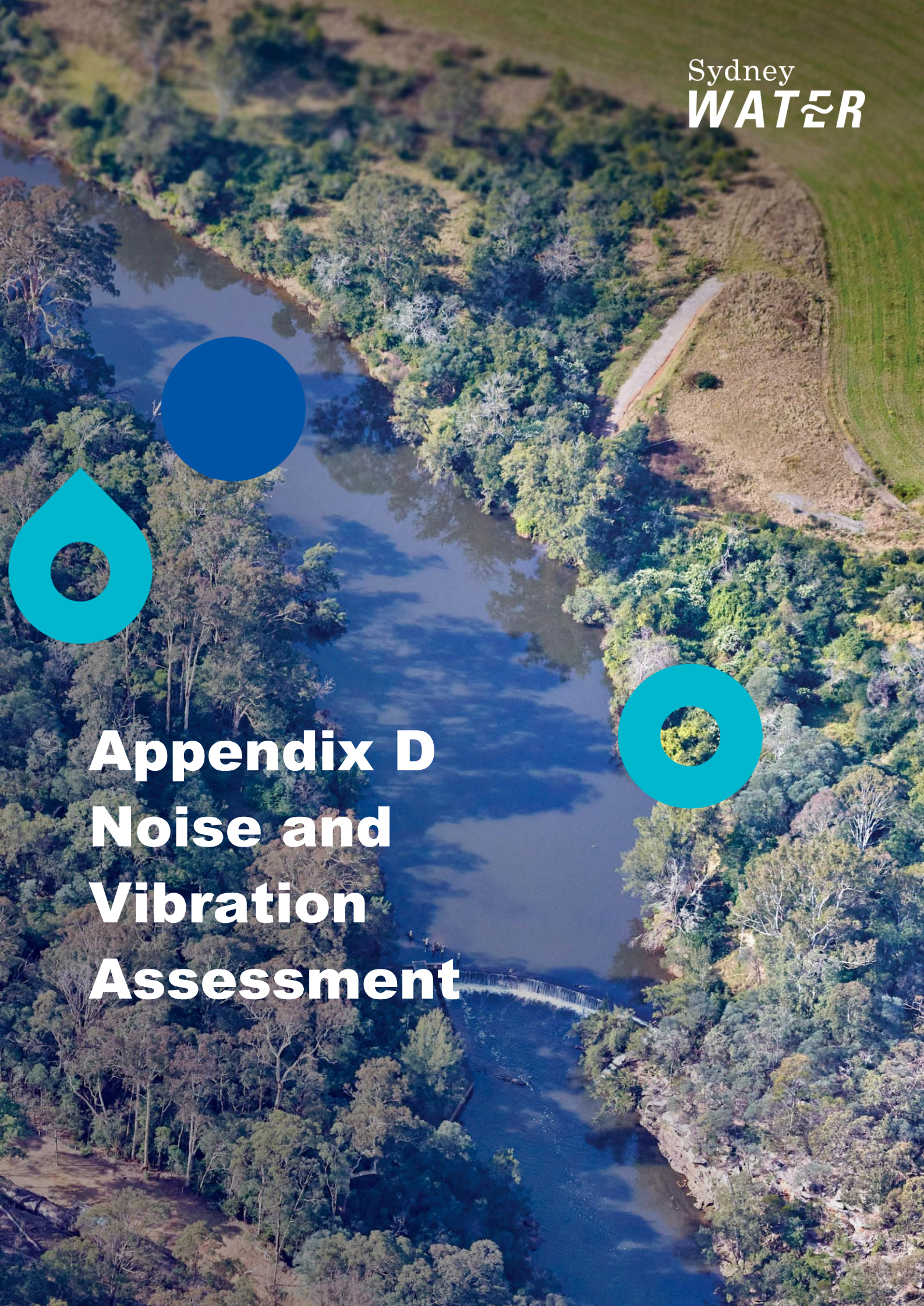


Sydney WATER

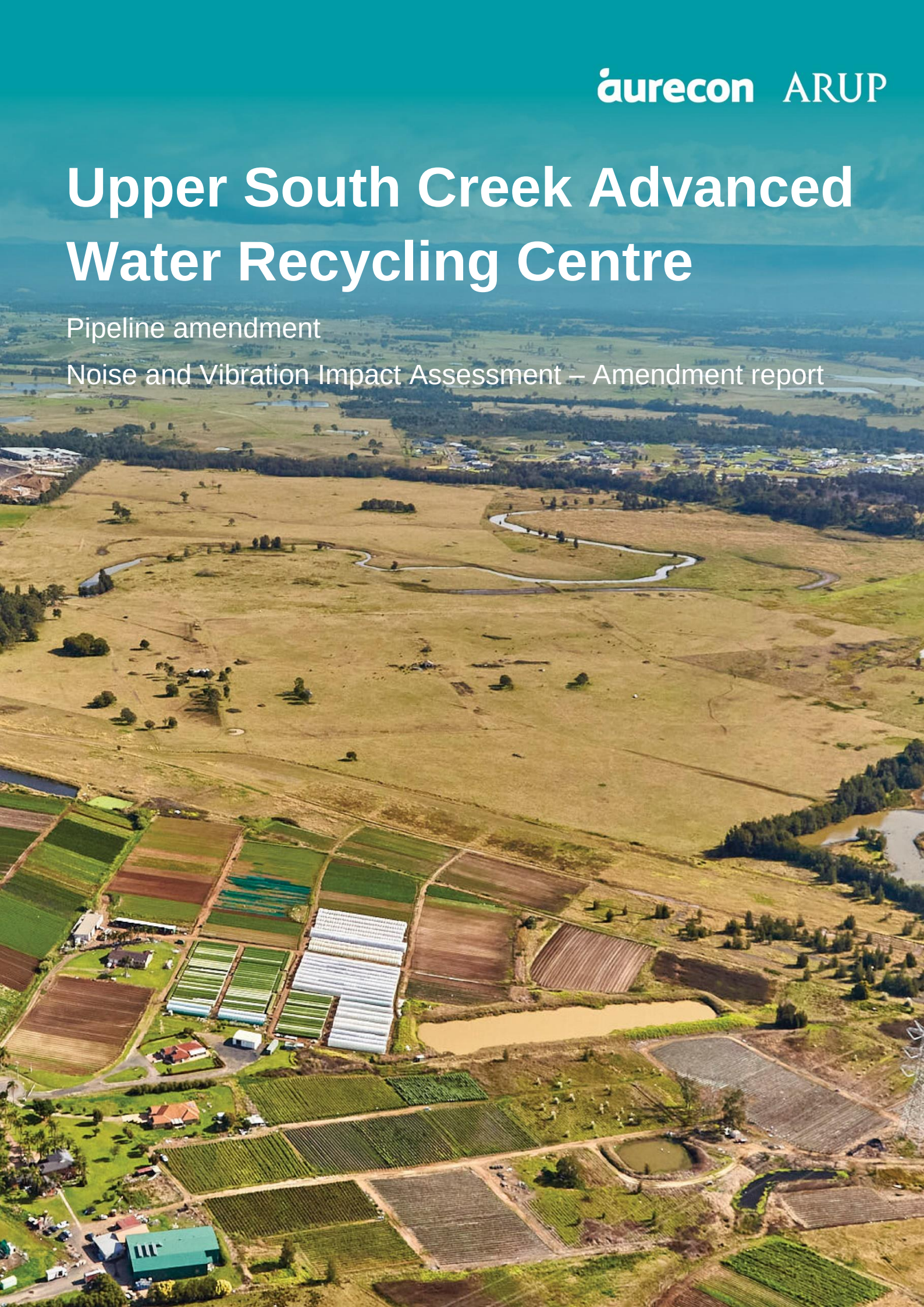
Appendix D Noise and Vibration Assessment

aurecon ARUP

Upper South Creek Advanced Water Recycling Centre

Pipeline amendment

Noise and Vibration Impact Assessment – Amendment report



Job title		Upper South Creek Advanced Water Recycling Centre Upper South Creek Advanced Water Recycling Centre		**Job number** 269002
Document title		Technical Report I Pipeline Amendment Noise and Vibration Impact Assessment – Amendment report		**File reference:** AC07
Document ref				
Revision	**Date**	**Filename**	269002-AC07 v1 USC Amendment Report	
1	25 Oct 2021	**Description**	Combined operational and construction NVIA – Amendment report	
			Prepared by	**Checked by**	**Approved by**
		Name	Clemence Terraz	Glenn Wheatley	Glenn Wheatley
		Signature			
2	15 Nov 2021	**Filename**	269002-AC07 v2 USC Amendment Report	
		Description	SydneyWater comments addressed	
			Prepared by	**Checked by**	**Approved by**
		Name	Clemence Terraz	Glenn Wheatley	Glenn Wheatley
		Signature			
3	25 Nov 2021	**Filename**	269002-AC07 v3 USC Amendment Report	
		Description	Additional SydneyWater comments addressed + change of equipment proposed to be used	
			Prepared by	**Checked by**	**Approved by**
		Name	Clemence Terraz	Glenn Wheatley	Glenn Wheatley
		Signature			
4	2 Dec 2021	**Filename**	269002-AC07 v4 USC Amendment Report	
		Description	Additional SydneyWater comments addressed	
			Prepared by	**Checked by**	**Approved by**
		Name	Clemence Terraz		
		Signature			
			Issue Document Verification with Document		✓

Table of Contents

1 Introduction

Sydney Water is seeking approval for construction and operation of a wastewater treatment plant, and associated pipelines known as the Upper South Creek Advanced Water Recycling Centre (the Project). A noise and vibration impact assessment (Upper South Creek Advanced Water Recycling Centre, Noise and Vibration Impact Assessment (NVIA), Aurecon Arup 2021),) for the construction and operation of the Project was prepared to support the Environmental Impact Statement (EIS) for the Project.

Following changes to the pipeline alignment and design since the preparation of the EIS, this noise and vibration amendment report assesses the proposed changes in accordance with assessment requirements in Section 2 of the NVIA (Aurecon Arup 2021).

Amendments associated with the brine and treated water pipeline re-alignment and design are:

- Northern Road crossing realignment
- M12 crossing realignment
- South Creek realignment
- Kemps Creek crossing realignment
- Western Sydney Parklands realignment
- Bartley Street realignment

In terms of noise and vibration impacts, this report considers further assessment for the Northern Road crossing realignment and Bartley Street realignment. For the remaining amendments, noise and vibration impacts to receivers are expected to be unchanged from those described in the EIS so further assessment has not been undertaken.

2 Pipeline construction assessment locations

A preliminary desktop survey covering approximately 100 m each side of the proposed pipeline centreline was carried out in the NVIA (Aurecon Arup, 2021). This area was considered sufficient for the assessment of vibration impact, particularly structural damage. While noise impacts could occur at greater distances than 100 m, especially in non-built-up areas, the survey was considered to have identified the nearest sensitive receivers.

The desktop survey identified and categorised relevant receivers, structures and utilities according to the applied noise and vibration policies, standards and guidelines. The survey provided in Appendix A of this report has now been updated from the survey in Appendix B of the NVIA (Aurecon Arup, 2021). The study area and receiver categorisation should however be progressively reviewed prior to construction following:

- Ground truthing by the contractor(s) during construction planning and development of noise and vibration management plans
- Advice from authorities regarding any future development.
- Advice received regarding medical facilities and any vibration sensitive equipment or activities.
- Heritage structures and /or sensitive structures based on available information and communication with the heritage consultant and relevant stakeholders. Before start of construction, an assessment of the integrity of the structures should be conducted.

3 Construction noise and vibration assessment

Construction activities for trenchless and open trenching techniques remain as per Section 7.1 of the EIS report. Location of the compounds and activities conducted within, remain unchanged except for C13. C13, originally located in Cabravale park is now proposed to be located East of the railway in the carpark near Cabravale Leisure centre as shown in Appendix A. C13 is to be used as a drilling site and a support compound.

Hours of operation for the project generally remain unchanged. Changes include night-time dewatering works which will likely be conducted for the underboring section under the railway (BP-U11) within compound C13. Table 1 summarises the updated hours of operation for the updated alignment (Note that the notes identify changes from the EIS report in terms of change in the hours of operation, naming convention or proximity to receivers (Refer to Appendix A).

Table 1: Project hours of operation

Ref ID	Location	Indicative Duration	Hours of Work				
			Standard Day	OOHW	Day	OOHW Evening	OOHW Night
C1	Warragamba River via Core Park Road	6 months	✓	✓		✓	✓
C2	Bent Basins Road	6 months	✓	✓		✓	✓
C3	Treated Effluent release location near Wallacia Weir at Nepean River	6 months	✓				
C4	West of Wallacia drilling site (Fowler Reserve)	3 months	✓				
C5	1 Park Rd, Wallacia	36 months	✓				
C6	344 Park Rd, Wallacia	30 months (include up to 6 months of Night-time works)	✓	✓		✓	✓
C7	Elizabeth Drive between The Northern Road and Luddenham Rd	24 months	✓	✓		✓	✓
C8	AWRC site	36 months	✓				
C9	Western Sydney Parklands, near Liverpool Offtake Reservoir	36 months	✓	✓		✓	✓
C10	Liverpool reservoir, Cecil Hills – Brine Satellite Compound	36 months	✓	✓		✓	✓
C11	Plan DP262454 Lot 419, Bonnyrigg - Brine Satellite Compound	36 months	✓	✓		✓	✓
C12	East Parade, Fairfield – Brine pipeline satellite compound	36 months	✓	✓		✓	✓

Ref ID	Location	Indicative Duration	Hours of Work				
			Standard Day	OOHW	Day	OOHW Evening	OOHW Night
C13[2]	Car park near Cabravale leasure centre - Cabramatta Rail underbore crossing	3 months	✓	✓		✓	✓
C14	Lansvale Park, Lansdowne - west of Henry Lawson Drive and Prospect Creek	3 months	✓	✓		✓	✓
C15	Lansdowne east of Henry Lawson Drive – NGRS connection location	3 months	✓	✓		✓	✓
TP – U1	From C6 to C1 (between Bents Basin Road and the release location)	6 months	✓	✓		✓	✓
TP – U2	From C3 to Fowler Reserve	8 weeks	✓				
TP – U3	Under Crossman Reserve	8 weeks	✓				
TP – U4[3]	Across the Northern Road to Elisabeth Drive	8 weeks	✓				
TP – U5[3]	Along Elizabeth Drive (3 underbore locations)	8 weeks	✓				
BP – U1	Across Elizabeth Drive	3 months	✓				
BP – U3	Across the Upper Canal	3 months	✓				
BP – U4	Across the M7	3 months	✓				
BP – U5	Across Cowpasture Road	3 months	✓				
BP – U6	Small section on North Liverpool Road near Maria Locke Park	3 months	✓				
BP – U7	Small section on Montgomery Avenue near Beltana Avenue	3 months	✓				
BP – U8	Across Elizabeth Drive	3 months	✓				
BP – U9	Along Cabramatta road, across the creek, west of Meadow Road	3 months	✓				
BP – U10	Across Joseph Street	3 months	✓				
BP – U11[2]	Across the T2, T3 and T5 train lines	3 months	✓	✓		✓	✓
BP – U12	A small area along Beckenham street	3 months	✓				
BP – U13	Across the Hume Hwy	3 months	✓				
BP – U14	Across Lansvale Reserve and Henry Lawson Drive	3 months	✓	✓		✓	✓

Ref ID	Location	Indicative Duration	Hours of Work				
			Standard Day	OOHW	Day	OOHW Evening	OOHW Night
TP – T1	On Bents Basin Road – from C3 to C6	-	✓				
TP – T2	From C3 to C4 Along Silverdale Road	-	✓				
TP – T3	From Fowler Reserve to Crossman Reserve	-	✓				
TP – T4	From Crossman reserve, along Park Road	-	✓	✓		✓	✓
TP – T5	Along the Northern Road	-	✓	✓		✓	✓
TP – T6[3]	East of the Northern Road, along Elizabeth Drive	-	✓				
TP – T7[1]	Along Elizabeth Drive (3 Segments) to the AWRC	-	✓				
BP – T1	From the AWRC to Elizabeth Drive	-	✓				
BP – T2	From Elizabeth Drive, along Western Street, Cross Street,	-	✓	✓		✓	✓
BP – T3[4]	Through Cecil park to Liverpool Off lake Reservoir	-	✓	✓		✓	✓
BP – T4[5]	From the Liverpool Off take Reservoir to the M7	-	✓				
BP – T5	From the M7 to Cowpasture Road	-	✓	✓		✓	✓
BP – T6	From Cowpasture Road to Maria Locke Park along North Liverpool Road	-	✓	✓		✓	✓
BP – T7	From Maria Locke Park along North Liverpool Road, along Montgomery Road to the intersection with Beltana Avenue	-	✓	✓		✓	✓
BP – T8	Along Montgomery Avenue from Beltana avenue to Elizabeth Drive	-	✓	✓		✓	✓
BP – T9	From Elizabeth Drive, along Cabramatta Road West to the creek west of Meadow Road	-	✓	✓		✓	✓
BP – T10	From the Creek west of Meadow Road, along Meadow Road, Edensor Road, John Street to Joseph Street	-	✓	✓		✓	✓

Ref ID	Location	Indicative Duration	Hours of Work				
			Standard Day	OOHW	Day	OOHW Evening	OOHW Night
BP – T11	From Joseph Street, along John street, Gladstone Street, Bartley Street to the T2, T3 and T5 train lines	-	✓	✓		✓	✓
BP – T12	From the T2, T3 and T5 train lines, along Curtin Street, Bareena Street, Chancery Street, Bromley Street and Beckenham street	-	✓	✓		✓	✓
BP – T13	From Beckenham street to Lennox Reserve	-	✓	✓		✓	✓
BP – T14	In Lansvale Reserve	-	✓	✓		✓	✓
BP – T15	In Lansvale Reserve, east of Henry Lawson Drive	-	✓				

All notes indicate changes from the EIS report in terms of hours of operation, naming convention or proximity to receivers.

Notes:

1_changes associated with the pipeline re-alignment and design near the M12 crossing (no change in impact so not assessed further in this report)

2_changes associated with the Bartley Street realignment. (assessment described below)

3_changes associated with the Northern Road Crossing realignment. (assessment described below)

4_changes associated with the pipeline re-alignment and design in Kemps Creek (no change in impact so not assessed further in this report)

5_changes associated with the pipeline re-alignment and design in Western Sydney Parklands (no change in impact so not assessed further in this report)

Justification for conducting OOHW work has been updated from the EIS and is summarised in Table 2

Table 2: Justification for OOHW

Ref ID	Justification for OOHW works
C1, C2, TP – U1 **C14, C15, BP – U14**	The 24 hour HDD drilling operation will minimise duration impacts and risk of tunnelling failure
BP-U11*	Likely dewatering works associated with the type of drilling required.
TP – T4, TP – T5, C6, C7	Possible night-time works depending on Road Occupancy Licences (ROLs) for works on the treated pipeline along Parks Road and the Northern Road
BP – T2, BP- T3, BP – T5 to BP - T14 **C9, C10, C11, C12, C13**	Possible night-time works depending on ROLs for works along the Brine pipeline

*** Indicates changes from the EIS report**

3.1 Construction noise and vibration criteria

Refer to Section 7.2 of the NVIA (Aurecon Arup, 2021)

Construction airborne noise objectives (or noise management levels (NMLs) are noise levels that guide the need to apply work practices to minimise noise impacts. The NMLs, based on the Interim Construction Noise Guideline (ICNG), are derived from the background noise levels in an area and depend on the time when works are conducted. In addition, the ICNG identifies the 75 dBA Highly Noise affected NML, a noise level above which there may be a strong community reaction to noise.

Ground-borne noise is noise generated by vibration transmitted through the ground into a structure. Ground-borne noise is usually not a significant disturbance to building occupants during daytime periods due to higher ambient levels which mask the audibility of ground-borne noise emissions. During night-time periods however, when ambient noise levels are often much lower, ground-borne noise is more prominent.

3.2 Pipeline and ancillary facilities construction assessment

In the NVIA (Aurecon Arup, 20210 a qualitative assessment 'Sound pressure levels of individual plant items at various distances' (Appendix B) was carried out for the construction of the pipelines given the relative short-duration of continuous works in any one location.

Where construction was proposed for a longer duration, a quantitative noise assessment was conducted such as for:

- The operation of the two main drilling locations where 24 hour drilling is required:
  - Drilling operation between Bent Basins Road and the Warragamba river (Refer to TP-U1, C1 and C2)
  - Drilling operation in Lansvale Reserve (Refer to BP-U14, C14 and C15)
- The long-term support sites where the sites will be used for 24 months or more (C5, C6, C7, C8, C9, C10, C11, C12).

Locations of the works described above are shown in Appendix A within the NVIA (Aurecon Arup, 2021). The qualitative and quantitative assessments at the locations above remain unchanged refer to the NVIA (Aurecon Arup 2021).

As a result of amendments, additional night-time dewatering works are likely required due to ground conditions and type of drilling proposed for BP-U11 within Cabravale Leisure Centre car park. This activity warrants additional quantitative assessment for the night-time works. Operation of the compound C13 as a support site for the duration of works has also been included in the assessment, however OOHW for compound activities at C13 are not expected.

Appendix A, which shows locations where open trenched/trenchless techniques are proposed, has been amended... Note that the locations where trenched/trenchless techniques are proposed may change as design progresses.

Typical construction activities as described in the NVIA (Aurecon Arup, 2021) and Chapter 4 of the EIS for open trenching and trenchless methodologies are unchanged.

Noise and vibration impacts resulting from changes due to the pipeline re-alignment and re-design for the Bartley Street realignment and the Northern Road Crossing realignment have been assessed in the following sections.

3.2.1 Northern road crossing realignment assessment

The qualitative assessment approach described in the NVIA (Aurecon Arup, 2021) and the EIS applies to changes associated with the Northern Road crossing realignment.

The alignment is proposed to cross the Northern Road further north than the EIS alignment. This re-alignment results in the removal of the underbore section under Elizabeth Drive. The proposed alignment is also now closer to two residential receivers East of the northern Road and north of Elizabeth drive (approximately 50m) compared to the EIS alignment (where the receivers were located approximately 130m and 60m away. For the residential receiver located west of the Northern road, the same distance separate the works from this receiver than in the EIS and no change in impacts are expected

In relation to airborne noise, a review of the NVIA (Aurecon Arup, 2021) table 49 “Sound pressure levels of individual plant items at various distances” shows that construction noise levels at the two receivers to the north of Elizabeth drive were potentially be at or above 75 dBA which corresponds to the highly noise affected NMLs depending on the type of equipment used for the construction. Being now closer to the new alignment, those receivers are more likely to experience noise levels at or above the 75 dBA highly noise affected NML (depending on the type of equipment used for the construction). Construction noise levels at those receivers are therefore likely to be higher than noise levels generated by the construction of the EIS alignment.

In relation to groundborne noise, as the works are anticipated to remain being conducted during daytime hours, ground borne noise impacts are anticipated to be minimum and impacts are unchanged from those described EIS.

In relation to vibration, a review of table 60 within the NVIA (Aurecon Arup, 2021) shows that while the alignment is now closer to two residences (as described above), resulting in higher vibration levels than for the EIS alignment, those residences are still outside the minimum working distance and therefore cosmetic damage to the properties is unlikely.

In relation to construction traffic, changes to traffic flows generated by the construction of the pipeline are not anticipated and impacts will remain unchanged from those described in the EIS.

While the noise and vibration impacts at the residential receivers now located closer to the alignment are anticipated to increase from noise and vibration impacts generated by the construction of the EIS pipeline alignment, the mitigation measures described in the EIS are sufficient to minimise and manage potential noise and vibration impacts at those properties.

3.2.2 Bartley Street realignment assessment

Proposed re-alignment includes relocation of compound C13 from west of the train tracks in Cabravale park to east of the train tracks in the car park near Cabravale leisure centre. The re-alignment runs through the car park near Cabravale leisure centre then south down Cumberland street then east along Curtin street.

Airborne noise

The noise assessment aims to provide a ‘realistic worst-case’ noise impact assessment based on construction works within any 15-minute period. The predictions assume all equipment is located at the closest point of the works zone to the nearest sensitive receivers for the dewatering plant and north of the pipeline alignment for the equipment within the compound.

An analysis of potential cumulative impacts due to concurrent construction of other nearby developments has not been included. Should other construction activities be occurring in proximity to nearby receivers, consultation with the relevant works shall be carried out as outlined in Section 3.4.

No barriers have been considered in the noise assessment. Temporary barriers and screens may provide up to 7 to 10 dB reduction to the predicted levels at the sensitive receivers (As per AS 2436 [1]) when located in close proximity to the noise source or to a receiver.

Predicted construction noise levels during night-time for the operation of the dewatering equipment associated with BP-U11 as well as the operation of the compound C13 is shown in Table 4 based on construction activities noise levels in Table 3.

Table 3: C13 Construction equipment sound level data

Equipment	Lw of equipment, L_{Aeq} dB	% of used within 15 minutes	Resulting Lw, $L_{Aeq15minute}$, dB	Number of items	
				BP U11 (dewatering works)	C13 support site
Crane (Truck mounted)	108	25	102	-	1
Loader (FEL) 23t	112	25	106	-	1
Truck	108	25	102	-	1
Vehicle (Light Commercial (4WD)	111	25	105	-	1
Pump and dewatering equipment	96	100	96	1	-
Total Lw				**96**	**110**

Table 4: Predicted construction noise levels at sensitive receivers

Location	Approximate Distance to nearest receiver	NCA	Predicted Noise Level, $L_{Aeq,15min}$		Noise Management Levels NMLs		
			Dewatering works Lw 96 dBA	Operation of C13 Lw 110 dBA	Highly Noise affected	Daytime (Standard hours)*	OOHW, $L_{Aeq,15min}$ dB Night*
BP-U11 (East side) near drill[1]	10 m (Place of worship)	NCA B14	68	-	75	70 (when in use)	70 (when in use)
	10 m (commercial)		68	-	75	70 (when in use)	70 (when in use)
	123 m (residential)		46	-	75	55	40
C13	22 m (Place of worship)		-	75	75	70 (when in use)	70 (when in use)
	22 m (commercial)		-	75	75	70 (when in use)	70 (when in use)
	35 m (residential)		-	71	75	55	40

Note 1: Refer to the qualitative assessment (Appendix B)for the underbore drilling at BP-U11 (within C13) during standard hours

Dewatering works OOHW. Operation of C13 during standard hours.

Table 4 shows that NMLs will be exceeded at receivers near the dewatering location and compound during daytime and night-time.

Vibration

Vibration generating equipment is proposed to be used during trenching (refer BP-T12) undertaken near south of C13 and during drilling activities (BP-U11). Vibration monitoring is likely to be required at the nearest receivers.

Summary of Impacts Bartley Street realignment

Below is an assessment of impacts associated with the Bartley Street re-alignment. Table 3 and Table 4 informed the assessment as well as information in Appendix B 'Sound pressure levels of individual plant items at various distances' of the NVIA (Aurecon Arup, 2021).

The proposed changes associated with Bartley Street realignment will result in changes to noise and vibration impacts during construction. The changes relate mainly to different receivers being potentially impacted as the EIS alignment has now been modified. Changes are described below.

- For residential receivers located in Curtin Street (between Broomfield street and Cumberland Street)

  Construction noise and vibration impacts to the residential receivers located south of Curtin Street between Broomfield street and Cumberland Street are predicted to be reduced from the EIS report as the construction works (trenching) are now not directly near those receivers.

- For residential receivers located to the north of Cumberland street

  Construction noise and vibration impacts are predicted to increase at residential receivers along the north of Cumberland Street (between the car park and Curtin Street) due to re-alignment of the pipeline as the construction works in the roadway are now directly near those receivers. Table 49 of the NVIA indicates those receivers are now likely to experience noise levels at or above the 75 dBA Highly noise affected NML (depending on equipment used during trenching activities).

- In addition, the nearest residential receivers are now located approximately 123 m from the drilling location within C13 where night-time activities are now proposed (dewatering works). predicted levels from the operation of C13 as a drilling site are likely to exceed the NMLs and the 75 dBA Highly noise affected NML during standard hours but are likely to exceed the NMLs but be below the 75 dBA Highly noise affected NML for OOHW. For places of worship and commercial receivers to the east of the train tracks, south of car park

  Construction noise and vibration impacts are predicted to increase slightly at the place of worship and commercial receivers located east of train track as the alignment is now slightly closer than the EIS alignment and because of C13 now relocated nearby where drilling will be conducted. Note that noise and vibration impacts were already predicted at those receivers mainly to the south of the buildings as the EIS alignment was travelling south of those receivers while it is now traveling north or those receivers.

  Regarding the operation of C13 as a drilling site, predicted levels at those receivers from the operation of C13 as a drilling site are likely to exceed the NMLs and the 75 dBA Highly noise affected NML during standard hours but are likely to be below the NMLs and the 75 dBA Highly noise affected NML for OOHW.

- For Cabravale Leisure Centre commercial receiver

Construction noise and vibration impacts to the Cabravale Leisure Centre are predicted to increase due to the alignment extending through the car park and due to the relocation of C13 now nearby. This receiver is now likely to experience noise levels at or above the 75 dBA Highly noise affected NML (depending on equipment used) during trenching construction activities.

Regarding the operation of C13 as a drilling site, predicted levels at this receiver are likely to exceed the NMLs and the 75 dBA Highly noise affected NML during standard hours but are likely to be below the NMLs and the 75 dBA Highly noise affected NML OOHW.

- For commercial receivers along Bartley Street to the west of the train tracks

  Construction noise and vibration impacts due to the use of C13 to the commercial receivers to the west of the train tracks are predicted to be reduced due to the relocation of C13 to the east of the train tracks however construction noise and vibration impacts due to the construction of the pipeline to the commercial receivers (such as Cabravale Diggers Club) are predicted to increase as the re-alignment now extends along Bartley Street.

  These receivers are now likely to experience noise levels at or above the 75 dBA Highly noise affected NML (depending on equipment used) during trenched construction activities..

Mitigation and management measures should be applied during the construction (refer to Section 3.4).

Physical mitigation measures identified in the NVIA (Aurecon Arup 2021) such as implementing noise screening in the form of site hoarding between the site and nearby noise sensitive receiver and/or an enclosure around the site or noisy piece of equipment should be implemented.

These recommendations should be reviewed prior to commencement of works.

Mitigation measures described in the NVIA are adequate to manage changes in impacts resulting from the amendments. Physical mitigation measures for C13 are summarised in **Error! Reference source not found.**.

Table 5: Physical mitigation measures – long-term support sites

Compound	Physical mitigation measures recommended	Justification
C13	Potentially noise screening in the form of site hoarding between the site or noisy piece of equipment and nearby noise sensitive receivers required	Exceedance of the NMLs are predicted, noise screening in the form of site hoarding between the site or noisy piece of equipment and nearby noise sensitive receivers might reduce noise levels at the nearest receivers.

3.3 Construction traffic assessment

Depending on the type of roads used to access work areas, additional traffic generated by the construction of the Project may impact on the amenity of the nearby receivers. Where construction traffic or temporary reroutes due to road closure is directed to busy roads, any increase in traffic noise is likely to be negligible. On local roads, there is greater potential for impact, especially during the night-period. Accordingly, construction traffic should be planned to minimise impact on sensitive receivers on lower order roads wherever practicable.

Table 6 below, amended from the table in the EIS report and updated in accordance with the Traffic and Transport Amendment Report – Barley Street Realignment, identifies the local roads potentially impacted by traffic during construction.

Table 6: Local Roads potentially impacted by traffic during construction

Segment	Local Road
Segment 1	Weir Road, Fourth Street, Farnsworth Avenue
Segment 2/3	Western Road, Clifton Avenue
Segment 3	Cross Street
Segment 3/4	Kensington Close, Stirling Street, Feodore Drive. Frederick Road
Segment 4	Monash Place, Hebblewhite Place
Segment 4/5	John Street
Segment 5*	Curtin Street, Fairview Road, Bromley Street, Beckenham Street, Willowbank Crescent, Knight Street, Dale Street, Wilga Street, North Street, East Parade, Lansdowne Road, Tillett Parade, Park road (in Cabramatta), McBurney Road, north of Cumberland Street

*** Indicates changes from the EIS report**

3.4 Mitigation and management measures

Noise and vibration mitigation measures to mitigate impacts from the construction of the Project are described in the EIS report and summarised in Table 7. These mitigation measures are considered to represent all 'feasible and reasonable' mitigation measures suitable for implementation during construction of the Project. As noted in the EIS report, this is a preliminary study, therefore selection of equipment activities and operating hours will be further refined, and a detailed management plan will be implemented by the successful contractor once further information is available.

Table 7 is taken from the summary table in the NVIA and summarises mitigation measures to be applied for the construction of the Project. Note that changes from the NVIA relate to the location where mitigation measures should be applied have been identified (Refer to note in the table)

Table 7: Construction noise and vibration mitigation measures

Item where mitigation applies	Impacts	Mitigation measures	Mitigation measures description
All	Construction noise and vibration impacts - General	CNVMP	Develop a CNVMP
		Hours of work	Construction works should be scheduled for Standard Construction Hours, where possible. If it is not possible to restrict the works to the day period, then they should be completed as early as possible in each work shift. Appropriate respite should also be provided to affected receivers in accordance with the CNVG and/or the project's conditions of approval.
		Equipment selection	Select low noise emissions equipment. Where possible stationary equipment should be located behind structures such as demountable buildings or stockpiles to maximise shielding to receivers. Consider using electric / hydraulic equipment where possible. Use only the necessary size and power equipment All plant and equipment used on site must be: • maintained in a proper and efficient condition; and • operated in a proper and efficient manner. Turn off all vehicles, plant and equipment when not in use. Ensuring that the Responsible Person checks the conditions of the powered equipment used on site daily to ensure plant is properly maintained and that noise is kept as low as practicable. If rental equipment is to be used, the noise levels of plant and equipment items are to be considered in rental decisions.
		Location of plant	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site. Plan truck movements to avoid residential streets where possible.
		Non-tonal and ambient sensitive reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.
		Consultation	Carry out consultation:

Item where mitigation applies	Impacts	Mitigation measures	Mitigation measures description
			• with the community and surrounding building owners/occupants during construction including, but not limited to; advance notification of planned activities and expected disruption/effects, construction noise complaints handling procedures. • with proponents or applicants of other State Significant development and infrastructure works near the CSSI to minimise cumulative impacts of noise and vibration and maximise respite for affected sensitive receivers • with medical facilities prior the start of construction to determine if any equipment within the facilities are sensitive to vibration
	Construction vibration impacts – **general**	Vibration monitoring and property survey and equipment selection	Select low vibration generating equipment Equipment selection and/or method of construction are to be reviewed if works are within the minimum working distance. Vibration measurements are required at the start of vibration generating activities that are within the minimum working distances if vibration intensive works are required within the minimum working distances and attended vibration monitoring has established risk of exceedance, extended monitoring should be carried out. Conduct property survey if required.
WaterNSW Upper Canal	Construction vibration impacts	Vibration monitoring – Upper Canal	Conduct vibration monitoring during construction near and under the Upper Canal.
24h drilling sites (C1, C2, C14, C15, C13 (TB-U11))*	Airborne noise	Site planning and site hoarding/enclosure	Physical mitigation measures such as implementing noise screening in the form of site hoarding between the sites and nearby noise sensitive receiver and/or an enclosure around the sites or noisy piece of equipment are required. These recommendations should be reviewed prior to commencement of works.
Long term site support*	Construction noise impacts	Site planning and site hoarding	Noise mitigation in the form of careful site planning and potentially noise screening in the form of site hoarding between the site and nearby noise sensitive receivers might be required for C6, C7, C8, C10, C11, C12, C13. These recommendations should be reviewed prior to commencement of works.
Receivers near Pipelines	Construction noise impacts	Alternative accommodation	Establish if alternative accommodation for work to be conducted OOHW should be offered in accordance with guidance in the CNVS.
Traffic on local roads	Construction noise impacts	Adherence to daytime hours	Where possible, heavy vehicle movements should be limited to daytime hours.

Item where mitigation applies	Impacts	Mitigation measures	Mitigation measures description
			Opportunities to reduce road traffic noise during construction should be investigated during construction planning, including restricting heavy vehicle movements to standard construction hours and/or to routes with fewer sensitive receivers.

*** Indicates changes from the EIS report.**

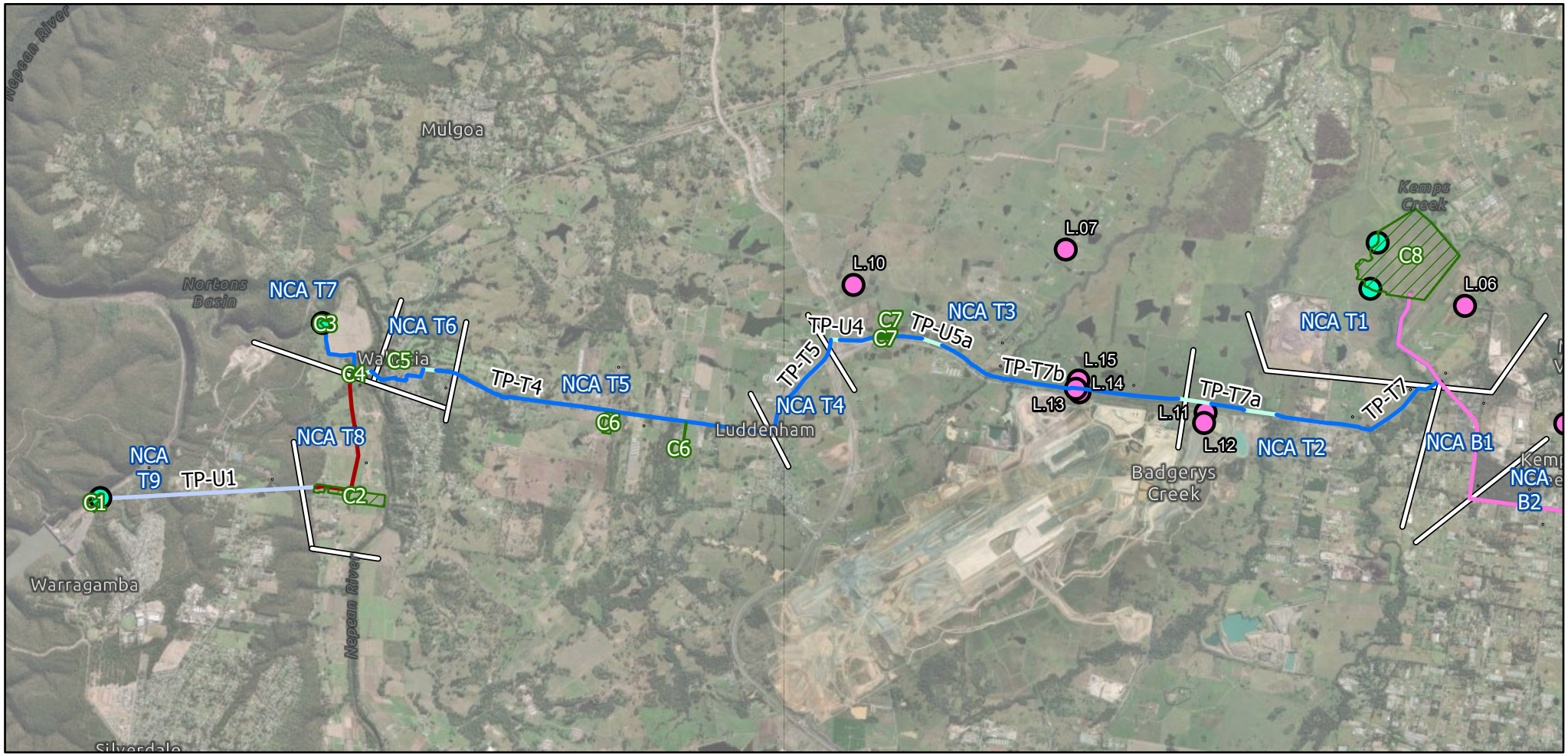
4 Conclusion

A noise and vibration impact assessment has been carried out for the changes to the pipeline alignment and design for Bartely Street and Northern Road Crossing realignments following the preparation of the NVIA This amendment report addresses these changes and was prepared in accordance with assessment requirements in Section 2 of the NVIA.

Most construction works are to be conducted during Standard Hours for which standard practices will be adopted to manage potential impacts. Where works are required to be conducted outside Standard Hours, more detailed consideration of mitigation and management practices are warranted, particularly where they are in proximity to residential receivers. Management measures for each location of works will be clarified in a CNVMP to be prepared for the Project. The CNVMP should outline the necessary processes to enable the proponent and contractor(s) to appropriately plan, mitigate and manage noise and vibration risks and/or impacts throughout the construction of the Project.

Appendix A

Land use survey



Treated water pipeline
Environmental flows pipeline
Environmental flows pipeline - Underbore
Treated water pipeline - Underbore
Brine pipeline
EIS M12 Noise Monitoring Location
Release location
NCA boundary

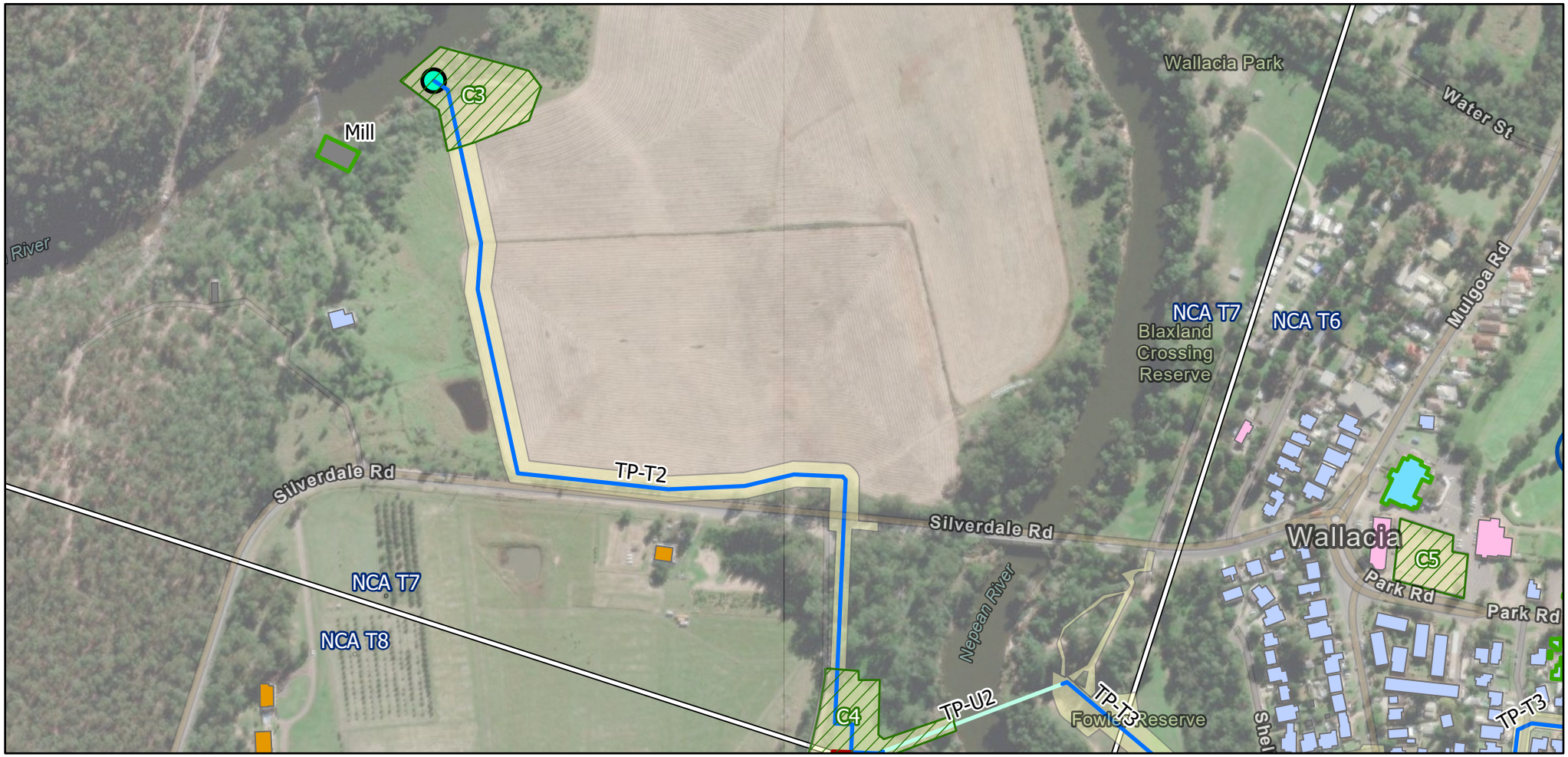
Source: ESRI
Date: 20/10/2021

0 1 Kilometers

Projection: MGA56 GDA94

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Environmental flows and Treated water pipeline



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

Source: ESRI
Date: 20/10/2021

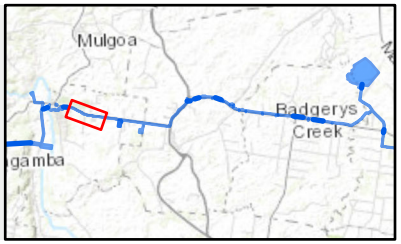
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

- Treated water pipeline
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound



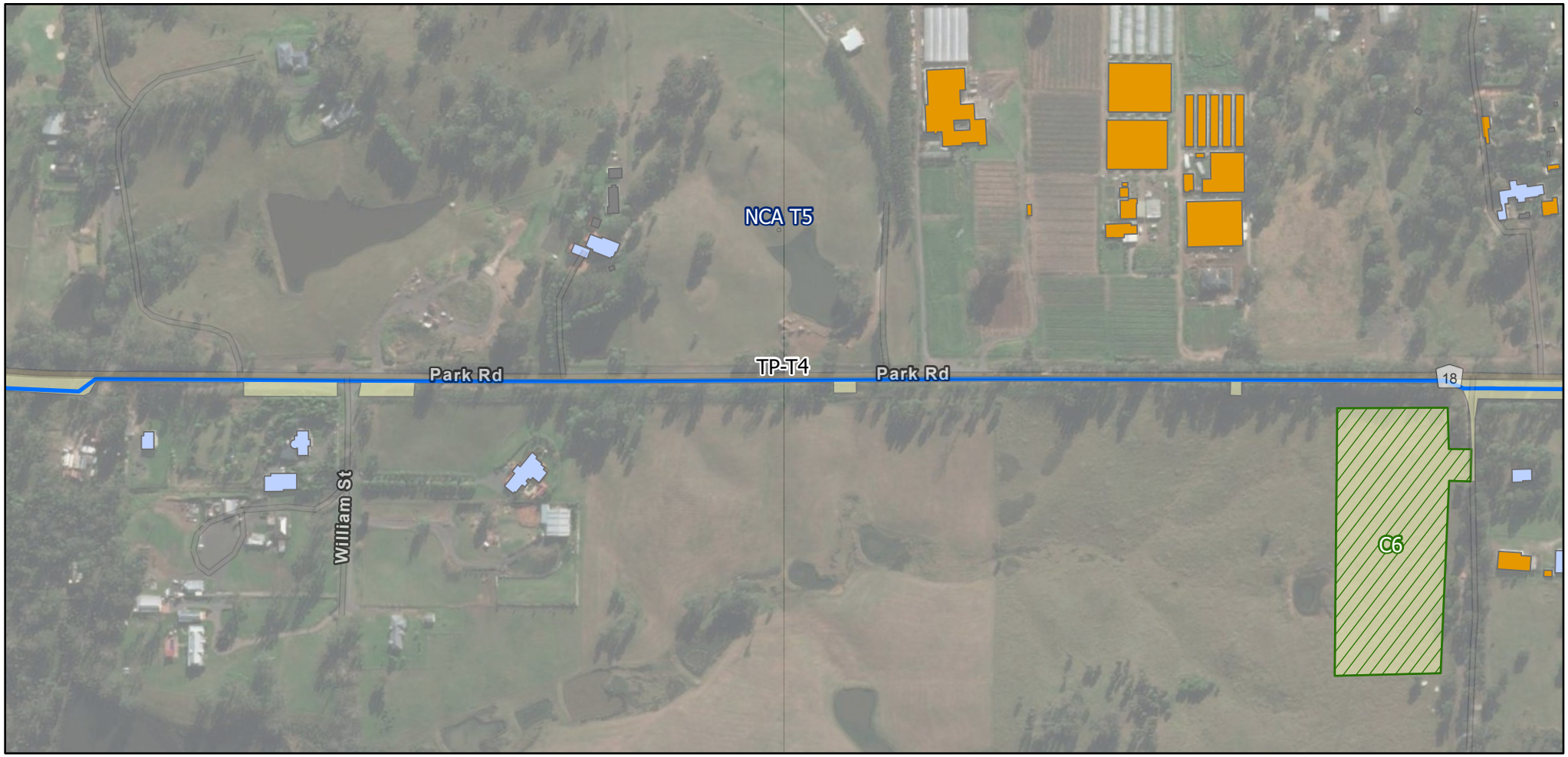
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

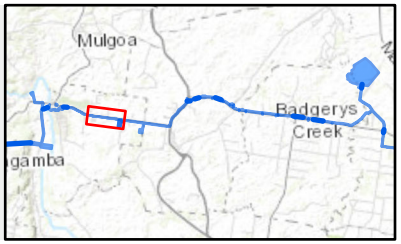
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline



Treated water pipeline
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction corridor
NCA boundary
EIS M12 Noise Monitoring Location
Construction compound



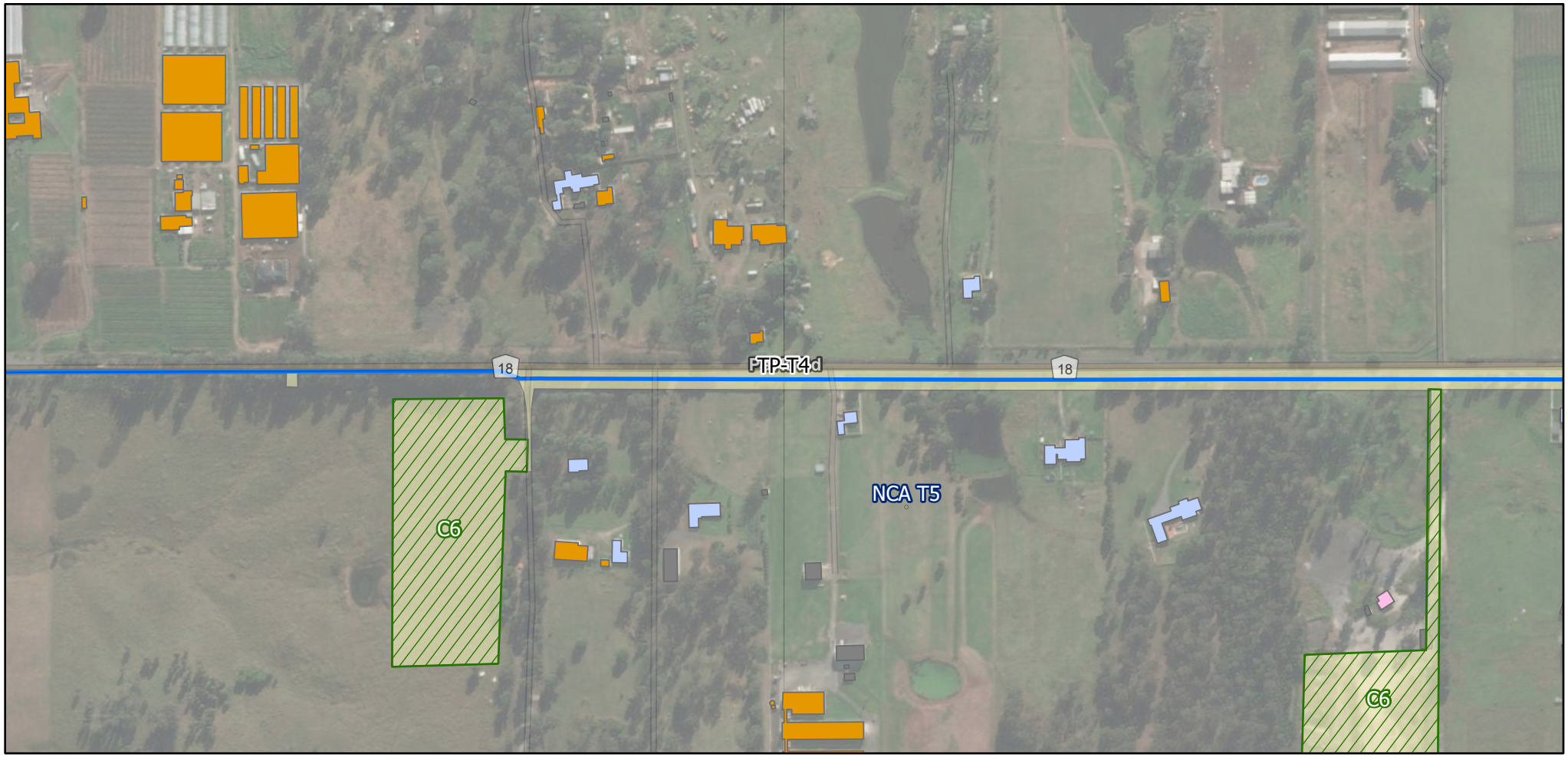
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline



Treated water pipeline
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction corridor
NCA boundary
EIS M12 Noise Monitoring Location
Construction compound

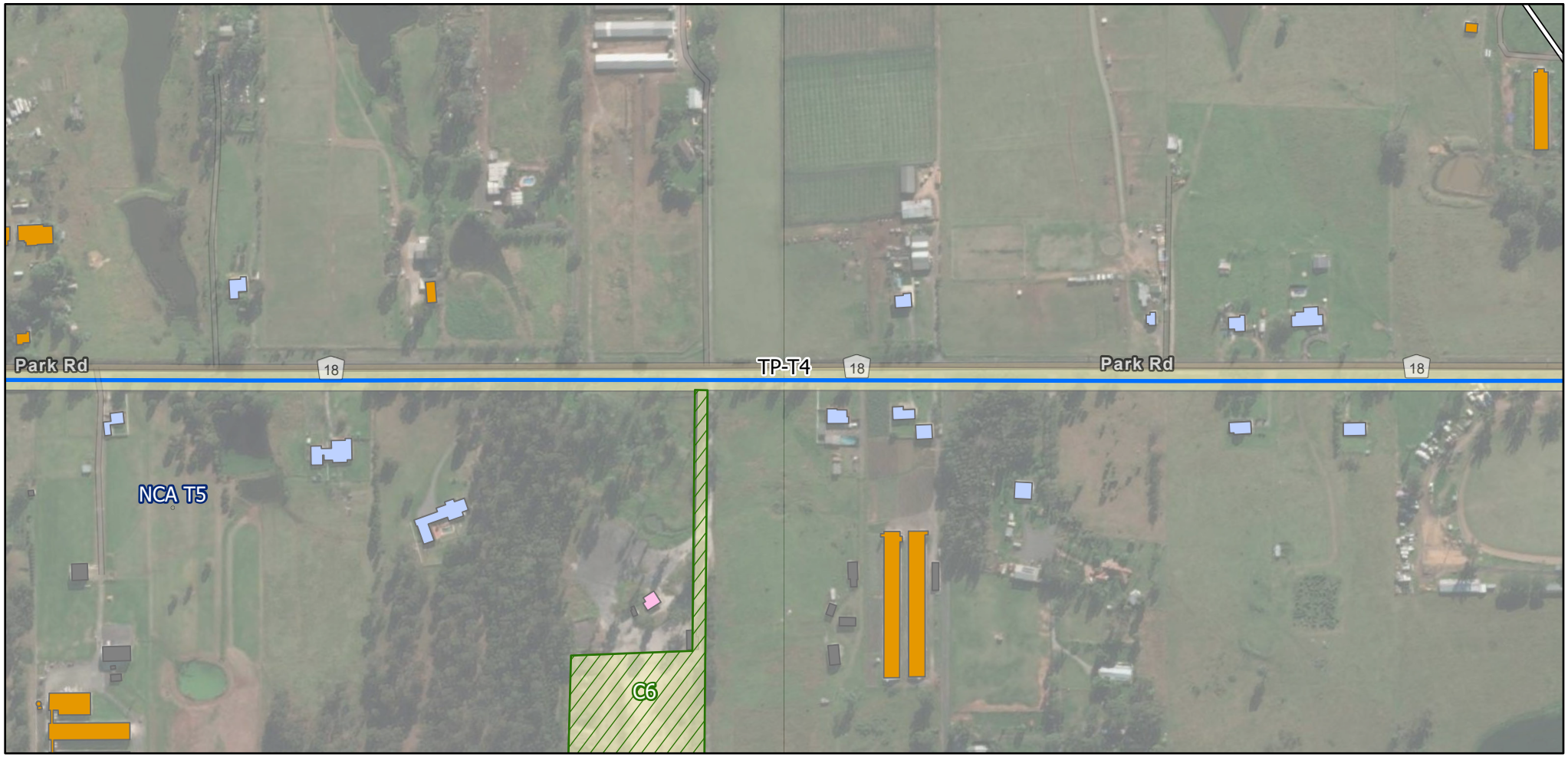
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

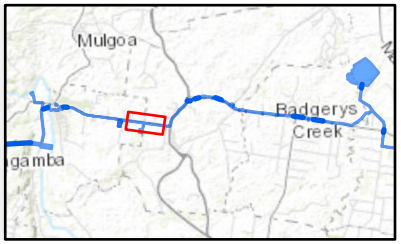
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline



- Treated water pipeline
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound



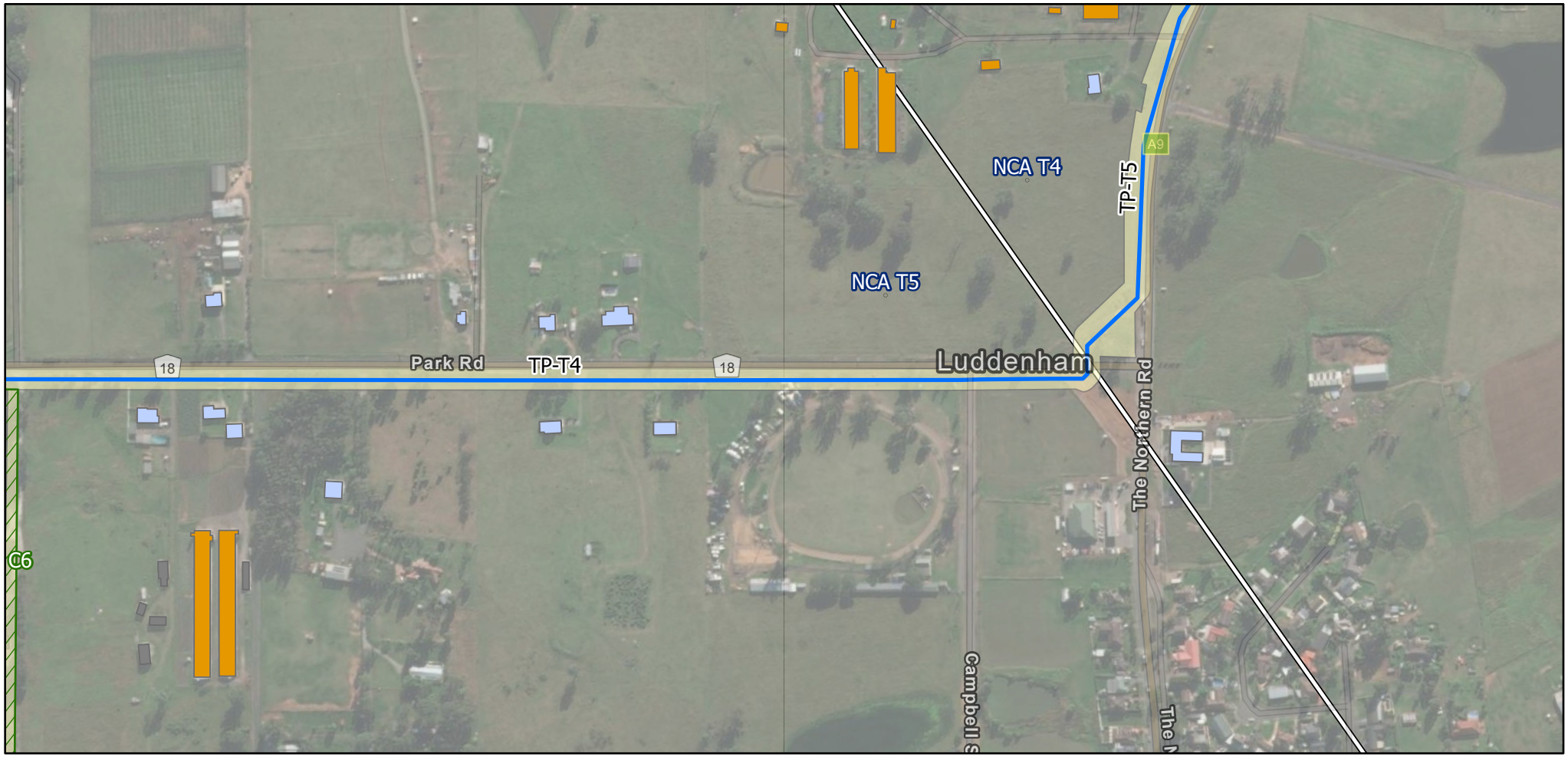
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline



Source: ESRI
Date: 20/10/2021

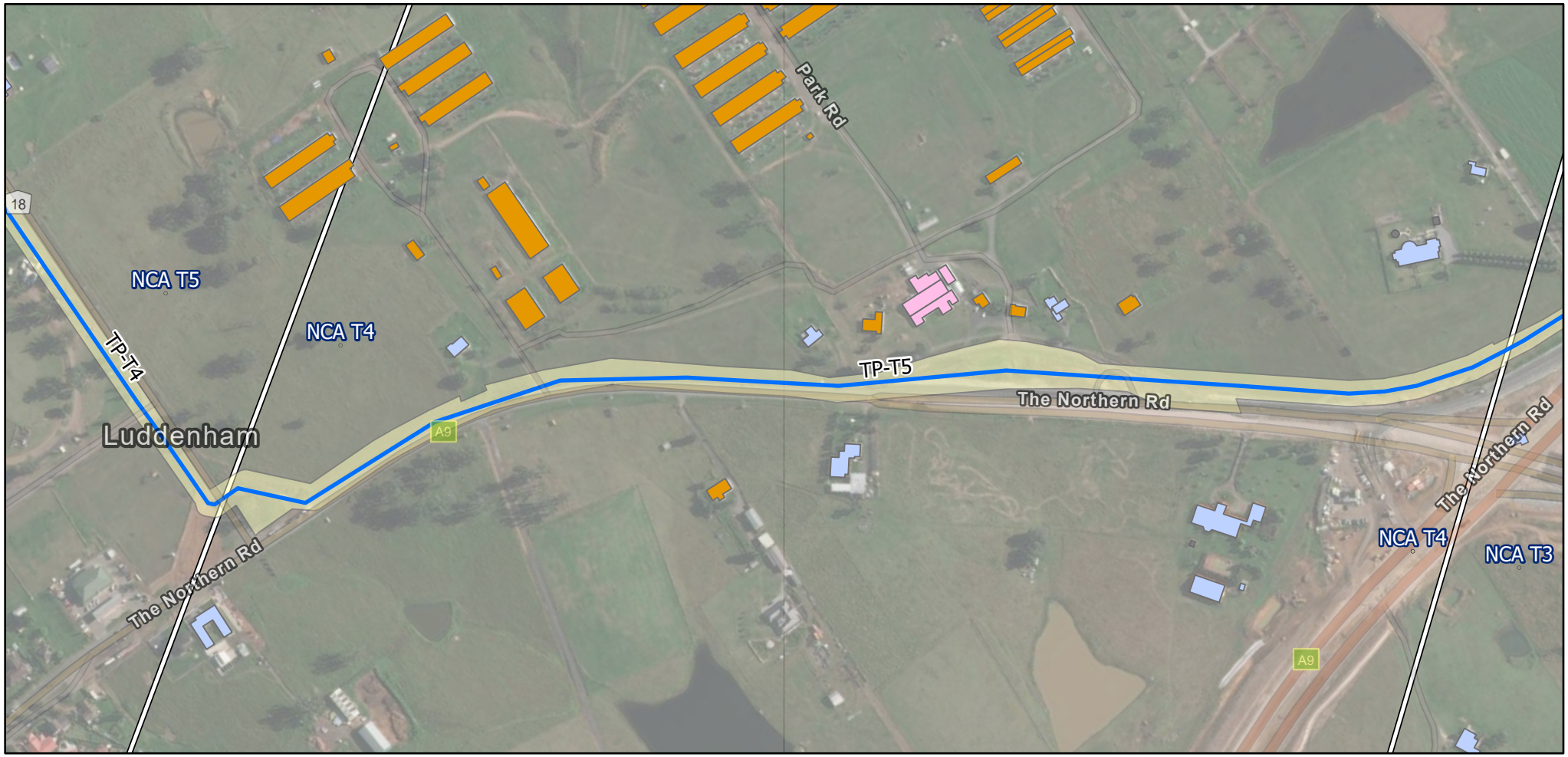
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

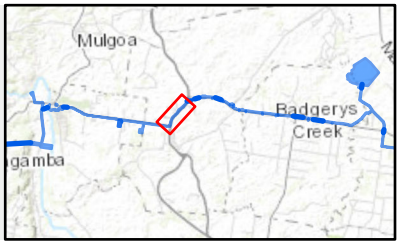
Projection: MGA56 GDA94

Treated water pipeline

aurecon ARUP



- Treated water pipeline
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound



Source: ESRI
Date: 20/10/2021

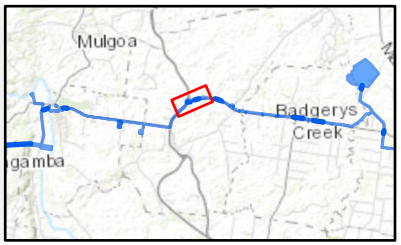
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

- Treated water pipeline
- Treated water pipeline - Underbore
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction compound
- NCA boundary



Source: ESRI
Date: 12/11/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

- Treated water pipeline
- Treated water pipeline - Underbore
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound

Source: ESRI
Date: 20/10/2021

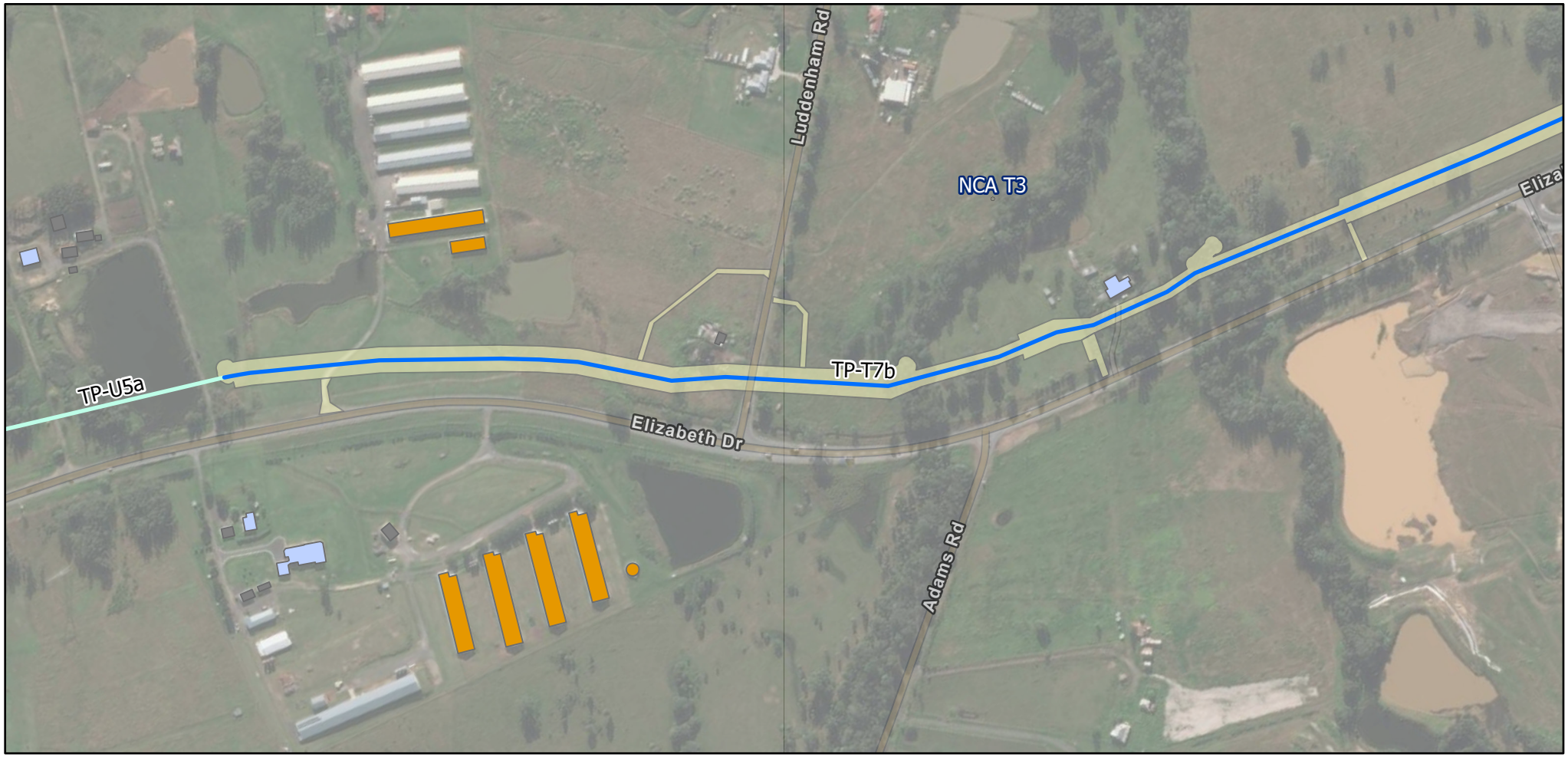
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

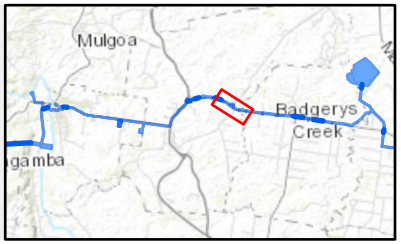
Projection: MGA56 GDA94

Treated water pipeline

aurecon ARUP



- Treated water pipeline
- Treated water pipeline - Underbore
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

aurecon ARUP

- Treated water pipeline
- Active Recreation
- Commercial/Business
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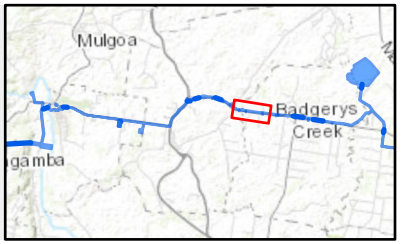
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

- Treated water pipeline
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

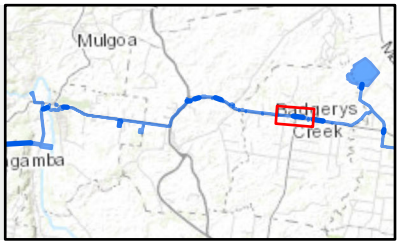
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

aurecon ARUP

Treated water pipeline
Treated water pipeline - Underbore
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction corridor
NCA boundary
EIS M12 Noise Monitoring Location
Construction compound



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

aurecon ARUP

- Treated water pipeline
- Treated water pipeline - Underbore
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

Treated water pipeline
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction corridor
NCA boundary
EIS M12 Noise Monitoring Location
Construction compound

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

aurecon ARUP

- Treated water pipeline
- Brine pipeline
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction corridor
- NCA boundary
- EIS M12 Noise Monitoring Location
- Construction compound

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

Treated water pipeline
Brine pipeline
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction corridor
NCA boundary
EIS M12 Noise Monitoring Location
Construction compound

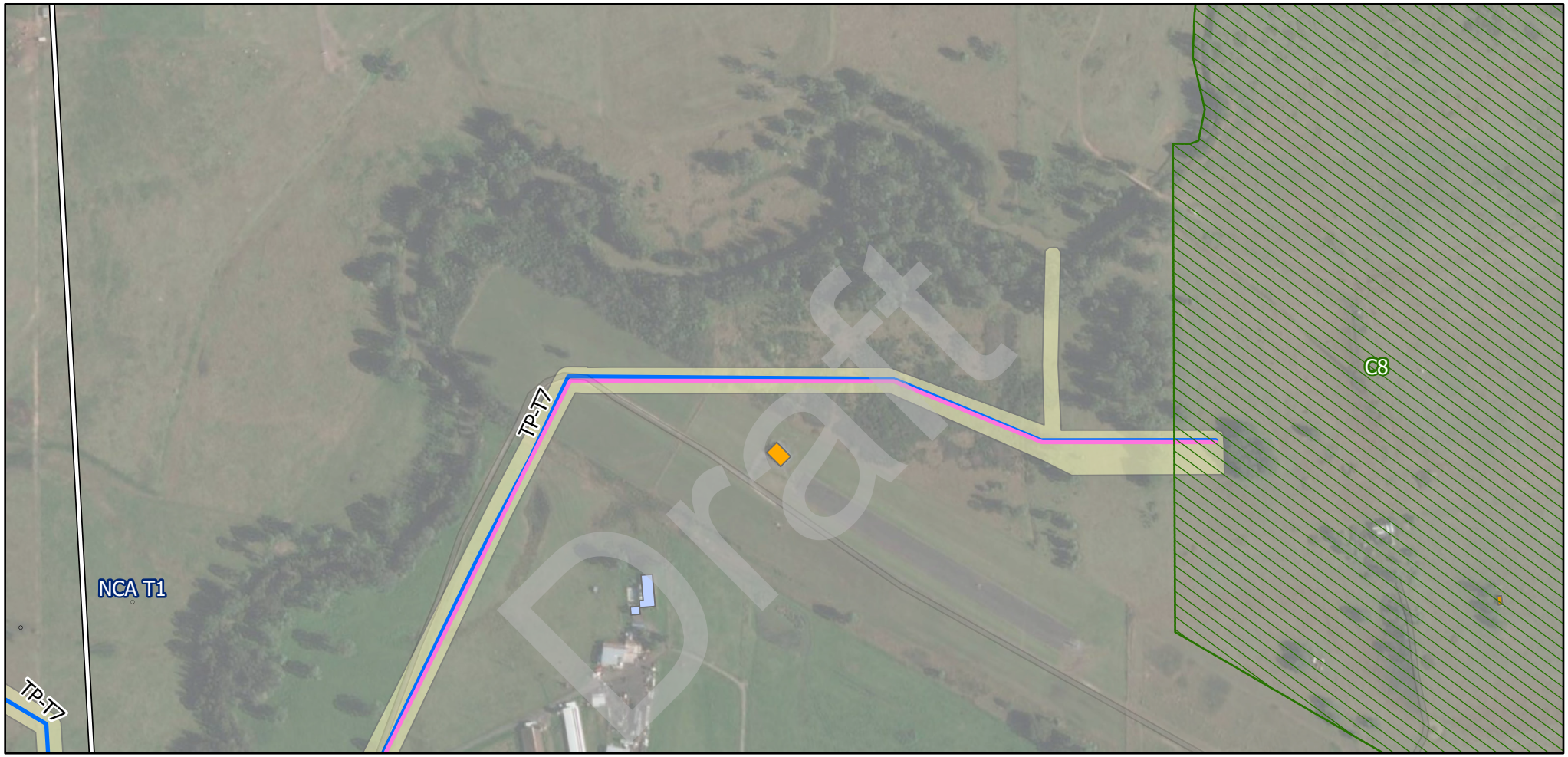
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Projection: MGA56 GDA94

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Treated water pipeline



Treated water pipeline
Brine pipeline
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction corridor
NCA boundary
EIS M12 Noise Monitoring Location
Construction compound

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

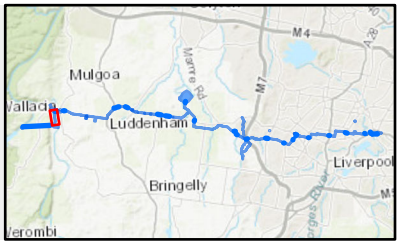
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Treated water pipeline

aurecon ARUP

- Environmental flows pipeline
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction compound
- NCA boundary
- Release location
- Construction corridor



Source: ESRI
Date: 20/10/2021

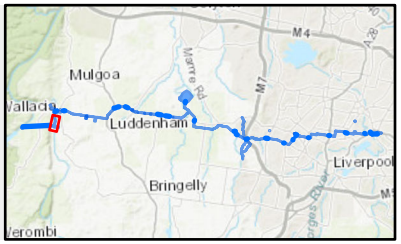
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Environmental flows pipeline

- Environmental flows pipeline
- Active Recreation
- Commercial/Business
- Hotel
- Industrial/Utilities
- Residential
- Worship
- all other receivers
- Heritage
- Construction compound
- NCA boundary
- Release location
- Construction corridor



Source: ESRI
Date: 20/10/2021

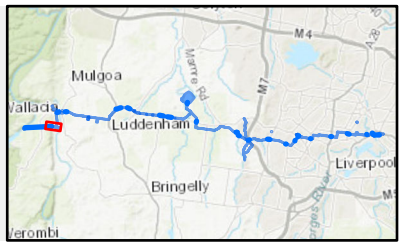
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Environmental flows pipeline

Environmental flows pipeline
Environmental flows pipeline - Underbore
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction compound
NCA boundary
Release location
Construction corridor



Source: ESRI
Date: 20/10/2021

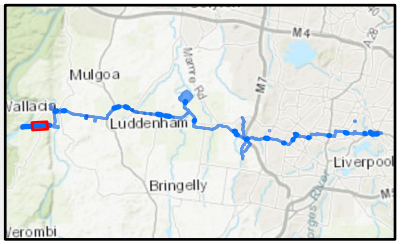
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Environmental flows pipeline

Environmental flows pipeline - Underbore
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
NCA boundary
Release location



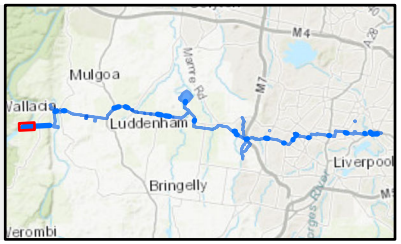
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Projection: MGA56 GDA94

Upper South Creek Advanced Water Recycling Centre **269002-AC06**
Environmental flows pipeline

Environmental flows pipeline - Underbore
Active Recreation
Commercial/Business
Hotel
Industrial/Utilities
Residential
Worship
all other receivers
Heritage
Construction compound
NCA boundary
Release location
Construction corridor



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

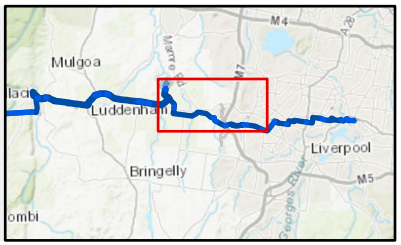
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Environmental flows pipeline

aurecon ARUP

Brine pipeline
Brine pipeline - Underbore
NCA boundary
EIS M12 Noise Monitoring Location
Release location
Construction compound
Indicative valve location



Source: ESRI
Date: 20/10/2021

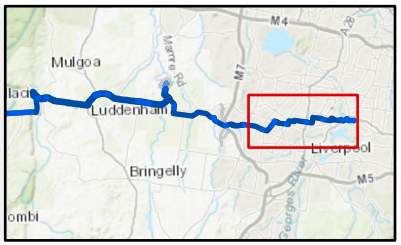
0 1 Kilometers

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline 1

- Brine pipeline
- Brine pipeline - Underbore
- NCA boundary
- EIS M12 Noise Monitoring Location
- Release location
- Construction compound
- Indicative valve location



Source: ESRI
Date: 20/10/2021

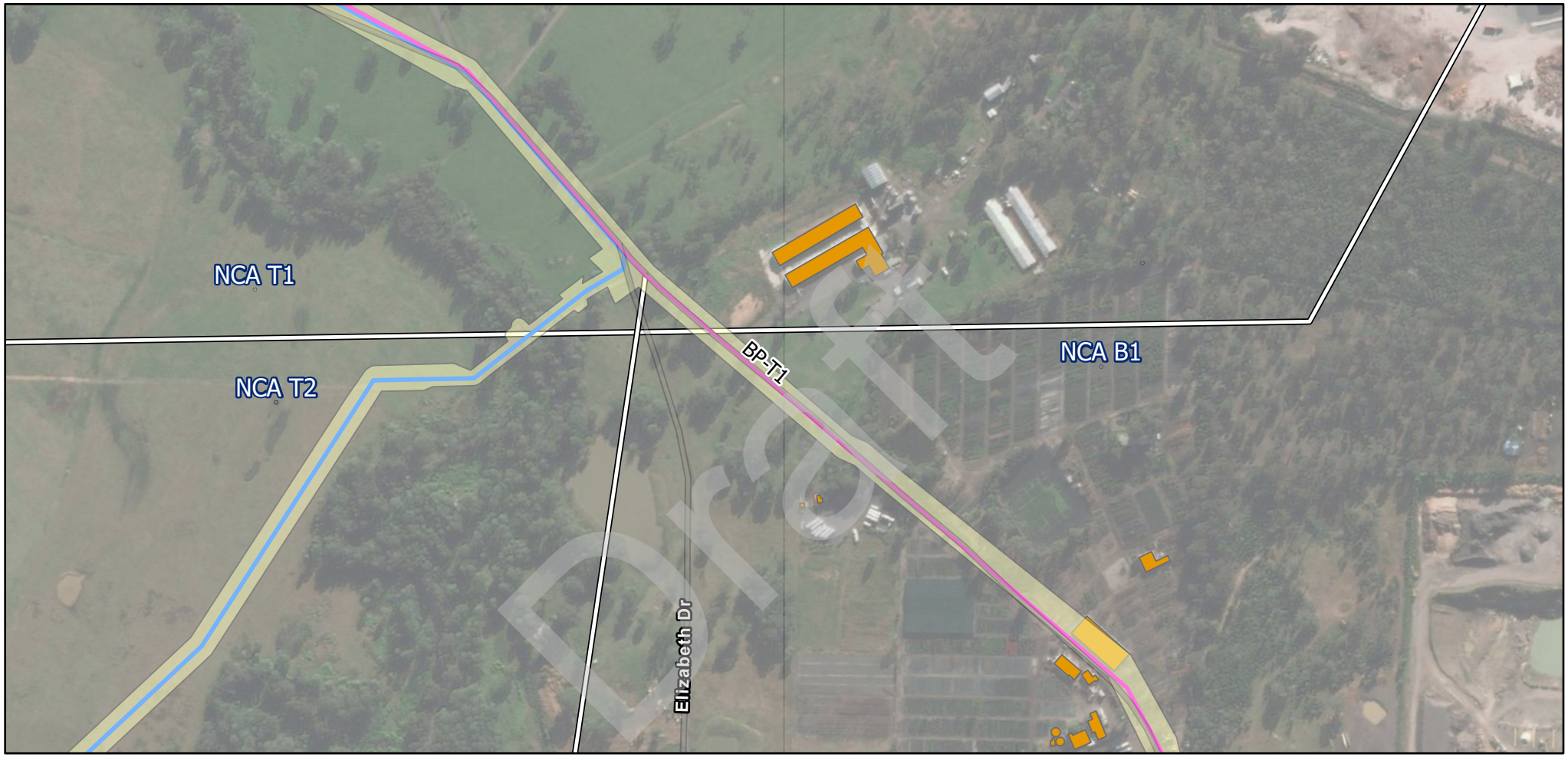
0 1 Kilometers

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

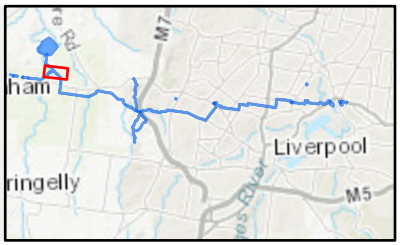
Projection: MGA56 GDA94

Brine Pipeline 2

aurecon ARUP



- Brine pipeline
- Brine pipeline - Underbore
- Active Recreation
- Child Care
- Commercial/Business
- Industrial/Utilities
- Medical
- Passive Recreation
- Residential
- School
- Worship
- all other receivers
- Heritage
- Upper canal
- Construction compound
- Construction corridor
- NCA boundary
- Indicative valve location
- EIS M12 Noise Monitoring Location
- Release location



Source: ESRI
Date: 20/10/2021

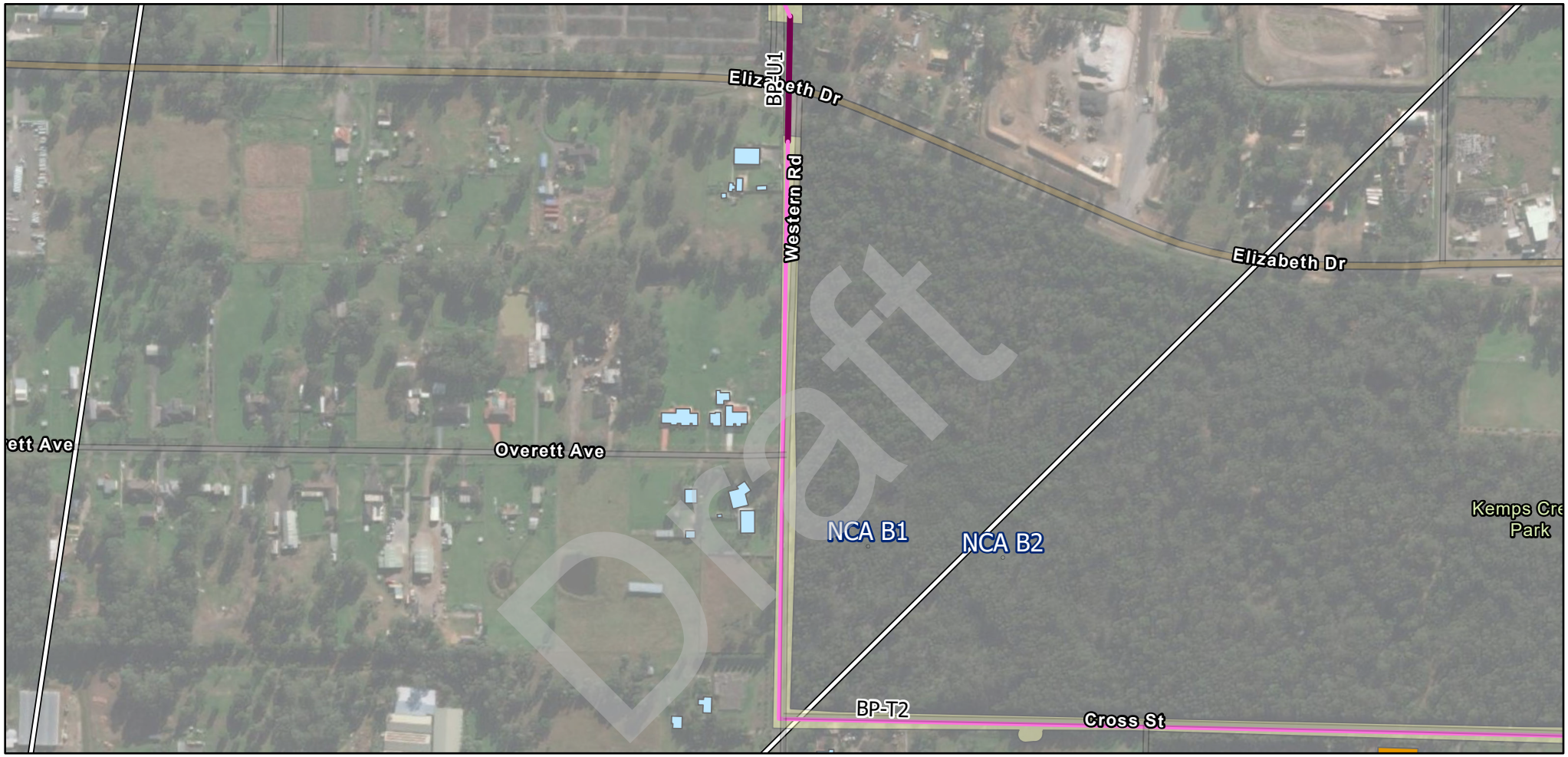
0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

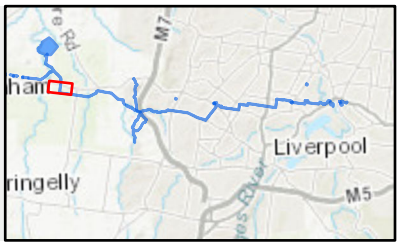
Projection: MGA56 GDA94

Brine Pipeline

aurecon ARUP



- Brine pipeline
- Brine pipeline - Underbore
- Active Recreation
- Child Care
- Commercial/Business
- Industrial/Utilities
- Medical
- Passive Recreation
- Residential
- School
- Worship
- all other receivers
- Heritage
- Upper canal
- Construction compound
- Construction corridor
- NCA boundary
- Indicative valve location
- EIS M12 Noise Monitoring Location
- Release location



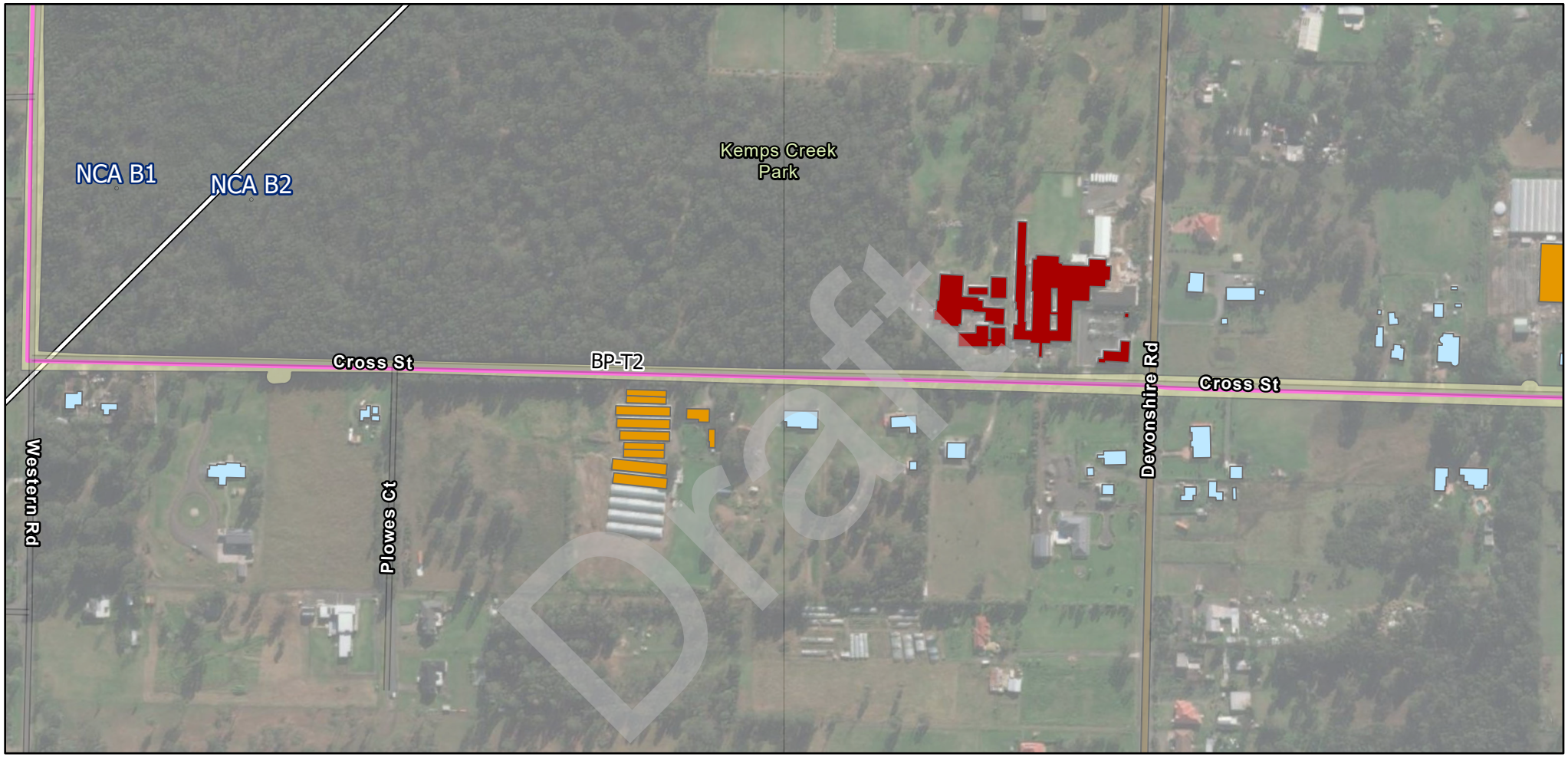
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

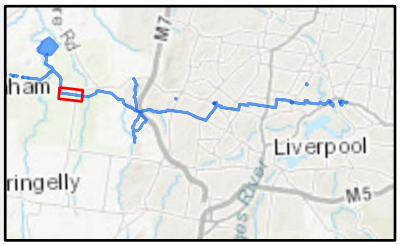
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline



- Brine pipeline
- Brine pipeline - Underbore
- Active Recreation
- Child Care
- Commercial/Business
- Industrial/Utilities
- Medical
- Passive Recreation
- Residential
- School
- Worship
- all other receivers
- Heritage
- Upper canal
- Construction compound
- Construction corridor
- NCA boundary
- Indicative valve location
- EIS M12 Noise Monitoring Location
- Release location



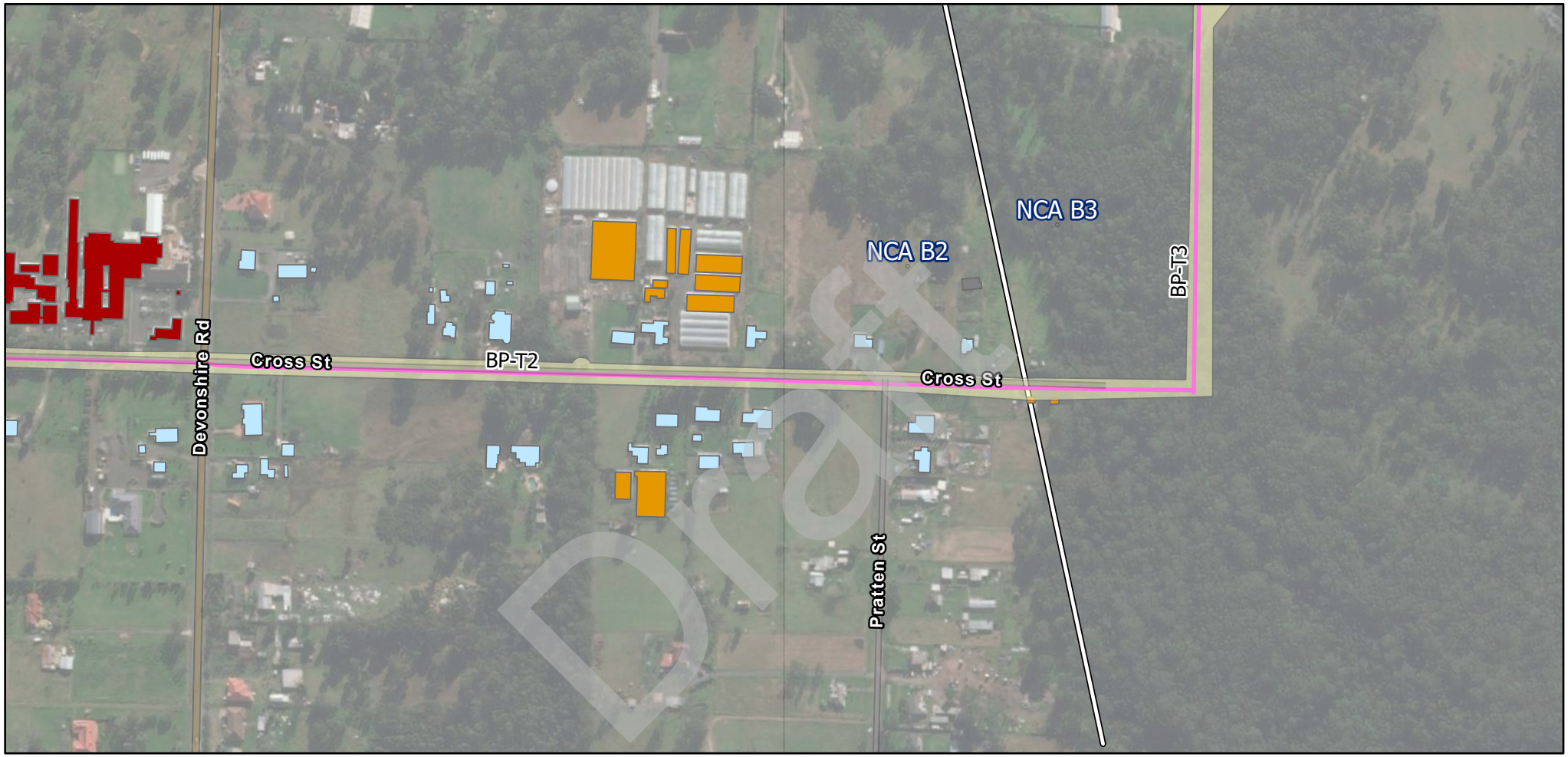
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

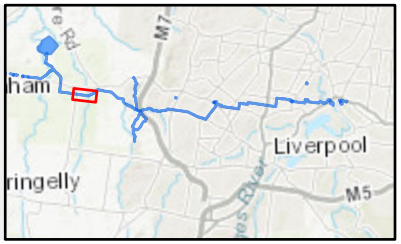
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline



Brine pipeline
Brine pipeline - Underbore
Active Recreation
Child Care
Commercial/Business
Industrial/Utilities
Medical
Passive Recreation
Residential
School
Worship
all other receivers
Heritage
Upper canal
Construction compound
Construction corridor
NCA boundary
Indicative valve location
EIS M12 Noise Monitoring Location
Release location



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline

aurecon ARUP

- Brine pipeline
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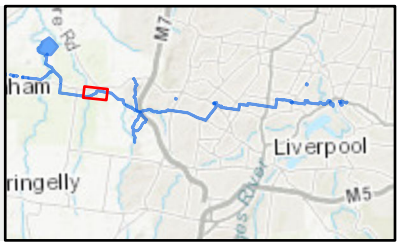
- Release location



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline

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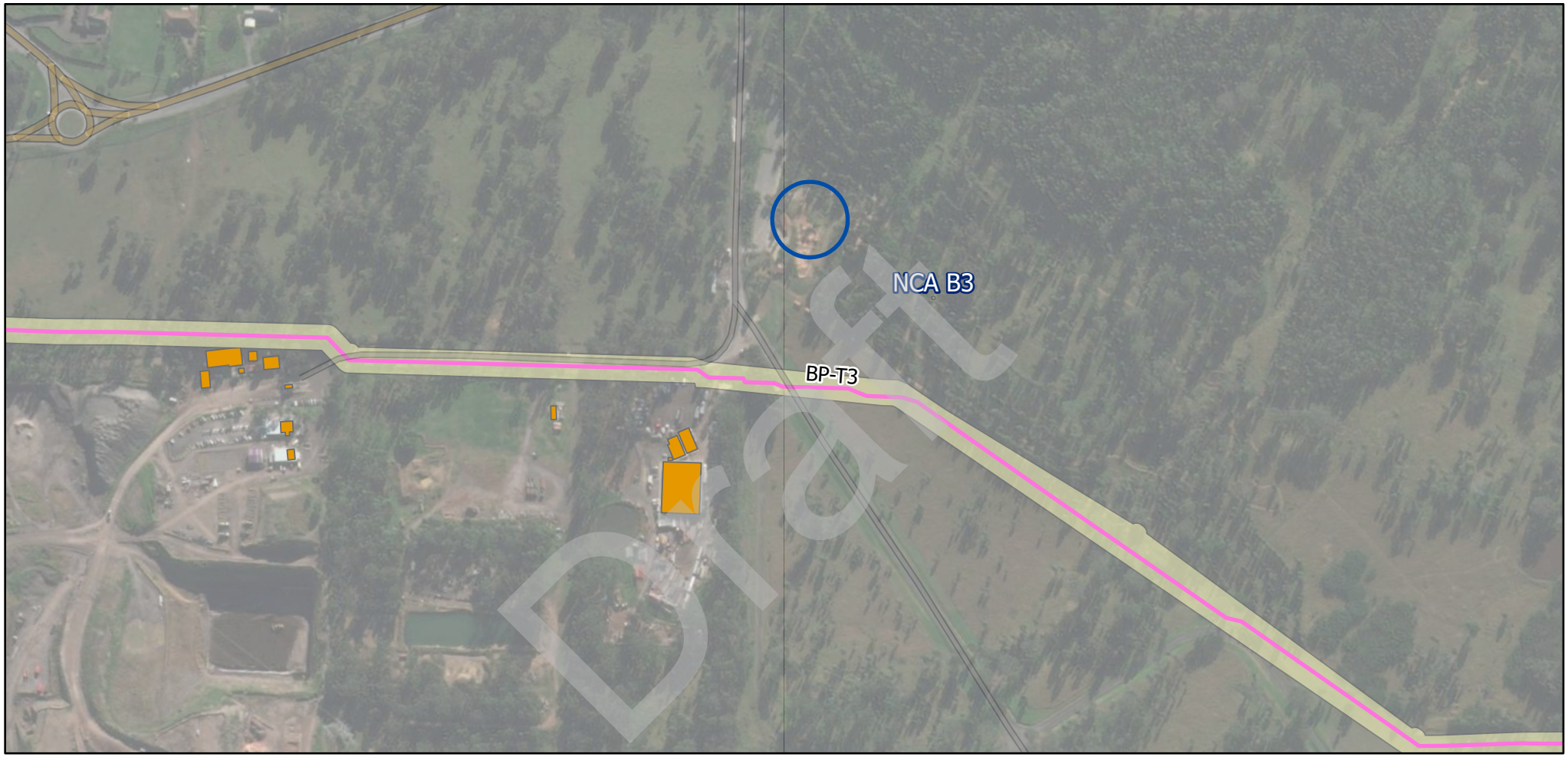

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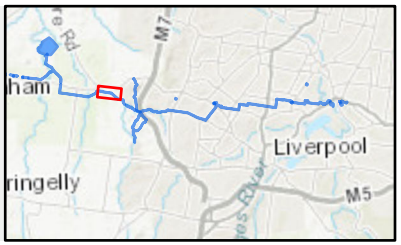


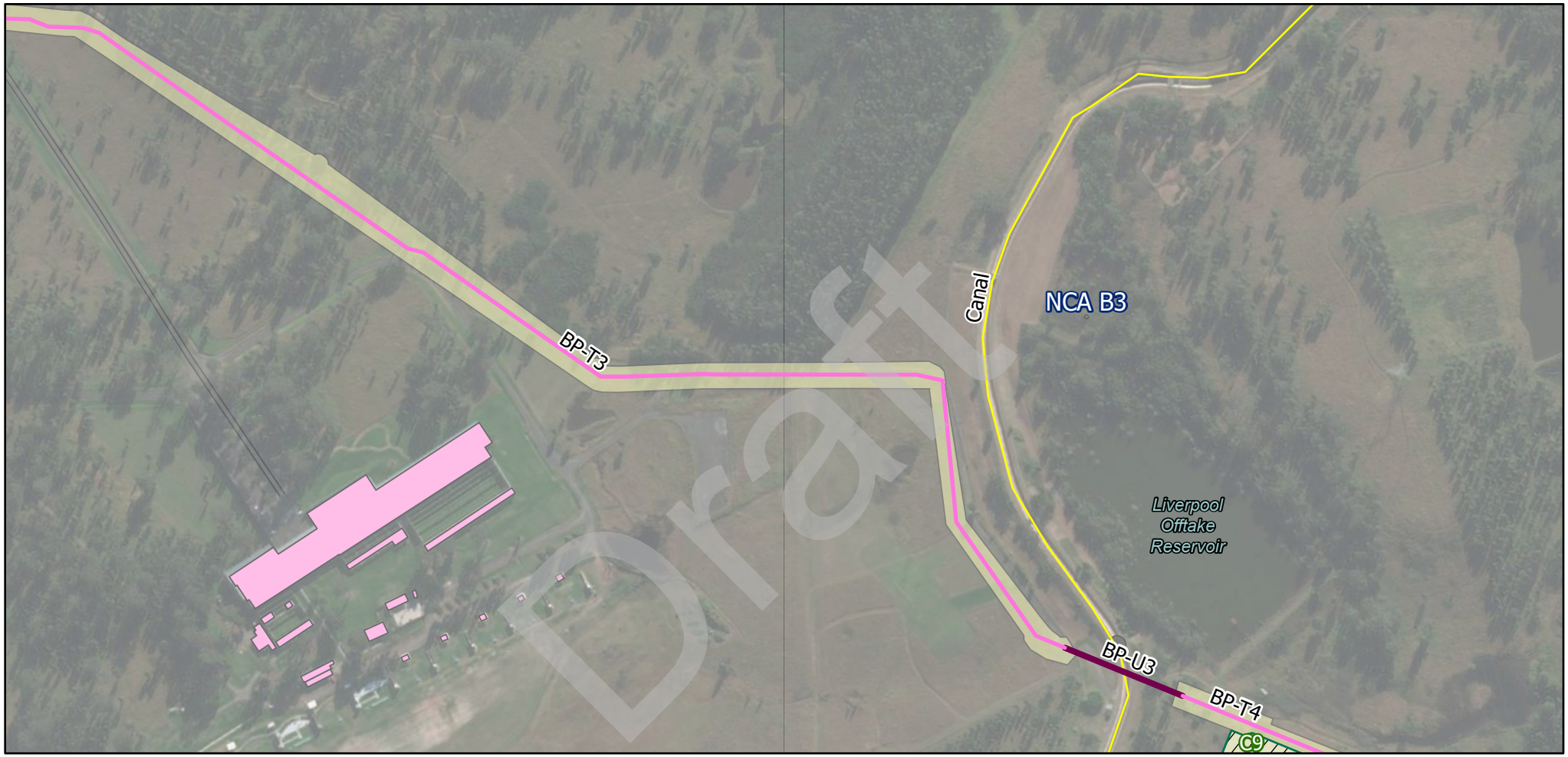
Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline



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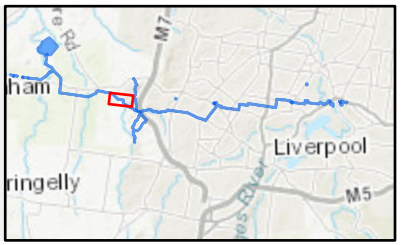

Source: ESRI
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Upper South Creek Advanced Water Recycling Centre **269002-AC06**

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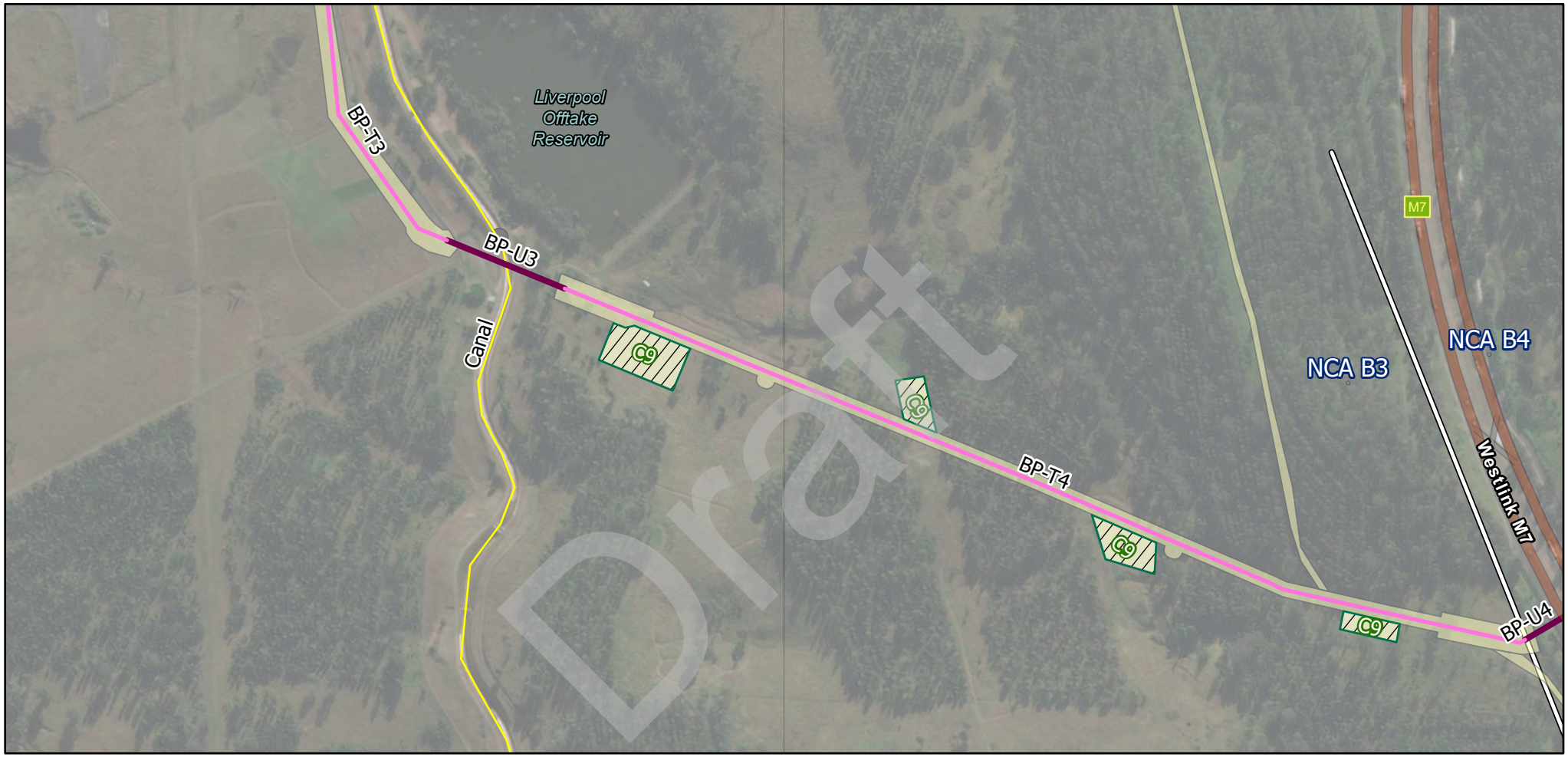

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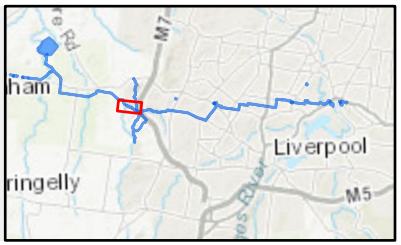

Source: ESRI
Date: 20/10/2021

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Projection: MGA56 GDA94

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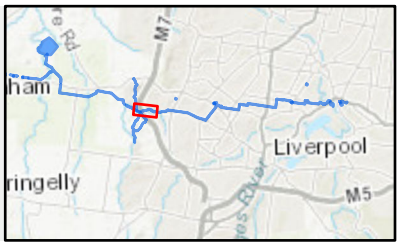

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline

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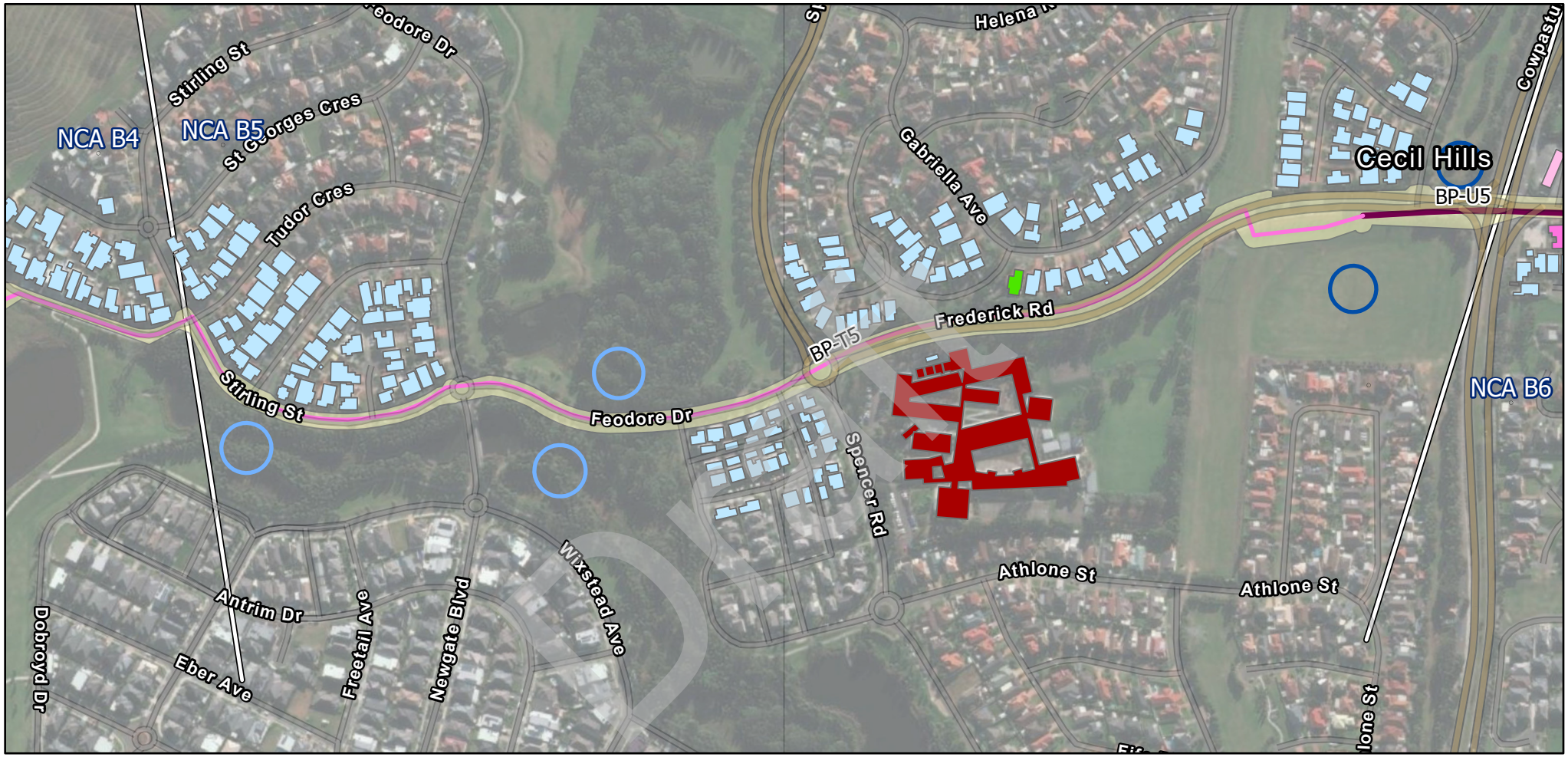

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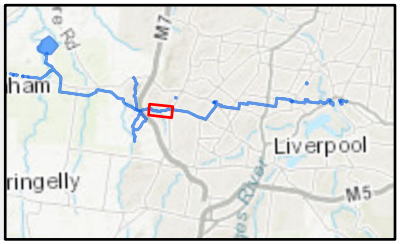

Source: ESRI
Date: 20/10/2021

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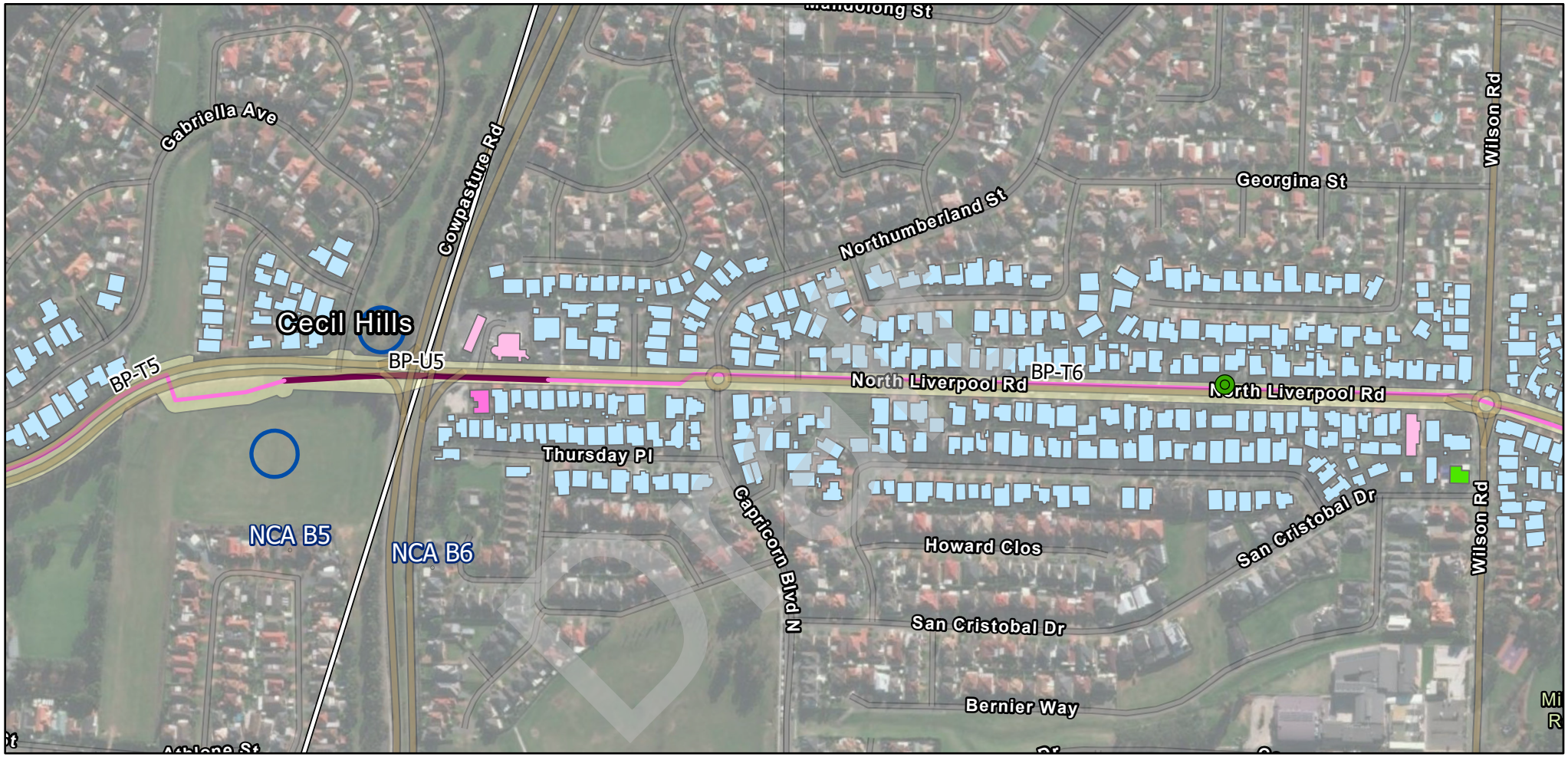
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline



Source: ESRI
Date: 20/10/2021

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Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline

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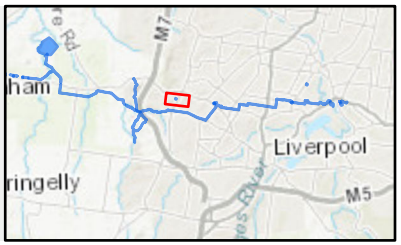

Source: ESRI
Date: 20/10/2021

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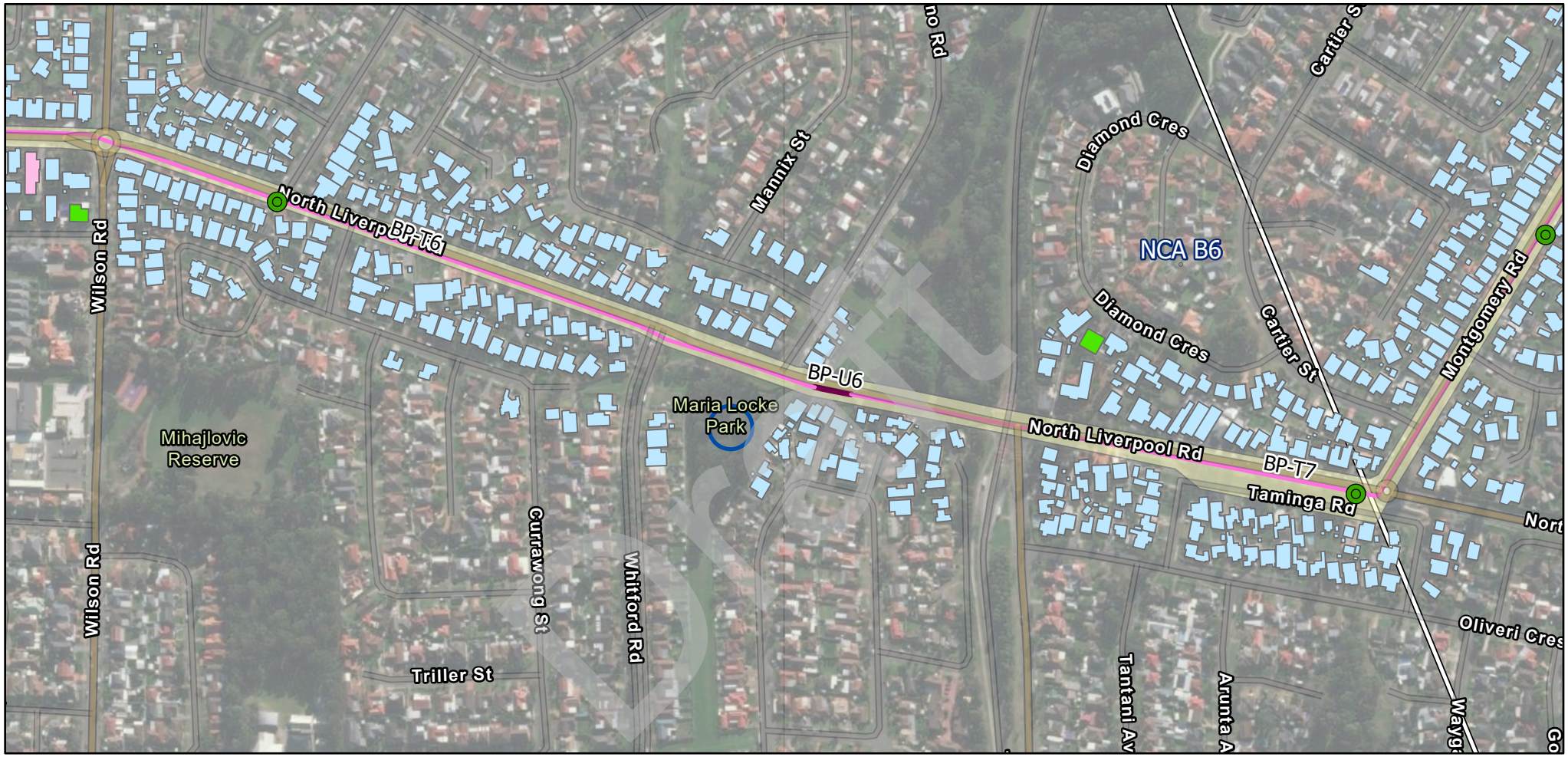

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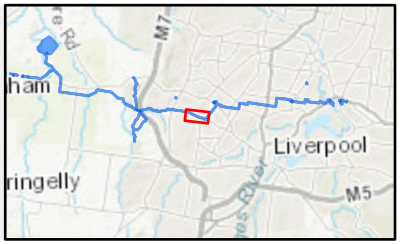

Source: ESRI
Date: 20/10/2021

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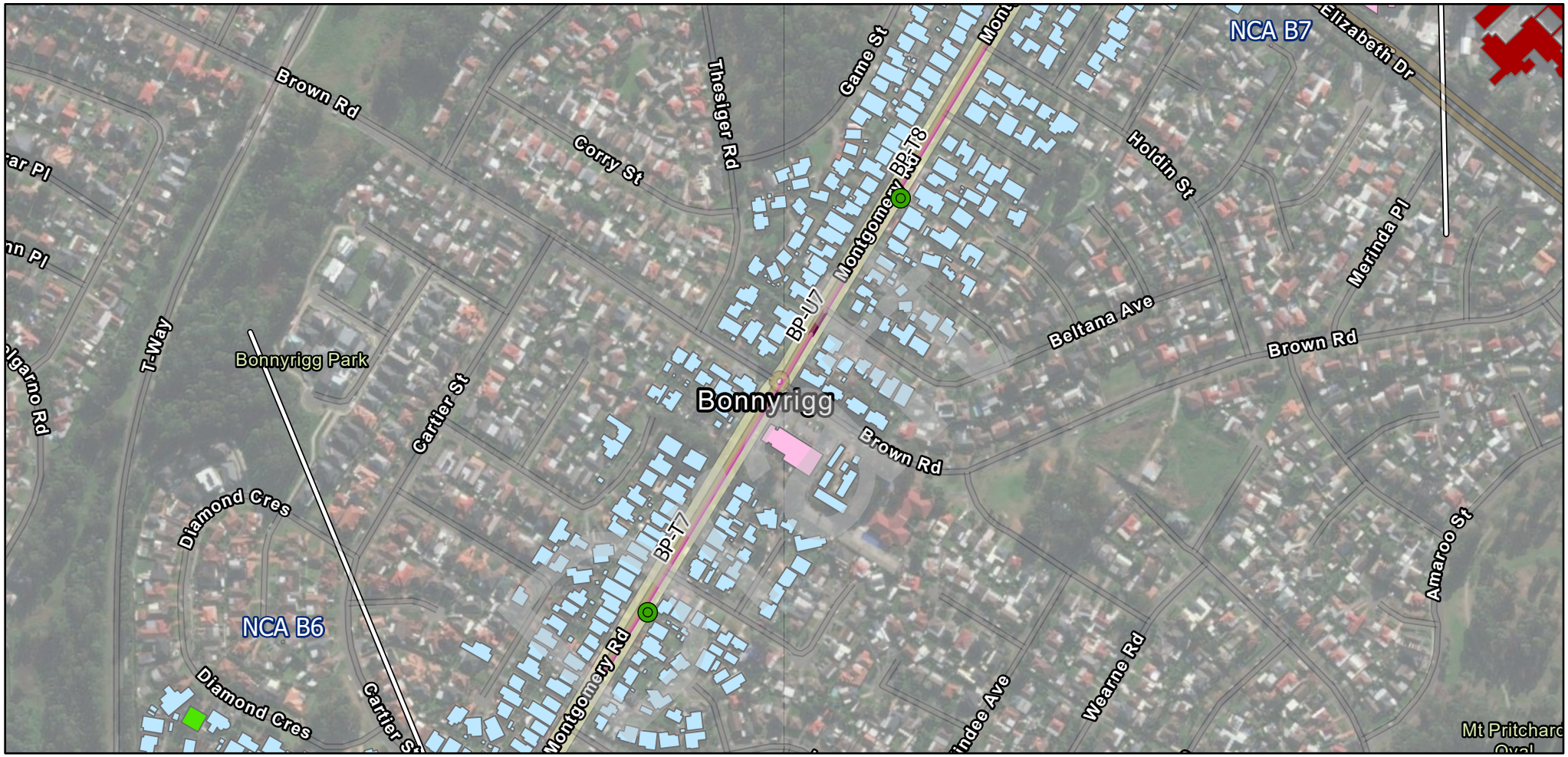
Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline

aurecon ARUP



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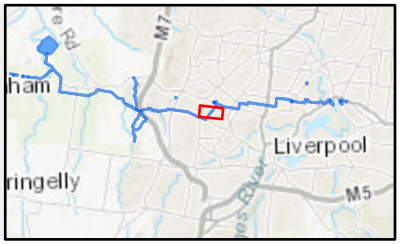

Source: ESRI
Date: 20/10/2021

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Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

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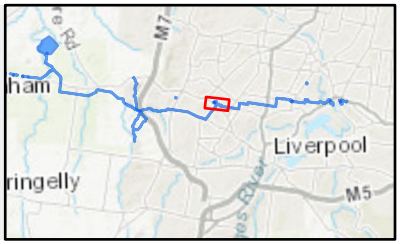

Source: ESRI
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Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

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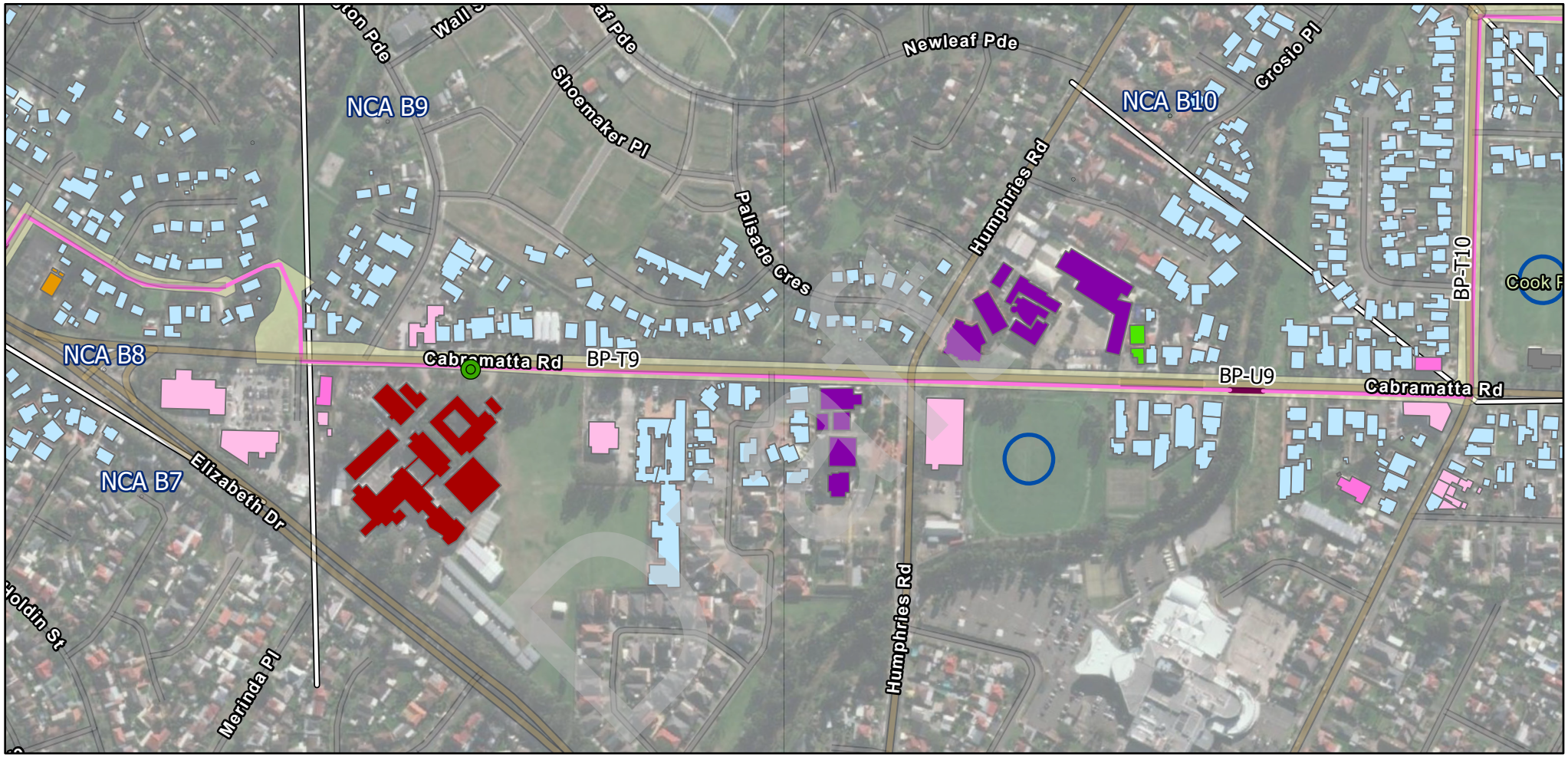

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline

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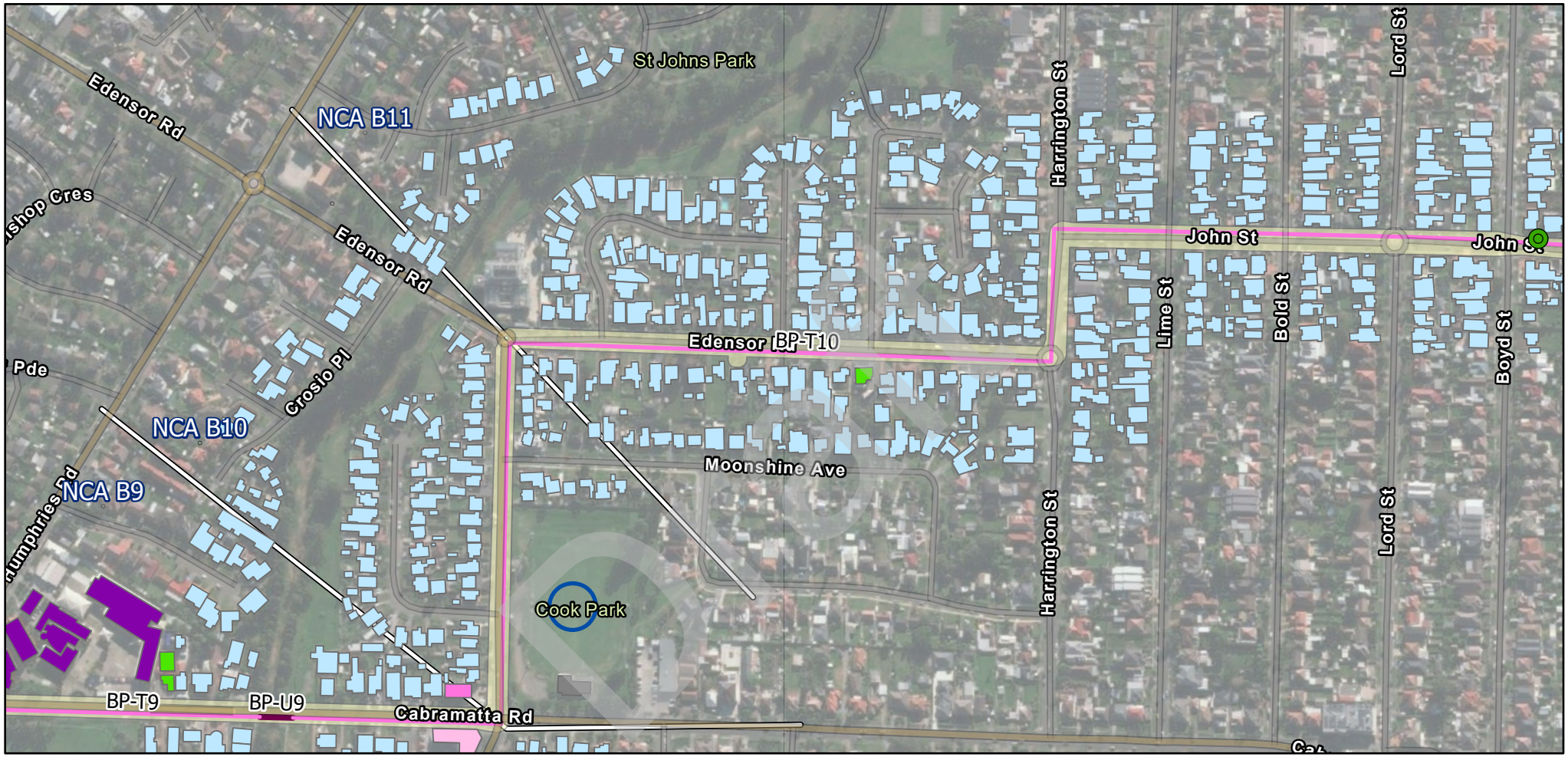

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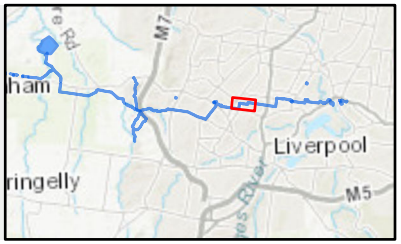

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Upper South Creek Advanced Water Recycling Centre **269002-AC06**

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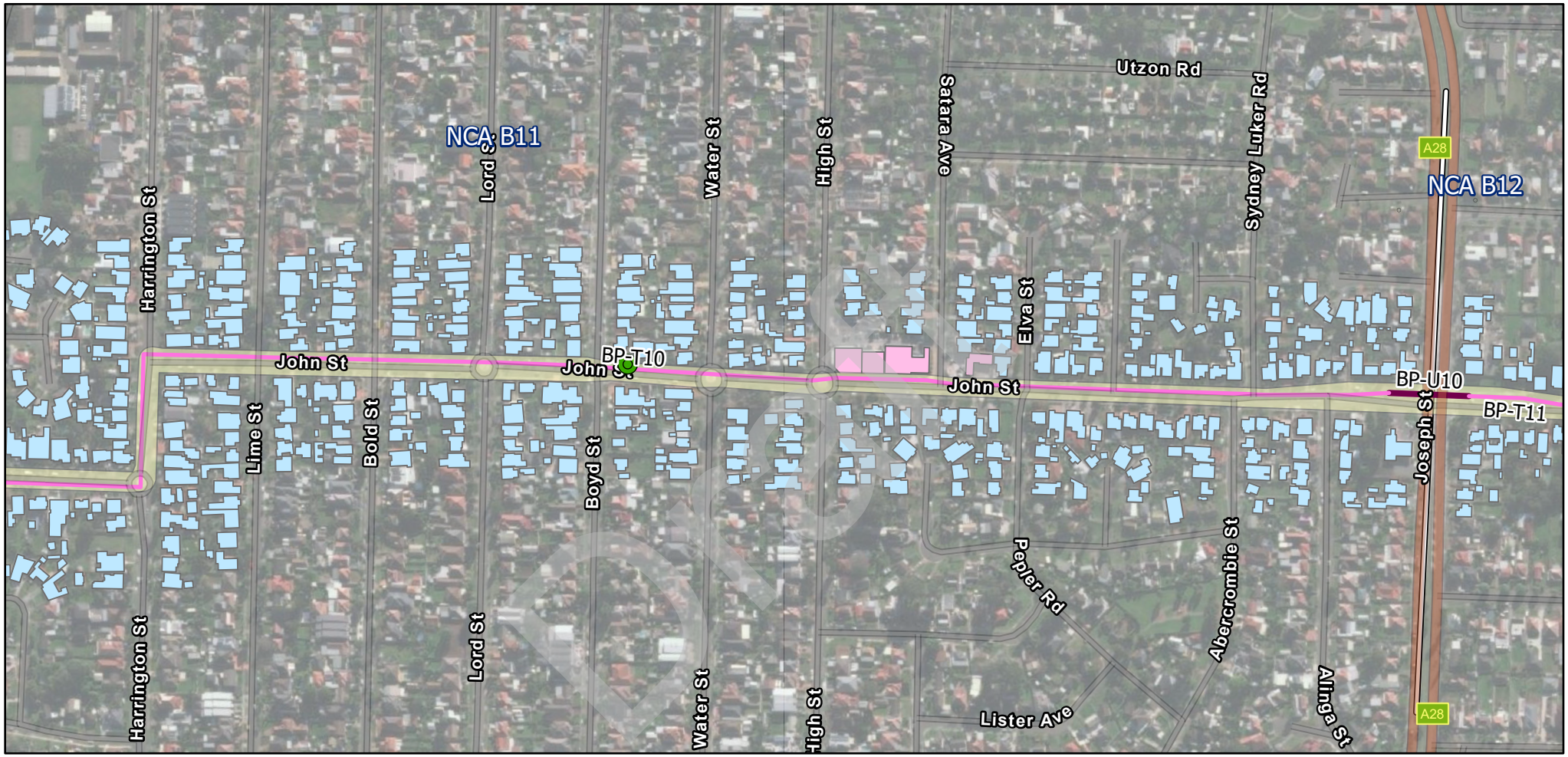

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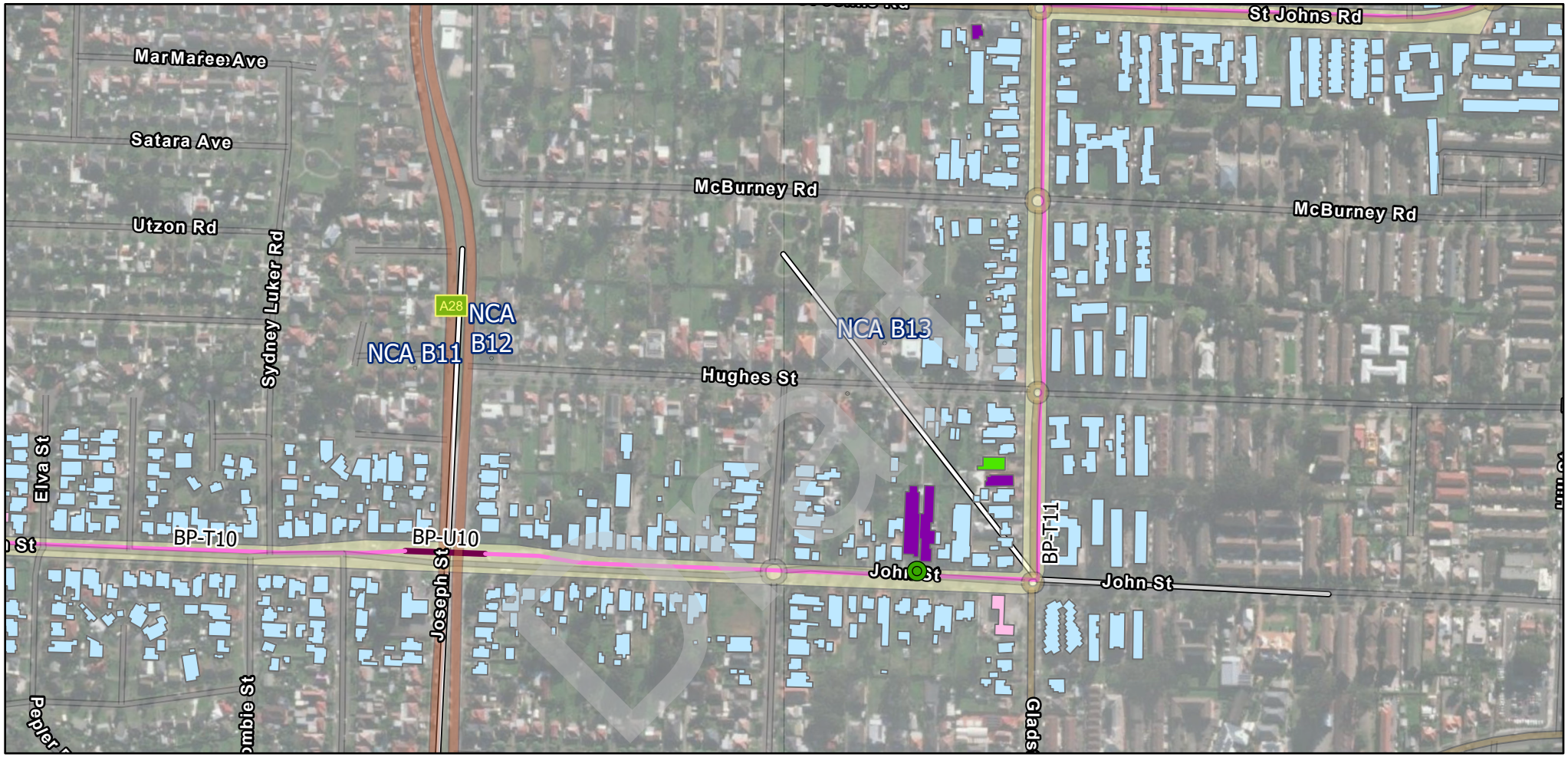

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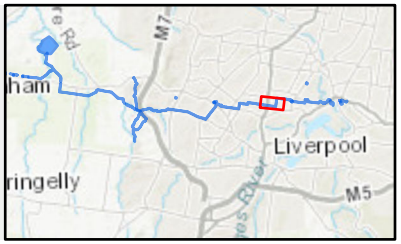

Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

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Brine Pipeline

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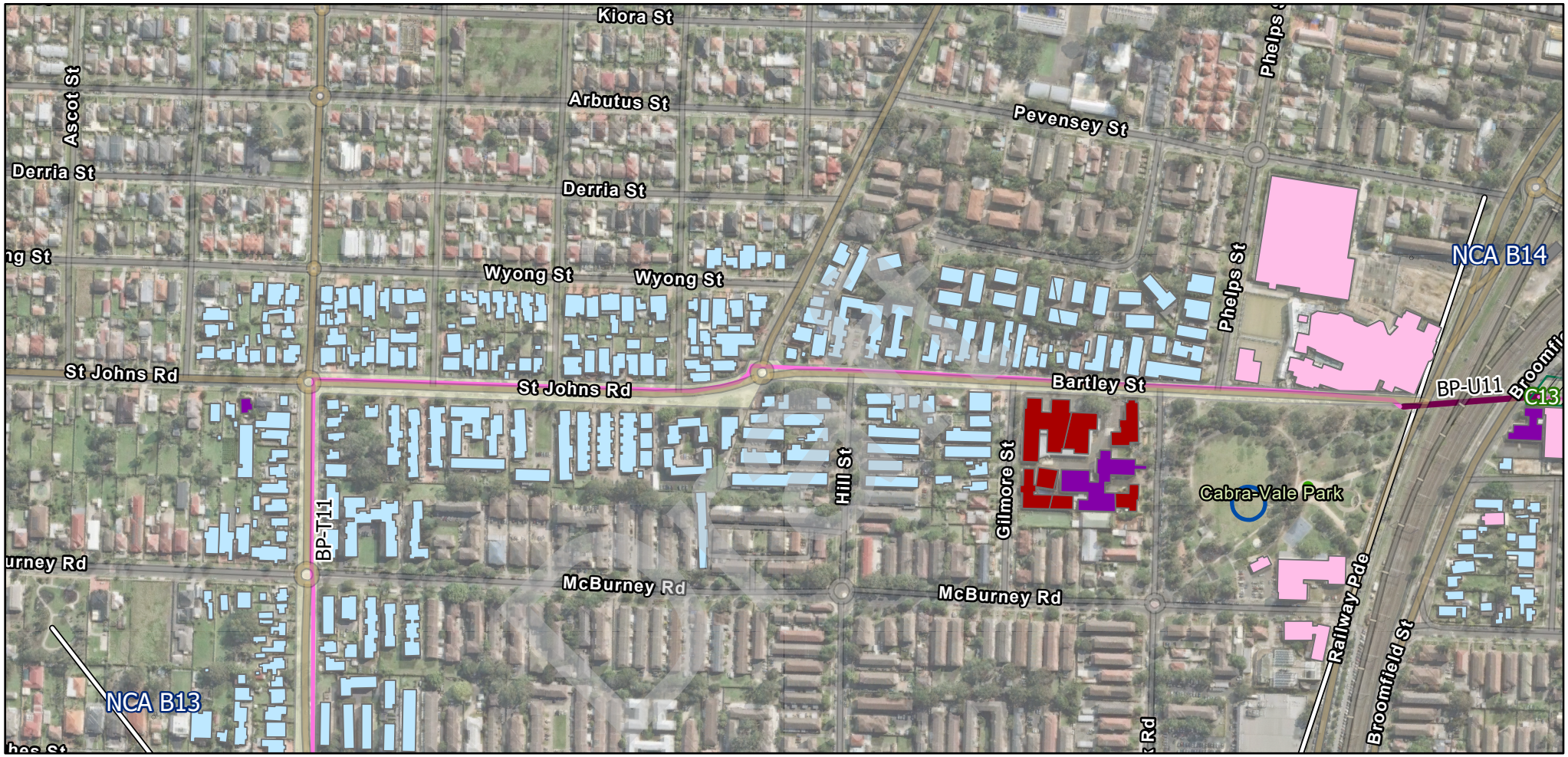

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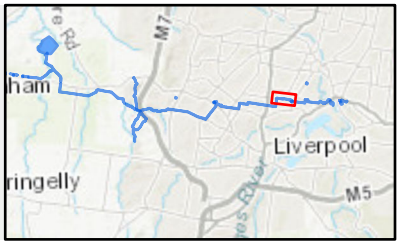

Source: ESRI
Date: 12/11/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

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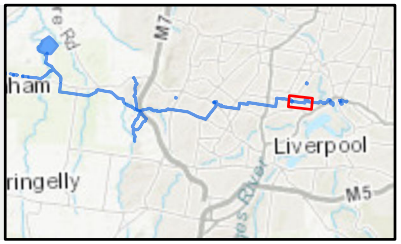

Source: ESRI
Date: 12/11/2021

0 100 200 Meters

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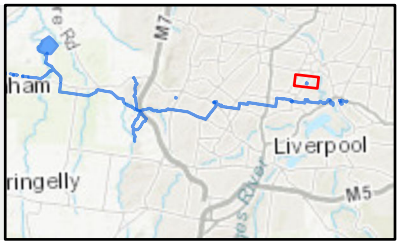

Source: ESRI
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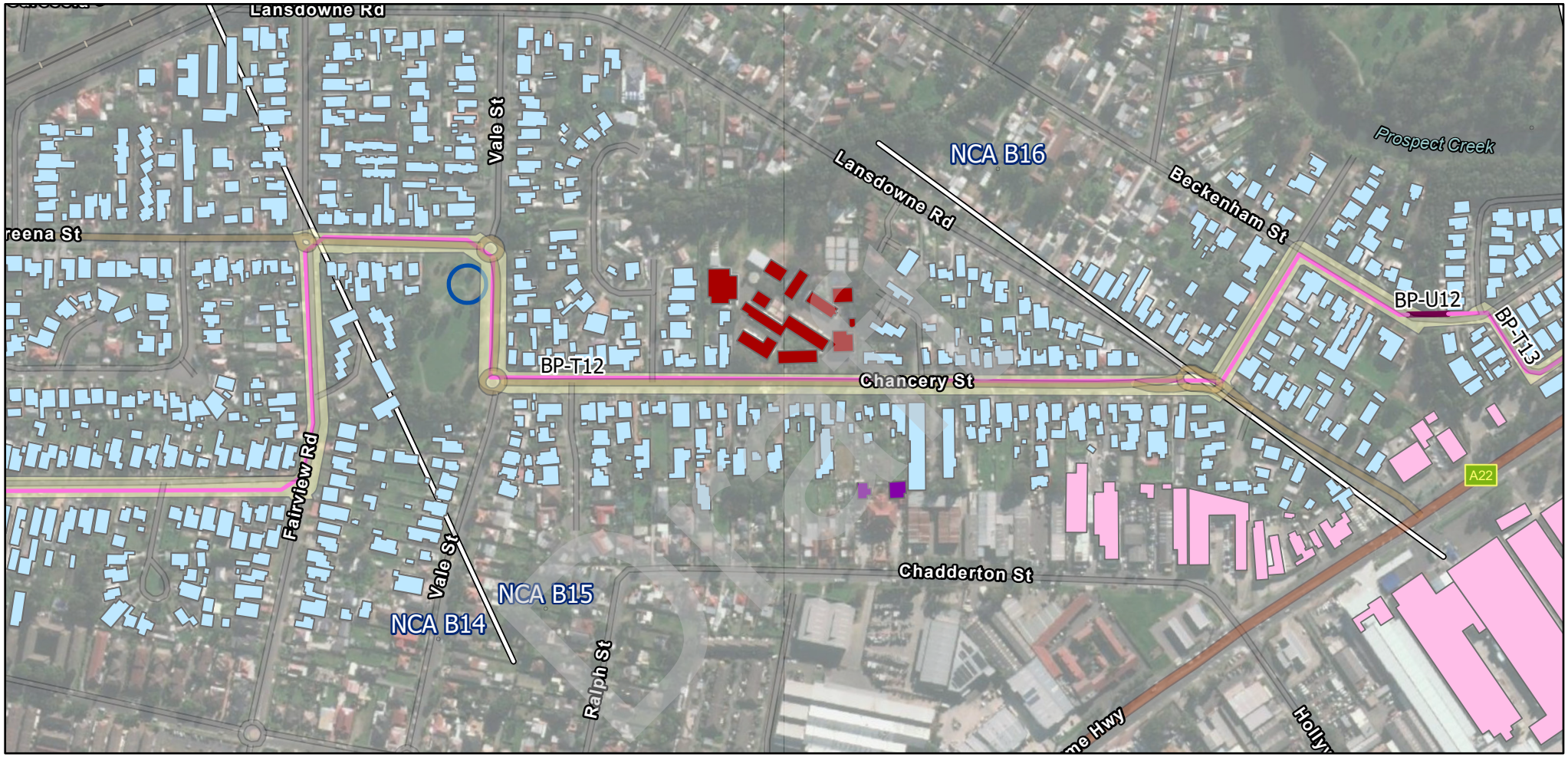

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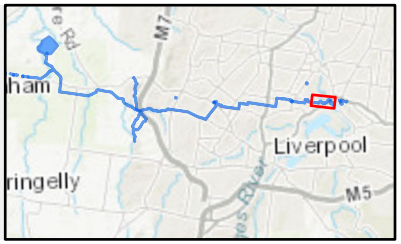

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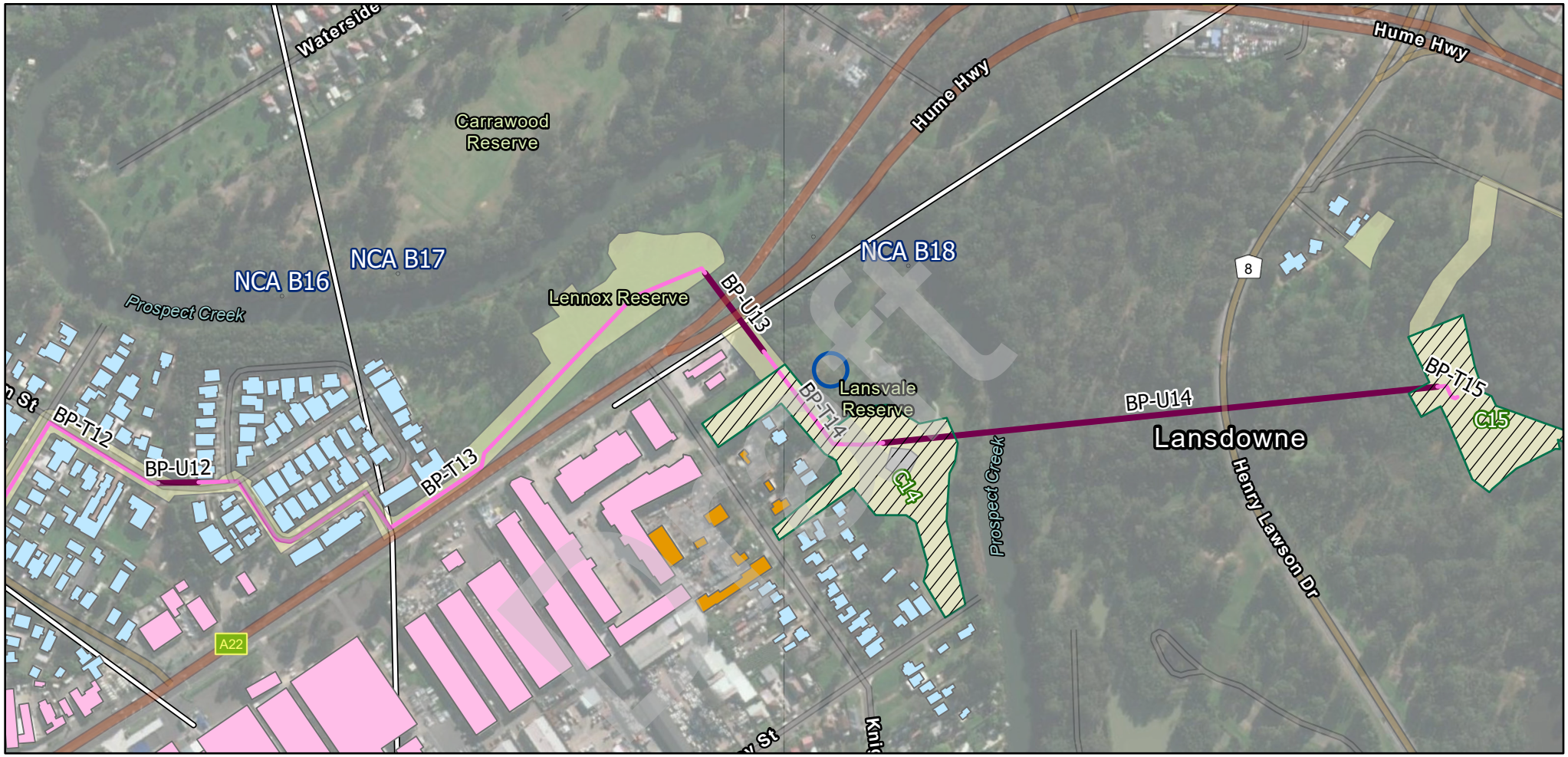

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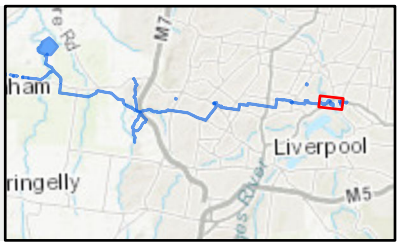

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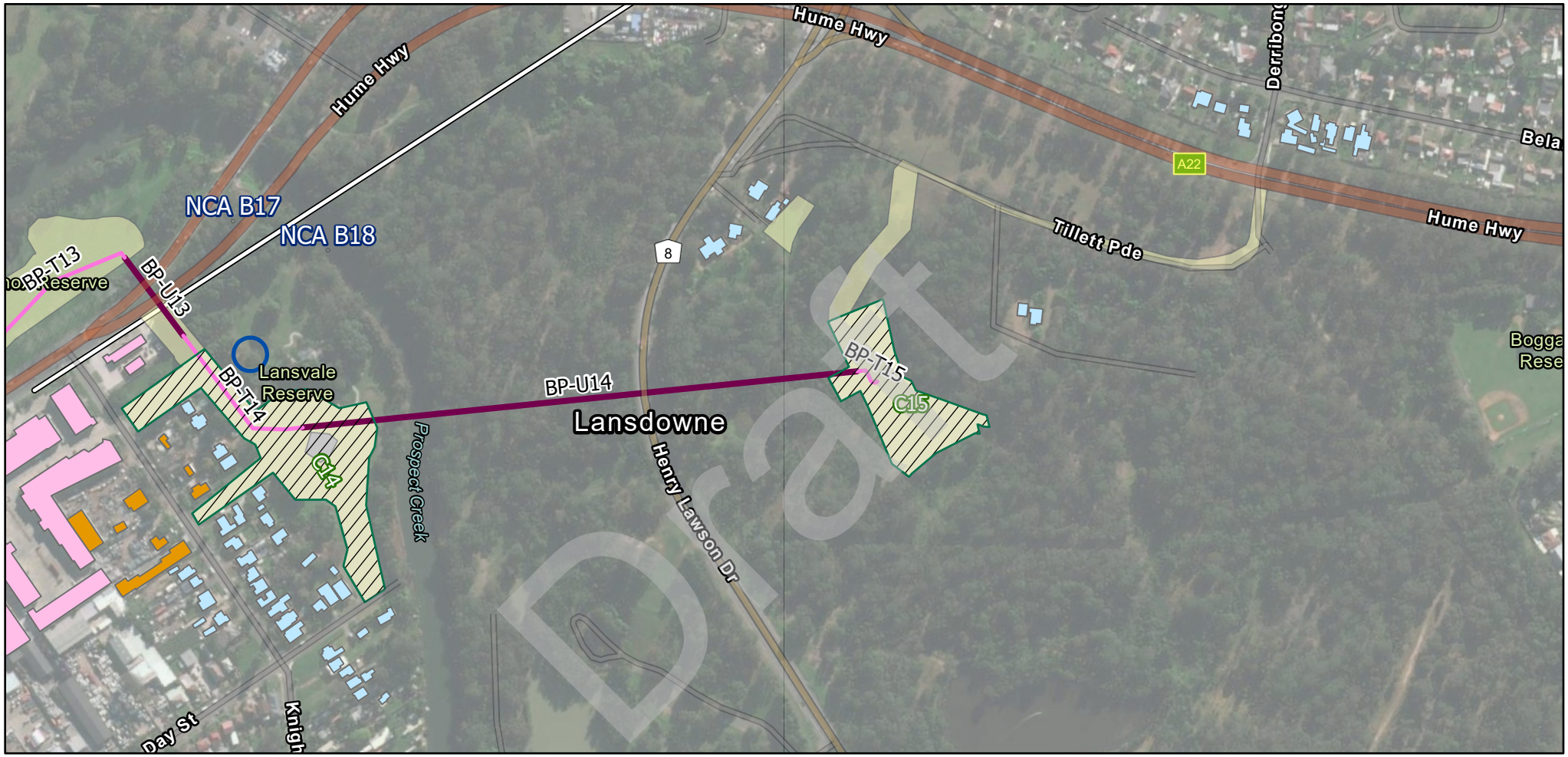

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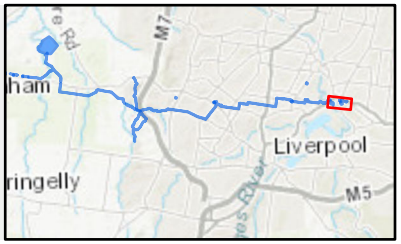
- EIS M12 Noise Monitoring Location
- Release location



Source: ESRI
Date: 20/10/2021

0 100 200 Meters

Upper South Creek Advanced Water Recycling Centre **269002-AC06**

Projection: MGA56 GDA94

Brine Pipeline

Appendix B

Sound pressure levels of individual plant items are various distances have been stated in Table 49 of the EIS and are replicated below.

Equipment	Equipment Lw	Distance from equipment				Predicted sound pressure levels						LAeq(15min) dB		
		10 m	30 m	50 m	75 m	100 m	150 m	200 m	300 m	500 m	700 m	1 km	2 km	3 km
Pump and dewatering equipment	96	68	58	54	51	48	44	42	38	34	31	28	22	18
Trenching machine/ excavator (20t)	105	77	67	63	60	57	53	51	47	43	40	37	31	27
Sideboom/crane	108	80	70	66	63	60	56	54	50	46	43	40	34	30
Roller (non vibratory)	109	81	71	67	64	61	57	55	51	47	44	41	35	31
Welding equipment	110	82	72	68	65	62	58	56	52	48	45	42	36	32
Micro-tunnelling/ directional drilling	112	84	74	70	67	64	60	58	54	50	47	44	38	34
Vibratory roller	1142	86	76	72	69	66	62	60	56	52	49	46	40	36
Dozer D9	116	88	78	74	71	68	64	62	58	54	51	48	42	38
Chainsaw	1192	91	81	77	74	71	67	65	61	57	54	51	45	41
Concrete saw/ Excavator breaker (10 tonnes)	1232	95	85	81	78	75	71	69	65	61	58	55	49	45
Excavator Breaker (30 tonnes)	1272	99	89	85	82	79	75	73	69	65	62	59	53	49

Notes:

1. In Red – Noise levels above the 75 dBA Highly Noise Affected NMLs – Receivers experiencing noise levels higher than 75 dBA fall into the Highly noise affected category as defined in Section 3.1 of the EIS.
2. Sound power levels include a 5 dBA penalty because these plant and equipment are identified as containing special audible characteristics (refer to **Error! Reference source not found.** and **Error! Reference source not found.** of the EIS).