



Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades Utilities Management Strategy

Sydney Metro Integrated Management System (IMS)

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00	27/11/20	For internal and ER review
01	23/12/20	Revisions in response to ER comments
02	28/01/21	Revised in response to DPIE comment

Terms and Definitions

Terms	Definitions
AARD	Archaeological Assessment and Research Design Report
AS	Australian Standard
AC	Asbestos cement
CICL	Cast iron cement lined
CEMP	Construction Environmental Management Plan
CNVIS	Construction Noise and Vibration Impact Statement
CNVS	Construction Noise and Vibration Strategy
CoA	Conditions of Approval (SSI-8256)
CSSI	Critical Station Significant Infrastructure
DN	Nominal diameter (pipe size)
DPIE	Department of Planning, Industry and Environment
ECM	Environmental Control Map
EIS	Environmental Impact Statement
EP&A Act	Environment Planning and Assessment Act 1979 (NSW)
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence under the POEO Act
ER	Environmental Representative
GI	Galvanised Iron
HMP	Heritage Management Plan
IMS	Sydney Metro Integrated Management System
ISO	International Standardization Organisation
NSW	New South Wales
NVMP	Noise and Vibration Management Plan
OEH	NSW Office of Environment and Heritage
OOHW	Out-of-Hour Works
P50	50mm conduit made of PVC (polyvinyl chloride)
PE	Polyethylene
POEO Act	Protection of Environment Operations Act 1997 (NSW)
PPE	Personal Protective Equipment
Proponent	The person or organisation identified as the proponent in Schedule 1 of the planning approval. In this case Transport for NSW
Secretary	The Secretary of the Department of Planning, Industry and Environment
SM	Sydney Metro
SPIR	Submissions and Preferred Infrastructure Report
SWMP	Soil and Water Management Plan

Terms	Definitions
SWMS	Safe Works Method Statement
TfNSW	Transport for New South Wales.
UCM	Utility Coordination Manager
UMF	Utilities Management Framework
UMS	Utilities Management Strategy

1. Introduction

Sydney Metro is Australia's biggest public transport project. The network will deliver 31 metro stations and more than 65km of new metro rail. The Sydney Metro Network will provide opportunities to lead the transformation of Sydney's urban environment and support transit orientated development connecting Sydney's Central Business District to vibrant and attractive places across the Greater Sydney Region. The Sydney Metro Network will link Sydney's three Metropolitan centres and introduce the necessary step change in rail infrastructure to ensure, the NSW Government's aim of 30-minute cities as defined in Future Transport Strategy 2056.

The Sydney Metro Network has currently two core corridors, the, Northwest Corridor and City and Southwest Corridor, with a further six corridors proposed as shown in Figure 1.

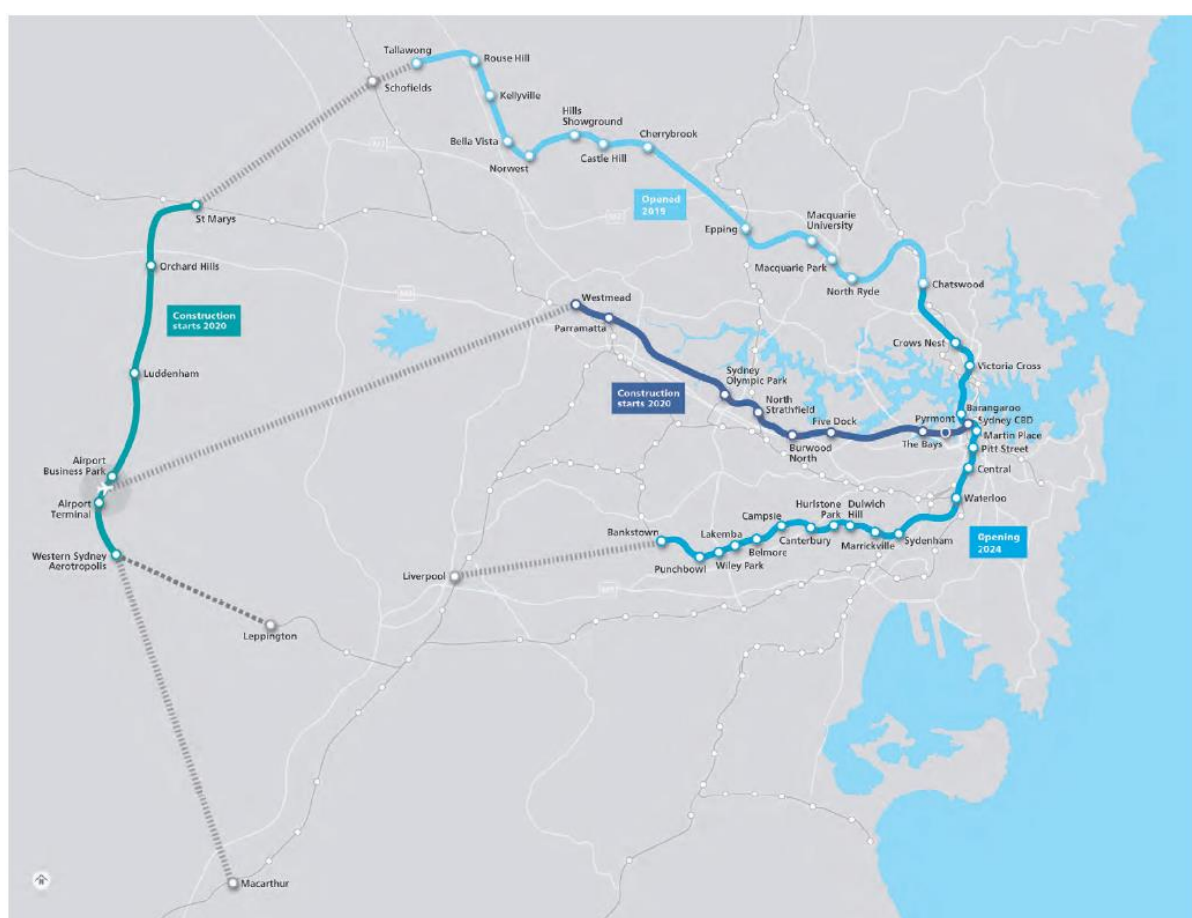


Figure 1 Sydney Metro route map

The Sydney Metro City & Southwest project includes a new 30km metro line extending metro rail from the end of the Metro North West Line at Chatswood, under Sydney Harbour, through new CBD stations and southwest to Bankstown. It is due to open in 2024 with the ultimate capacity to run a metro train every two minutes each way through the centre of Sydney.

Sydney Metro City & Southwest comprises two core components – the Chatswood to Sydenham project, and the Sydenham to Bankstown upgrade. This document refers to the Sydenham to Bankstown upgrade (herein referred to as the Southwest Metro (SWM) Project).

The SWM Project was declared to be State Significant Infrastructure (SSI) and Critical State Significant Infrastructure (CSSI) by a Ministerial order on 10 December 2015 under Section 5.12 (4) and 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (previously referred to as sections 115U(4) and 115V prior to amendment of the EP&A Act). The project application number is SSI-8256. An Environmental Impact Statement (EIS) (GHD/AECOM September 2017) was prepared and placed on public exhibition from 13 September 2017 to 8 November 2017. A Submissions and Preferred Infrastructure Report (SPIR) (GHD/AECOM June 2018) was prepared in response to the submissions received during the EIS exhibition period. The SPIR was placed on public exhibition from 20 June 2018 to 18 July 2018. A Submissions Report was then prepared by Sydney Metro (September 2018) in response to submissions received during the SPIR exhibition period. The project was approved by the Minister for Planning on 12 December 2018.

A modification report for the SWM Project was prepared by Sydney Metro (May 2020) and placed on public exhibition from 21 May 2020 to 4 June 2020. A Submissions Report was prepared by Sydney Metro (September 2020) in response to the submissions received during the modification report exhibition period. The SWM Project Modification was determined by the Minister for Planning on 22 October 2020.

1.1. Scope of works

This document refers to the Southwest Metro – Hurlstone Park, Belmore and Wiley Park Station Upgrades (the Project). Below is a description of the construction scope for the Project:

Hurlstone Park Station

- Refurbishment and re-use of existing overhead booking office with new cladding and new canopy roof;
- Installation of bike parking hoops;
- Provision of new kiss and ride and taxi parking on Floss Street;
- New accessible carpark space at Duntroon Street;
- Construction of new service building
- Landscaped embankment treatment with new planting;
- Regrade platforms as per Metro requirements, including drainage and provision for platform screen doors, platform edge screens and mechanical gap fillers to Platform 1 and 2
- Refurbishment and re-use existing platform buildings;
- Extension of existing concourse and provision of new lifts and stairs, including canopies;
- Repair and repainting of existing fencing on corner of Duntroon Street and Crinan Street;

- Installation of new paving and provision of an extended kerb ramp on Duntroon Street;
- Installation of new vertical protection (anti-throw) screens to both sides of Duntroon Street overbridge; and
- Installation of new security and segregation fencing; and
- Construction of a new Combined Services Route.

Belmore Station

- Raise platform edges, regrade platform as required, provide platform drainage and emergency egress ramps from platforms to rail corridors as required;
- Provision for platform edge screens, platform screen doors and mechanical gap fillers
- Construction of new services building with associated landscaping;
- Replace existing seats and bins;
- Refurbish and reuse platform building;
- Provide associated passenger information displays;
- New vertical protection (anti-throw) screens to Burwood road bridge;
- New landscape works to the north and south of the station entrance, including landscaping, paving and relocation of existing bike parking and new bike parking;
- New shelter and seat to kiss and ride. New kiss and ride and taxi parking on Tobruk Avenue;
- New line marking to accessible parking within the station carpark off Tobruk Avenue;
- Installation of new security fencing;
- Construction of new Combined Services Route.

Wiley Park Station

- Provision of new accessible parking, kiss and ride and taxi spaces on The Boulevard;
- Refurbishment and reuse of heritage overhead booking office;
- The existing station platforms would be removed, excavated and replaced within a like-for like concrete slab platform;
- Installation of new lifts and retaining walls;
- Refurbishment and reuse of heritage platform buildings;
- Construction of new services building including retaining wall construction;
- Construction of new concrete swale;
- Construction of new platform building and canopy;
- Installation of new public plaza, including paving, planters and bicycle parking;

- Installation of lighting to shared path between King Georges Road and Urunga Parade;
- Installation of errant vehicle bollards at King Georges Road and The Boulevarde intersection;
- Reinstatement of original station kiosk;
- New vertical protection screens to existing King Georges Road bridge;
- Installation of new security fencing; and
- Construction of new Combined Services Route.

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(Uncontrolled when printed)



Figure 2 Sydney Metro Hurlstone Park Station upgrades

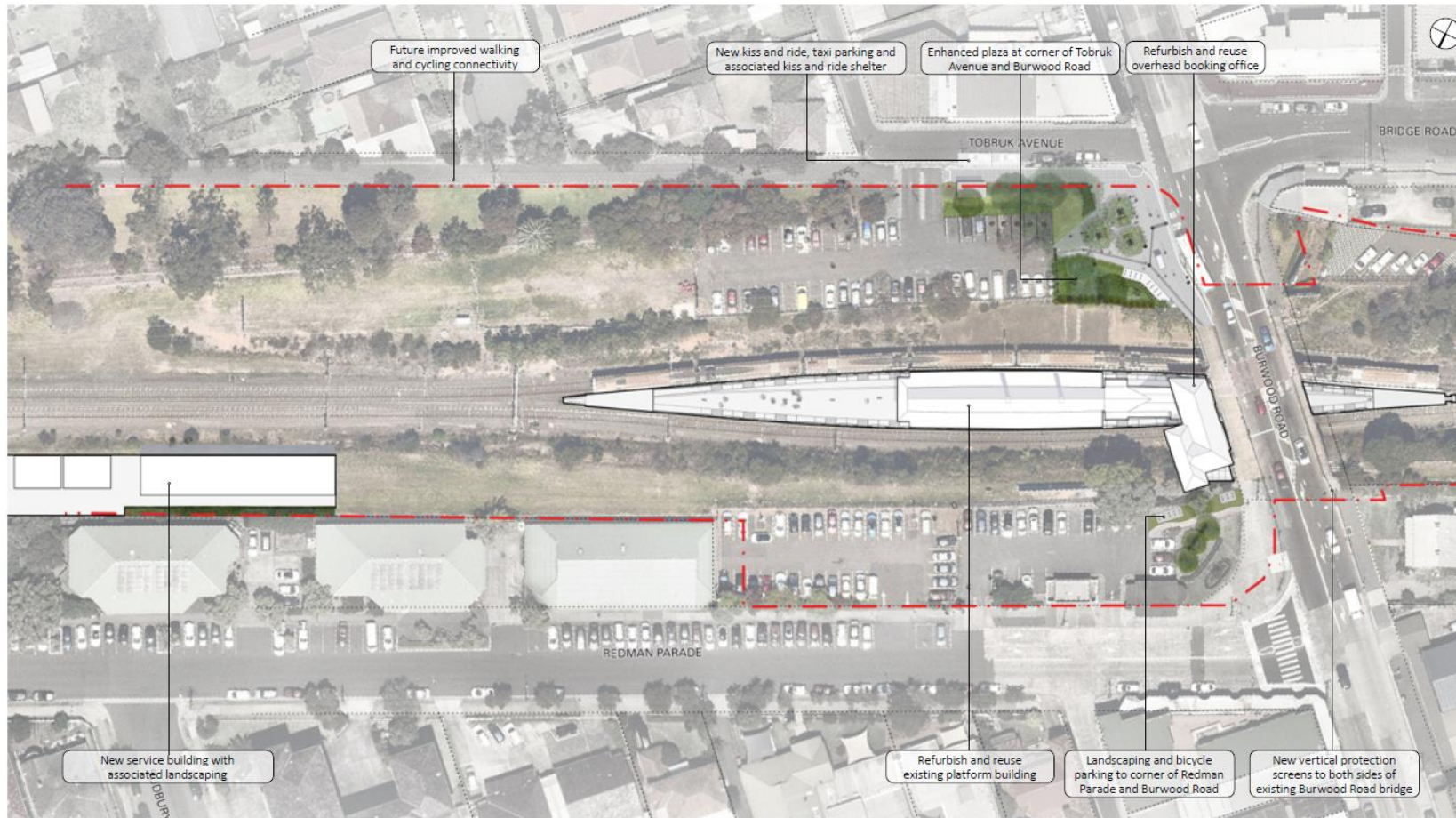


Figure 3 Sydney Metro Belmore Station upgrades



Figure 4 Sydney Metro Wiley Park Station upgrades

1.2. Purpose of this Utilities Management Strategy

This Utilities Management Strategy (UMS) outlines how Sydney Metro's Principal Contractor will manage utility work, and environmental risks associated with utility work, during the Construction of the Project, in accordance with the relevant Conditions of Approval.

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 UMS and the requirements thereof;

Table 1: Relevant Conditions of Approval

No.	Requirement	Section Reference
Conditions of Approval		
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 any works 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>	Section 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 Section 2
E70	<p>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.</p> <p>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.</p>	Section 1.6 Section 2
E71	<p>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.</p> <p>The Utilities Management Strategy must include;</p>	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

No.	Requirement	Section Reference
(c)	management measures to be implemented to manage dust, noise, traffic, access and lighting impacts associated with utility Work.	Section 4 Appendix A
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
Revised Environmental Mitigation Measures		
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);
- 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 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;
- Manage escalation of utility work-related issues within Sydney Metro and the utility service providers as required; and
- 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 (CNVS). 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 take into account 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 (CNVIS), 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. Utility Work Scope

For the purpose of this UMS, Utility Work will include applying protection structures to utilities, relocating utilities or service connections for permanent Sydney Metro assets. These activities have been categorised within Section 2.3 as Type 3, Type 4 and Type 5 activities respectively. Construction within the vicinity of utilities (Type 1 and Type 2 activities) are not deemed as utility work.

Refer to Section 3 for further details on the below assets. Where additional Utility Work will occur, this UMS will be updated.

As such, the utility work scope part of the Project are;

Ausgrid

- Temporary relocation of the customer pole and meter box on Burwood Rd bridge, Belmore

Jemena

- Relocate medium pressure gas main in Duntroon St bridge, Hurlstone Park

Sydney Water

- Relocate DN125 PE water main in Duntroon St bridge, Hurlstone Park
- New water and sewer service connections for the Sydney Metro station service building in Railway St, Hurlstone Park
- New water and sewer service connections for the Sydney Metro station service building in Redman Pde, Belmore
- New water and sewer service connections for the Sydney Metro station service building in Urunga Pde, Wiley Park

Qenos

Sydney Metro has been notified that the Qenos ethylene pipeline located within the project 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 as part of the Project in agreement with Qenos. Pipeline removal is not considered to be utility work under the scope of this UMS.

The Project 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.

The Project 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 Sydney Metro will work within the vicinity of during the construction of the Project.

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 (UMF) and Sydney Metro's past experience. It is noted that not all environmental aspects within Section 4 relate to the Project's current utility work scope, these have been included for completeness and to account for any scope changes.

As outlined in the Project's Construction Environmental Management Plan (CEMP), Sydney Metro's Principal Contractor will be responsible for developing Environmental Control Maps (ECMs) showing the indicative location of utility works. Once prepared, this UMS will be revised to include these ECMs.

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 UMS.

Table 2: Contact details for the utility service providers

Utility Provider	Utility General Contact Number
Ausgrid	(02) 4951 0899
Jemena	1300 880 906
Optus	1800 505 777
Qenos	0438 168 750
Canterbury-Bankstown Council	(02) 9789 9300
Sydney Water	13 20 92
Telstra	1800 653 935
Transport for NSW (formerly RMS)	131 700

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 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, Sydney Metro and their contractors 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 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; and
- 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 owner's requirements and approval.
Type 4	The asset must be relocated.
Type 5	Permanent connection to utility services for Sydney Metro assets

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, Type 4 (utility diversions) are required at Hurlstone Park and Belmore Stations.

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 UMS 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 UMS 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 UMS 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 Strategy/Protocol (as per CoA-E25) and the Project’s Noise and Vibration Management Plan (NVMP). Any utilities work that is subject to an EPL will be undertaken in accordance with the out-of-hours work provisions within the relevant EPL.

Regardless of EPL, the Project works will be undertaken in accordance with the out-of-hours work provisions within the Project’s Noise and Vibration Management Plan (NVMP).

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 Principal Contractor 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. It is the responsibility of the Principal Contractor to 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, the Principal Contractor must be able to 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 the Principal Contractor, 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

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Hurlstone Park	TBA	9km340	Lateral	2	6 x Direct-buried cables (3 x 11kV, 2 x pilots, 2 x AUX) and 2 x 125mm PVC conduits on Duntroon St bridge
Hurlstone Park	HPDS-AG-B2, HPDS-AG-P2, HPDS-AG-PL5, HPDS-AG-PL2	9km 320	Lateral	2	Overhead powerlines and poles on Duntroon St bridge
Belmore	BSBR-AG-PL2	13km920	Lateral	2	11kV asset (1 x DN100 GI / 1 x DN600 GI conduits and direct-buried) in Burwood Rd bridge
Belmore	BSBR-AG-PL4	13km920	Lateral	4	Temporary relocation of the customer pole and meter box on Burwood Rd bridge
Belmore	BSBR-AG-F1	13km920	Lateral	2	Overhead powerlines and poles on Burwood Rd bridge
Belmore	BS-E-F6	13km920	Lateral	2	Low voltage cable to the west of Burwood Rd bridge
Wiley Park	WPKG-AG-KB3, WPKG-AG-KB4	15km860	Lateral	2	Overhead powerlines and poles on King Georges Rd bridge
Wiley Park	WPKG-AG-P4	15km860	Lateral	2	Direct-buried 11kV and auxiliary cables in King Georges Rd bridge
Wiley Park	TBA	15km	Lateral	2	Direct-buried 11kV cables and 2 x 140mm AC conduits in King Georges Rd bridge

3.2. Jemena

Table 5: Jemena

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Hurlstone Park	HPDS-JE-P4	9km320	Lateral	4	75mm nylon inserted in 4" cast iron medium pressure gas main in Duntroon St bridge
Hurlstone Park	HP-G-S1	9km620	Lateral	2	32mm nylon medium pressure gas main in Railway St
Belmore	BSBR-JE-BO1, BSBR-JE-PL5	13km920	Lateral	2	18" cast iron and 75mm nylon low pressure gas mains in Burwood Rd
Belmore	BS-G-W2	13km620	Lateral	2	75mm nylon inserted in 4" cast iron medium pressure gas main in Redman Pde

3.3. Canterbury-Bankstown Council

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Hurlstone Park	HP-D-F1, HP-D-F2, HP-D-D1, HP-D-CSR4, HP-D-CSR5, HP-D-DRV2, HP-D-DRV3	9km 630	Lateral	2	2.5m x 1.2m stormwater culvert crossing the corridor from Railway Street to east of Foord Ave
Wiley Park	WP-D-F8, WP-SW-RW2, WP-SW-CSR4, WP-SW-D6	16km200	Lateral	2	1200mm x 1200mm stormwater culvert crossing the corridor from The Boulevard to Urunga Pde

3.4. Sydney Water

Table 6: Sydney Water

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Hurlstone Park	HP-S-F4, HP-S-D4	9km470	Lateral	2	Sewer (1066 x 1371 brick tunnel) crossing the corridor to the west of the station
Hurlstone Park	HPDS-SW-P3	9km320	Lateral	4	DN125 PE water main in the Duntroon St bridge
Hurlstone Park	HP-S-F5, HP-S-D2,	9km560	Lateral	2	DN225 sewer crossing the rail corridor west of Hurlstone Park station, from Railway St
Hurlstone Park	HP-W-S2	9km620	Lateral	3	DN100 CICL water main in Railway St
Hurlstone Park	N/A	9km620	Lateral	3	DN100 CICL water main in Railway St
Hurlstone Park	N/A	9km620	Lateral	5	New station service building sewer connection to existing DN150 sewer main in Railway St
Belmore	BSBR-SW-BO2, BSBR-SW-PL3	13km900	Lateral	2	DN150 GI water main in Burwood Rd
Belmore	N/A	13km900	Lateral	5	New station water services connection to existing water main on Tobruk Ave
Belmore	N/A	13km620	Lateral	5	New sewer services connection for the service building to an existing sewer main in Redman Pde
Belmore	N/A	13km620	Lateral	5	New water services connection for the service building to an existing sewer main in Redman Pde
Wiley Park	WP-W-D5, WP-W-F6, WP-W-CSR12, WP-W-CSR11	16km020	Lateral	3	DN750 CICL water main crossing the corridor at Wiley Park station

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Wiley Park	WP-W-F5, WP-W-CSR2, WP-W-MSB2	16km120	Lateral	3	DN900 SCL IBL water main crossing the corridor from The Boulevard to Urunga Pde
Wiley Park	WP-W-F4, WP-W1-SR1, WP-W-MSB1	16km120	Lateral	3	DN600 SCL IBL water main crossing the corridor from The Boulevard to Urunga Pde
Wiley Park	WP-D-F8, WP-SW-D9, WP-SW-CSR5, WP-SW-RW3	16km180	Lateral	2	3124mm x 1327mm brick stormwater culvert crossing the corridor from The Boulevard to Urunga Pde
Wiley Park	WP-S-F7, WP-S-D5, WP-S-CSR3, WP-S-RW1	16km180	Lateral	2	DN375 CICL sewer main crossing the corridor from The Boulevard to Urunga Pde
Wiley Park	WP-S-ATC5	16km040	Lateral	2	Sewer main in Urunga Pde
Wiley Park	WPKG-SW-P1, WPKG-SW-KB2	15km860	Lateral	2	DN150 CICL water main in King Georges Rd bridge
Wiley Park	WP-W-S1	16km110	Lateral	2	DN750 CICL water main in Urunga Pde
Wiley Park	N/A	16km110	Lateral	5	New sewer service connection for the station service building in Urunga Pde
Wiley Park	N/A	16km140	Lateral	5	New water service connection for the station service building in Urunga Pde

3.5. Telstra

Table 7: Telstra

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Hurlstone Park	HPDS-T-B3	9km320	Lateral	2	2 x AC100 and 1 x P50 conduits and cables in Duntroon St bridge
Hurlstone Park	BS-T-W1	13km620	Lateral	2	Conduits in Redman Pde
Belmore	BSBR-T-PL1, BSBR-T-F2, BSBR-T-F3	13km920	Lateral	2	Conduits and pits in Burwood Rd bridge
Belmore	BS-T-F4	13km930	Lateral	2	Lead-in cable to the west of Burwood Rd bridge
Wiley Park	WPKG-T-KB6, WPKG-T-KB8,	15km860, 15km880	Lateral	2	Conduits and pits in King Georges Rd bridge

3.6. Optus

Table 8: Optus

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Hurlstone Park	HPDS-OP-B1, HPDS-OP-P1, HPDS-OP-PL3	9km320	Lateral	2	Aerial co-axial cables located on Ausgrid poles on Duntroon St bridge
Hurlstone Park	TBA	9km340	Lateral	2	UECOMM conduit and fibre located in Duntroon St bridge
Wiley Park	WPKG-OP-KB11	15km880	Lateral	2	Aerial co-axial cables located on Ausgrid poles on King Georges Rd

3.7. NBN

NBN assets are contained within conduits owned and managed by Telstra. Sydney Metro will liaise with Telstra for the protection of these assets.

3.8. Transport for NSW

Table 9: Transport for NSW

Station	Asset tags	Approx. Sydney Metro Down Chainage	Lateral or Longitudinal	Treatment Type	Description
Belmore	TBA	13km900	Lateral	2	Traffic signal cable conduits and pits in Burwood Rd bridge
Wiley Park	WPKG-RM-KB1	15km860, 15km880	Lateral	2	Traffic signal cable conduits and pits on King Georges Rd bridge

4. Environmental 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 Project's CEMP, CEMP Sub-plans, the Construction Traffic Management Plan (CTMP) and this UMS.

If utility works are to occur within the pre-Construction phase, the works will be undertaken in accordance with an approved Pre-Construction Minor Works approval and this UMS.

Any utility work undertaken outside of standard construction hours will be subject to Out Of Hours Work Approval, to be approved by Sydney Metro and the Independent Environmental Representative prior to works.

Section 5 of the 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. Sydney Metro and their contractor will implement these measures where appropriate to the Project.

In addition, Sydney Metro has undertaken a risk assessment, based on the Project's scope and other risk factors known from Sydney Metro's experience on previous projects to develop key mitigation measures. The Sydney Metro consequence criteria, likelihood criteria and risk matrix is provided Tables 11 and 12 below (on page 40).

A summary of these key mitigation measures is included within the risk assessment provided in Table 10 below;

Table 10: 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.	L3	C5	12	Implement the controls within the CEMP (or relevant Sydney Metro 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.	L4	C5	7	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.	L3	C5	12	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.	L4	C5	7	Review plant check list prior to operating on site. Undertake verification checks a required.
Noise									

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C=	Risk		P X	C =	Risk	
Noise from general utility works resulting in impact to residents.	Disturbance to residents or neighbouring businesses. Potential for complaints.	L2	C5	18	Control measures as per the Project's NVMP (or relevant Sydney Metro 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. 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.	L3	C5	12	Noise performance will be continually monitored as per the requirements of the Project's NVMP. Where high impact noise is required, it will be restricted and managed in accordance with the Project's NVMP.

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C =	Risk		P X	C =	Risk	
Noise during utility works required to be undertaken out of standard construction hours.	Disturbance to residents or neighbouring businesses with potential for complaints.	L2	C5	18	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 NVMP are to be implemented.	L4	C5	7	Noise performance will be continually monitored as per the requirements of the Project's NVMP. Where high impact noise is required, it will be restricted and managed in accordance with the Project's NVMP.
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	L3	C5	12	Control Measures as per the NVMP (or relevant Sydney Metro 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.	L4	C5	7	Standard and specific mitigation measures for sensitive receptors around the Project works will be applied as per the Project's NVMP and the CNVIS.
Traffic & Access									
Loss of on-street car parking in adjacent	Loss of parking availability to adjacent	L3	C5	12	Implement the Project's CTMP Community notifications in accordance with Sydney Metro	L4	C5	7	Complete regular toolbox talks on how to minimise impacts in relation to traffic.

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C=	Risk		P X	C =	Risk	
residential streets and commercial areas during construction.	residential and commercial properties due to utility works could result in community complaints.				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.				Undertake regular inspections of worksite and adjacent streets. Supervisor and traffic controller to enforce traffic management requirements
General construction traffic disturbing public access between local roads.	Disturbance to local residents due to utility works resulting in complaints being made, limited access, and potential for delays at local road access points resulting in complaints.	L3	C5	12	Implement the Project's 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. Approved Traffic Management Plans in consultation with relevant authorities. Detour routes to be advertised/notified.	L4	C5	7	Complete regular toolbox talks on how to minimise impacts in relation to traffic. Undertake regular inspections of worksite and adjacent streets.

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C=	Risk		P X	C =	Risk	
					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.	L3	C5	12	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.	L4	C5	7	Complete regular toolbox talks on how to minimise impacts in relation to traffic. Permits from local council and/or TfNSW

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C=	Risk		P X	C =	Risk	
Pedestrian/Cyclist access	Loss or disruption of pedestrian and/or cyclist access around the project site due to utility works	L4	C5	7	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	L4	C5	7	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	L4	C4	11	Implement the Project's Visual Amenity Management Plan (VAMP) 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	L5	C4	8	Undertake regular inspections of work areas pre, during and after works to ensure controls are in good condition.

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Risk	Management of Residual Risk
		P X	C =	Risk		P X	C =	Risk		
Utilities										
Utility management	Service strike leading to environmental degradation	L3	C3	24	Develop and implement the UMS in accordance with the UMF. Implement a Permit to Disturb Induction and toolbox talks Detailed Site Survey to be managed by an appropriately qualified surveyor.	L5	C3	13	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	L3	C3	24	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.	L5	C3	13	Toolbox workers on requirements Undertake regular inspections	
Encountering hazardous materials during utility adjustments	Exposure to hazardous materials	L4	C3	17	In accordance with REMM SC6, Sydney Metro's Principal Contractor will conduct hazardous material surveys prior to carrying out Type 4 Treatments, where required.	L5	C3	13	Toolbox workers on requirements Undertake regular inspections	
Heritage										

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C =	Risk		P X	C =	Risk	
Non-aboriginal heritage	Impacts to build items and structures with heritage significance Impacts to areas of archaeological potential	L3	C3	24	Implement the mitigation measures included within the Project's Heritage Management Plan (HMP) (or relevant Sydney Metro 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	L5	C3	13	Toolbox workers on requirements Undertake regular inspections
Aboriginal heritage	Impacts to areas of archaeological potential	L4	C3	17	Implement the mitigation measures included within the Project's HMP (or relevant Pre-Construction Minor Works Approval). Ensure measures outlined within Aboriginal Cultural Heritage Assessment Report (ACHAR) such as salvage within areas of Potential	L5	C3	13	Toolbox workers on requirements Undertake regular inspections

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C=	Risk		P X	C =	Risk	
					Archaeological Deposits are implemented. Implement the Sydney Metro Unexpected Heritage Finds Procedure				
Biodiversity									
Flora	Unauthorised clearing of vegetation impacting on threatened species, threatened vegetation communities or fauna habitat	L3	C4	18	Implements the measures within the Project's CEMP (or relevant Sydney Metro 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.	L5	C4	8	Toolbox workers on requirements Undertake regular inspections
Fauna	Impacting fauna	L4	C4	11	Implements the measures within the Project's CEMP (or relevant Sydney Metro Pre-Construction Minor Works Approval). Implement a Vegetation Removal and Trimming Permit system	L5	C4	8	Toolbox workers on requirements Undertake regular inspections

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C=	Risk		P X	C =	Risk	
					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.				
Land use and Property									
Land use and Property	Changes to land use and property impacts Construction compounds impacting on nearby receivers Works through easements	L4	C5	7	Design to avoid impacts to nearby properties Utilise existing hard stand within the rail corridor where possible Obtain required approvals for working within easements	L5	C5	4	
Soils and Contamination									
Soils and contamination	Encountering contamination Creating contamination through utility works Acid Sulphate Soils	L3	C3	24	Works to occur in accordance with the Project's Soil and Water Management Plan (or relevant Sydney Metro Pre-Construction Minor Works Approval). All waste is to be classified in Accordance with the Waste Classification Guidelines (NSW EPA, 2014)	L5	C3	13	Toolbox workers on requirements Undertake regular inspections

Aspect	Potential Environmental Impact	Initial Risk Rating			Control Measures	Residual Risk Rating			Management of Residual Risk
		P X	C =	Risk		P X	C =	Risk	
					Acid Sulphate Soils are to be managed in accordance with the Acid Sulfate 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				

Once a Principal Contractor has been engaged for this Project, the Principal Contractor will be responsible for revising this risk assessment to adequately reflect any changes to their scope of works and/or methodologies, and to conform to their E&SMS.

All indicative environmental issues have been assessed in accordance with the consequence criteria, likelihood criteria and risk matrix provided in Tables 11 and 12 below.

Risk Assessment Rankings:

- >31 Very High;
- 22 to 30 High;
- 11 to 21 Medium; and
- 1 to 10 Low.

Risks will be reassessed by Sydney Metro's Principal Contractor following the consideration of control measures. The Principal Contractor will be responsible for nominating an owner for the implementation of management measures.

Issues or activities that represent a Very High risk after the application of control measures are not to be undertaken.

Table 11: Sydney Metro Risk Assessment Consequence Criteria

	ENTERPRISE RISK CONSEQUENCES					
	C6 Insignificant	C5 Minor	C4 Moderate	C3 Major	C2 Severe	C1 Catastrophic
Environment	No appreciable changes to environment and/or highly localised event.	Change from normal conditions within environmental regulatory limits & environmental effects are within site boundaries.	Short-term and/or well-contained environmental effects. Minor remedial actions probably required.	Impacts external ecosystem & considerable remediation is required.	Long-term environmental impairment in neighbouring or valued ecosystems. Extensive remediation required.	Irreversible large-scale environmental impact with loss of valued ecosystems.

Table 12: Sydney Metro Risk Assessment Likelihood Criteria and Risk Matrix

	One off event How likely?	Frequency	Repeated How often?	Likelihood		Consequences					
						C6	C5	C4	C3	C2	C1
						Insignificant	Minor	Moderate	Major	Severe	Catastrophic Transformation for opportunities
Probability	Expected to occur frequently during time of activity or project. Greater than a 90% chance of occurring.	Frequency	10 times or more every year	Almost certain	L1	20	22	29	32	34	36
	Expected to occur occasionally during time of activity or project. A 75-90% chance of occurring.		1-10 times every year	Very Likely	L2	14	18	23	28	31	35
	More likely to occur than not occur during time of activity or project. A 50-75% chance of occurring.		Once each year	Likely	L3	9	12	16	24	27	33
	More likely not to occur than occur during time of activity or project. A 25-50% chance of occurring.		Once every 1 to 10 years	Unlikely	L4	6	7	11	17	25	30
	Not expected to occur during the time of activity or project. A 10-25% chance of occurring.		Once every 10 to 100 years	Very Unlikely	L5	3	4	8	13	19	26
	Not expected to ever occur during time of activity or project. Less than 10% chance of occurring.		Less than once every 100 years	Almost Unprecedented	L6	1	2	5	10	15	21

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–400 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 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 – Environmental Control Maps

To be developed as appropriate by the Principal Contractor