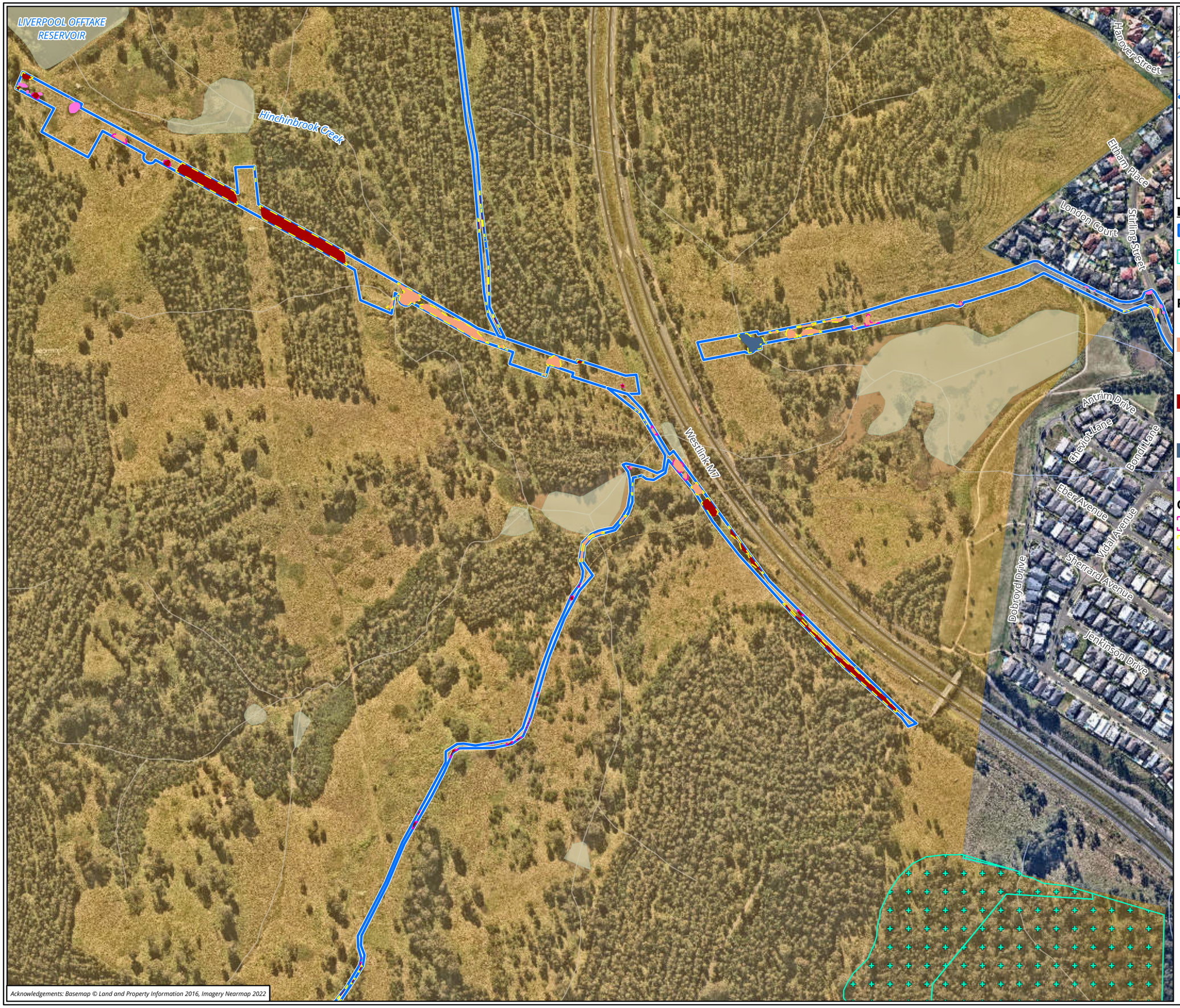
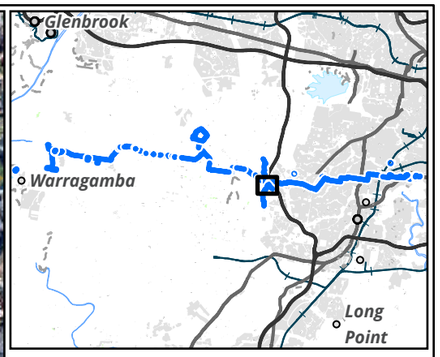




Legend

- Amended impact area
- Biodiversity Certification Order Mapped ENV
- Existing Non Certified

Plant Community Type

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

Condition class

- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 8

0 50 100 150 200 250

Metres

Scale: 1:5,000 @ A3

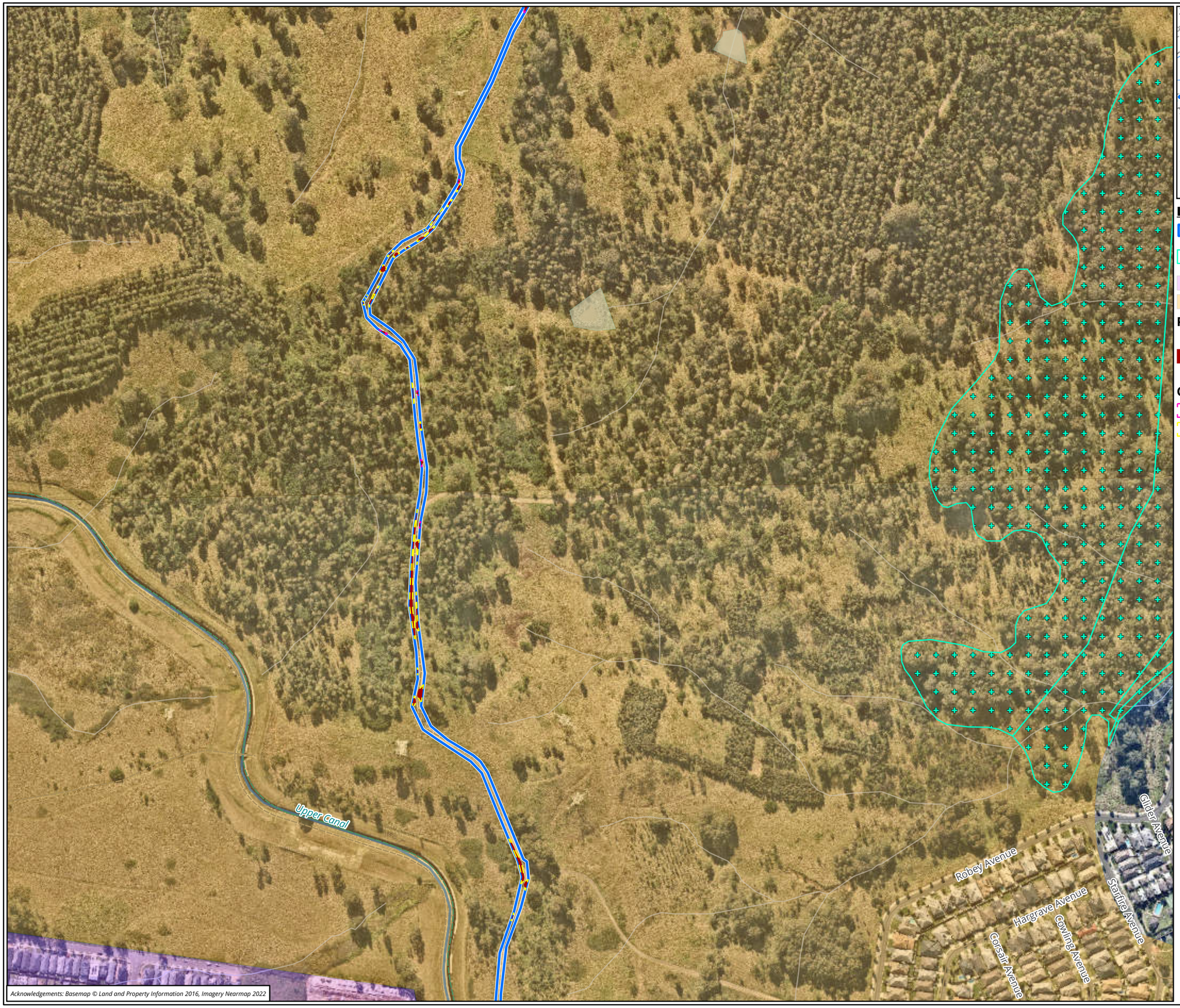
Coordinate System: GDA 1994 MGA Zone 56

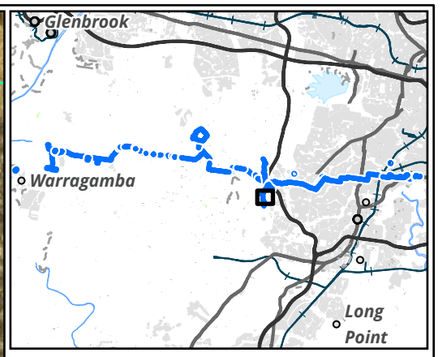
N

biosis

Matter: 31617,
Date: 30 June 2022 ,
Prepared for: CW, Prepared by: AM, Last edited by: lharley
Layout: 31617_ImpactsToENV
Project: P:\31600s\31617\Mapping\
31617_WaterFactory.aprx

Acknowledgements: Basemap © Land and Property Information 2016, Imagery Nearmap 2022





Legend

- Amended impact area
- Biodiversity Certification Order Mapped ENV
- Existing Certified
- Existing Non Certified

Plant Community Type

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

Condition class

- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 9

0 40 80 120 160 200

Metres

Scale: 1:4,000 @ A3

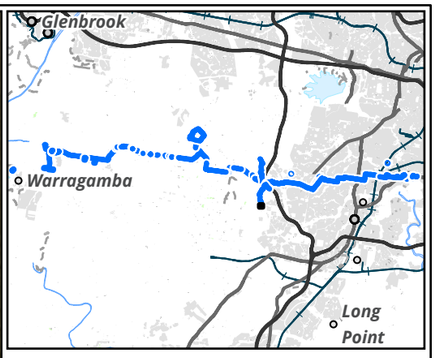
Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617,
Date: 30 June 2022 ,
Prepared for: CW, Prepared by: AM, Last edited by: lharley
Layout: 31617_ImpactsToENV
Project: P:\31600s\31617\Mapping\31617_WaterFactory.aprx

Acknowledgements: Basemap © Land and Property Information 2016, Imagery Nearmap 2022



Legend

- Amended impact area
- Biodiversity Certification Order Mapped ENV
- Existing Certified
- Existing Non Certified

Plant Community Type

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

Condition class

- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 10

0 10 20 30 40 50

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

N

biosis

Matter: 31617,
Date: 30 June 2022 ,
Prepared for: CW, Prepared by: AM, Last edited by: lharley
Layout: 31617_ImpactsToENV
Project: P:\31600s\31617\Mapping\
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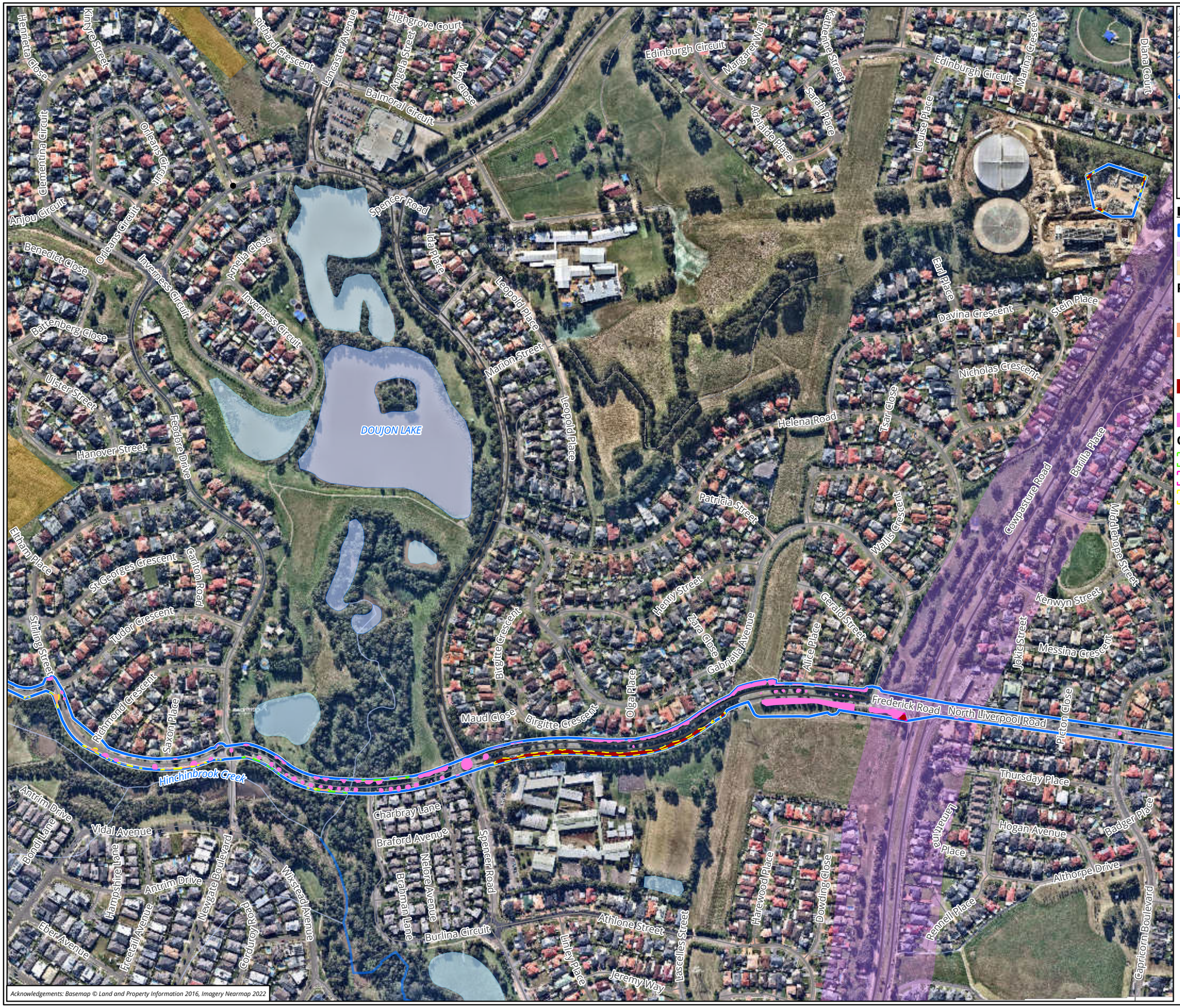

Acknowledgements: Basemap © Land and Property Information 2016, Imagery Nearmap 2022

Legend

- Amended impact area
- Existing Certified
- Existing Non Certified

Plant Community Type

- 835 - Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
- Exotic vegetation

Condition class

- Intact
- Scattered Trees
- Thinned

Upper South Creek Advanced Water Recycling Centre - Impacts to ENV, page 11

0 50 100 150 200 250

Metres
Scale: 1:5,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56

N

biosis

Matter: 31617,
Date: 30 June 2022 ,
Prepared for: CW, Prepared by: AM, Last edited by: lharley
Layout: 31617_ImpactsToENV
Project: P:\31600s\31617\Mapping\
31617_WaterFactory.aprx

Attachment B DECCW NOx exemption response

Our reference: DOC10/47068
Contact: Rachael Chan, 9995 6827

Ms Emma Cooper
System Assurance Manager
Sydney Water Corporation
PO Box 399
PARRAMATTA NSW 2124

Dear Emma,

Application for Exemption of Cogeneration Facilities at Sewage Treatment Plants

Thank you for your letter dated 19 May 2010 and the subsequent NOx emission data from Bondi and North Head to apply for an exemption for the cogeneration facilities at Bondi, Cronulla, Glenfield, Liverpool, North Head, Warriewood, Wollongong and Malabar sewage treatment plants.

The Department of Environment, Climate Change and Water (DECCW) has reviewed the data and does not consider there is a need for Sydney Water Corporation's (SWC) cogeneration facilities to be classified as exempt under the Protection of the Environment Operations (Clean Air) Regulation 2010. This is due to the following:

- Relevant NO_X emission standard for the SWC cogeneration plant is 450mg/m^3. There is no flexibility in the Regulation regarding this limit and it applies to **all fuel types**, including biogas.
- SWC cogeneration plants are expected to comply with a NO_X emission standard of 450mg/m^3. The sampling results show the Bondi and North Head cogeneration plant are likely to comply with the Regulation limit of 450mg/m^3.

DECCW's policy position on NO_X emissions from natural gas fired cogeneration plant **does not apply** to SWC's cogeneration plant as they are fired on biogas, not on natural gas. To summarise, DECCW's policy position is as follows:

- All new cogeneration in Sydney and the Illawarra must either be NO_X neutral or achieve Best Available Technique (BAT) emission performance (http://www.environment.nsw.gov.au/resources/air/inp09124.pdf).
- A NO_X emission standard of 250mg/m^3 (which is less than the Regulation limit of 450mg/m^3) is considered by DECCW to be BAT for **natural gas fired** cogeneration plant with a capacity to burn less than 7 megajoules of fuel per second (http://www.environment.nsw.gov.au/air/cogentrigen.htm).

The Department of Environment and Climate Change NSW is now known as the Department of Environment, Climate Change and Water

PO Box 668 Parramatta NSW 2124
Level 7, 79 George Street Parramatta NSW
Tel: (02) 9995 5000 Fax: (02) 9995 6900
ABN 30 841 387 271
www.environment.nsw.gov.au

DECCW proposes that all SWC's STPs licences which have cogeneration facilities be required to monitor the NOx emission on an annual basis using TM-11, our Approved Method for NOx. Unless SWC wishes to further discuss this issue, SWC is requested to submit a licence variation for all the above mentioned STS licences to include the monitoring and reporting requirements for the cogeneration facilities for each of these sites.

Should you wish to discuss any of DECCW's comments further, please contact Rachael Chan on 9995 6827.

Yours sincerely

FRANK GAROFALOW
Manager Metropolitan Infrastructure and Biodiversity
Environment Protection and Regulation

Attachment C Additional NO_2 air quality information

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21 June 2022

Dane Collins
Senior Environmental Scientist | E&TS Asset Lifecycle
Sydney Water
Level 11, 1 Smith Street, Parramatta NSW 2150

Project Name: Upper South Creek Advanced Water Recycling Centre
Project Number: IS315300

Dear Dane

Additional assessment of NO_2 impacts from the Upper South Creek Water Recycling Centre

The Environmental Impact Statement (EIS) for the Upper South Creek Advanced Water Recycling Centre was placed on public exhibition by the Department of Planning and Environment (DPE) from 21 October 2021 to 17 November 2021. The EIS included an Air Quality Impact Assessment prepared by Jacobs (2021).

During and following the exhibition period, submissions on the EIS were received from government agencies (including the Environment Protection Authority [EPA]), organisations and members of the public. These have been addressed in the Response to Submissions (RtS).

The Environment Protection Authority (EPA) has subsequently requested additional information regarding the potential nitrogen dioxide (NO_2) impacts of the proposed co-generation engines. This document provides the requested information.

Yours sincerely

Shane Lakmaker
Principal (Air Quality)

1. Request from the Environment Protection Authority

Should the adopted emission performance of 450 mg/m^3, or marginally below 450 mg/m^3, continue to be proposed, the EPA will require a more robust assessment of nitrogen oxides be performed in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants. The assessment must:

- *Include a worst-case operating scenario for NO_2 impacts*
- *Present all predicted incremental and cumulative impacts of NO_2 for each modelled scenario at all existing and future receptors*
- *Consider the 2021 one hour and annual average NO_2 AAQ NEPM standards.*

Biogas produced by the digesters will be combusted in the cogeneration engines to produce electricity and provide heating of the digesters using the waste heat. Gas produced in excess of the cogeneration engine and heating utilisation capacity will be destroyed by combustion using the waste gas burners (WGBs). The specific model of cogeneration engine has not been selected, so design specifications are not yet available. However the engine will be required to comply with the relevant emission limits from the *Protection of the Environment Operations (Clear Air) Regulation 2010* (Clean Air Regulation).

A worst case approach was adopted for the air quality impact assessment (AQIA) (Jacobs, 2021). This approach was based on:

- Assumed maximum emissions (i.e. at the limit of 450 mg/Nm^3).
- Continuous (24/7) operation.
- An assumption that 100% of the NO_x is NO_2 at the point of maximum ground-level impact. Typically, only about 20% of the NO_x will be NO_2 at the point of maximum ground-level impact.
- Adding maximum model predictions to maximum background concentrations.

From the approach outlined above it was demonstrated (Figure 11 of Jacobs, 2021) that NO_2 concentrations would not exceed the EPA's assessment criteria under the 50 megalitre per day (ML/d) scenario. Doubling the model results as an indication of impacts under the conceptual 100 ML/d scenario also demonstrated compliance with the EPA's assessment criteria at sensitive receptors.

The EPA has requested more detail regarding the potential NO_2 impacts of a worst-case scenario (assumed to be the 100 megalitre per day scenario) and consideration of the 2021 NEPM Standards for NO_2. It should be noted that the Standards from the 2021 variation to the NEPM are not used for the assessment of specific projects in NSW. The Project is required to be assessed using the criteria from the EPA's "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA, 2016) as per the Secretary's Environmental Assessment Requirements (SEARs).

Further details on the potential NO_2 impacts of the Project have been developed. This involved examining the rate of conversion from NO_x to NO_2 in the ambient air, extracting model results for key sensitive receptors for 50 and 100 ML/d scenarios and comparing model results to both the EPA assessment criteria and 2021 NEPM Standards. Again, the modelling assumed

maximum emissions (i.e. at the limit of 450 mg/Nm^3), continuous (24/7) operation and maximum background concentrations in the representative year.

Table 1 shows the modelled emissions from co-generation sources under the 50 and 100 ML/d scenarios.

Table 1. Modelled emissions from co-generation

Parameter	50 ML/d scenario	100 ML/d scenario		Reference
	Co-gen 1	Co-gen 1	Co-gen 2	
Easting (m)	293892	293892	294073	GIS / site layout
Northing (m)	6251372	6251372	6251425	GIS / site layout
Height (m)	6	6	6	Assumed minimum height
Stack tip diameter (m)	0.4	0.4	0.4	Sydney Water
Base elevation (m)	40	40	40	GIS / site layout
Flow rate (Am^3/s)	1.6	1.6	1.6	Sydney Water
Flow rate (Nm^3/s)	0.6	0.6	0.6	Sydney Water
Temperature (K)	699	699	699	Sydney Water
Velocity (m/s)	12.3	12.3	12.3	From flow rate
NO_x concentration (mg/Nm^3)	450	450	450	POEO Clean Air Regulation
NO_x mass emission rate (mg/Nm^3)	0.27	0.27	0.27	From in-stack concentration

The rate of conversion from NO_x to NO_2 in the ambient air has been examined using monitoring data collected by the DPE[1]. Nitrogen dioxide is a component of NO_x. Emissions of NO_x from combustion related sources will include both nitric oxide (NO) and NO_2. In general, at the point of emission, NO will comprise the greatest proportion of the total NO_x emission. Typically, this is 90% by volume of the NO_x. The remaining 10% will comprise mostly NO_2. Ultimately however, much of the NO emitted into the atmosphere is oxidised to NO_2. The rate at which this oxidisation takes place depends on prevailing atmospheric conditions including temperature, humidity and the presence of other substances in the atmosphere such as ozone. It can vary from a few minutes to many hours. The rate of conversion is important because from the point of emission to the point of maximum ground-level concentration there will be an interval of time during which some oxidation will take place. If the dispersion is sufficient to have diluted the plume to the point where the concentration is very low, then the level of oxidation is unimportant. However, if the oxidation is rapid and the dispersion is slow then high concentrations of NO_2 can occur.

The NO_x monitoring data in Sydney show that the percentage of NO_2 in the NO_x is inversely proportional to the total NO_x concentration, and when NO_x concentrations are high, the percentage of NO_2 in the NO_x is typically of the order of 20%. This is demonstrated by Figure 1

[1] https://www.dpie.nsw.gov.au/air-quality/air-quality-data-services/data-download-facility

and Figure 2 which show that, for high NO_x concentrations at the nearby Prospect and St Marys monitoring stations, the NO_2 to NO_x ratio reduces to less than 20%.

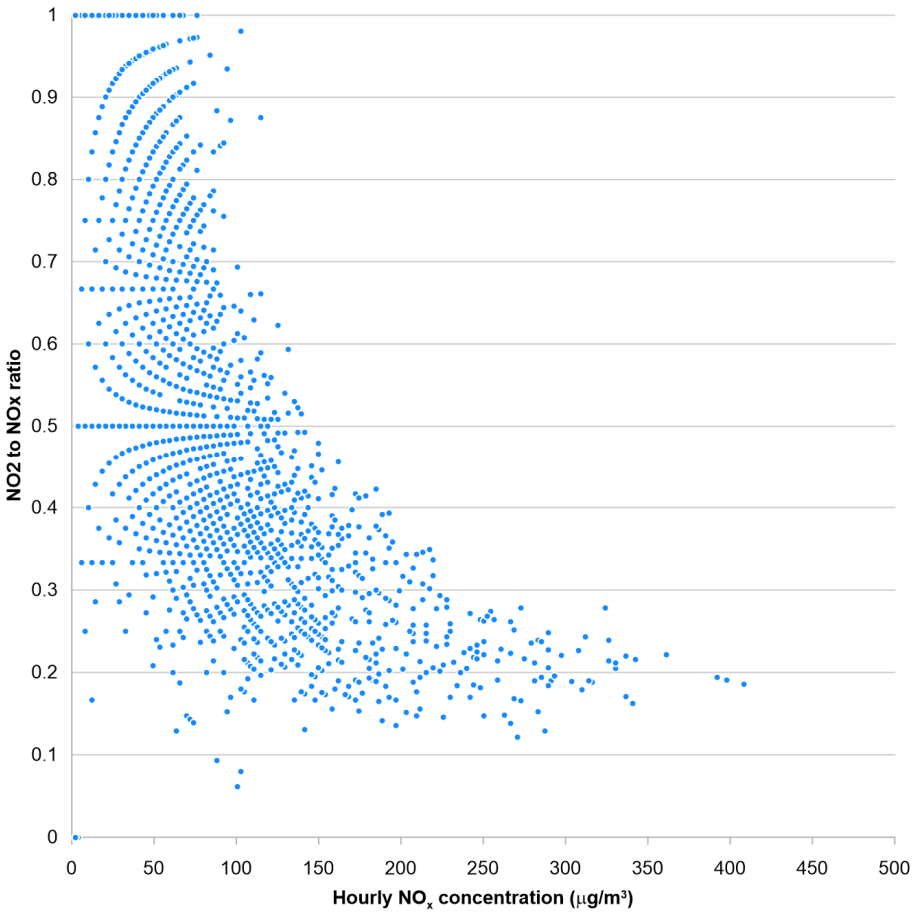

Figure 1. Measured NO_2 to NO_x ratios from hourly data collected at Prospect in 2019

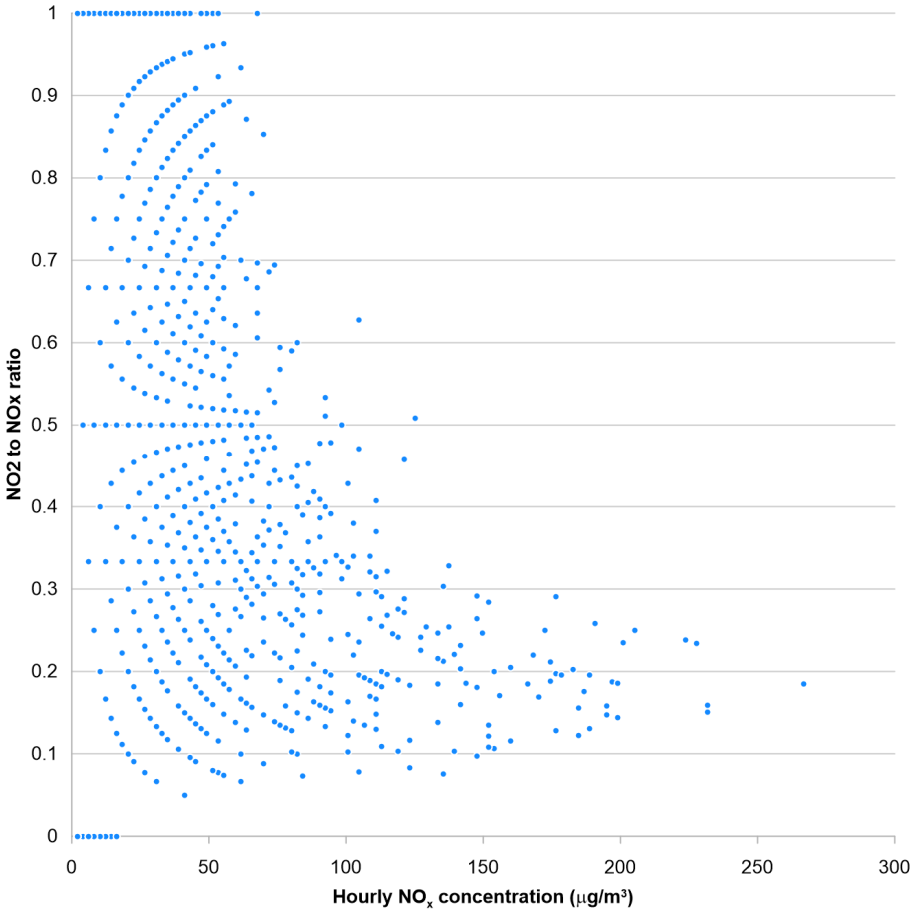

Figure 2. Measured NO_2 to NO_x ratios from hourly data collected at St Marys in 2019

Figure 3 shows the predicted maximum 1-hour average NO_2 concentrations, at ground-level, due to the Project under the 50 and 100 ML/d scenarios. These results assume that 30% of the NO_x is NO_2 at the locations of maximum (1-hour average) ground-level concentrations. As noted above, the DPE monitoring data show that NO_2 will only be in the order of 20% of the NO_x for maximum levels so 30% is a conservative assumption.

At the nearest sensitive receptors, the predicted maximum 1-hour average NO_2 concentrations are less than 20 µg/m^3 under the worst-case 100 ML/d scenario. With the addition of maximum background levels for the selected model year (103 µg/m^3) the cumulative results (i.e. 123 µg/m^3 or less) demonstrate compliance with the EPA's assessment criterion (246 µg/m^3) criterion. The results also demonstrate compliance with the 2021 NEPM Standard (162 µg/m^3).

Figure 4 shows the predicted annual average NO_2 concentrations due to the Project under the 50 and 100 ML/d scenarios. These results assume that 100% of the NO_x is NO_2 since more conversion can occur over longer averaging times. At the nearest sensitive receptors, the predicted annual average NO_2 concentrations are less than 2 µg/m^3 under the worst-case 100 ML/d scenario. With the addition of maximum background levels for the selected model year (25 µg/m^3) the results demonstrate compliance with the EPA's assessment criterion (62 µg/m^3) criterion. The results also demonstrate compliance with the 2021 NEPM Standard (30 µg/m^3).

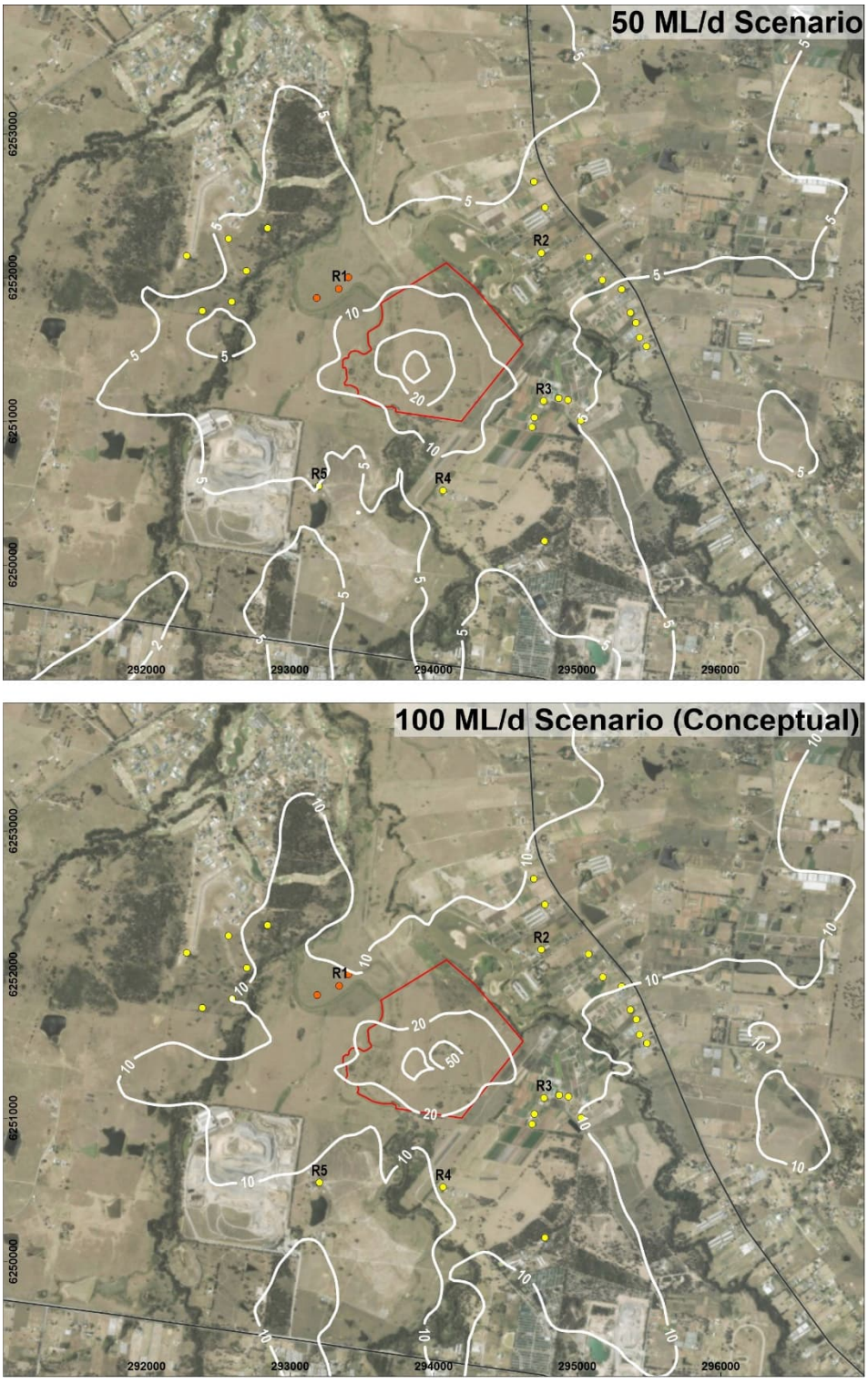

Figure 3. Predicted maximum 1-hour average NO_2 concentrations due to co-generation

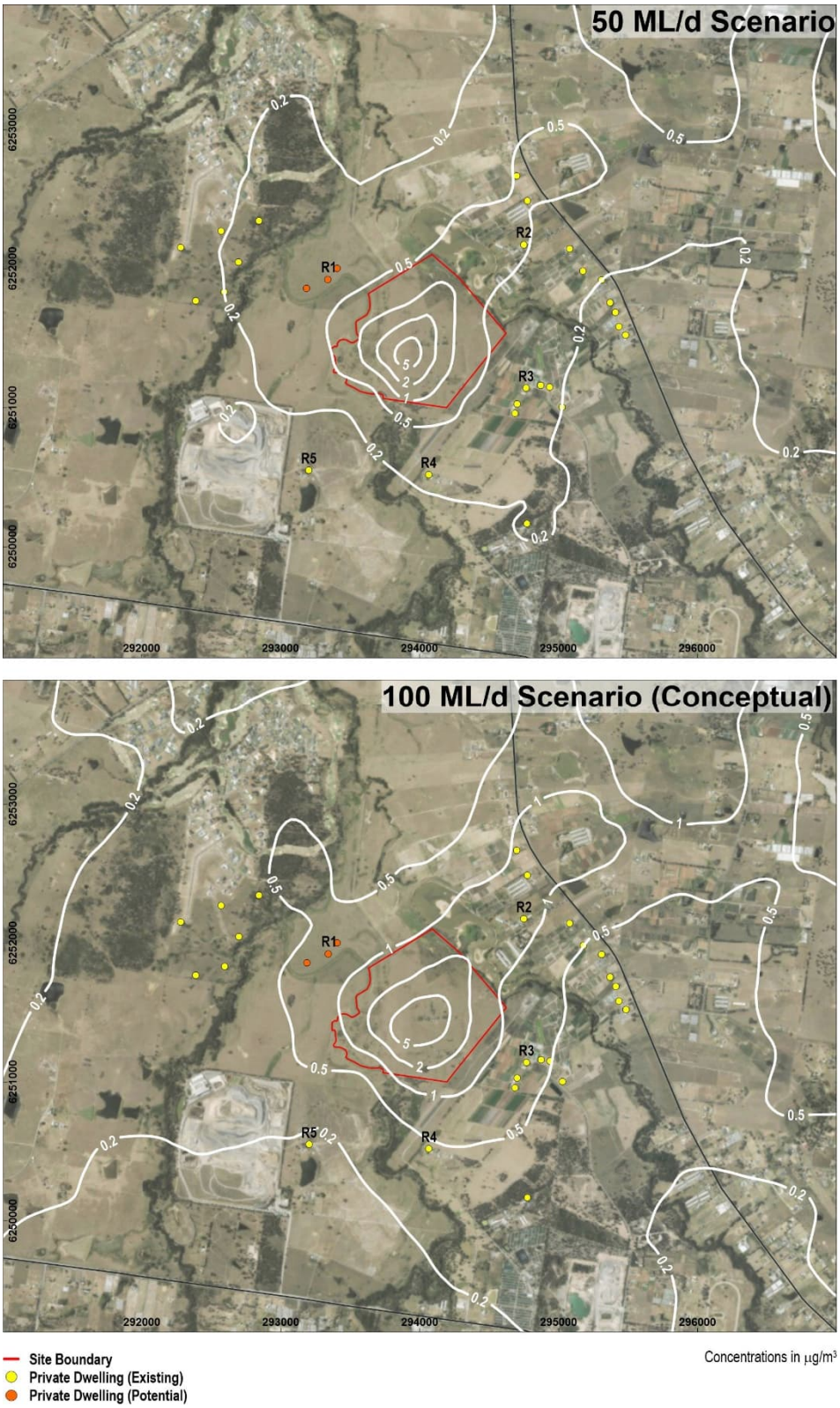

Figure 4. Predicted annual average NO_2 concentrations due to co-generation

Table 2 provides tabulated results for the nearest existing and potential sensitive receptors, where the receptor locations are shown on Figure 3 and Figure 4. The data from Table 2 show that NO_2 concentrations at the nearest sensitive receptors will not exceed the EPA assessment criteria or more stringent 2021 NEPM Standards.

Table 2. Predicted NO_2 concentrations at sensitive receptors due to co-generation

Receptor	Due to Project		Background	Cumulative		EPA assessment criteria[1]	NEPM 2021 Standard
	50 ML/d	100 ML/d		50 ML/d	100 ML/d		
Maximum 1-hour average NO_2 concentration ($\mu g/m^3$)							
R1	7	12	103	110	115	246	162
R2	8	16	103	111	119	246	162
R3	7	14	103	110	117	246	162
R4	7	11	103	110	114	246	162
R5	5	9	103	108	112	246	162
Annual average NO_2 concentration ($\mu g/m^3$)							
R1	0.4	0.7	25	25.4	25.7	62	30
R2	0.5	1.3	25	25.5	26.3	62	30
R3	0.3	0.7	25	25.3	25.7	62	30
R4	0.3	0.4	25	25.3	25.4	62	30
R5	0.1	0.2	25	25.1	25.2	62	30

[1] From the "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW" (EPA, 2016).

From these additional investigations it has therefore been inferred that the worst case operation of the Project will not result in any adverse air quality impacts with respect to NO_2.

2. References

EPA (2016) "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW".

Jacobs (2021) "Upper South Creek Advanced Water Recycling Centre – Air Quality Impact Assessment". Final | Revision 1. Dated 15 June 2021. Prepared for Sydney Water Corporation.