



Utility Management Strategy Plan

SWMCSWSSJ-JHL-WEC-UT-PLN-000002

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1. Introduction

1.1 Background

The John Holland Laing O'Rourke joint venture (JHLOR) has been engaged to deliver the Southwest Metro Corridor Works (SWMC).

1.1.1 [Permanent Works](#)

The works include all permanent new infrastructure and modifications to existing infrastructure, as part of the construction of Sydenham to Bankstown station upgrade works. The permanent new infrastructure and modifications to existing infrastructure to be constructed includes;

- Installation and commissioning of Combined Service Route (GST, GLT, pit & pipe)
- Signalling, communications and HV diversions
- Rail embankment stabilisation including retaining walls
- Installation of drainage
- Installation of security and segregation fencing
- Civil enabling works for traction substations
- Vegetation clearing
- Access road upgrades/establishment
- Utility diversions
- Bridge remedial works, including installation of crash barriers and throw screens
- Modifications to the existing rail track (including crossovers and hi-rail access pads),
- Overhead wire works
- Demolition of redundant infrastructure

1.1.2 [Temporary Works](#)

The SWMC temporary works include:

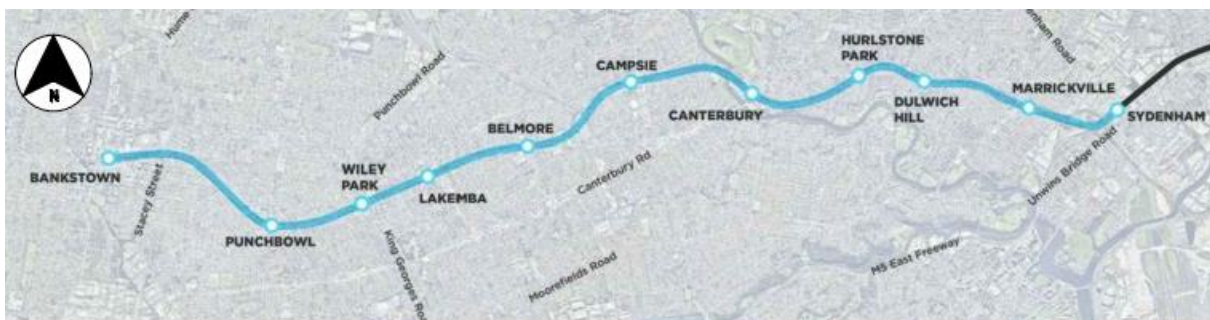
- Temporary arrangements to divert and control pedestrians, public transport users, cyclists, public transport and traffic and to provide public access, amenity, security and safety during all stages of design and construction of the Works;
- Temporary arrangements for people and vehicles to safely access all property, including publicly accessible space affected by the Contractor's Activities;
- Temporary arrangements for people and vehicles to safely access the Site;
- Temporary access stairs, walkways and platforms within the Site;
- Temporary construction hoardings, fencing, noise walls, access gates, barriers and signage on and around the Site;
- All environmental safeguards and measures necessary to mitigate environmental effects which may arise during the design and construction of the Works;
- Cleaning, maintenance, repair, replacement and reinstatement, as required, of all areas occupied by the Contractor during design and construction of the Works;
- Temporary site facilities/compounds required for design and construction of the Works (i.e. Canterbury Bowls Club);
- Temporary infrastructure, safety screens and ground support installed or erected to undertake design and construction of the Works;
- Temporary arrangements for Utility Services including water, electricity, stormwater, sewerage, gas and electronic communications;
- Temporary power for stations

- Temporary works and measures required as a consequence of requirements arising from the stakeholder and community liaison process; and
- All other temporary works and measures required for the construction of the Works.
- Geotechnical and intrusive service searching (including contamination testing) investigation works in the vicinity of Bankstown Station (if required)

1.2 Project Location

The SWMC are located largely within the rail corridor between Sydenham and Bankstown, but will largely exclude works within the corresponding Sydney Trains stations (which are shown for clarity only). Refer to Figure 1 for the project location map.

Figure 1 Project Location Map



1.3 Project Planning Approval and Conditions

In relation to the *Sydney Metro City & Southwest - Sydenham to Bankstown - Instrument of Approval* (SSI-8256), the following conditions relate the Utilities Management Strategy and the requirements thereof;

Table 1 Relevant Conditions of Approval

Condition of Approval	Requirement	Section Reference
E26	<p>Work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must:</p> <p>(a) reschedule Work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with Condition E23; or</p> <p>(b) consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and</p> <p>(c) provide documentary evidence to the ER in support of any decision made by the Proponent in relation to respite or mitigation.</p>	2.7

E69	The Proponent must co-ordinate utility providers and relevant council(s) to identify opportunities for maintenance, replacement or augmentation of utilities that cross the rail corridor and facilitate and co-ordinate requests by the utility providers and relevant council(s) to undertake the Work during rail shutdowns, with particular reference to the final three (3) to six (6) month shutdown before metro services commence.	Section 1.6 Table 2
E70	Nothing in this approval allows for the undertaking of any third-party utility Work identified through the implementation of Condition E69 and not required for the purposes of the CSSI. Note: Third-party utility Work, including but not limited to drainage, water or energy supply etc. identified not required for the project is not the responsibility of the Proponent and is subject to separate approvals process.	Section 1.6 Section 2
E71	A Utilities Management Strategy must be prepared and implemented in line with the Utilities Management Framework, provided as Appendix H of the SPIR for all utility Work. The Strategy must identify how utility Work will be defined and managed. The Utilities Management Strategy must include:	This Strategy
(a)	the functions of the Utility Coordination Manager as required by Condition E72 ; ;	Section 1.4
(b)	a description of all utility Work to be undertaken; and	Section 1.5
(c)	management measures to be implemented to manage dust, noise, traffic, access and lighting impacts associated with utility Work.	Section 4 Appendix A
	The Utilities Management Strategy must be submitted to the Planning Secretary for approval at least one (1) month before the commencement of utility Work.	
E72	A Utility Coordination Manager must be appointed for the duration of the CSSI Work. The role of the Utility Coordination Manager must include, but not be limited to:	Section 1.4

(a)	the management and coordination of all utility Work associated with the delivery of the CSSI, to ensure respite is provided to the community, as required under Condition E22	Section 1.4
(b)	investigating complaints received from the Community Complaints Mediator relating to utility Work and providing a response to the Community Complaints Mediator	Section 1.4
REMM SC6	Hazardous materials surveys would be undertaken during detailed design for all proposed demolition activities, and for utility adjustments as required.	Section 4

1.4 Sydney Metro Utility Coordination Manager

The Sydney Metro Utilities Project Manager and the Utilities and Stakeholder Manager have been jointly appointed as the Sydney Metro Utility Coordination Manager (UCM) to coordinate delivery of the Sydenham to Bankstown CSSI project utility works.

Utility works include any construction or physical modification of utility infrastructure (e.g. connections / disconnections) to ensure continual operation of utility assets/services during the delivery of the Sydenham to Bankstown CSSI project. Utility works does not include investigative works (such as surveying or pot-holing of utility assets) to gather information to inform design and construction methodologies. Utility works for the Sydenham to Bankstown CSSI project may involve the following utility assets:

- Gas (Jemena, Qenos, VIVA Energy);
- Power (Ausgrid, Transgrid);
- Telecommunications (Telstra, NBN Co, TPG, Vocus, Optus);
- Water and sewer (Sydney Water); and
- Stormwater (Sydney Water, Canterbury-Bankstown Council, Inner West Council).

Several Contractors, including JHLOR, may be undertaking utility works on the Project at the same time.

The functions of the UCM include, but are not limited to:

- Establishing a Utilities Project Team with nominated representatives from utility service providers that may be impacted by the CSSI;
- Coordination of meetings with utility service providers as requested by Sydney Metro's Contractors;
- Involvement with reviews of CSSI designs and construction methodologies to assist with identifying potentially impacted utility assets;
- Assist with coordination of design and construction methodology reviews by utility service providers to identify necessary utility works;
- Communicate with the Utilities Project Team, Sydney Metro, and Sydney Metro's Contractors' delivery teams to understand the proposed program of works to coordinate intercepting, interconnecting and interrelated works and manage priorities as they may arise;
- Observation of utility works; and
- Manage escalation of utility work-related issues within Sydney Metro and the utility service providers as required.
- In conjunction with the Contractors, co-ordinate utility providers and relevant council(s) to identify opportunities for maintenance, replacement or augmentation of utilities that cross

the rail corridor and facilitate and co-ordinate requests by the utility providers and relevant council(s) to undertake the Work during rail shutdowns

Respite for impacted receivers will be considered throughout the coordination and management of the utility works in accordance with the Sydney Metro City & Southwest Construction Noise & Vibration Strategy. Respite may be offered in the form of a reduction or absence of noise emissions for a period of time, or by removing the affected receiver from the noise emission point source (e.g. dinner/movie tickets and/or alternative accommodation offers). Consideration of respite will consider many factors, including but not limited to the predicted noise level, duration, time of day, surrounding land uses and community feedback from Sydney Metro Place Managers of the proposed works. The UCM will endeavour to coordinate works to avoid the same receiver being affected over consecutive nights by more than one Contractor as much as possible. The UCM, where required, will facilitate information sharing between Contractors where concurrent utility works (or other works and utility works) may occur to ensure that these are appropriately assessed within noise predictions. The UCM will collaborate with Contractors to ensure utility work staging is appropriately captured within any Construction Noise and Vibration Impact Statement, to ensure that cumulative impacts from utility works are accounted for. Furthermore, the UCM will endeavour to stage the timing of works by different Contractors that affect the same receiver as much as possible in order to maximise the respite period between the works.

The UCM will collaborate with all Contractor Community and Stakeholder Managers and Place Managers to ensure that notifications for works are accurate and up to date. Where a community complaint is received the UCM will work with the Contractors' communications team to ensure the complaint is resolved in a timely manner and to put in place measures to mitigate the risk of future complaints, where possible.

In the case of ongoing complaints, the UCM will assist in investigating complaints received by the Community Complaints Mediator relating to utility works by responding to the Community Complaints Mediator on complaints related to utility works as requested.

1.5 JHLOR Utility Work Scope

For the purpose of this plan utility work will include applying protection to utilities or relocating of utilities. These activities have been categorised within Section 2.3 as Type 3 and Type 4 activities, respectively. Construction within the vicinity of utilities (Type 1 and Type 2 activities) are not deemed as utility work.

As such, JHLOR's utility scope will include;

Ausgrid

- Protection of Ausgrid overhead wiring and pole at Wairoa St underbridge, Canterbury
- Protection of Ausgrid 33kV cables and conduits crossing the corridor from Park St, Campsie
- Protection of Ausgrid LV overhead wiring and poles on the southern side of the corridor from 11km915 to 12km145;
- Protection of Ausgrid overhead wiring and poles at Moreton St overbridge, Belmore
- Protection of Ausgrid LV conduits and cables crossing the corridor at 16km360
- Protection of Ausgrid LV crossing the corridor at 16km735;
- Protection of Ausgrid conduits on Church Street bridge, Hurlstone Park

City of Canterbury Bankstown

- Protection of Canterbury Bankstown Council 1980 x 1980 stormwater culvert crossing the corridor at 9km600;
- Protection of Canterbury Bankstown Council 900x900 concrete arch culvert stormwater crossing the corridor at 17km750

Inner West Council

- Protection of Inner West Council DN600 stormwater crossing the corridor at 7km530

Jemena

- Protection of Jemena Secondary gas main crossing the corridor at 6km760;
- Protection of Jemena 110mm NY gas main at Wairoa St underbridge, Canterbury;
- Protection of Jemena 75mm NY inserted in 6-inch cast iron medium pressure main in Loch St overbridge, Campsie
- Protection of Jemena 6-inch cast-iron low-pressure gas main crossing the corridor at 15km360;
- Protection of Jemena medium pressure gas main in the footpath at Charlotte Ave, Marrickville

Sydney Water

- Protection of Sydney Water 4877 x 1803mm stormwater culvert crossing the corridor at 6km810;
- Protection of Sydney Water DN225 sewer crossing the corridor at 7km470;
- Protection of Sydney Water 2896mm x 2896mm stormwater crossing the corridor at 7km470;
- Protection of Sydney Water DN225 sewer crossing the corridor at 9km650;
- Protection of Sydney Water DN400 sewer crossing the corridor at 15km330; and
- Protection of Sydney Water hydrant on city-side footpath of Livingstone Road

Telstra

- Protection of Telstra P100 conduit and cables at Wairoa St underbridge, Canterbury
- Protection of Telstra 6 x P100 conduits and cables crossing the corridor at 11km930

Qenos

Sydney Metro has been notified that the Qenos pipeline located within the Southwest Metro Corridor scope area has been decommissioned and will no longer be used. As such, the pipeline no longer requires protection. Portions of the pipeline will be removed by JHLOR in agreement with Qenos.

Refer to Section 3 for further details on the above assets. JHLOR's full scope of works is currently subject to detailed design. Where additional utility work will occur, this UMS will be updated.

The works may include the following activities;

- Service searching (non-destructive digging or hand excavation)
- Clearing and grubbing/tree removal;
- Removal of existing hard surfaces (i.e. concrete sawing and concrete breaking);
- Earthworks such as trenching, backfilling and compacting;
- Concreting works
- Restoration and landscaping works

These activities will be reviewed in relation to the environmental sensitivities specific to that location (i.e. sensitive noise receivers, potential archaeology, flora etc.). The appropriate mitigation measures will then be applied in accordance with Section 4 and Appendix A. All protection work, including the location, type and detailed methodology, will occur in consultation with the utility owner.

JHLOR works will also occur within the vicinity of known, and potentially unknown services. Although working in the vicinity of existing service would not meet the definition of Utility Works, it is important to identify these assets to inform design and to establish safe working distances for construction. Section 3 includes the known assets that JHLOR will work within the vicinity of during Southwest Metro Corridor Works (categorised as Type 1 and Type 2).

Section 2 of this document includes measures for identifying services, including unknown services, and measures for eliminating or mitigating impacts to existing services.

Section 4 of the document includes a series of key management measures for mitigating environmental impacts. These are based on the requirements of Condition of Approval E71(c), the Utilities Management Framework and JHLOR's past experience. It is noted that not all environmental aspects within Section 4 relate to JHLOR's current utility work scope, these have been included for completeness and to account for any scope changes.

Environmental Control Maps (ECMs) showing the indicative location of utility works are included in Appendix B.

It is noted that this Plan will be submitted to the *Department of Industry, Planning and Environment* for approval 1 month prior to any utility work.

1.6 Identified Utility Service Providers

The third-party utility service providers listed below are known to have assets located within the project area. The nominated contact details for each utility provider has been included in Table 2.

For clarity, operational services associated with Sydney Trains, ARTC and/or Sydney Metro are not included and all interfaces with these services will sit outside of this Plan.

Table 2 Contact details for the utility service providers

Utility Provider	Utility General Contact Number
Ausgrid	(02) 4951 0899
Jemena	1300 880 906
Qenos	0438 168 750
Canterbury-Bankstown Council	(02) 9789 9300

Inner West Council	(02) 9392 5000
Sydney Water	13 20 92
Telstra	1800 653 935
Optus	1800 505 777
NBN	1800 626 329
Viva Energy	(03) 8823 4444

In accordance with CoA E69, service providers and Councils will be provided the opportunity to maintain, replace or augment utilities within the Project area. The UCM and JHLOR's Design Manager and Construction Manager will facilitate these works through Coordination Meetings, as required.

In accordance with CoA E70 the Conditions of approval do not permit the undertaking of any third-party utility Work identified through the implementation of Condition E69 and not required for the purposes of the CSSI.

Note: Third-party utility Work, including but not limited to drainage, water or energy supply etc. identified not required for the project is not the responsibility of the Proponent and is subject to separate approvals process.

2. Utility co-ordination and protection

2.1 Identification and Location of Services

In order to accurately evaluate how the project works will interface or conflict with known existing utilities, JHLOR JV and the Design JV will carry out the following functions as part of the design development process;

- Identify potential touch points through desktop reviews of Dial Before you Dig (DBYD) and Sydney Trains Detailed Site Survey (DSS) information.
- Confirm location the physical location utilities using potholing, ground penetrating radar, or other suitable methods

Consultation will continue with asset owners on an ongoing basis to confirm and assess the locations of utilities. Updates to DBYD and DDS information will be reviewed and updated as required for the duration of the works.

2.2 Utility providers requirements

As the design progresses and the impact of project works on existing utilities becomes developed, utility asset owners (refer to Table 1 for asset owner contact) will be consulted on a regular basis. The aim of this consultation is to;

- Notify asset owner of the project works and interfaces,
- Confirm the technical or physical requirements for avoidance, protection or relocation.
- Obtain approval from the asset owner for the design, protection or relocation.

Utility provider requirements will be confirmed during initial consultations. These requirements will be incorporated into the design philosophy throughout the design process and the asset owner will be afforded opportunity to comment at each stage of the design process.

2.3 Mitigation measures

Where it has been determined that Utility services will interface with the project works, treatment measures will be implemented to manage and mitigate the interface. The range of proposed treatment measures have been nominated within Table 3.

Table 3 Treatment types

Control type	Works
Type 1	No impact is expected.
Type 2	An administrative or engineering control methodology to manage the asset owner requirements, which may include asset owner supervision
Type 3	The construction of temporary or permanent works is required to protect the asset to the asset owners' requirements and approval.
Type 4	The asset must be relocated.

2.4 Design philosophy

Based on an assessment of the project scope, the interfaces with existing utilities can be deemed low risk in nature. As defined within Section 3, the majority of utility touch points fall with treatment Type 1 'no impact is expected' and treatment Type 2 'An administrative or engineering control methodology to manage the asset owner requirements, which may include asset owner supervision'. As a consequence, the primary design philosophy is to prioritise the avoidance of clashes with utility assets.

Where treatment Type 3 solutions are necessary, the affected asset is to be protected. Section 2.1 and 2.2 of this Plan document how the design requirements and asset owner approvals will be developed in these instances.

At present, no services have been identified treatment Type 4 and therefore no utility diversions are required.

2.5 Change management

As the design develops and the requirements for individual asset is confirmed, there is risk that the identified treatment measures specified within Section 3 may change. In order to capture these changes this document will be revised periodically.

When a change is identified the following process will be undertaken.

Where an additional treatment Type 1 is identified, or a Type 1 treatment is upgraded to a Type 2 treatment, the affected utility service provider will be notified, however the Utility Management Plan will not require update.

Where a Type 1 or 2 treatment is upgraded to a Type 3 treatment, the affected utility service provider will be notified, and the Utility Management Strategy Plan will be updated to reflect this change.

Where a Type 4 treatment is deemed necessary, since this will require a diversion to a utility service, the asset owner will be consulted as early as practicable to assist with the development of a viable design solution. The Utility Management Strategy Plan will be updated to account for the inclusion of the diversion works and will identify the specific risks, controls and works methodology associated with the diversion works.

2.6 Out of Hours Works

Where utilities work that is not subject to an EPL is scheduled to occur outside standard construction hours, the work will be undertaken in accordance with the Sydney Metro City & Southwest Out of Hours Work Protocol (as per CoA-E25).

Any utilities work that is subject to an EPL will be undertaken in accordance with the out of hours work provisions with the EPL. JHLOR works will be undertaken in accordance with the out of hours work provisions within the Laing O'Rourke EPL (21147). Refer to the SWMC Construction Environmental Management Plan and SWMC Construction Noise and Vibration Management Plan.

2.7 Utility coordination and respite

Related to cumulative impacts and provision of aligned respite periods, CoA E26 states that:

Work undertaken for the delivery of the CSSI, including those undertaken by third parties (such as utility relocations), must be coordinated to ensure respite periods are provided. The Proponent must:

*(a) reschedule Work to provide respite to impacted noise sensitive receivers so that the respite is achieved in accordance with **Condition E23**; or*

(b) consider the provision of alternative respite or mitigation to impacted noise sensitive receivers; and

*(c) provide documentary evidence to the **ER** in support of any decision made by the Proponent in relation to respite or mitigation.*

The Place Manager and Utility Coordination Manager will be able to assist in helping the JHLOR coordinate works with third parties and understand the various agreed Respite Periods and, where possible, negotiate respite periods which can be effectively implemented by all contractors working in the local area. JHLOR will liaise directly with other Sydney Metro contractors to coordinate works and proposed respite periods.

Interface meetings are regularly facilitated by Sydney Metro to coordinate works including those carried out by local Councils.

If Respite Periods cannot be aligned between Contractors working in the same area, JHLOR will justify why the proposed utility works cannot observe the same Respite Periods as other Contractors. Justification may be related to limited access to the worksite for a rail possession, for example. All reasonable and feasible efforts will be made to observe the same respite periods as other works packages. Community information about planned works must provide information about which package of work cannot adhere to Respite Periods which are observed by other Contractors working in the area, and provide the reason(s) for not being able to align Respite Periods.

Documentary evidence of works coordination including copies of written correspondence and meeting minutes with relevant third parties will be retained by JHLOR and be provided to the ER within one week - should this evidence be requested by the ER.

3. Identified Assets

3.1 Ausgrid

Table 4 Ausgrid

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
STM-E-F1	6km760	Lateral	2	132kV cables crossing the corridor at 6km760
MRLR-AG1-P1		Longitudinal	1	Overhead powerlines and poles on Livingstone Rd overbridge, Marrickville
MRLR-AG2-P2		Longitudinal	2	Underground transmission cables on Livingstone Rd bridge, Marrickville
MRLR-AG3-P1		Longitudinal	2	Underground transmission cables on Livingstone Rd bridge, Marrickville
MRLR-AG4-P1		Longitudinal	2	Underground transmission cables on Livingstone Rd bridge, Marrickville
CBMS-AS2-P2		Lateral	2	Buried conduits and cables in Melford St overbridge, Canterbury
CBMS-AS1-P		Longitudinal	2	Overhead wiring and poles on Melford St overbridge;
CBCS-AS1-FP		Longitudinal	3	LV conduit and cable in Church St footbridge, Canterbury
CPWS-AS1-OH		Lateral	3	Overhead wiring and pole at Wairoa St underbridge, Canterbury
CTC-E-F17 CTC-E-F20 CTC-E-TR3 CTC-E-ATC7	11km930	Lateral	3	33kV conduit and cables crossing the corridor at 11km930
CTC-E-ATC9 CTC-E-ATC10	11km915 to 12km145	Longitudinal	3	LV overhead wiring and poles on the southern side of the corridor from 11km915 to 12km145
CTB-E-F25, CTB-E-CSR14	13km620	Lateral	2	11kV conduits and cable crossing the corridor at 13km620
BLMS-AS3-P		Longitudinal	2	Conduits and cables in Moreton St overbridge, Belmore
BLMS-AS2-P2		Longitudinal	3	Overhead wiring and poles on Moreton St overbridge, Belmore
LTW-E-F8, LTW-E-CSR9, LTW-E-ATC6, LTW-E-ATC7	15km580	Lateral	1	11kV conduits and cables crossing the corridor at 15km580
LTW-E-F2, LTW-E-CSR2	16km360	Lateral	3	LV conduits and cables crossing the corridor at 16km360
LTW-E-F4, LTW-E-CSR3	16km580	Lateral	2	11kV conduits and cables crossing the corridor at 16km580
WTP-E-F6, WTP-E-CSR7	16km735	Lateral	2	LV crossing the corridor at 16km735
PTB-AG-F1	17km240	Lateral	2	HV overhead wiring and poles crossing the corridor at 17km240

3.2 Jemena

Table 5 Jemena

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
SMT-G-F1	6km760	Lateral	3	250mm / High Pressure (Secondary) crossing the corridor

MRLR-JE1-P2		Longitudinal	2	50mm NY inserted in 225mm cast iron gas main in the footpath of Livingstone Rd overbridge, Marrickville
CPWS-JE1-OH		Lateral	3	110mm NY gas main at Wairoa St underbridge, Canterbury
CPLS-JE1-P1		Longitudinal	3	75mm NY inserted in 6-inch cast iron medium pressure main in Loch St overbridge, Campsie
BTL-G-F18	14km755	Lateral	2	DN250 Secondary gas main crossing the corridor at 14km755;
LTW-G-F5, LTW-G-RW5, LTW-G-CSR6	15km360	Lateral	3	6-inch cast-iron low-pressure gas main crossing the corridor at 15km360;
MRCA-G-P1	6km960	Lateral	2	Gas main in the footpath at Charlotte Ave, Marrickville

3.3 Canterbury-Bankstown Council

Table 6 Canterbury-Bankstown Council

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
HTC-D-F3 HTC-D-F4	9km600	Lateral	3	1980mm x 1980mm stormwater culvert crossing the corridor
HTC-D-F12	10km000	Lateral	2	Stormwater culvert crossing the corridor
HTC-D-F17	10km200 to 10km230	Lateral	2	Stormwater crossing the corridor at 10km230 and located in the northern side of the corridor from 10km200;
HTC-D-F26	10km500	Lateral	2	Stormwater culvert crossing the corridor at 10km500
CTC-D-F2		Lateral	2	Stormwater asset at Charles St
CTB-D-F12	12km950 to 13km040	Longitudinal	2	Stormwater culvert within the corridor between 12km950 and 13km040;
CTB-D-F18	13km250	Longitudinal	2	Stormwater on the southern side of the corridor at 13km250;
CTB-D-CSR 12	13km300	Lateral	2	Stormwater 1500mm x1500mm culvert crossing the corridor at 13km300;
BTL-D-F10, BTL-D-CSR4	14km160	Lateral	2	Stormwater 900mm x900mm box culvert crossing the corridor at 14km160;
BTL-D-F16	14km720	Lateral	2	900mm x900mm brick arch culvert stormwater crossing the corridor at 14km720;
BTL-D-F21	14km800	Lateral	2	900mm x 900mm brick arch culvert stormwater crossing the corridor at 14km800;
LTW-D-ARC1	15km300	Longitudinal	2	Stormwater on the northern side of the corridor at 15km300;
LTW-D-F3, LTW-D-RW3, LTW-D-CSR4	15km350	Lateral	2	1200mm x 1200mm brick arch culvert stormwater crossing the corridor at 15km350;
LTW-D-F4, LTW-D-RW4, LTW-D-CSR5	15km360	Lateral	2	Stormwater 1200mm x1200mm brick arch culvert crossing the corridor at 15km360;
LTW-D-F1, LTW-D-CSR1	16km220	Lateral	2	1200mm x1200mm concrete arch culvert stormwater crossing the corridor

WTP-D-CSR6, WTP-D_F5	16km600	Lateral	2	DN900 stormwater crossing the corridor
No Tag - Fence and CSR crossing existing drainage	16km820	Lateral	2	Stormwater culvert crossing the corridor
PTB-D-CW1, PTV-D-CSR3, PTB-D-F3	17km340	Lateral	2	DN900 stormwater crossing the corridor
PTB-D-CSR9	17km750	Lateral	3	900mm x 900mm concrete arch culvert stormwater crossing the corridor
PTB-D-F22	18km240	Lateral	2	900mm x 900mm concrete arch culvert stormwater crossing the corridor

3.4 Inner West Council

Table 7 Inner West Council

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
MTD-D-F5	7km530	Lateral	3	DN600 stormwater crossing the corridor at 7km530
MTD-D-F16	7km540	Lateral	1	DN1050 stormwater crossing the corridor at 7km540
MTD-D-F7	7km840	Longitudinal	1	DN225 stormwater on northern side of corridor at 7km840
MTD-D-F9	8km100 to 8km310	Longitudinal	2	DN300 stormwater on the northern side of the corridor from 8km100 to 8km310;
MTD-D-F24	8km280	Lateral	2	DN375 stormwater crossing the corridor at 8km280;
DTH-D-F1	8km720	Lateral	2	DN1800 stormwater crossing the corridor at 8km720;
DTH-D-F2	8km770	Longitudinal	2	DN600 stormwater on the northern side of the corridor at 8km770;
DTH-D-F4	8km710 to 8km755	Longitudinal	2	DN450 stormwater on southern side of the corridor at 8km710 and 8km755;

3.5 Sydney Water

Table 8 Sydney Water

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
STM-SW-F3	6km810	Lateral	3	4877mm x 1803mm stormwater culvert crossing the corridor at 6km810
STM-S-F4	6km960	Longitudinal	1	DN225 sewer at 6km960
MTD-W-F15, MTD-W-F16	7km450	Lateral	1	DN900 water main crossing the corridor at 7km450
MTD-S-F12	7km470	Lateral	3	DN225 sewer crossing the corridor at 7km470
MTD-SW-F13	7km470	Lateral	3	2896mm x 2896mm stormwater culvert crossing the corridor at 7km470
MTD-S-F18	7km740	Lateral	2	Brick 1371mm x 1676mm sewer crossing the corridor
MRLR-SW1-P1		Longitudinal	1	DN250 water main in the countryside footpath of Livingstone Rd overbridge, Marrickville
MRLR-SW2-P2		Longitudinal	4	DN150 water main in the cityside footpath of Livingstone Rd overbridge, Marrickville Relocation of hydrant only, not water main
MTD-W-F9	8km010	Longitudinal	2	DN100 water main on northern side of corridor at 8km010
MTD-S-F23	8km260	Lateral	2	DN225 sewer crossing the corridor
MTD-W-F11	8km300	Lateral	2	DN100 water pipe and maintenance hole at 8km300;
MTD-S-F10	8km260 to 8km340	Longitudinal	2	DN225 sewer pipe and maintenance holes on the northern side of the corridor from 8km260 to 8km340;
DTH-S-F6	8km820	Lateral	2	DN225 sewer crossing the corridor from 8km820 to 8km900;
DTH-S-F7	8km840	Longitudinal	1	DN225 sewer on the northern side of the corridor at 8km840;
HTC-S-F7	9km650	Lateral	3	DN225 sewer crossing the corridor at 9km650;
CBMS-SW1-P1		Longitudinal	2	DN500 sewer main on Melford St overbridge, Canterbury
HTC-W-F15		Longitudinal	2	DN300 water main on Melford St overbridge, Canterbury
HTC-S-F19	10km260	Longitudinal	2	Sydney Water sewer maintenance hole at 10km260
CBCS-SW1-P HTC-S-F24		Longitudinal	2	DN300 sewer in the approach to and on Church St footbridge, Canterbury
No Tag (W Line type) dead end water		Longitudinal	2	DN300 water main in the approach to and on Church St footbridge, Canterbury
HTC-W-F29	10km500	Lateral	2	DN1200 water main crossing the corridor at 10km500;
CTC-S-F16 CTC-S-F21 CTC-S-TR4 CTC-S-ATC6	11km930	Lateral	2	DN1500 sewer crossing the corridor at 11km930
CTB-S-CSR5	12km940	Lateral	2	DN225 sewer crossing the corridor at 12km940
CTB-W-F23	12km960	Longitudinal	2	DN100 water main on the northern side of the corridor at 12km960
BEBO-SW1-CS		Lateral	1	Sewer DN400 VC in the pedestrian access bridge from Redman Parade
BTL-S-F3, BTL-S-CSR3	14km080	Lateral	2	Sewer crossing the corridor at 14km080
BTL-S-F11	14km170	Lateral	2	DN225 sewer crossing the corridor at 14km170

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
BTL-S-F19	14km770	Lateral	2	DN225 sewer crossing the corridor at 14km770
LTW-S-F2, LTW-S-RW1, LTW-S-CSR2	15km330	Lateral	3	DN400 sewer crossing the corridor at 15km330
PTB-S-F2, PTB-S-CW2, PTB-S-CSR4	17km340	Lateral	2	DN225 sewer crossing the corridor at 17km340
PTB-S-CW2, PTB-S-F2, PTB-S-CSR4	17km350	Lateral	2	DN225 sewer crossing the corridor at 17km350
PTB-S-F7	17km750	Lateral	2	DN300 sewer crossing the corridor at 17km750
DTH-S-SC1	8km860	Lateral	2	1066mm x 1371mm brick sewer culvert crossing the corridor
CR-S-SC2	10km845	Lateral	2	DN225 VC sewer crossing the corridor
WP-W-CSR12	16km030	Lateral	2	DN750 SCL IBL water main crossing the corridor at Wiley Park station
WP-W-LCSR1	16km120	Lateral	2	DN600 CICL water main crossing the corridor
WP-W-LCSR2	16km120	Lateral	2	DN900 CICL water main crossing the corridor

3.6 Telstra

Table 9 Telstra

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
MRLR-T2-P2, MRLR-T3-P2		Longitudinal	1	Telstra conduits, cables and pits within Livingstone Rd overbridge, Marrickville
MTD-T-F25, MTD-T-F28	8km300	Lateral	2	6xP100 conduits and cables crossing the corridor at 8km300
HTC-T-F9 HTC-T-F10	9km800	Lateral	2	Conduits crossing the corridor at 9km800
HTC-T-F23	10km375 to 10km390	Longitudinal	2	P100 conduit and cable on the southern side of the corridor between 10km375 and 10km390
CPWS-T1-OH		Lateral	3	P100 conduit and cables at Wairoa St underbridge, Canterbury
CTC-T-F18, CTC-T-F22 CTC-T-TR5 CTC-T-ATC8	11km930	Lateral	3	6 x P100 conduits and cables crossing the corridor at 11km930
BTL-T&O-F22	14km850	Lateral	2	Telstra conduits and cables crossing the corridor at 14km850;
LS-T&VS-SC1	15km140	Lateral	2	48 x P100 conduits and cables crossing the corridor at Lakemba Station

LS-T-SC1	15km135	Lateral	2	16 x P100 conduits and cables crossing the corridor at Lakemba Station
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3.7 Optus

Table 10 Optus

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
MRLR-OP1-P1		Longitudinal	2	Aerial coaxial cables and optic fibre installed on the Ausgrid poles on Livingstone Rd overbridge, Marrickville
BTL-T&O-F22	14km850	Lateral	2	Conduits and cables crossing the corridor at 14km850
WTP-C-CSR7	16km850	Lateral	2	Conduit and cable crossing the corridor at 16km850

3.8 NBN

Table 11 NBN

Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
MRLR-T1-P1		Longitudinal	2	Aerial coaxial cables and optic fibre installed on the Ausgrid poles on Livingstone Rd overbridge, Marrickville

3.9 Viva Energy

Nil items identified

4. Management Measures

Utilities works will be undertaken in accordance with the management measures for dust, noise, traffic, access and lighting impacts as identified within the Construction Environmental Management Plan, Construction Environmental Management Plan Sub-plans, the Construction Traffic Management Plan and this Utility Management Strategy.

Any utility work undertaken outside of standard construction hours will be subject to Out of Hours Work Permit, to be issued in accordance with the SMC Construction Noise and Vibration Management Plan.

JHLOR will undertake hazardous material surveys of utilities where adjustments are required. As per section 1.5 JHLOR will not be adjusting any utilities, only applying protection measures. It is noted that previous testing has indicated that the lining of the redundant Qenos gas main may contain asbestos and elevated levels of PAHs and benzo(a)pyrene.

Section 5 of the Utilities Management Framework (UMF) includes a number of typical mitigation measures that are to be implemented for utility work. An extract from the UMF containing these measures is included within Appendix A. JHLOR will implement these measures, where appropriate to the SWMC scope. In addition, JHLOR has undertaken a risk analysis, based on the Southwest Metro Corridor Works scope and other risk factors known from JHLOR's experience on previous projects to develop key mitigation measures.

A summary of these key mitigation measures is included within the risk assessment below;

Table 13 Environmental Risk Assessment

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C =	Risk		P X	C =	Risk	
Air Quality									
General construction works; site establishment, excavations	Dust activity in close proximity to residential and commercial premises due to utility works, complaints received.	3	2	6	Implement the controls within the Construction Environmental Management Plan (or relevant Pre-Construction Minor Works Approval). Toolbox training on Dust and Air Quality Management. Provide dust mitigation measures through water sprays/misting as required. Cover stockpiles that are not to be worked on for a period of greater than 10 days. Erosion and Sediment Control Plans approved before works commence. Controls are then reviewed for maintenance.	2	2	4	Undertake regular inspections of work areas pre, during and after works to ensure controls are in good condition.
Exhaust from plant and equipment.	Emissions from plant associated with utility works resulting in air pollution.	3	2	6	Inductions and toolbox training on Dust and Air Quality Management. Well maintained plant/ equipment and pre-start checks and servicing. Non-complaint vehicles removed from site / repaired.	2	2	4	Review plant check list prior to operating on site. Undertake verification checks a required.
Noise									
Noise from general utility works resulting in impact to residents.	Disturbance to residents or neighbouring businesses. Potential for complaints.	4	2	8	Control measures as per SWMC Construction Noise and Vibration Management Plan (CNVMP) (or relevant Pre-Construction Minor Works Approval) are to be implemented. Respond to community enquiries and complaints in accordance with Sydney Metro requirements and Community & Stakeholder Manager (Sydney Metro), control measures as per Community Communication Strategy (CCS) are to be implemented. Consult with the community in relation to upcoming activities that may result in concern.	3	2	6	Noise performance will be continually monitored as per the requirements of the Construction Noise and Vibration Management Plan. Where high impact noise is required, it will be restricted to the conditions of EPL 21147 with respite periods implemented.

					Monitor noise for compliance as the works progress at receiver locations. Provide periods of respite for high noise generating activities. Apply noise mitigation measures during entire project. Noise efficient equipment to be used on site.				
Noise during utility works required to be undertaken out of standard construction hours.	Disturbance to residents or neighbouring businesses with potential for complaints.	4	2	8	Implement noise mitigation strategies for out of standard hours work. Monitor noise for compliance to project goals. Obtain Out of Hours Work Approval as required. Control Measures as per the CNVMP are to be implemented.	3	3	6	Noise performance will be continually monitored as per the requirements of the Construction Noise and Vibration Management Plan. Where high impact noise is required, it will be restricted to the conditions of EPL 21147 with respite periods implemented.
Vibration									
Vibration intensive activities undertaken on the site such as vibratory rolling, etc.	Disruption, annoyance and nuisance to residents. Potential damage to adjacent residential and commercial residences and structures. Disruption to businesses as a result of vibration nuisance	3	2	6	Control Measures as per the CNVMP (or relevant Pre-Construction Minor Works Approval) are to be implemented. Determine vibration limits and structure/receiver offset distances. Consult with potentially affected parties prior to commencement of works on their upcoming activities that may be impacted by construction vibration. Ongoing vibration monitoring during vibration intensive works.	2	2	4	Standard and specific mitigation measures for sensitive receptors around the SWMC works will be applied as per the Construction Noise and Vibration Management Plan and the Construction Noise and Vibration Impact Statement.
Traffic & Access									
Loss of on-street car parking in adjacent residential streets and commercial areas during construction.	Loss of parking availability to adjacent residential and commercial properties due to utility works could result in community complaints.	3	2	6	Implement the Construction Traffic Management Plan (CTMP) Community notifications in accordance with Sydney Metro Community Communication Strategy. Site vehicles shall be parked within the rail corridor and not affect public parking area where possible Develop Traffic Management Plan / Traffic control procedures.	2	2	4	Complete regular toolbox talks on how to minimise impacts in relation to traffic. Undertake regular inspections of worksite and adjacent streets. Supervisor and traffic controller to enforce traffic management requirements
General construction traffic disturbing public access	Disturbance to local residents due to utility works resulting in complaints being made, limited access, and	3	2	6	Implement the Construction Traffic Management Plan (CTMP) Deliveries of plant and materials shall be undertaken outside of peak periods where possible	2	2	4	Complete regular toolbox talks on how to minimise impacts in relation to traffic. Undertake regular inspections of worksite and adjacent streets.

between local roads.	potential for delays at local road access points resulting in complaints.				Site vehicles shall be parked within the rail corridor and not affect public parking areas Scheduled road movements shall be minimised where possible Oversized deliveries would be undertaken in accordance with the requirements of NSW Police or Roads and Maritime Services. Approved Traffic Management Plans in consultation with relevant authorities. Detour routes to be advertised/ notified. Approved access routes, detailed Traffic Control Plans. Clear notifications / signage.				
Management of heavy vehicles / access routes.	Complaints from sensitive receivers due to increased level and frequency of noise.	3	2	6	Implement the Construction Traffic Management Plan (CTMP) Deliveries of plant and materials shall be undertaken outside of peak periods where possible Site vehicles shall be parked within the rail corridor and not affect public parking areas Scheduled road movements shall be minimised where possible Oversized deliveries would be undertaken in accordance with the requirements of NSW Police or Roads and Maritime Services. Designated access routes. Approved Traffic Management Plans. Community Notifications. Pedestrian management with traffic controller in place where required.	2	2	4	Complete regular toolbox talks on how to minimise impacts in relation to traffic. Permits from local council and/or RMS
Pedestrian/Cyclist access	Loss or disruption of pedestrian and/or cyclist access around the project site due to utility works	3	2	6	Construction Traffic Management Plan (CTMP) to be in place Traffic Control Plans to be in place Clear signage Appropriate barriers, fencing or other to direct pedestrians and cyclists	2	2	4	Regular inspections of work fronts
Landscaping, urban design and visual amenity									

Landscaping, urban design and visual amenity	Surrounding aesthetic temporary altered during construction Lighting towers used during out of hours works may spill on nearby residents Post-construction surfaces	2	3	6	Implement the SWMC Visual Amenity Management Plan The work area shall be maintained in an orderly manner Lighting required during night works shall be directed towards the work area and are from adjacent sensitive receivers Any land disturbed for the works will be restored to its prior state or, where appropriate, restored to a state that is in line with the approved urban design	1	3	3	Undertake regular inspections of work areas pre, during and after works to ensure controls are in good condition.
Utilities									
Utility management	Service strike leading to environmental degradation	3	4	12	Develop and implement the Utilities Management Strategy in accordance with the Utilities Management Framework Implement a Permit to Disturb Induction and toolbox talks Detailed Site Survey to be managed by an appropriately qualified surveyor.	1	4	4	Permit to Disturb Service searching Detailed Site Survey management
Hazard and Risk									
Hazards and risk associated with utility works	Hazardous substances High risk works Exposure to radiation and electromagnetic fields				Work in accordance with the Safety Management Plan and relevant sub-plans Develop a Safe Work Method Statement (SWMS) for high risk works, works with hazardous substances or where anyone may be exposed to radiation or electromagnetic field issues. An occupational hygienist is review and supervise works as required.				Toolbox workers on requirements Undertake regular inspections
Heritage									
Non-aboriginal heritage	Impacts to build items and structures with heritage significance Impacts to areas of archaeological potential	3	4	12	Implement the mitigation measures included within the Construction Heritage Management Plan (or relevant Pre-Construction Minor Works Approval). Work to plant specific safe working distances for vibratory works and seek the advice of a heritage engineer. Implement the measures required by the Archaeological Assessment and Research Design Report (AARD) such as salvage, monitoring and investigation, where relevant. Implement the Sydney Metro Unexpected Heritage Finds Procedure	1	4	4	Toolbox workers on requirements Undertake regular inspections

Aboriginal heritage	Impacts to areas of archaeological potential	2	4	8	Implement the mitigation measures included within the Construction Heritage Management Plan (or relevant Pre-Construction Minor Works Approval). Ensure measures outlined within Aboriginal Cultural Heritage Assessment Report (ACHAR) such as salvage within areas of Potential Archaeological Deposits are implemented. Implement the Sydney Metro Unexpected Heritage Finds Procedure	1	4	4	Toolbox workers on requirements Undertake regular inspections
Biodiversity									
Flora	Unauthorised clearing of vegetation Impacting on threatened species, threatened vegetation communities or fauna habitat	3	3	9	Implements the measures within the Construction Environmental Management Plan (or relevant Pre-Construction Minor Works Approval). Implement a Vegetation Removal and Trimming Permit system Identify all sensitive areas, sign post and demarcate Establish tree protection zones An ecologist is to undertake a pre-clearance survey of all vegetation to be removed. An ecologist is to be present during the removal of native vegetation or fauna habitat.	1	3	3	Toolbox workers on requirements Undertake regular inspections
Fauna	Impacting on fauna	2	3	6	Implements the measures within the Construction Environmental Management Plan (or relevant Pre-Construction Minor Works Approval). Implement a Vegetation Removal and Trimming Permit system Identify all sensitive areas, sign post and demarcate Establish tree protection zones An ecologist is to undertake a pre-clearance survey of all vegetation to be removed. An ecologist is to be present during the removal of native vegetation or fauna habitat.	1	3	3	Toolbox workers on requirements Undertake regular inspections
Land use and Property									
Land use and Property	Changes to land use and property impacts Construction compounds impacting on nearby receivers	2	2	4	Design to avoid impacts to nearby properties Utilise existing hard stand within the rail corridor where possible Obtain required approvals for working within easements	1	2	2	

	Works through easements								
Soils and Contamination									
Soils and contamination	Encountering contamination Creating contamination through utility works Acid Sulphate Soils	3	4	12	Works to occur in accordance with Construction Soil and Water Management Plan (or relevant Pre-Construction Minor Works Approval). All waste is to be classified in Accordance with the Waste Classification Guidelines (NSW EPA, 2014) Acid Sulphate Soils are to be managed in accordance with the Acid Sulphate Soil Manual (ASSMAC, 1998) An occupational hygienist is to provide guidance and, where appropriate, supervise works with contaminated soils or substances Remove any excess hazardous substances from services before relocating	1	4	4	Toolbox workers on requirements Undertake regular inspections

Environmental Risk Assessment Rankings

This table may be used as a guide in determining the level of risk for each environmental issue.

For each identified issue, consider the 'maximum credible' (not absolute worst case) risk that could result with **minimal or no controls** other than existing and using normal construction practices.

Note: Any one of the listed consequences must result in the use of the applicable consequence grading.

Probability:				Consequence:		
		5 = Certain 4 = Likely 3 = Possible 2 = Unlikely 1 = Rare		5 = Severe 4 = Major 3 = Moderate 2 = Minor 1= Incidental		
1- 4 Acceptable 5 - 9 Acceptable with control measures 10 - 16 Requires the implementation of best practice 17 and Above = UNACCEPTABLE						
Likelihood (Probability and Frequency of Occurrence)			Consequence (Outcome or Severity of Occurrence)			
5	Certain	Common or repeating occurrence Consequence can reasonably be expected to occur in life of Project.	5	Severe	<ul style="list-style-type: none">Major pollution incident causing significant and widespread damage or potential to health or the environmentPersistent reduction in ecosystem function and value.Ongoing disruption and loss of protected species.Major prosecution likely, outcome in excess of \$500,000	
4	Likely	Known to have occurred / “has happened” Conditions may allow the consequence to occur on the Project during its lifetime The event has occurred within the Business Unit within the previous 5 years.	4	Major	<ul style="list-style-type: none">Significant widespread and persistent changes to habitat, species or environmental mediaSignificant pollution incident causing damage or potential damage to health or the environment external to the site.Potential for prosecution. Potential outcome between \$50,000 - \$500,000Numerous substantial complaintsActual material environmental harm	
3	Possible	Could occur / “heard of it happening”	3	Moderate	<ul style="list-style-type: none">Localised irreversible habitat loss or effects on habitat, species or environmental mediaReportable incident to the relevant environmental regulator or other authority.Demonstrated breach of legislative, licence or guideline requirements.Likely infringement notice or fine, potential for prosecution up to \$50,000.	

		Exceptional conditions may allow consequences to occur on the Project, or has occurred nationally within the Australian Business.			<ul style="list-style-type: none"> Will cause complaints.
2	Unlikely	Not likely to occur Reasonable to expect that the consequence will not occur on the Project. Has occurred in industry but not in Business Unit.	2	Minor	<ul style="list-style-type: none"> Localised degradation of habitat or short-term impacts to habitat, species or environmental media. Pollution incident that marginally exceeds licence conditions or guidelines for acceptable pollution. Fine unlikely. Potential for complaints.
1	Rare	Practically impossible Not known to have occurred in industry or unheard of.	1	Incidental	<ul style="list-style-type: none"> Localised or short-term effects on habitat, species or environmental media. Fully contained on site and can be fully remediated. Little potential for fine or complaints. Insignificant or trivial incident

Probability ► ▼Consequence	CERTAIN 5	LIKELY 4	POSSIBLE 3	UNLIKELY 2	RARE 1
5 – Severe	25	20	15	10	5
4 – Major	20	16	12	8	4
3 – Moderate	15	12	9	6	3
2 – Minor	10	8	6	4	2
1 – Incidental	5	4	3	2	1

Appendix A – Utility Management Framework Management Measures

Environmental aspect	Typical mitigation measures to be adopted as required
Traffic and access	<p>During detailed design:</p> <ul style="list-style-type: none"> • Road occupancy licence(s) for temporary closure of roads would be obtained prior to construction, where required, from the relevant road authority. • A Traffic Control Plan would be developed during detailed design and would identify all traffic control arrangements required to be implemented during construction. • To keep the road user delays to a minimum, all works would be planned and staged to avoid road occupancies during peak periods, where possible. • An emergency response plan would be developed for construction traffic incidents. • A pre and post-construction assessment of road pavement assets would be conducted in areas likely to be used by construction traffic or disturbed by the proposed trenching and HDD activities. <p>During construction:</p> <ul style="list-style-type: none"> • Heavy vehicles would be restricted to allowable routes. • Where schools or child care centres occur in the immediate vicinity of the construction sites, heavy vehicle movement would be minimised (where reasonable and feasible), between 8 am and 9.30 am and 2.30 pm–4.00 pm Monday to Friday (on school days). • Traffic controllers would be located at worksite access point(s) as required to direct vehicle movements, vehicle deliveries, pedestrians and cyclists, where required. • Public communications would be conducted to notify the community and local residents of vehicle movements and anticipated effects on the local road network relating to the site works. • Access to all private properties adjacent to the works would be maintained during construction, where possible. Where access is known to be restricted, all proposed changes to existing access arrangements would be discussed with residents and/or businesses prior to the commencement of works. Upon completion of the construction works, the original property access would be reinstated. • Early advanced communication with affected properties would be undertaken to identify alternative arrangements. • During Project inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents. • Project staging, vehicle movement and scheduling, equipment and resourcing would be coordinated to minimise impacts. • Construction vehicle parking would be discouraged on local roads and construction staff encouraged to use public transport, car share, or in some cases workers can park in a designated off-site area and ferried to site via a shuttle bus. • Temporary closure or relocation of any bus stops impacted by the works would be coordinated with bus companies and advertised locally in advance.

Environmental aspect	Typical mitigation measures to be adopted as required
Noise and vibration	<p>During construction:</p> <ul style="list-style-type: none"> • Carry out work mainly during standard construction hours when in the vicinity of residential receivers. • Use a portable barrier (or similar protection) to shield the drilling equipment where works occur in proximity to residential receivers where reasonable and feasible. The height and nature of the barrier would be determined when the equipment selection is finalised. The barrier would be constructed of a material of minimum mass 12 kilograms per metre squared such as 20 millimetre plywood or a proprietary barrier such as Echobarrier. • Provide periods of respite from use of the road saw. • Schedule the use of the road saw to times when the community are less sensitive by avoiding early morning and late evening/night periods, where feasible with respect to the proposed construction methodology. • Inform surrounding residents by mail of planned works prior to the works commencing. • Organise the site to avoid unnecessary use of reversing alarms on vehicles. • Truck drivers to use approved access routes to the site. • Orientate and place water pumps and vacuum trucks away from receivers. • Turn equipment off when not in use and avoid idling machinery or trucks near sensitive receivers. • Utilise vehicles, obstacles and stockpiles on site to provide shielding to receivers, where possible. • Avoid dropping tools or materials from height, striking materials or making metal-metal contact • Operate the excavator in a manner that avoids maximum noise levels associated with striking or shaking the bucket. • Educate workers on the importance of minimising noise and avoid creating short duration high noise level events. • Carry out a survey of sensitive receivers to ensure adequate acoustic performance of façade. <p>During reinstatement/rehabilitation works:</p> <ul style="list-style-type: none"> • Schedule deliveries to be carried out to avoid sensitive periods in the early morning and late evening/night. • Turn equipment off when not in use and avoid idling machinery or trucks near sensitive receivers. • Provide respite periods from tipper and compactor usage. • Select equipment such as a compactor and tipper trucks, based on lower noise emissions and use equipment that has lower noise levels • Inform surrounding residents by mail of planned works prior to the works commencing.
Non Aboriginal heritage	<ul style="list-style-type: none"> • Construction works associated with utilities relocation/adjustment with the potential to impact non Aboriginal heritage would be managed through a Heritage Management Plan that would be prepared for the Sydney Metro Sydenham to Bankstown upgrade project. • The presence or potential presence of a heritage item or archaeological deposit would inform the construction method adopted, for instance underboring using HDD may be preferable to trenching in some sensitive locations.

Environmental aspect	Typical mitigation measures to be adopted as required
Biodiversity	<p>During construction</p> <ul style="list-style-type: none">• Where vegetation clearing is required, pre-clearing surveys would be completed to mitigate potential impacts and identify risks to flora, fauna and habitat prior to construction activities occurring and to identify the presence of any unidentified threatened or endangered species.• Where impacts to existing street trees are unavoidable, both the relevant Council and an ecologist or arborist would be consulted prior to removal or pruning of any trees• If the removal of any tree with hollows/dead trees/tree stump is unavoidable (subject to detailed design and advice from contractor) further assessment by a qualified ecologist would be undertaken.• Any sensitive areas along alignment would be identified during detailed design and/or pre-construction planning activities and would be indicated on a site environmental plan for the proposed works. Protective fencing and environmental signage would be installed as required.• Vegetation removal would only be carried out under a permit system.• Flora and/or fauna located during works would be subject to a Vegetation Clearing Procedure and/or Fauna Rescue Procedure.• Site office, stockpiles, machinery wash down areas, and plant storage areas would be located outside of any ecologically sensitive areas.• Fuel (or other chemical) storage would be located outside all identified riparian zones, and at least 10 metres from any retained ecologically sensitive areas onsite.

Environmental aspect	Typical mitigation measures to be adopted as required
Air quality	<p>During construction:</p> <ul style="list-style-type: none"> • Trucks carrying spoil onto or off site are to be covered. • Any stockpiling of materials would be located away from sensitive receivers, where feasible and reasonable, and protected from the elements through barriers or appropriate coverings. • On-going monitoring for dust (e.g. site inspections) would be undertaken during trenching works to assess the effectiveness of mitigation measures. • Water sprays and/or water carts would be used as required for dampening exposed surfaces to control dust generation. • Silt accumulated in sediment control devices (e.g. silt fences and spoon drains) would be removed on a regular basis to prevent dust generation. • Cutting, grinding or sawing equipment (such as for concrete/bitumen surfaces) must only be used in conjunction with suitable dust suppression techniques, such as water sprays or local extraction. • Dust generating activities would be assessed during periods of strong winds and rescheduled, where required. • Exhaust systems of construction plant, vehicles and machinery would be maintained to minimise exhaust emissions to the atmosphere. All equipment and vehicles are to be regularly maintained and records kept of maintenance. • Engines would be switched off when vehicles and plant are not in use, to minimise idling, and refuelling areas would be away from areas of public access and sensitive receivers. • Plant would be well maintained and serviced in accordance with manufacturers' recommendations. • Low emission vehicles and plant fitted with catalysts, diesel particulate filters or similar devices would be used, where feasible and reasonable. • Plant and other machinery (including generators) would be sited away from sensitive receivers, such as dwellings and schools, where feasible and reasonable. • The amount of excavated material stored on site would be minimised, and replaced within the open trench as soon as possible. • Dust generating activities would be assessed during periods of strong winds and rescheduled where required. • Dust complaints would be handled accordance with the complaints handling process in the Community Communication Strategy to be developed by each Sydney Metro Principal Contractor.

Environmental aspect	Typical mitigation measures to be adopted as required
Hazard and risk	<p>With regard to EMF:</p> <ul style="list-style-type: none"> Where practical, site the electrical infrastructure in the carriageway of roads, away from residential property boundaries, so that the magnetic field contribution at and beyond them would be lower. Adopt an underground cable concept rather than overhead lines. Use 3-core cables, which greatly increase the rate at which the magnetic field levels drop off with increasing distance from the source when compared to the single core alternative. Include consideration of public awareness/education as part of community information material to identify the minimal impacts with respect to EMF. <p>General:</p> <ul style="list-style-type: none"> Hazardous substances would only be used onsite as required, in accordance with the manufacturer/ supplier instructions. The use of any hazardous substance that could result in a spill would be undertaken away from drainage or stormwater lines and, wherever possible, within defined bunds Contractors to operate under appropriate Work Health and Safety Plan
Property and land use	<p>During pre-construction:</p> <ul style="list-style-type: none"> In consultation with utility providers, the ongoing maintenance and access requirements would be identified and the potential impact to an existing easement or need for a new easement considered. The proposal would not permanently restrict any future access to residential, commercial, industrial or recreational land uses.
Soils and contamination	<p>During construction:</p> <ul style="list-style-type: none"> All fuels, chemicals and hazardous liquids would be stored in accordance with Australian standards and EPA guidelines. Any refuelling undertaken on site would be undertaken in designated areas only. Spill kits would be available as part of any worksite for use in case of fuels, chemical or other spill(s) which may occur during construction. All spills or leakages would be immediately contained and absorbed. Should any signs of contamination be identified during work within the site, the material would be tested against the National Environment Protection Council's National Environment Protection (Assessment of Site Contamination) Measure 1999, and managed accordingly. Soil excavated in areas with identified surrounding industrial land uses (including former uses) would be assessed for either its potential re-use on-site or classified for waste disposal purposes. If groundwater is encountered during the works, groundwater quality would be investigated and appropriate management measures implemented to avoid further impacts. In the event of unexpected finds of contamination a Contamination Unexpected Finds and Contingency (refer to the CSWMP) procedure would be implemented.

Environmental aspect	Typical mitigation measures to be adopted as required
Landscaping/urban design matters	<p>During construction:</p> <ul style="list-style-type: none"> Visual mitigation measures would be implemented as soon as feasible and practical and remain in place during the construction period. All effort would be made for vegetation to be retained where practical and feasible. Site sheds, where required, would be located to minimise visual impact where it is feasible and reasonable to do so. Hoarding banners for the external faces of hoardings and fences at each construction site would be a non-obtrusive colour, which would comply with the Sydney Metro style guidelines (co-branding). Hoarding would be maintained in an excellent condition with prompt removal of graffiti. No signage, advertising or branding (other than safety signage or other required signage) would be placed on the external face of any hoarding or fence without the prior written approval of TfNSW. Temporary works to be designed and constructed as per the requirements of crime prevention through environmental design. Temporary fencing, walls, and hoarding would be designed and implemented to increase natural surveillance with straight runs. Way finding signage to direct pedestrians, commuters and vehicles around the construction site would be installed as required. The storage of materials and construction machinery would be minimised as far as possible. The site would be maintained in an orderly and tidy fashion through good housekeeping. Cut-off and directed lighting would be used to ensure glare and light spill are minimised at night during night work periods (where this is required).
Aboriginal heritage	<p>During construction</p> <ul style="list-style-type: none"> If suspected Aboriginal objects are located during construction, an archaeologist would be notified to assess the nature and significance of the find. If the find is an Aboriginal object, further investigation and permits may be required before works commence. If the find is an Aboriginal object, then OEH and the relevant Local Aboriginal Land Council (LALC) would be notified. If suspected human skeletal remains were uncovered at any time within the area of the utility works, the following actions would need to be followed: <ul style="list-style-type: none"> immediately cease all excavation activity in the vicinity of the remains notify NSW Police notify OEH via the Environment Line on 131 555 to provide details of the remains and their location no recommencement of activity in the vicinity of the remains unless authorised in writing by OEH

Appendix B – Maps and ECMs



















The ECMs are considered a “live document” and will continue to evolve as the works progress.

SWMC - Environmental Control Map		
ID	Environmental Aspect	Description
1	Project	<ul style="list-style-type: none"> This ECM is a supplementary document to the SWMC Construction Environment Management Plan, Sydney Metro City and Southwest Sydney to Bankstown Environmental Impact Statement, Submissions and Preferred Infrastructure Report, Instrument of Approval and all related planning documentation
2	Site Access	<ul style="list-style-type: none"> Site access will be from various existing rail corridor access gates
3	General	<ul style="list-style-type: none"> The team will be trained on this ECM, general environmental issues, location of sensitive areas and erosion/sediment controls. Works will be subject to inspections by the ER, Sydney Metro Environment and Planning Manager and JHLOR Environmental Manager (or delegate). This ECM will be displayed on site sheds.
4	Contamination	<ul style="list-style-type: none"> If suspected contamination is encountered, works will cease in the immediate area, the area will be demarcated and sign-posted and the Occupational Hygienist will be called upon to confirm the contamination and provide advice on the best way to remove or remediate the contamination Occupational hygienist and asbestos removalist will be in attendance for all shifts to manage contaminated soil.
5	Air Quality	<ul style="list-style-type: none"> Air quality issues will be managed in accordance with the mitigation measures specified within the UMS and Air Quality Management Plan. A water cart will be available to suppress any dust. Plant or machinery will not be left idling Drive to conditions Temporary spoil stockpiles to be covered to prevent wind erosion and dust.
6	Waste	<ul style="list-style-type: none"> Waste will be managed in accordance with the mitigation measures specified within the UMS and Waste and Spoil Management Plan Any construction waste generated will be stored within bins as appropriate Any stockpiles of waste spoil will be stockpiled onsite and appropriate erosion and sediments controls will be installed All waste will be classified in accordance with the Waste Classification Guidelines (EPA, 2014) prior to disposal from site.
7	Soils and water	<ul style="list-style-type: none"> Soil and water will be managed in accordance with the mitigation measures specified within the UMS and Construction Soil and Water Management Plan Stockpiles will be covered to mitigate the risk of erosion Drainage and waterways will be protected Erosion and Sediment Control Plans will be implemented for work fronts and will be updated to reflect the progress of the works. If water discharge is required, Sydney Metro Water Discharge or Reuse Approval form to be utilised. Form to be approved by JHLOR Environmental Manager (or delegate) prior to discharge.
8	Heritage	<ul style="list-style-type: none"> Heritage will be managed in accordance with the mitigation measures outlined within the UMS and Construction Heritage Management Plan Unexpected finds of heritage items must be reported to JHLOR Environmental Manager and Sydney Metro. The site is to be isolated and investigated by a heritage consultant. Approval to proceed required prior to re-commencing works. If material that has the potential to be human remains are uncovered works in the area will cease immediately and the Environmental Manager will be informed.

9	Noise and Vibration	<ul style="list-style-type: none"> Noise and vibration will be managed in accordance with the mitigation measures outlined within the UMS and Construction Noise and Vibration Management Plan All works will be completed in compliance with Sydney Metro CEMF, Sydenham to Bankstown Planning Approval, OOHV Approvals, Construction Noise and Vibration Strategy and EPL 21147 requirements. All plant will have non-tonal reversing alarms. Staff and workers will be instructed to avoid shouting both on-site and off-site The Community will be notified of works in accordance with the Construction Noise and Vibration Strategy. Noise monitoring will be undertaken in accordance with the Construction Noise and Vibration Strategy and in response to complaints.
10	Traffic and Transport	<ul style="list-style-type: none"> Traffic will be managed in accordance with the mitigation measures outlines within the UMS and Construction Traffic Management Plan. Road Occupancy Licences will be obtained as required. Additional traffic controls will be implemented in accordance with TCP(s) as approved by the relevant local council. All vehicles to enter rail corridor immediately on arrival to gate Plant and vehicles engines to be switched off when not in use, with engine idling minimised as much as possible. Pedestrian and cyclist access will be maintained in public spaces or redirected as appropriate.
11	Utilities	<ul style="list-style-type: none"> Utilities will be managed in accordance with the Utilities Management Strategy Any impacts to utilities will be reported to site HSE Manager, supervisors, Sydney Trains and Sydney Metro.
12	Biodiversity	<ul style="list-style-type: none"> No vegetation trimming/removal is must only occur with a valid JHLOR Vegetation Removal or Trimming Permit. Protection will be put in place around any threatened vegetation communities Pre-clearance surveys and clearance inspections will be undertaken by a qualified ecologist If threatened flora or fauna species are identified on site, work in the vicinity of these species would stop immediately. A spotter/catcher/botanist would be engaged to survey the site and advise on species management Where trenching or excavation is required, the location or route would be modified to avoid any damage to trees or tree roots, where possible Stockpiles, plant, equipment and materials are to be located on existing cleared areas, away from the drip zone of trees and native vegetation Soil and vegetation that could contain weed material should be removed from machinery prior to any movements off site
13	Chemical, fuel storage and use	<ul style="list-style-type: none"> No chemicals or fuel required to be stored onsite. If you are required to bring any chemicals onto site, they must be verified and registered in an SDS. SDS must be kept on site. Spill kits located at site compound. Portable spill kits available in site vehicles. Refuelling is to be undertaken using suitable measure to prevent contamination – this should include the use of absorbent pads, plant nappies, and portable spill trays to prevent splash back spills. All plant and equipment will be checked daily to ensure there is no leaking oil, fuel or other liquids.
14	Imported materials	<ul style="list-style-type: none"> Imported materials will include stabilised sand, recovered resources, quarry materials and will be sourced from licenced suppliers. Materials to be stockpiled temporarily within the rail corridor with controls around it.
15	No-go zones	<ul style="list-style-type: none"> Construction activities will be restricted to the Project boundary. Activities outside site boundary will undergo a review for potential environmental impacts and require approval from Sydney Metro and ER as appropriate.

Contact Information		
Position	Name	Phone
JHLOR Project Leader	Malachy Breslin	0407 827 187
JHLOR Construction Manager	Paul Fields	0438 792 797
JHLOR Environment Manager	Dan Keegan	0435 859 160
JHLOR WHS Manager	Brian Lockwood	0488 004 154
ER	Jo Heltborg	02 9659 5433
Sydney Metro Environmental Manager	Tim Solomon	0400 034 207
Sydney Metro Northwest Info Line		1800 019 989
Sydney Trains Info Line		131 500
Environmental Line / Pollution Incident Response Line		131 555
Office of Environment & Heritage Pollution Line		131 555
Emergency		000 or 112 (mobiles)
WIRES		1300 094 737
Standard Working Hours		
<p>As per Laing O'Rourke EPL 21147, audible construction works within the rail corridor will be restricted to the below hours unless otherwise approved by the Environmental Manager:</p> <ul style="list-style-type: none"> 7:00AM to 6:00PM - Monday to Friday 8:00AM to 1:00PM - Saturdays No work on Sundays or public holidays <p>Any works outside of the hours above require OOHW and Sydney Metro and JHLOR Environmental Manager's Approval</p> <p>Refer to Section 2.5 of the SWMC CEMP for works occurring outside the rail corridor.</p>		
<p>As per Laing O'Rourke EPL 21147,</p> <p>"High noise impact works and activities must only be undertaken:</p> <ol style="list-style-type: none"> between the hours of 8:00am to 6:00pm Monday to Friday; between the hours of 8:00am to 1:00pm Saturday; and in continuous blocks not exceeding 3 hours each with a minimum respite from those activities and works of not less than 1 hour between each block" 		

SWMC - EMC
Utility Protection
Map: 01 of 22



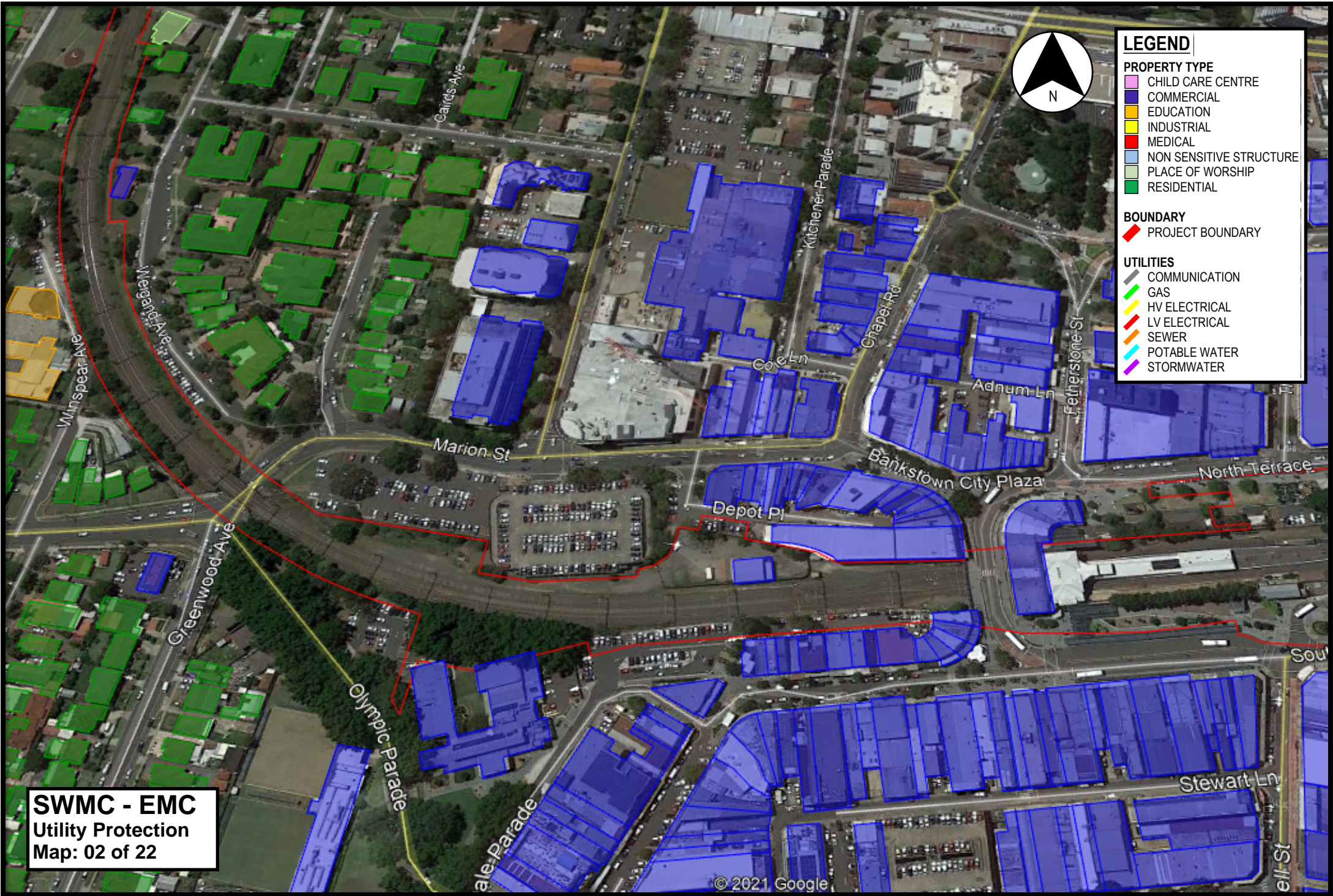
LEGEND

- PROPERTY TYPE**
- CHILD CARE CENTRE
 - COMMERCIAL
 - EDUCATION
 - INDUSTRIAL
 - MEDICAL
 - NON SENSITIVE STRUCTURE
 - PLACE OF WORSHIP
 - RESIDENTIAL

- BOUNDARY**
- PROJECT BOUNDARY

- UTILITIES**
- COMMUNICATION
 - GAS
 - HV ELECTRICAL
 - LV ELECTRICAL
 - SEWER
 - POTABLE WATER
 - STORMWATER





LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- PROJECT BOUNDARY

UTILITIES

- COMMUNICATION
- GAS
- HV ELECTRICAL
- LV ELECTRICAL
- SEWER
- POTABLE WATER
- STORMWATER

SWMC - EMC
Utility Protection
Map: 02 of 22

SWMC - EMC
Utility Protection
Map: 03 of 22



LEGEND

- PROPERTY TYPE**
- CHILD CARE CENTRE
 - COMMERCIAL
 - EDUCATION
 - INDUSTRIAL
 - MEDICAL
 - NON SENSITIVE STRUCTURE
 - PLACE OF WORSHIP
 - RESIDENTIAL

- BOUNDARY**
- PROJECT BOUNDARY

- UTILITIES**
- COMMUNICATION
 - GAS
 - HV ELECTRICAL
 - LV ELECTRICAL
 - SEWER
 - POTABLE WATER
 - STORMWATER



SWMC - EMC
Utility Protection
Map: 04 of 22

A6



LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

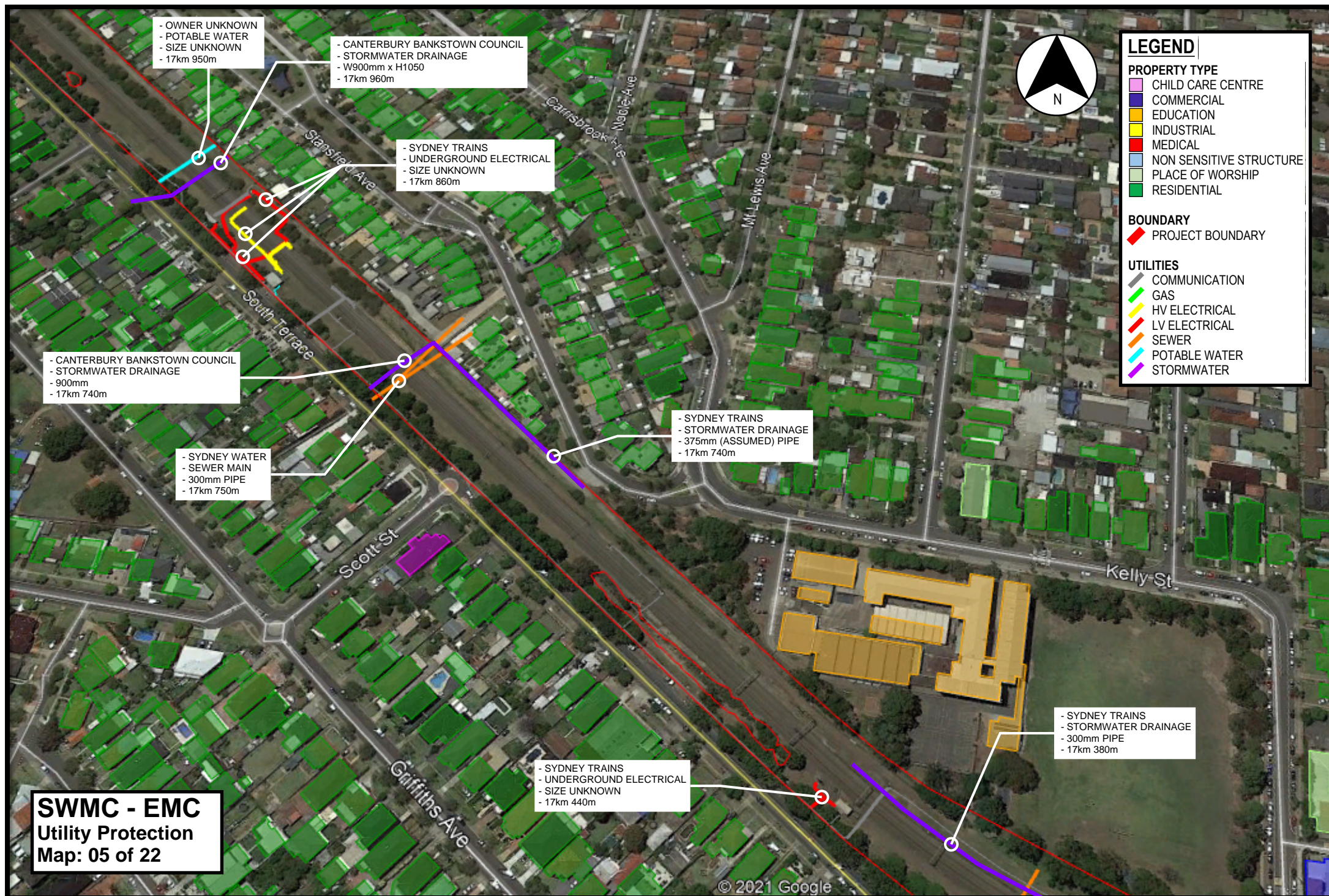
- PROJECT BOUNDARY

UTILITIES

- COMMUNICATION
- GAS
- HV ELECTRICAL
- LV ELECTRICAL
- SEWER
- POTABLE WATER
- STORMWATER

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 18km 370m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 900mm PIPE
- 18km 240m



SWMC - EMC

Utility Protection

Map: 06 of 22



LEGEND

- PROPERTY TYPE**
- CHILD CARE CENTRE
 - COMMERCIAL
 - EDUCATION
 - INDUSTRIAL
 - MEDICAL
 - NON SENSITIVE STRUCTURE
 - PLACE OF WORSHIP
 - RESIDENTIAL

- BOUNDARY**
- PROJECT BOUNDARY

- UTILITIES**
- COMMUNICATION
 - GAS
 - HV ELECTRICAL
 - LV ELECTRICAL
 - SEWER
 - POTABLE WATER
 - STORMWATER

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 17km 360m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 750mm PIPE
- 17km 350m

- SYDNEY WATER
- SEWER MAIN
- SIZE UNKNOWN
- 16km 940m

- SYDNEY TRAINS
- STORMWATER DRAINAGE
- 300mm PIPE
- 17km 300m

- OPTUS
- DUCTED PIPE
- SIZE UNKNOWN
- 16km 850m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 16km 740m

SWMC - EMC
Utility Protection
Map: 07 of 22

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 900mm
- 16km 600m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 16km 740m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 300mm x 300mm
- 16km 560m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 16km 350m

- SYDNEY WATER
- SEWER MAIN
- 300mm PIPE
- 16km 180m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 1200mm
- 16km 220m

LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- PROJECT BOUNDARY

UTILITIES

- COMMUNICATION
- GAS
- HV ELECTRICAL
- LV ELECTRICAL
- SEWER
- POTABLE WATER
- STORMWATER



SWMC - EMC
Utility Protection
Map: 08 of 22



SWMC - EMC
Utility Protection
Map: 09 of 22



SWMC - EMC

Utility Protection

Map: 10 of 22

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 900mm
- 14km 820m

- JEMENA
- HIGH PRESSURE GAS MAIN
- 250mm
- 14km 740m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 900mm
- 14km 740m

- SYDNEY TRAINS
- STORMWATER DRAINAGE
- 375mm (ASSUMED) PIPE
- 14km 740m

- AUSGRID
- OVERHEAD ELECTRICAL
- SIZE UNKNOWN
- 14km 530m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 375mm (ASSUMED) PIPE
- 14km 740m

- AUSGRID
- UNDERGROUND ELECTRICAL
- SIZE UNKNOWN
- 14km 520m

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 14km 760m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 14km 520m - 14km 620m

- SYDNEY TRAINS
- UNDERGROUND ELECTRICAL
- SIZE UNKNOWN
- 15km 580m

- OPTUS AND TELSTRA
- DUCTED PIPE
- SIZE UNKNOWN
- 14km 840m

LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- ▬ PROJECT BOUNDARY

UTILITIES

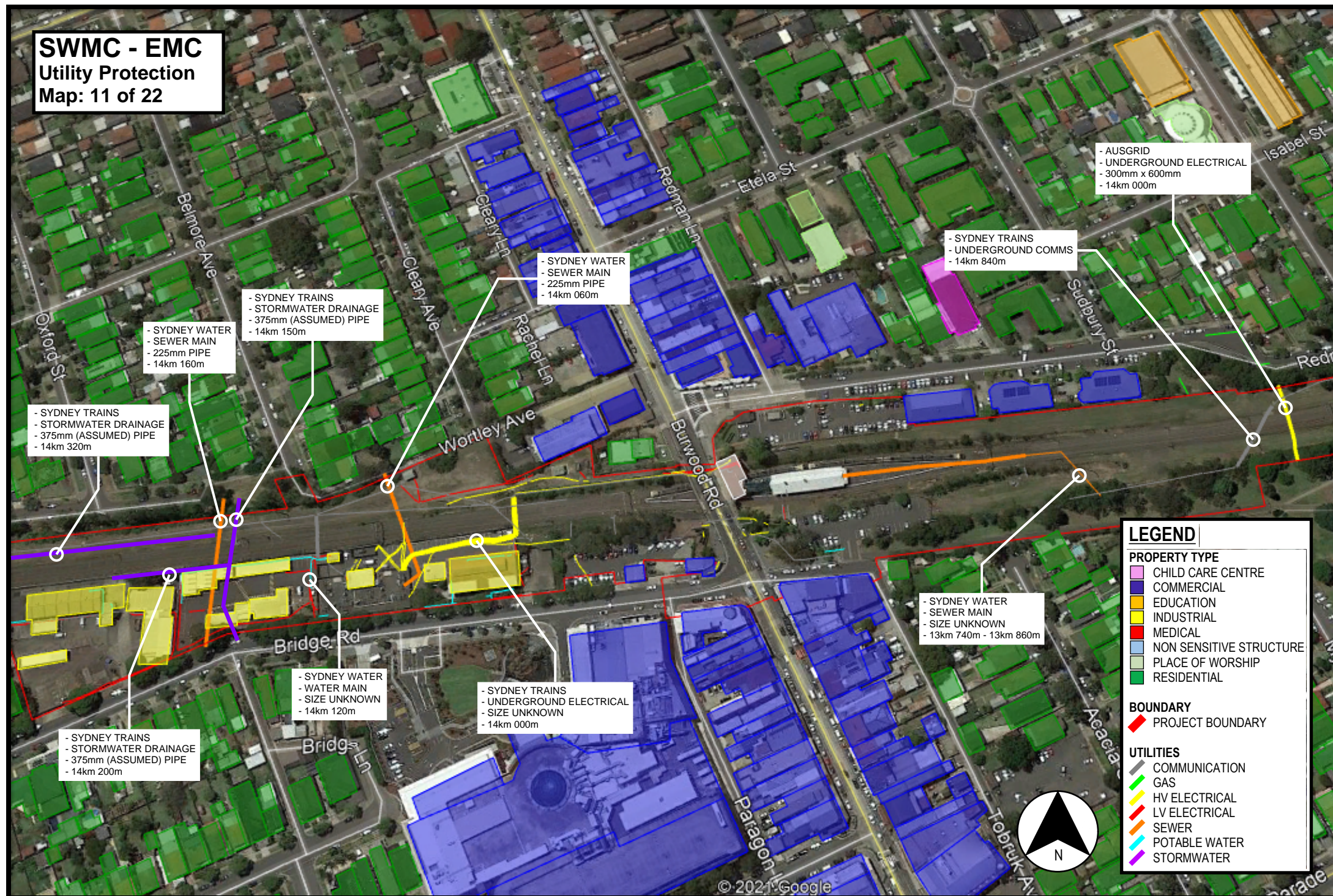
- ▬ COMMUNICATION
- ▬ GAS
- ▬ HV ELECTRICAL
- ▬ LV ELECTRICAL
- ▬ SEWER
- ▬ POTABLE WATER
- ▬ STORMWATER



SWMC - EMC

Utility Protection

Map: 11 of 22



SWMC - EMC

Utility Protection

Map: 12 of 22

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER WATER
- 900mm
- 12km 920m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 200mm x 200mm
- 13km 000m

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 12km 940m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 600mm PIPE
- 12km 940m

- SYDNEY WATER
- SEWER MAIN
- 400mm PIPE
- 13km 600m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 300mm x 600mm
- 13km 600m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- W1330mm x h1500mm
- 13km 320m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- 1500mm
- 13km 440m

LEGEND

PROPERTY TYPE	
	CHILD CARE CENTRE
	COMMERCIAL
	EDUCATION
	INDUSTRIAL
	MEDICAL
	NON SENSITIVE STRUCTURE
	PLACE OF WORSHIP
	RESIDENTIAL

BOUNDARY
 PROJECT BOUNDARY

UTILITIES
 COMMUNICATION
 GAS
 HV ELECTRICAL
 LV ELECTRICAL
 SEWER
 POTABLE WATER
 STORMWATER



SWMC - EMC

Utility Protection

Map: 13 of 22

- SYDNEY TRAINS
- STORMWATER DRAINAGE
- 375mm PIPE
- 12km 700m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 12km 440m

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 12km 440m

- SYDNEY TRAINS
- STORMWATER DRAINAGE
- 225mm (ASSUMED) PIPE
- 12km 600m

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 12km 940m

LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- ▬ PROJECT BOUNDARY

UTILITIES

- ▬ COMMUNICATION
- ▬ GAS
- ▬ HV ELECTRICAL
- ▬ LV ELECTRICAL
- ▬ SEWER
- ▬ POTABLE WATER
- ▬ STORMWATER



SWMC - EMC

Utility Protection

Map: 14 of 22



LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- PROJECT BOUNDARY

UTILITIES

- COMMUNICATION
- GAS
- HV ELECTRICAL
- LV ELECTRICAL
- SEWER
- POTABLE WATER
- STORMWATER



SWMC - EMC

Utility Protection

Map: 15 of 22

- AUSGRID
- UNDERGROUND ELECTRICAL
- 300mm x 300mm
- 11km 360m

- SYDNEY WATER
- POTABLE WATER
- 2 x 150mm
- 11km 360m



LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- PROJECT BOUNDARY

UTILITIES

- COMMUNICATION
- GAS
- HV ELECTRICAL
- LV ELECTRICAL
- SEWER
- POTABLE WATER
- STORMWATER

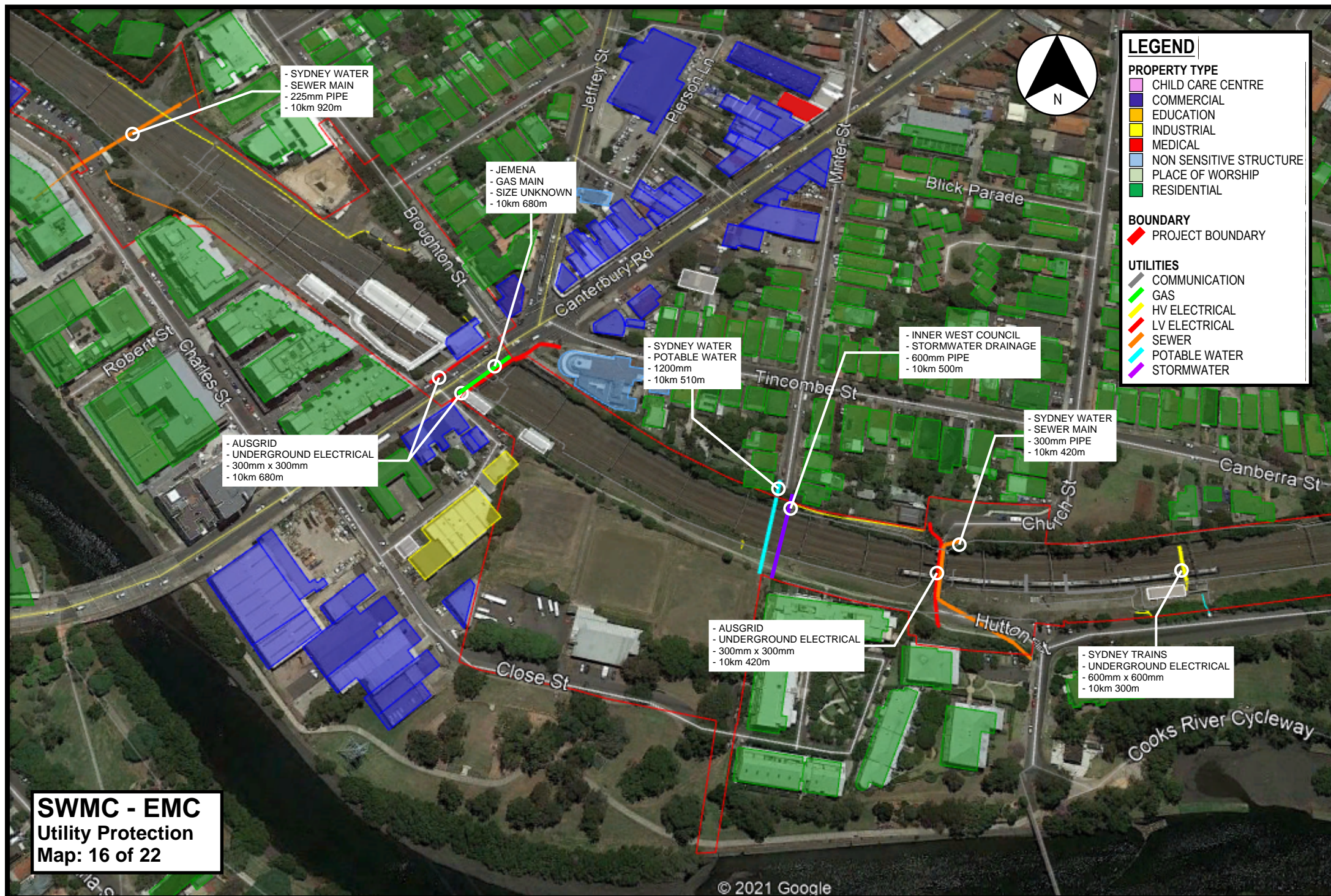
- TELSTRA
- DUCTED PIPE
- SIZE UNKNOWN
- 11km 360m

- JEMENA
- LOW PRESSURE GAS MAIN
- SIZE UNKNOWN
- 11km 360m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 11km 160m

- JEMENA
- GAS MAIN
- SIZE UNKNOWN
- 11km 140m

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 10km 920m



SWMC - EMC

Utility Protection

Map: 17 of 22



SWMC - EMC

Utility Protection

Map: 18 of 22

- SYDNEY WATER
- SEWER MAIN
- 1066mm x 1371mm
- 9km 560m

- SYDNEY WATER
- SEWER MAIN
- 482mm x 736mm
- 9km 560m

- CANTERBURY BANKSTOWN COUNCIL
- STORMWATER DRAINAGE
- W1980mm x H1980mm
- 9km 620m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 300mm x 300mm
- 9km 340m

- JEMENA
- GAS MAIN
- SIZE UNKNOWN
- 9km 300m

LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- ▬ PROJECT BOUNDARY

UTILITIES

- ▬ COMMUNICATION
- ▬ GAS
- ▬ HV ELECTRICAL
- ▬ LV ELECTRICAL
- ▬ SEWER
- ▬ POTABLE WATER
- ▬ STORMWATER



SWMC - EMC

Utility Protection

Map: 19 of 22



LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- PROJECT BOUNDARY

UTILITIES

- COMMUNICATION
- GAS
- HV ELECTRICAL
- LV ELECTRICAL
- SEWER
- POTABLE WATER
- STORMWATER

- SYDNEY WATER
- POTABLE WATER
- 100mm PIPE
- 8km 800m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 600mm x 600mm
- 8km 800m

- SYDNEY WATER
- SEWER MAIN
- 1066 x 1371mm
- 8km 840m

- SYDNEY WATER
- POTABLE WATER
- 750mm
- 8km 800m

- INNER WEST COUNCIL
- STORMWATER DRAINAGE
- 1800mm
- 8km 700m

- SYDNEY WATER
- SEWER MAIN
- SIZE UNKNOWN
- 8km 480m

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 8km 480m

- JEMENA
- GAS MAIN
- SIZE UNKNOWN
- 9km 300m

- SYDNEY WATER
- SEWER MAIN
- 2032mm x 2336mm
- 8km 420m

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 8km 300m

SWMC - EMC Utility Protection Map: 20 of 22



LEGEND

PROPERTY TYPE

- CHILD CARE CENTRE
- COMMERCIAL
- EDUCATION
- INDUSTRIAL
- MEDICAL
- NON SENSITIVE STRUCTURE
- PLACE OF WORSHIP
- RESIDENTIAL

BOUNDARY

- ▬ PROJECT BOUNDARY

UTILITIES

- ▬ COMMUNICATION
- ▬ GAS
- ▬ HV ELECTRICAL
- ▬ LV ELECTRICAL
- ▬ SEWER
- ▬ POTABLE WATER
- ▬ STORMWATER

- SYDNEY WATER
- SEWER MAIN
- 225mm PIPE
- 8km 300m

- SYDNEY WATER
- POTABLE WATER
- 150mm PIPE
- 7km 800m

- SYDNEY WATER
- POTABLE WATER
- 250mm PIPE
- 7km 800m

- SYDNEY WATER
- SEWER MAIN
- 1371mm x 1676mm
- 7km 710m

- INNER WEST COUNCIL
- STORMWATER DRAINAGE
- 600mm PIPE
- 8km 260m

- AUSGRID
- UNDERGROUND ELECTRICAL
- 300mm x 300mm
- 7km 800m

- SYDNEY WATER
- SEWER MAIN
- SIZE UNKNOWN
- 7km 710m

- SYDNEY TRAINS
- STORMWATER DRAINAGE
- 300mm
- 7km 780m

- SYDNEY TRAINS
- UNDERGROUND COMMS
- SIZE UNKNOWN
- 8km 300m



