



# Planning Approval Consistency Assessment Form

SM-17-00000111

Metro Body of Knowledge (MBoK)

<b>Assessment name:</b>	Sydney Metro West – Low Risk Boreholes and Monitoring Wells Outside Approved Construction Boundary
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<b>Prepared for:</b>	Sydney Metro
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For information – do not alter:

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The Planning Approval Consistency Assessment Form should be completed in accordance with [SM-17-00000103 Planning Approval Consistency Assessment Procedure](#).

## 1. Existing Approved Project

Planning approval reference details (Application/Document No. (including modifications)):

- SSI-10038 Sydney Metro West – Concept and major civil construction work for Sydney Metro West between Westmead and The Bays (Stage 1 of the planning approval process for Sydney Metro West)
- SSI-10038-Mod-1 The Sydney Metro West Westmead to The Bays and Sydney CBD - Modification 1 (Administrative Modification)
- SSI-10038-Mod-2 The Sydney Metro West Westmead to The Bays and Sydney CBD – Modification 2 (Clyde Stabling and Maintenance Facility)
- SSI-10038-Mod-3 The Sydney Metro West Westmead to The Bays and Sydney CBD - Modification 3 (Administrative Modification)

Date of determination:

- SSI 10038: 11 March 2021
- SSI-10038-Mod-1: 28 July 2021
- SSI-10038-Mod-2: 03 June 2022
- SSI-10038-Mod-3: 04 July 2022

Type of planning approval: Critical SSI (Division 5.2 “State significant infrastructure”, *Environmental Planning and Assessment Act 1979*)

### Approved Project

The approved project includes the Concept and major civil construction works between Westmead and The Bays (Stage 1 of the planning approval process). This Consistency Assessment relates to Stage 1 works, as described below.

### ***Approved Major Civil Construction Work for Sydney Metro West between Westmead and The Bays***

Approved major civil construction works for Sydney Metro West between Westmead and The Bays (Stage 1 of the planning approval process) includes the following (refer to Section 9 of the Environmental Impact Statement (EIS) for more detail):

- Enabling works, such as demolition, utility supply to construction sites, utility adjustments and modifications to the existing transport network

- Tunnel excavation including tunnel support activities between Westmead and The Bays
- Station excavation for new metro stations at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock and The Bays
- Shaft excavation for services facilities
- Civil work for the stabling and maintenance facility at Clyde.

**Stage 1 Construction Sites and Tunnel Alignment**

Sydney Metro West - Stage 1 involves major civil construction works for Sydney Metro West (Westmead to The Bays) at nine surface construction sites, including:

- Westmead Metro Station
- Parramatta Metro Station
- Clyde Maintenance and Stabling Facility
- Silverwater Services Facility
- Sydney Olympic Park Metro Station
- North Strathfield Metro Station
- Burwood North Metro Station
- Five Dock Metro Station
- The Bays Metro Station

The location and layout of these construction sites are described in Section 9 of this EIS, with the exception of:

- Westmead Metro Station which received approval for a revised construction site boundary in Consistency Assessment SMW04: Sydney Metro West – Revised Westmead Station Box (endorsed 16 February 2022);
- Clyde Maintenance and Stabling Facility which received approval for, amongst other things, a revised layout and expanded construction site boundary in Consistency Assessment SMW01: Sydney Metro West – Tunnel boring machine drive strategy and future Rosehill crossover (endorsed 13 September 2021) and SSI-10038-Mod-2; and
- Clyde Dive and Portal Structure, which received approval for amendments to the Clyde Dive Portal construction methodology in Consistency Assessment GLC02: Sydney Metro West – Clyde Dive and Portal Structure (endorsed July/August 2022).

The location of Stage 1, including the underground tunnel and surface construction sites for the stations and services facilities are shown on Figure 1 below.

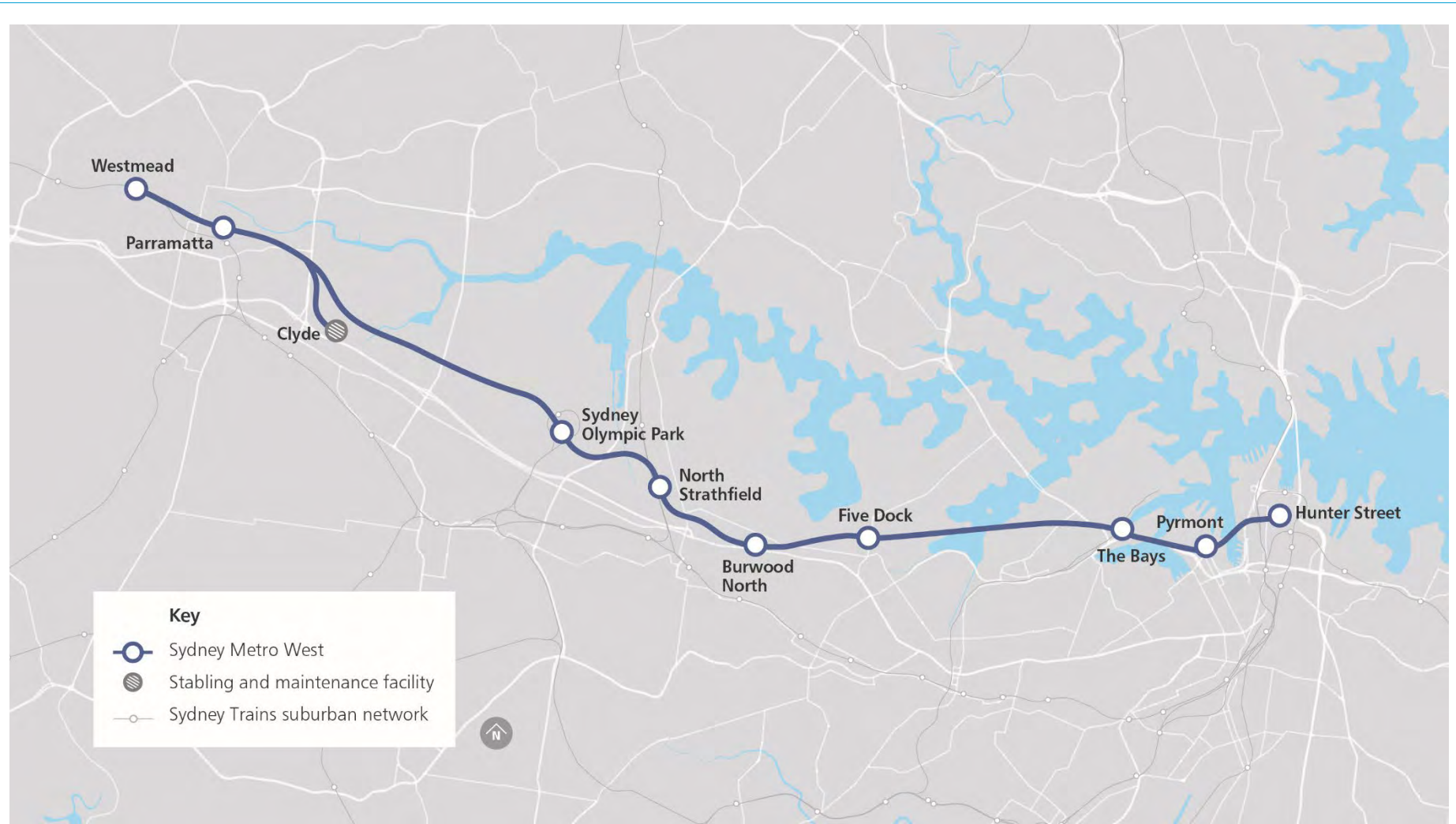


Figure 1: Sydney Metro West - Stage 1

**Stage 1 Delivery Phases**

The Sydney Metro West - Stage 1 construction works were split into seven delivery phases, including:

- Phase A – Power Enabling Works
- Phase B1 – Central Tunnelling Early Works
- Phase B2 – Central Tunnelling Main Works
- Phase C – Parramatta and Clyde Enabling Works
- Phase D – Greater Sydney Road Works
- Phase E – Existing Rail Corridor Enabling Works
- Phase F – Western Tunnelling Works

This Consistency Assessment has been prepared to support a scope of works to carry out geotechnical services (e.g. borehole investigations or monitoring well installations) at eight locations between Westmead and Sydney Olympic Park, which is one aspect of the Detailed Site Investigations (DSI) required for Phase F – Western Tunnelling Works to obtain geotechnical and groundwater data for the design of the project. This phase includes nine kilometres of twin railway tunnels between Sydney Olympic Park and Westmead, as well as station box excavation works, associated support works, retrieval of Tunnel Boring Machines, and construction works for the Clyde Maintenance and Stabling Facility / Rosehill Services Facility.

All borehole/monitoring well sites (refer Figure 2 below) are located outside the surface construction site boundaries (but in the vicinity of the tunnelling alignment) as identified for the approved project. A targeted assessment of the scope of works was not conducted for the approved project, and as such, the existing environment, potential impacts and additional mitigation measures (if any) for the geotechnical services are subject to the assessment undertaken in this Consistency Assessment.

This Consistency Assessment has been prepared using the approved project information and site descriptions for construction activities between Sydney Olympic Park and Westmead, as documented in the 'Relevant background information' section below.

**Relevant background information (including EA, REF, Submissions Report, Director General's Report, MCoA):**

This Consistency Assessment has been undertaken for the Sydney Metro West – Stage 1 Concept and major civil construction work for Sydney Metro. This includes consideration of the following planning approval documentation:

- Sydney Metro West - Westmead to The Bays and Sydney CBD (Concept and Stage 1) Environmental Impact Statement (15 April 2020)
- Sydney Metro West - Westmead to The Bays and Sydney CBD (Concept and Stage 1) Submissions Report (20 November 2020)

- Sydney Metro West - Westmead to The Bays and Sydney CBD (Concept and Stage 1) Amendment Report (20 November 2020)
- Sydney Metro West - Westmead to The Bays and Sydney CBD (Concept and Stage 1) Modification 1 - Administrative Modification (28 July 2021)
- Sydney Metro West - Westmead to The Bays and Sydney CBD (Concept and Stage 1) Modification 2 – Clyde Stabling and Maintenance Facility Modification Report (03 June 2022)
- Sydney Metro West - Westmead to The Bays and Sydney CBD (Concept and Stage 1) Modification 3 - Administrative Modification (04 July 2022)
- Consolidated Instrument of Approval (04 July 2022).

All documentation has been published on the Department of Planning and Environment Major Projects website located here (Major Project Number: SSI-10038): <https://www.planningportal.nsw.gov.au/major-projects/project/25631>

Other relevant documentation prepared as part of design development and construction planning include:

- Consistency Assessment SMW01: Sydney Metro West – Tunnel boring machine drive strategy and future Rosehill crossover (endorsed 13 September 2021).
- Consistency Assessment SMW04: Sydney Metro West – Revised Westmead Station Box (endorsed 16 February 2022).

All proposed works identified in this assessment would be undertaken in accordance with the mitigation measures identified in the EIS, Submissions Report, Amendment Report and the Ministers Conditions of Approval (MCoA).

## 2. Description of Proposed Development/Activity/Works

The purpose of this Consistency Assessment is to assess the location and methodology for the proposed moderate environmental risk borehole/monitoring well sites, as shown on Figure 2 below. Refer to Appendix A for more detailed location and Appendix B for the environmental characteristics for each site.

43 borehole/monitoring well locations were originally proposed as part of the DSI scope required to support the Western Tunnelling Package phase, however three locations were either completed by Sydney Metro or were no longer required and subsequently removed from the package. Of the remaining 40 locations, 14 locations were deemed as low environmental risk following the completion of a heritage and ecological constraints review undertaken across all borehole/monitoring well sites (refer to Appendix C). Following the first submission of this Consistency Assessment (draft version 1.0), six borehole/monitoring well sites (BH84, BH89, MW14, MW17, MW18 and MW47) were relocated to be within existing approved Sydney Metro construction site boundaries (at Westmead and Clyde MSF) and will be implemented as part of general construction works for the existing approved project. No further assessment of these six borehole/monitoring well sites is

provided in this Consistency Assessment. These six locations are however depicted in Figure 2 below (and relevant figures throughout this Consistency Assessment) so a record of their location is retained in the context of this Consistency Assessment.

The remaining eight low risk borehole/monitoring well sites located outside of approved construction boundaries are subject to assessment under this Consistency Assessment.

The moderate and higher environmental risk sites will be assessed in separate Consistency Assessments and are not addressed within this Consistency Assessment.



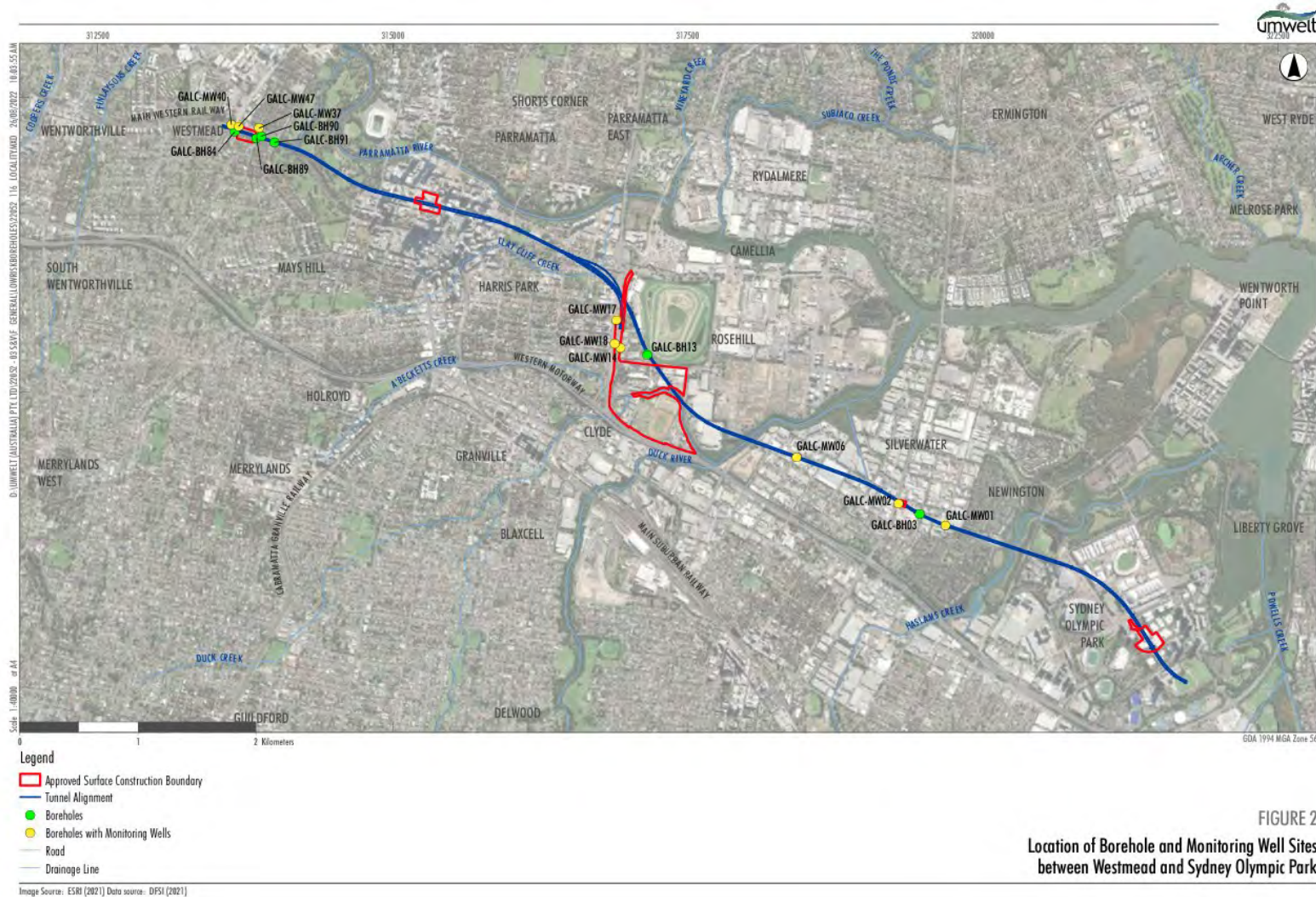


FIGURE 2  
Location of Borehole and Monitoring Well Sites  
between Westmead and Sydney Olympic Park

Figure 2: Location of low risk borehole/monitoring well sites between Westmead and Sydney Olympic Park

### Proposed Methodology

The geotechnical services involve borehole investigations and the installation of permanent monitoring wells above the underground tunnel alignment to understand groundwater conditions and soil profile to inform the project design. The proposed methodology for the geotechnical services is discussed below.

- Undertake pre-condition surveys
- Undertake site setup including traffic control, temporary site fencing, heritage buffers, shade cloths, erosion/sediment controls and noise blankets
- Undertake onsite service location, service clearance and proving activities (to determine service location, depth, and type) using an accredited service locator and non-destructive digging method
- Transport drill rig to each site via a float truck and drill boreholes using a truck or tractor mounted augur drill rig
- Drilling operation – drilling of boreholes and installation of groundwater monitoring wells where required
- Surplus soil from drilling operation to be managed as per the approved SWMP and WMP
- Any excess water will be removed from site using a vacuum truck
- Reinstate each borehole/monitoring well site, including:
  - Demobilisation of drill rig and other plant and equipment from the site including removal of any waste related to the drilling activities
  - Backfill drilled hole with grout to just under surface level
  - Reinstate surface area around drill location
  - Clean site and undertake post-construction dilapidation survey
  - Remove traffic controls and environmental controls
- Undertake fortnightly manual dripping and groundwater sampling (only required for monitoring well sites – refer to section 4 – Site description for details on location and number of monitoring wells)

Each drilling site will be in operation for a duration of approximately 2 weeks, inclusive of pre-works, drilling and reinstatement phases. For proposed monitoring well sites, the monitoring well will stay in place for the duration of the project (monitoring well flush to ground). The monitoring well will be decommissioned as required once redundant.

The location of the proposed boreholes/monitoring wells has been selected based on detailed design considerations and consultation within project teams, supported by field inspections where required. It is expected that these locations will be fit for purpose to undertake the required geotechnical investigation. However, in the event that the locations become inadequate to safely undertake the geotechnical investigations (i.e. existing services are identified during potholing that need to be avoided), a nearby location within the vicinity of the proposed site and within the same risk category (i.e. low risk) would be selected to carry out the geotechnical services. Each revised location would be assessed against a Health, Safety and Environment (HSE) Checklist to ensure that works could safely proceed, in accordance with the approved project.

Public safety measures and signage will be used at each site to reduce the potential for localised impacts during drilling operation. Safety cones will be placed around each site to demarcate potential trip hazards. Appropriate signage will be used at each site to notify the public of the proposed works. Community notification will also be undertaken as required. The plant and equipment required to carry out the proposed geotechnical services include but are not limited to:

- Safety water barriers
- 1 x 2t tipper
- 1x 5t excavator
- 1x vacuum truck
- Up to 4x light vehicles (Surveillance officer, Safety officers and field manager to conduct inspections of the work site where required)
- 1x light vehicle for the purpose of periodic groundwater well monitoring (for monitoring wells only)

Figures showing an example borehole/monitoring well site set-up, as well example monitoring well installation and sampling, are provided below in Figure 3 and Figure 4 respectively.



Figure 3: Example of a borehole/monitoring well set-up required for the proposed geotechnical services



Figure 4: Example of an installed monitoring well (left) and periodic monitoring well sampling (right)

### 3. Timeframe

The geotechnical services activities are estimated to take approximately 2 weeks per borehole/monitoring well site, inclusive of pre-works, drilling and reinstatement phases. It is expected that these works will be undertaken in October/November 2022, dependent on the approval timeline for this Consistency Assessment.

The geotechnical services are proposed to occur within the approved standard hours for the project and will comply with MCoA D37 and D38, however out-of-hours works (OOHW) may be required to carry out the proposed works at certain sites. All OOHW would be managed in accordance with the Project Noise and Vibration Management Plan, the Project EPL 21676 and the Out-of-hours Work (OOHW) Protocol (for BH/MW not covered by the existing EPL).

## 4. Site Description

There are eight low risk borehole/monitoring well sites between Westmead and Sydney Olympic Park, all of which fall within the City of Parramatta Local Government Area (LGA) or Cumberland LGA. These borehole/monitoring well sites have been separated into three portions being Westmead, Clyde and Silverwater, based on shared geographic locations and characteristics across borehole/monitoring well sites within each of these portions.

Refer to Table 1 for the description at each site, Appendix A for figures presenting each site, and Appendix B for further detail of the environmental characteristics within each portion.

Table 1: Site Description

BH/MW ID	Site Description
<b>Portion 1 (Westmead)</b>	
<b>BH90, BH91, MW40, and MW37</b>	<p>Portion 1 is located in Westmead, with MW40 located within 100m of the western boundary of the Westmead Metro Station surface construction site. BH90 and MW37 are located within 170m of the eastern boundary of the Westmead Metro Station surface construction site. Portion 1 is surrounded by the existing Westmead train station, residential / commercial premises and Western Sydney University (Westmead Campus) to the north, residential premises and Westmead Public School to the west and south, and residential premises continuing to Parramatta Park to the east.</p> <p>Portion 1 sites (excluding MW37) fall within the following land use zones under the Cumberland Local Environmental Plan 2021:</p> <ul style="list-style-type: none"> <li>• MW40 - 'R2 – Low Density Residential'</li> <li>• BH90 and BH91 – 'R4 – High Density Residential'</li> </ul> <p>MW37 is located on the northern side of the existing Westmead rail corridor and is zoned as 'R4 – High Density Residential' under the Parramatta Local Environmental Plan 2011.</p>
<b>Portion 2 (Clyde)</b>	
<b>BH13</b>	<p>Portion 2 is located in Clyde within close proximity to the surface construction site boundary for Clyde Maintenance and Stabling Facility (CMSF). BH13 is located adjacent to the underground tunnel alignment, along the south-south western border of the Rosehill Racecourse.</p> <p>Portion 2 is bound by James Ruse Drive and residential properties to the north and west, James Ruse Drive and industrial premises to the south, and the CMSF and Rosehill Racecourse to the east.</p> <p>BH13 falls within the 'RE2 – Private Recreation' land use zone under the Parramatta Local Environmental Plan 2011.</p>
<b>Portion 3 (Silverwater)</b>	

<p><b>BH03, MW01, and MW06</b></p>	<p>Portion 3 is located in Silverwater, with all four borehole/monitoring well sites located along the underground tunnel alignment in a largely industrial/commercial setting. MW01 and BH03 are located within 380m east of the Silverwater Services Facility site boundary. MW06 is located approximately 940m north west of the Silverwater Services Facility site boundary.</p> <p>Portion 3 is surrounded by industrial/commercial premises in all directions, extending to residential premises approximately 150m east of MW01, and Duck River located approximately 250m north of MW06.</p> <p>All Portion 3 sites fall within the 'IN1 – General Industrial' land use zone under the Auburn Local Environmental Plan 2010.</p>
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**5. Site Environmental Characteristics**

The proposed borehole/monitoring well sites are generally located in proximity to the tunnel alignment between Westmead to Sydney Olympic Park. As these sites are located outside the surface construction site boundaries, environmental characteristics for each site have not been previously described as part of the approved project.

A desktop assessment, review of the EIS and supporting assessments, as well as site inspections in July/August 2022 at publicly assessable locations was undertaken to understand the existing environment for each site and potential impacts associated with the proposed works. A desktop heritage and ecological constraints review of the borehole/monitoring well sites was also undertaken to support this Consistency Assessment (refer to Appendix C).

The surrounding environmental characteristics is described for each site in Appendix B of this Consistency Assessment but summarised below for the broader scope of works.

**Land Use**

A review of the NSW Spatial Services Historical Imagery Viewer was undertaken in August 2022 to understand the historic and current land use for each site.

The land surrounding these sites were typically used for agricultural purposes and residential areas prior to the 1950s. Parramatta CBD and Sydney Olympic Park gradually developed into commercial precincts leading up to the early 2000s. Areas around Westmead and Silverwater developed into higher density residential areas. The land surrounding the borehole/monitoring well sites in Clyde and Rosehill were historically used as racecourses (for horses and vehicles) and developed into industrial areas between the 1950s and 1970s.

Currently, all borehole/monitoring well sites sit within industrial, commercial and residential land use areas, excluding BH13 which is located on land zoned as private recreation.

### Aboriginal and Non-Aboriginal Heritage

A review of the following publicly available online databases was undertaken in August 2022 to support the heritage and ecological constraints review:

- Australian Heritage Database
- NSW State Heritage Inventory (SHI)
- Schedule 5 of relevant Local Environmental Plans (LEP)
- Aboriginal Heritage Information Management System (AHIMS) web services

The results of the heritage and ecological constraints review indicate that no items of Aboriginal or Non-Aboriginal Heritage are present at each of the low risk borehole/monitoring well sites. Refer to Appendix D for figures showing the Aboriginal and Non-Aboriginal heritage context in relation to the borehole/monitoring well sites.

### Noise and Vibration

A Construction Noise and Vibration Impact Assessment (CNVIA) was prepared by SLR Consulting in October 2022 to assess potential noise and vibration impacts associated with the geotechnical service scope of works along the project alignment during approved hours and out-of-hours (OOH) assessment periods. The CNVIA was prepared to assess potential noise and vibration impacts across all low risks borehole/monitoring well sites outside of approved project construction boundaries, . An assessment of predicted NML exceedances at NCA's in which the boreholes/monitoring wells fall within is provided in Section 10 and Appendix B.

Refer to Appendix E for the full CNVIA prepared across low risks borehole/monitoring well sites outside of approved project construction boundaries.

### Surface Water and Groundwater

The borehole/monitoring well sites are located at varying distances from local watercourses. BH91 is located approximately 160m west of Domain Creek and 500m west of Parramatta River, and is the closest site to a watercourse within Portion 1. BH13 is located approximately 330m north of Duck Creek, and is the closest site to a watercourse within Portion 2. MW06 is located approximately 250m south of Duck River, and is the closest site to a watercourse within Portion 3.

Duck Creek, Duck River and Parramatta River are considered to be sensitive receiving environments due to their proximity to Coastal Wetlands and their mapping by DPI (2019) as Key Fish Habitat.

There are terrestrial groundwater dependent ecosystems associated with vegetation along Domain Creek, Duck Creek and Duck River.



### Soils and Contamination

In addition to reviewing the EIS and supporting documents, a search of the NSW Environmental Protection Authority (EPA) public registers and the NSW DPE eSPADE portal were undertaken in August 2022.

The borehole/monitoring well sites are located on the Cumberland Plain, an extensive low-lying plain within the Cumberland Basin, within three soil landscapes; Blacktown, Disturbed Terrain and Glenorie.

The majority of borehole/monitoring well sites are located within 250m of an Area of Environmental Interest (AEI) with moderate contamination risk (as identified in the EIS) due to current and historical activities. BH03 is located within 80m of an AEI with high contamination risk, which has known groundwater contamination due to historical industrial use.

BH03 is located within 120m of a site that has two current notices from the NSW EPA. These notices order the land owner to undertake preliminary investigations to determine whether the land is contaminated with trichloroethene (TCE) and daughter products of TCE in the groundwater.

No areas of acid sulfate soil risk were identified for the borehole/monitoring well sites. Refer to Appendix F for figures showing areas of acid sulfate soil risk in context to the borehole/monitoring well sites.

### Biodiversity

A search of the NSW DPE State Vegetation Type Map was undertaken in August 2022 to support the heritage and ecological constraints review undertaken for the borehole/monitoring well sites. A site inspection was undertaken to observe ecological characteristics for each site. All low risk borehole/monitoring well sites are located in either entirely cleared (i.e. urban) areas, or cleared grassland with scattered native trees, most of which are likely to be planted. As such, no impacts to biodiversity are anticipated. Refer to Appendix G for figures showing areas of native vegetation across the borehole/monitoring well sites.

### Traffic, Transport and Access

All borehole/monitoring well sites are located in publicly accessible locations with adequate parking to accommodate vehicle use required for the geotechnical services. Traffic control will be established at each borehole/monitoring well site to safety coordinate and manage local traffic whilst undertaking the necessary geotechnical services. Periodic visitation of monitoring wells following installation will also be required, which would involve the use of a standard fleet vehicle to access the monitoring well.

All work on or adjacent to roads would be carried out in accordance with a relevant Traffic Control Plan (TCP) and/or Road Occupancy Licence (ROL) to facilitate safe work near live traffic. Where an ROL cannot be obtained for the approved project hours and/or proposed

works cannot be undertaken safely during these hours, some works will be required to be undertaken outside of approved project hours (i.e. Out of Hours Work, OOHW).

Land access agreements will be in place for each of these borehole/monitoring well site prior to commencement of works.

## 6. Justification for the proposed works

The proposed geotechnical services along the underground tunnel alignment between Westmead and Sydney Olympic Park are required to collect geotechnical, groundwater and soil profile information deemed necessary to facilitate the design of the Project. The periodic visitation of the monitoring wells is also required to obtain real-time groundwater conditions, including groundwater levels and flow conditions, groundwater quality and enables the evaluation of hydraulic properties of water-bearing strata, as required.

Without the proposed geotechnical services scope of works occurring, these essential geotechnical inputs will not be available to inform the design of the project.

## 7. Environmental Benefit

Due to the minor scope associated with the proposed geotechnical services, no significant environmental benefits are expected.

## 8. Control Measures

The proposed geotechnical investigation scope of works would be undertaken in accordance with the mitigation measures and the conditions of approval for the approved Sydney Metro West – Stage 1 project. Any additional mitigation measures identified in this assessment will be implemented as required. The proposed works would be managed in accordance with the approved Construction Environment Management Plan (CEMP) and CEMP Sub-plans.

## 9. Climate Change Impacts

No change in climate change risk (as identified in the EIS) will occur as a result of the proposed geotechnical surveys.

## 10. Impact Assessment – Construction

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Flora and fauna	<p>The results of the heritage and ecological constraints review (Appendix C) indicate that there is no native vegetation mapped at each of the borehole/monitoring well sites.</p> <p>No pruning or removal of any trees or vegetation is proposed under this Consistency Assessment. The proposed borehole/monitoring well sites are located on hardstand, or in existing cleared areas.</p> <p>As such, no additional impacts to flora and fauna are anticipated as a result of the proposed geotechnical investigations.</p>	<p>No additional measures required.</p> <p>The Sydney Metro West – Western Tunnelling Package – Flora and Fauna Management Plan (SMWSTWTP-GLO-1NL-NL000-EO-PLN-000001) will be implemented where applicable.</p>	Y	Y	
Water (surface and groundwater)	<p>The proposed works would have negligible impact on surface water, as there will be minimal ground disturbance near watercourses. There is potential for erosion and sediment impacts, however these will be minimised with the implementation of appropriate control measures.</p> <p>The proposed geotechnical services will interact with groundwater during temporary borehole works and installation of permanent groundwater monitoring wells. The proposed geotechnical services are considered as minor and are unlikely to result in substantial groundwater impacts outside of those already assessed and understood under the approved project.</p>	<p>The Sydney Metro West – Western Tunnelling Package – Soil and Water Management Plan (SMWSTWTP-GLO-1NL-EN-PLN-000001) and Sydney Metro West – Western Tunnelling Package – Groundwater Management Plan (SMWSTWTP-GLO-1NL-EN-PLN-000002) will be implemented where applicable.</p> <p>The following targeted control measure will be implemented:</p> <ul style="list-style-type: none"> <li>Appropriate erosion and sediment controls will be implemented in accordance with the Blue Book and Attachment 3 (Erosion and Sediment Control Plan) of the Soil and Water Management Plan.</li> </ul>	Y	Y	
Air quality	<p>No additional impacts to the approved project, as the proposed geotechnical services will only generate minor, localised air quality emissions from the</p>	<p>No additional measures required.</p> <p>The Sydney Metro West – Western Tunnelling Package – Air Quality</p>	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
	operation of plant and machinery required to undertake the geotechnical services.	Management Plan (SMWSTWTP-GLO-1NL-NL000-AH-PLN-000001) will be implemented where applicable.			
Noise and vibration	<p>A Construction Noise and Vibration Impact Assessment (CNVIA) was prepared by SLR Consulting in October 2022 to assess potential noise and vibration impacts associated with the low risk geotechnical service scope of works along the project alignment during approved hours and out-of-hours (OOH) assessment periods. An assessment of predicted NML exceedances at NCA's in which the boreholes/monitoring wells fall within is provided in Appendix B, and is summarised below:</p> <p><u>Portion 1 (Westmead)</u></p> <ul style="list-style-type: none"> <li>Exceedances of up to 20-30 dBA above the NML may occur at up to seven residential receivers within NCA02 during approved construction hours, and exceedance of &gt;30 dBA above the NML may occur at 1eleven residential receives within NCA02 during night time OOHW.</li> <li>Exceedances of up to 20-30 dBA may occur at up to one residential receiver within NCA01 during approved construction hours, and exceedances of &gt;30 dBA above the NML may occur at one residential receiver within NCA01 during night time OOHW.</li> </ul> <p><u>Portion 2 (Clyde)</u></p> <ul style="list-style-type: none"> <li>Exceedances of up to 20-30 dBA above the NML may occur at up to four residential receivers within NCA07 during approved construction hours, and exceedance of 11-20 dBA above the NML may occur at sixteen residential receives within NCA07 during night time OOHW (although</li> </ul>	<p>The following targeted mitigation and management measures will be implemented where feasible and reasonable:</p> <ul style="list-style-type: none"> <li>Implement mitigation measures identified within the CNVMP and DNVIS</li> <li>Implement additional mitigation measures identified within the CNVMP and DNVIS</li> <li>Ensure the minimum sized equipment necessary to complete the work are used</li> <li>Implement portable noise barriers around noise intensive activities (i.e. drill rig)</li> <li>Where multiple crews work simultaneously during the geotechnical investigations. Crews should avoid working within 500 m of each other to avoid cumulative impacts.</li> <li>Provide respite periods for noise intensive activities</li> <li>Shut down plant and machinery, including vehicles when not in operation</li> <li>Notification to potentially affected receivers prior to OOHW</li> </ul>	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
	<p>OOHW are not anticipated for sites within this Portion)</p> <p><u>Portion 3 (Silverwater)</u></p> <ul style="list-style-type: none"> <li>Exceedances of up to 20-30 dBA above the NML may occur at up to four residential receivers within NCA07 during approved construction hours, and exceedance of 11-20 dBA above the NML may occur at sixteen residential receives within NCA07 during night time OOHW (although OOHW are not anticipated for sites within this Portion)</li> </ul> <p>The CNVIA is generally considered conservative as the calculations assume several items of construction equipment are in use at the same time within individual scenarios. However, there would frequently be periods when construction noise levels are much lower than the worst-case levels predicted as well as times when no equipment is in use and no noise impacts occur.</p> <p>A number of mitigation and management measures have been recommended. Where feasible and reasonable these should be applied to the project to control and minimise the impacts during construction as far as practicable.</p>	<ul style="list-style-type: none"> <li>Undertake noise monitoring during works to confirm noise predictions. Monitoring locations should be targeted to most affected receivers or representative locations nearby.</li> </ul> <p>The Sydney Metro West – Western Tunnelling Package – Noise and Vibration Management Plan (SMWSTWTP-GLO-1NL-NL000-NV-PLN-000001) will be implemented where applicable.</p>			
Indigenous heritage	The results of the heritage and ecological constraints review (Appendix C) indicate that there are no items or areas of Aboriginal heritage at each of the borehole/monitoring well sites. As such, there are no additional impacts to the approved project.	No additional measures required. The relevant control measures identified in the Sydney Metro West – Western Tunnelling Package – Heritage Management Plan (SMWSTWTP-GLO-1NL-HE-PLN-000001) will be implemented where applicable.	Y	Y	
Non-indigenous heritage	The results of the heritage and ecological constraints review (Appendix C) indicate that there are no world, state or local non-indigenous heritage items or values	No additional measures required. The relevant control measures identified the Sydney Metro West – Western Tunnelling	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
	at each of the borehole/monitoring well sites. As such, there are no additional impacts to the approved project.	Package – Heritage Management Plan (SMWSTWTP-GLO-1NL-HE-PLN-000001) will be implemented where applicable.			
Community and stakeholder	<p>Consultation would continue with stakeholders in line with the approved project, and updates would be provided through the existing communication streams. As such, no additional impacts to the approved project are anticipated as a result of the geotechnical services scope of works.</p>	<p>No additional measures required. Land access approvals will be sought prior to commencement of works. Consultation by GLC is occurring with relevant councils and stakeholders for geotechnical investigations outside the approved construction site boundaries. Updates will be regularly provided through communication streams for the approved project.</p>	Y	Y	
Traffic	<p>Minor, temporary traffic-related impacts are anticipated during the proposed geotechnical services scope of works. Periodic visitation of monitoring wells following installation will also be required, which would involve the use of a standard fleet vehicle to access the monitoring wells as required. Traffic control will be established at each borehole/monitoring well site to safety coordinate and manage local traffic whilst undertaking the necessary geotechnical services. As such, traffic related impacts are expected to be minimal and temporary in nature.</p>	<p>All work on or adjacent to roads would be carried out in accordance with a relevant TCP and/or ROL to facilitate safe work near live traffic. Where an ROL cannot be obtained for the approved project hours and/or proposed works cannot be undertaken safely during these hours, some works will be required to be undertaken outside of approved project hours (i.e. Out of Hours Work, OOHW). The Sydney Metro West – Stage 1 Construction Traffic Management Framework will be implemented where applicable.</p>	Y	Y	
Waste	No additional impacts to the approved project. The geotechnical services scope of works will generate a small amount of waste which will be managed as per the approved WMP.	No additional measures required. The Sydney Metro West – Western Tunnelling Package – Waste Management Plan (SMWSTWTP-GLO-1NL-NL000-WM-PLN-	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
		000002) will be implemented where applicable.			
Social	<p>Some of the proposed works will have temporary impacts with the local community including businesses due to their locations (e.g. footpath, near sensitive receivers). Those impacts will be managed as per the approved CNVMP and DNVIS. Mitigation measures listed in the CNVIA (Appendix E) will also be implemented as required.</p> <p>Consultation would continue with stakeholders in line with the approved project, and updates would be provided through the existing communication streams.</p> <p>If OOHW are required, specific notifications will be sent to impacted receivers as per the approved project. The level of noise impacts will define the appropriate notification processes (e.g. door knock, respite offers).</p>	No additional measures required. The Sydney Metro West – Western Tunnelling Package – Noise and Vibration Management Plan (SMWSTWTP-GLO-1NL-NL000-NV-PLN-000001) and the Overarching Community Communication Strategy will be implemented where applicable.	Y	Y	
Economic	No additional impacts to the approved project, as the geotechnical services scope of works will not interact with local businesses or contribute to the economic value of the project.	No additional measures required.	Y	Y	
Visual	<p>There will be minor changes to each borehole/monitoring well site when works are being undertaken, however these will be temporary in nature and the sites will be reinstated to their previous condition once works are completed.</p> <p>As such, no additional impacts to the approved project are anticipated as the geotechnical services scope of works will not permanently alter the visual landscape of each site.</p>	No additional measures required. The Sydney Metro West – Western Tunnelling Package – Visual Amenity Management Plan (SMWSTWTP-GLO-1NL-NL000-EN-PLN-000003) will be implemented where applicable.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Urban design	No additional impacts to the approved project, as the geotechnical services scope of works will not modify the existing urban design at each site.	No additional measures required.	Y	Y	
Geotechnical	The proposed geotechnical services will interact with geotechnical aspects of the environment at each borehole/monitoring well, as expected due to the nature of the proposed works. However no impacts to geotechnical aspects are anticipated as a result of the proposed geotechnical services outside of those already assessed and understood under the approved project.	No additional measures required.	Y	Y	
Land use	No additional impacts to the approved project, as the geotechnical services scope of works will only temporarily change the existing land use for each site during construction.	No additional measures required.	Y	Y	
Contamination	<p>The majority of sites for the temporary boreholes works and installation of monitoring wells are within 250m of AEIs with moderate to high risk of contaminated soil, vapour and groundwater.</p> <p>A search of the NSW EPA contaminated land record identified one site within 120m of BH02 and MW03, which has two current notices from the NSW EPA.</p> <p>No sites are within areas at risk of encountering acid sulfate soils.</p> <p>As such, there is potential for the proposed works to interact with contaminated soil and groundwater. However, contamination impacts will be minimised with the appropriate mitigation measures in place.</p>	<p>The Sydney Metro West – Western Tunnelling Package – Soil and Water Management Plan (SMWSTWTP-GLO-1NL-EN-PLN-000001) will be implemented where applicable.</p> <p>The following targeted control measures will be implemented:</p> <ul style="list-style-type: none"> <li>Any contamination identified will require management in accordance with the Soil and Water Management Plan and relevant guidance made or approved by the EPA under Section 105 of the <i>Contaminated Land Management Act 1997</i>.</li> <li>In-situ waste classification will occur for each site in accordance with the</li> </ul>	Y	Y	



Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
		<p>Waste Classification Guidelines (NSW EPA, 2014), which will allow material to be excavated and transported offsite to an appropriate facility.</p> <ul style="list-style-type: none"> <li>All spills and leaks from vehicles and machinery will be immediately contained and managed.</li> <li>If any unexpected contamination is identified, the procedure in Attachment 4 of Soil and Water Management Plan will be implemented.</li> <li>If acid sulfate soils are encountered, they would be effectively managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998).</li> </ul>			
Climate Change	<p>The use of minor plant/equipment and light vehicles required to undertake the geotechnical services at each site are the only anticipated source of any greenhouse gas emissions proposed under this Consistency Assessment.</p> <p>As such, no additional impacts to the approved project are anticipated.</p>	No additional measures required.	Y	Y	
Risk	No additional impacts to the approved project, as the risks associated with the geotechnical services scope of works are consistent with the project risks for minor activities.	No additional measures required.	Y	Y	
Other	No additional impacts to the approved project.	No additional measures required.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during construction (if control measures implemented) of the proposed/activity, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Management and mitigation measures	No additional impacts to the approved project.	No additional measures required.	Y	Y	

## 11. Impact Assessment – Operation

As noted in Section 3.0 above, the proposed geotechnical services works are predominantly limited to the construction phase, with the exception of the installation of permanent groundwater monitoring wells at four of the eight low risk sites identified in this Consistency Assessment.

Furthermore, Stage 1 of the planning application for Sydney Metro West (subject of this Consistency Assessment) is for major civil construction work for Sydney Metro West between Westmead and The Bays. As discussed below, operational impacts of the proposal are negligible, and therefore there are no changes from the approved project are anticipated.

Aspect	Nature and extent of impacts (negative and positive) during operation (if control measures implemented) of the proposed activity/works, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Flora and fauna	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Water	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Air quality	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Noise vibration	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Indigenous heritage	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Non-indigenous heritage	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Community and stakeholder	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during operation (if control measures implemented) of the proposed activity/works, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Traffic	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Waste	The geotechnical services scope of works will generate a small amount of waste during periodic groundwater monitoring (i.e. groundwater) which will be managed as per the approved WMP, which is considered as a minimal impact relative to the approved project.	No additional measures required.	Y	Y	
Social	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Economic	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Visual	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Urban design	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Geotechnical	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	

Aspect	Nature and extent of impacts (negative and positive) during operation (if control measures implemented) of the proposed activity/works, relative to the Approved Project	Proposed Control Measures in addition to project COA and REMMs	Minimal Impact Y/N	Endorsed	
				Y/N	Comments
Land use	<p>The geotechnical services involve the installation of permanent monitoring wells above the underground tunnel alignment to understand groundwater conditions to inform the project design. The installation of permanent monitoring wells is proposed at the following sites:</p> <ul style="list-style-type: none"> <li>MW01, MW06, MW37 and MW40</li> </ul> <p>These locations would also be accessed periodically to undertake groundwater monitoring as required.</p> <p>The installation of small monitoring wells is not considered as a substantial change to the existing use of the land at each monitoring well site, and will have a minimal impact on the existing land use at these locations.</p>	No additional measures required.	Y	Y	
Climate Change	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Risk	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Other	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	
Management and mitigation measures	As the scope of works are temporary and limited to the construction phase, these works will not change the operation of the approved project.	No additional measures required.	Y	Y	

## 12. Consistency with the Approved Project

<p>Based on a review and understanding of the existing Approved Project and the proposed modifications, is there is a transformation of the Project?</p>	<p>No. The proposal would not transform the project. The project would continue to provide major civil works between Westmead and The Bays as part of the approved project.</p>
<p>Is the project as modified consistent with the objectives and functions of the Approved Project as a whole?</p>	<p>Yes. The proposal would be consistent with the objectives and functions of the approved project.</p>
<p>Is the project as modified consistent with the objectives and functions of elements of the Approved Project?</p>	<p>Yes. The proposal would be consistent with the objectives and functions of the approved works for the project. The activities proposed to be undertaken are generally consistent with the activities identified for the approved project.</p>
<p>Are there any new environmental impacts as a result of the proposed works/modifications?</p>	<p>No. There would be no new environmental risks as a result of the proposal. All risks identified for the approved project and the proposal would be adequately addressed through the application of the mitigation measures provided in the Environmental Impact Statement, Submissions Report, Amendment Report and the Instrument of Approval.</p>
<p>Is the project as modified consistent with the conditions of approval?</p>	<p>Yes. The proposal would be consistent with the conditions of approval.</p>
<p>Are the impacts of the proposed activity/works known and understood?</p>	<p>Yes. The impacts of the proposal are understood and will be accounted for by implementing the existing mitigation measures provided in the Environmental Impact Statement, Submissions Report, Amendment Report and the Instrument of Approval for the approved project. These would be implemented through the Sydney Metro Construction Environment Management Framework, Construction Traffic Management Framework and Construction Noise and Vibration Standard, as well as the CEMP and CEMP sub-plans.</p>
<p>Are the impacts of the proposed activity/works able to be managed so as not to have an adverse impact?</p>	<p>Yes. The impacts of the proposal can be managed to avoid an adverse impact.</p>

## 13. Other Environmental Approvals

Identify all other approvals required for the project:

- Road Occupancy Licences (ROL) will be obtained for all work on or adjacent to roads.
- Approval for works that are required outside of approved construction hours (i.e. OOHW) will be sought in accordance with Condition D37 and/or D38 of the Instrument of Approval.

## Author certification

To be completed by person preparing checklist.

I certify that to the best of my knowledge this Consistency Checklist:

- Examines and takes into account the fullest extent possible all matters affecting or likely to affect the environment as a result of activities associated with the Proposed Revision; and
- Examines the consistency of the Proposed Revision with the Approved Project; is accurate in all material respects and does not omit any material information.

Name:	Candice Somerville	Signature:	
Title:	Environmental Approvals Manager		
Company:	GLC	Date:	13 October 2022

This section is for Sydney Metro only.

### Application supported and submitted by

Name:	Yvette Buchli	Date:	14/10/2022
Title:	Associate Director – Planning Approvals	Comments:	
Signature:			



Based on the above assessment, are the impacts and scope of the proposed activity/modification consistent with the existing Approved Project?

- Yes      The proposed activity/works are consistent and no further assessment is required.
  
- No        The proposed works/activity is not consistent with the Approved Project. A modification or a new activity approval/ consent is required. Advise Project Manager of appropriate alternative planning approvals pathway to be undertaken.

Endorsed by			
Name:	Ben Armstrong	Date:	14 October 2022
Title:	A/Director, Project ESP	Comments:	
Signature:			



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## Appendix A – Borehole/Monitoring Well Locations



- Legend**
- Approved Surface Construction Boundary
  - Tunnel Alignment
  - Boreholes
  - Boreholes with Monitoring Wells
  - Boreholes/Monitoring Wells removed from the CA
  - 50m Search Buffer
  - Drainage Line



**APPENDIX A.1**  
**Borehole and Monitoring Well Locations**



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Scale 1:2500 at A4

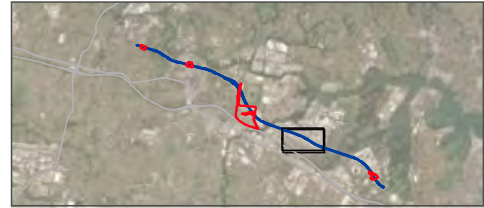
- Legend**
- Approved Surface Construction Boundary
  - Tunnel Alignment
  - Boreholes
  - Boreholes/Monitoring Wells removed from the CA
  - 50m Search Buffer



**APPENDIX A.2**  
**Borehole and Monitoring Well Locations**



- Legend**
- Tunnel Alignment
  - Drainage Line
  - Boreholes
  - Boreholes with Monitoring Wells
  - 50m Search Buffer



**APPENDIX A.3**  
**Borehole and Monitoring Well Locations**

## Appendix B – Borehole/Monitoring Well Environmental Characteristics

Environmental Characteristic	Description
<b>Portion 1 (Westmead) – BH90, BH91, MW37, MW40</b>	
<b>Land use</b>	<ul style="list-style-type: none"> <li>Portion 1 is located in Westmead, with MW40 located within 100m of the western boundary of the Westmead Metro Station surface construction site, and BH90, BH91 and MW37 located within 170m of the eastern boundary of the Westmead Metro Station surface construction site.</li> <li>Portion 1 is surrounded by the existing Westmead train station, residential / commercial premises and Western Sydney University (Westmead Campus) to the north, residential premises and Westmead Public School to the west and south, and residential premises continuing to Parramatta Park to the east.</li> <li>Portion 1 sites (excluding MW37) fall within the following land use zones under the Cumberland Local Environmental Plan 2021:                             <ul style="list-style-type: none"> <li>MW40 - 'R2 – Low Density Residential'</li> <li>BH90, BH91 – 'R4 – High Density Residential'</li> </ul> </li> <li>MW37 is located on the northern side of the existing Westmead rail corridor and is zoned as 'R4 – High Density Residential' under the Parramatta Local Environmental Plan 2011.</li> </ul>
<b>Noise and vibration</b>	<ul style="list-style-type: none"> <li>Existing noise levels within Portion 1 are generally attributed to transportation noise (i.e. road and rail) and general background noise in an urban location.</li> <li>The nearest receivers are residential dwellings located on Alexandria Avenue, Hawksbury Road, and Hassall Street.</li> <li>All Portion 1 sites (excluding MW37) sit within NCA02 (as identified in the EIS), which has a NML of 59dBA for daytime standard construction activities and 42dBA for night-time OOHW. MW37 sits within NCA01, which has an NML of 58 for daytime standard construction activities and 46dBA for night-time OOHW.</li> <li>The results of the CNVIA (Appendix E) indicate that exceedances of up to 20-30 dBA above the NML may occur at up to seven residential receivers within NCA02 during approved construction hours, and exceedance of &gt;30 dBA above the NML may occur at eleven residential receivers within NCA02 during night time OOHW.</li> <li>Exceedances of up to 20-30 dBA may occur at up to one residential receivers within NCA01 during approved construction hours, and exceedances of &gt;30 dBA above the NML may occur at one residential receiver within NCA01 during night time OOHW.</li> </ul>
<b>Surface water and groundwater</b>	<ul style="list-style-type: none"> <li>BH91 is the closest site to nearby waterways in Portion 1. It is located approximately 160m west of Domain Creek and 500m southwest of Parramatta River.</li> <li>The EIS identified Parramatta River as a sensitive receiving environment as it is a Type 1 Key Fish Habitat. It is also identified as SEPP Coastal Wetlands and has potential habitat for threatened aquatic species and protected aquatic vegetation.</li> <li>There are no aquatic groundwater dependent ecosystems within 250m of Portion 1.</li> </ul>

Environmental Characteristic	Description
	<ul style="list-style-type: none"> <li>There is one terrestrial groundwater dependent ecosystem within 250m of Portion 1, which is the Cumberland Shale Sandstone Transition F (located along Domain Creek). This has been identified as a high potential groundwater dependent ecosystem from national assessment.</li> </ul>
<b>Soils and contamination</b>	<ul style="list-style-type: none"> <li>The EIS identified three areas within 250m of the Portion 1 sites where the soils and groundwater have moderate contamination risk potential, all of which are associated with current and historical activities within the surface construction boundary for Westmead Metro Station. These include:                             <ul style="list-style-type: none"> <li>AEI 2: Mechanical workshop / services – Leaks and spills from underground petroleum storage infrastructure / automotive repair work</li> <li>AEI 3: Dumping of construction waste</li> <li>AEI 5: Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes</li> </ul> </li> <li>There are no sites listed on the NSW EPA Contaminated Sites Register within 250 metres of Portion 1.</li> <li>There are no sites notified to the NSW EPA as being potentially contaminated within 250 metres of Portion 1.</li> <li>There are no environment protection licences listed in the NSW EPA Protection of the Environment Operations Act public register for areas within 250m of Portion 1.</li> <li>There is no acid sulfate soil risk mapped for Portion 1.</li> </ul>
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>Borehole/monitoring well sites within Portion 1 are located within primarily residential areas surrounding the Westmead Metro Station surface construction site. MW40 is the closest sites to existing native vegetation. These sites are however located on the southern side of the Westmead rail corridor, avoiding any native vegetation / PCT's within the rail corridor.</li> </ul>
<b>Aboriginal heritage*</b>	<ul style="list-style-type: none"> <li>There are no registered Aboriginal sites within Portion 1.</li> </ul>
<b>Non-Aboriginal heritage</b>	<ul style="list-style-type: none"> <li>There are no heritage items or conservation areas within Portion 1.</li> </ul>
<b>Portion 2 (Clyde) – BH13</b>	
<b>Land use</b>	<ul style="list-style-type: none"> <li>Portion 2 is located in Clyde within close proximity to the surface construction site boundary for Clyde Maintenance and Stabling Facility (CMSF). BH13 is located adjacent to the underground tunnel alignment, along the south-south western border of the Rosehill Racecourse.</li> <li>Portion 2 is bound by James Ruse Drive and residential properties to the north and west, James Ruse Drive and industrial premises to the south, and the CMSF and Rosehill Racecourse to the east.</li> <li>BH13 falls within the 'RE2 – Private Recreation' land use zone under the Parramatta Local Environmental Plan 2011</li> </ul>
<b>Noise and vibration</b>	<ul style="list-style-type: none"> <li>Existing noise levels in Portion 2 (surrounding the CMSF construction site) are generally attributed to road traffic noise on the surrounding road network, particularly James Ruse Drive.</li> </ul>

Environmental Characteristic	Description
	<ul style="list-style-type: none"> <li>The nearest receivers are residential dwellings located along James Ruse Drive.</li> <li>BH13 sits within NCA07 (as identified in the EIS), which includes land east of James Ruse Drive, including mostly commercial premises and covers Rosehill Gardens racecourse (and associated stables), the Clyde commercial/industrial area, Silverwater and Newington.</li> <li>NCA07 has a NML of 56dBA for daytime standard construction activities and 46dBA for night-time OOHW.</li> <li>The results of the CNVIA (Appendix E) indicate that exceedances of up to 20-30 dBA above the NML may occur at up to sefour residential receivers within NCA07 during approved construction hours, and exceedance of 11-20 dBA above the NML may occur at sixteen residential receives within NCA07 during night time OOHW.</li> </ul>
<p><b>Surface water and groundwater</b></p>	<ul style="list-style-type: none"> <li>BH13 is the closest site to nearby waterways in Portion 2, being located approximately 320m north of Duck Creek.</li> <li>The EIS identified Duck Creek as a sensitive receiving environment as it is a Type 1 Key Fish Habitat. It is also located within 500m of a SEPP Coastal Wetland.</li> <li>There are no aquatic groundwater dependent ecosystems within 250m of Portion 2.</li> <li>There are no terrestrial groundwater dependent ecosystem within 250m of Portion 2, however a portion of Duck Creek has been identified as a high potential groundwater dependent ecosystem from national assessment. This is located approximately 275m south of BH13.</li> </ul>
<p><b>Soils and contamination</b></p>	<ul style="list-style-type: none"> <li>The EIS identified two areas within 250m of the Portion 2 sites where the soils, vapour and groundwater have moderate contamination risk potential, all of which are associated with current and historical activities within the surface construction boundary for Clyde Maintenance and Stabling Facility. These include:                         <ul style="list-style-type: none"> <li>AEI 13: Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes</li> <li>AEI 15: Current and historical commercial / industrial use within locality – Inappropriate chemical storage and use, industrial operations, waste disposal (e.g. James Hardie asbestos disposal sites) and management etc and current EPL (Downer EDI Works)</li> </ul> </li> <li>There are no sites listed on the NSW EPA Contaminated Sites Register within 250 metres of Portion 2, however it is worth noting that there are 11 sites within 2km of Portion 2 that have current notices from the NSW EPA. These sites are primarily within the suburbs of Rosehill and Camellia, which have been used for industrial purposes since the 1880s.</li> <li>There are no sites notified to the NSW EPA as being potentially contaminated within 250 metres of Portion 2.</li> <li>There are no environment protection licences listed in the NSW EPA Protection of the Environment Operations Act public register for areas within 250m of Portion 2.</li> <li>There is no acid sulfate soil risk mapped for Portion 2.</li> </ul>



Environmental Characteristic	Description
<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>The Portion 2 sites are largely located on existing hardstand area on the eastern side of James Ruse Drive. BH13 is located on a cleared grassed area at the southern end of the Rosehill Racecourse. There are no Plant Community Types (PCT) within 50m of Portion 2.</li> </ul>
<b>Aboriginal heritage</b>	<ul style="list-style-type: none"> <li>There are no registered Aboriginal sites within Portion 2.</li> </ul>
<b>Non-Aboriginal heritage</b>	<ul style="list-style-type: none"> <li>There are no heritage items or conservation areas within Portion 2.</li> </ul>
<b>Portion 3 (Silverwater) – BH03, MW01, MW06</b>	
<b>Land use</b>	<ul style="list-style-type: none"> <li>Portion 3 is located in Silverwater, with all three borehole/monitoring well sites located along the underground tunnel alignment in a largely industrial/commercial setting. MW01 and BH03 are located within 380m east of the Silverwater Services Facility site boundary. MW06 is located approximately 940m north west of the Silverwater Services Facility site boundary.</li> <li>Portion 3 is surrounded by industrial/commercial premises in all directions, extending to residential premises approximately 150m east of MW01, and Duck River located approximately 250m north of MW06.</li> <li>All Portion 3 sites fall within the 'IN1 – General Industrial' land use zone under the Auburn Local Environmental Plan 2010.</li> </ul>
<b>Noise and vibration</b>	<ul style="list-style-type: none"> <li>Existing noise levels at Portion 3 are generally attributed to road traffic noise on the surrounding road network and commercial/industrial noise.</li> <li>The nearest receivers are commercial/industrial facilities located on Silverwater Road, Derby Street and Skarratt Street North.</li> <li>All Portion 3 sites sit within NCA07 (as identified in the EIS), which includes land east of James Ruse Drive, including mostly commercial premises and covers Rosehill Gardens racecourse (and associated stables), the Clyde commercial/industrial area, Silverwater and Newington.</li> <li>NCA07 has a NML of 56dBA for daytime standard construction activities and 46dBA for night-time OOHW.</li> <li>The results of the CNVIA (Appendix E) indicate that exceedances of up to 20-30 dBA above the NML may occur at up to four residential receivers within NCA07 during approved construction hours, and exceedance of 11-20 dBA above the NML may occur at sixteen residential receivers within NCA07 during night time OOHW.</li> </ul>
<b>Surface water and groundwater</b>	<ul style="list-style-type: none"> <li>Site MW06 and MW01 are the closest site to nearby waterways in Portion 3. MW06 is located approximately 250m to the southeast of Duck River and MW01 is located approximately 570m to the west of Haslam Creek.</li> <li>The EIS identified Duck River and Haslam Creek as sensitive receiving environments as they are both Type 1 Key Fish Habitat. Both watercourses are also located within 500m of a SEPP Coastal Wetland.</li> <li>There are no aquatic groundwater dependent ecosystems within 250m of Portion 3.</li> <li>There is one terrestrial groundwater dependent ecosystem within 250m of Portion 3, which is the Cumberland River Flat Forest located in Duck River. This has been identified as a high potential groundwater dependent ecosystem from national assessment.</li> </ul>

Environmental Characteristic	Description
<p><b>Soils and contamination</b></p>	<ul style="list-style-type: none"> <li>• The EIS identified one area within 250m of the Portion 3 sites where the vapour and groundwater has a high contamination risk potential, which is associated with current and historical activities within a former storage facility. This includes:                             <ul style="list-style-type: none"> <li>○ AEI 22: Historical industrial use (former storage facility – 54-58 Derby Street, Silverwater) – Known groundwater contamination</li> <li>○ This storage facility is located directly adjacent to the east of the Silverwater Services Facility between MW02 and BH03.</li> </ul> </li> <li>• The EIS identified two areas within 250m of the Portion 3 sites where the soils have moderate contamination risk potential, all of which are associated with current and historical activities within the surface construction boundary for Silverwater Services Facility. These include:                             <ul style="list-style-type: none"> <li>○ AEI 21: Former and existing structures – Hazardous building materials within or from on-site buildings / structures, demolition wastes</li> <li>○ AEI 23: Dumping / storage of construction waste (soil stockpile and general wastes)</li> </ul> </li> <li>• There is one site listed on the NSW EPA Contaminated Sites Register within 250 metres of Portion 3, which has two current notices from the NSW EPA. This is the AEI 22 site located at 54-58 Derby Street, Silverwater. These notices order the land owner to undertake preliminary investigations to determine whether the land is contaminated with TCE and daughter products of TCE in the groundwater.</li> <li>• There are three sites notified to the NSW EPA as being potentially contaminated within 250 metres of Portion 3, two of which are currently under assessment by the NSW EPA and one where the NSW EPA determined that regulation under the <i>Contaminated Land Management Act 1997</i> is not required.</li> <li>• There is one environment protection licence listed in the NSW EPA Protection of the Environment Operations Act public register for areas within 250m of Portion 3. This site has been approved to perform 'non-thermal treatment of hazardous and other waste'.</li> <li>• There is no acid sulfate soil risk mapped for Portion 3.</li> </ul>
<p><b>Biodiversity</b></p>	<ul style="list-style-type: none"> <li>• The Portion 3 sites are located on existing hardstand area within a predominantly industrial/commercial area in Silverwater. There are no Plant Community Types (PCT) within 50m of Portion 3.</li> </ul>
<p><b>Aboriginal heritage</b></p>	<ul style="list-style-type: none"> <li>• There are no registered Aboriginal sites within Portion 3.</li> </ul>
<p><b>Non-Aboriginal heritage</b></p>	<ul style="list-style-type: none"> <li>• There are no heritage items or conservation areas within Portion 3.</li> </ul>

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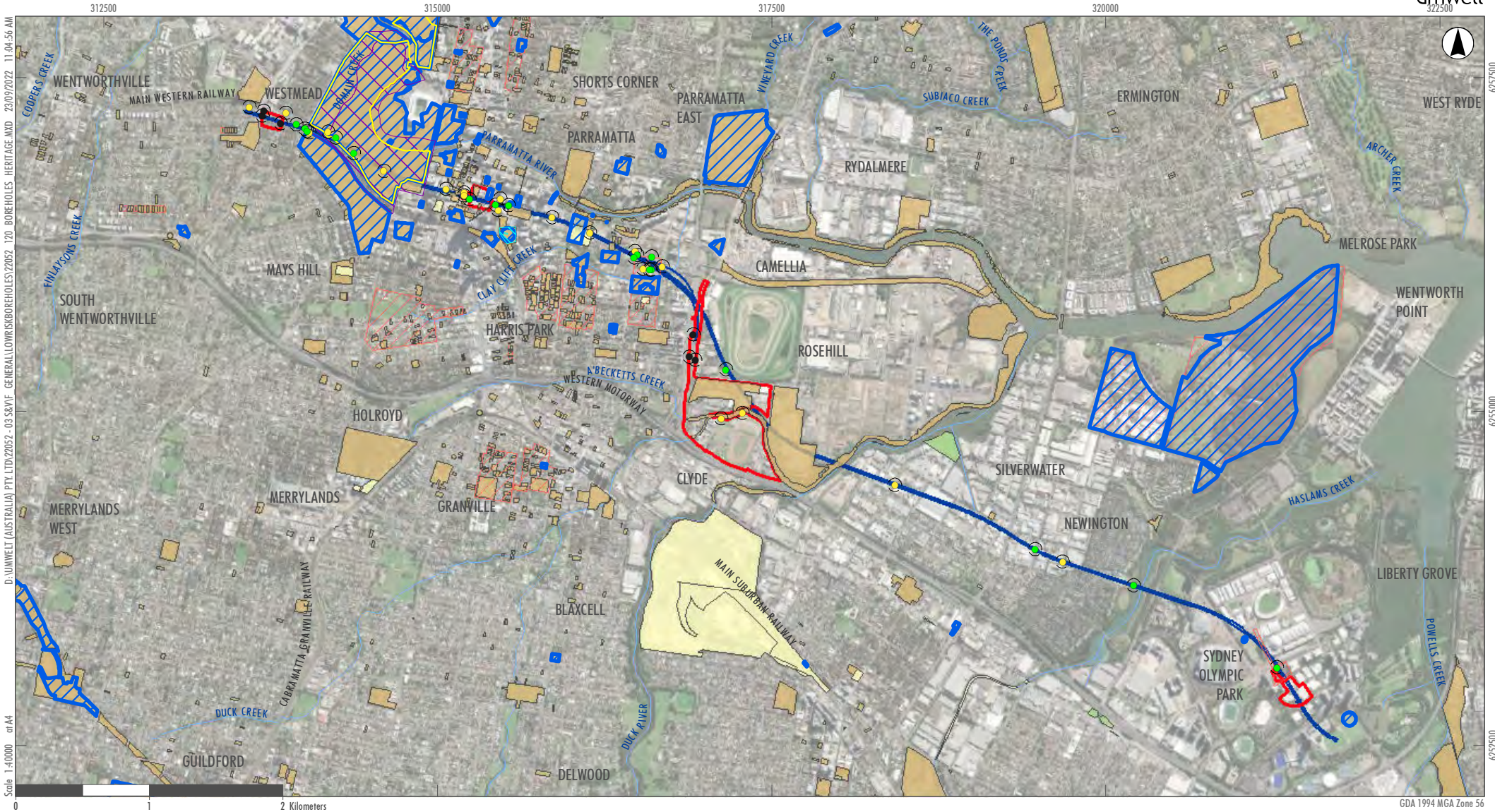
## Appendix C – Ecology and Heritage Constraints Review

Borehole ID	Investigation Type	Heritage Constraint/s	Ecology Constraint/s	Heritage Constraint Rating	Eco Constraint Rating	Overall Risk	Recommendation
GALC-BH03	Borehole	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-BH03 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted. Low biodiversity constraint	Low	Low	Low	No further heritage or ecology assessment required
GALC-BH13	Borehole	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-BH13 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted. Low biodiversity constraint	Low	Low	Low	No further heritage or ecology assessment required
GALC-BH84	Borehole	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-BH84 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted. Low biodiversity constraint	Low	Low	Low	Moved within Westmead Metro Station construction site boundary. No further heritage or ecology assessment required.
GALC-BH89	Borehole	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-BH89 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted. Low biodiversity constraint	Low	Low	Low	Moved within Westmead Metro Station construction site boundary. No further heritage or ecology assessment required.
GALC-BH90	Borehole	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-BH90 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted. Low biodiversity constraint	Low	Low	Low	No further heritage or ecology assessment required
GALC-BH91	Borehole	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-BH91 footprint. No heritage constraints.	Vegetation present is likely to be planted. Impact to vegetation easily avoidable. Low biodiversity risk.	Low	Low	Low	No further heritage or ecology assessment required
GALC-MW01	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW01 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted. Low biodiversity constraint	Low	Low	Low	No further heritage or ecology assessment required
GALC-MW06	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW06 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted.	Low	Low	Low	No further heritage or ecology assessment required
GALC-MW14	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW14 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is planted and or weedy. Likely to have been cleared prior to Geotech works commencing Low biodiversity constraint	Low	Low	Low	Moved within Clyde MSF construction site boundary. No further heritage or ecology assessment required.
GALC-MW17	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW17 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation within the buffer has already been cleared Low biodiversity constraint	Low	Low	Low	Moved within Clyde MSF construction site boundary. No further heritage or ecology assessment required.
GALC-MW18	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW18 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is planted and or weedy. Likely to have been cleared prior to Geotech works commencing Low biodiversity constraint	Low	Low	Low	Moved within Clyde MSF construction site boundary. No further heritage or ecology assessment required.
GALC-MW37	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW37 footprint. No heritage constraints.	No native vegetation mapped within the 50 buffer. Vegetation present is likely to be planted. Low biodiversity constraint	Low	Low	Low	No further heritage or ecology assessment required
GALC-MW40	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW40 footprint. No heritage constraints.	MW site located south of the existing CEEC mapped within rail corridor in BDAR. Low biodiversity risk.	Low	Low	Low	No further heritage or ecology assessment required
GALC-MW47	Monitoring well	No historical (non-Aboriginal) items and/or Aboriginal sites located within the GALC-MW47 footprint. No heritage constraints.	MW site located south of the existing CEEC mapped within rail corridor in BDAR. Low biodiversity risk.	Low	Low	Low	Moved within Westmead Metro Station construction site boundary. No further heritage or ecology assessment required.



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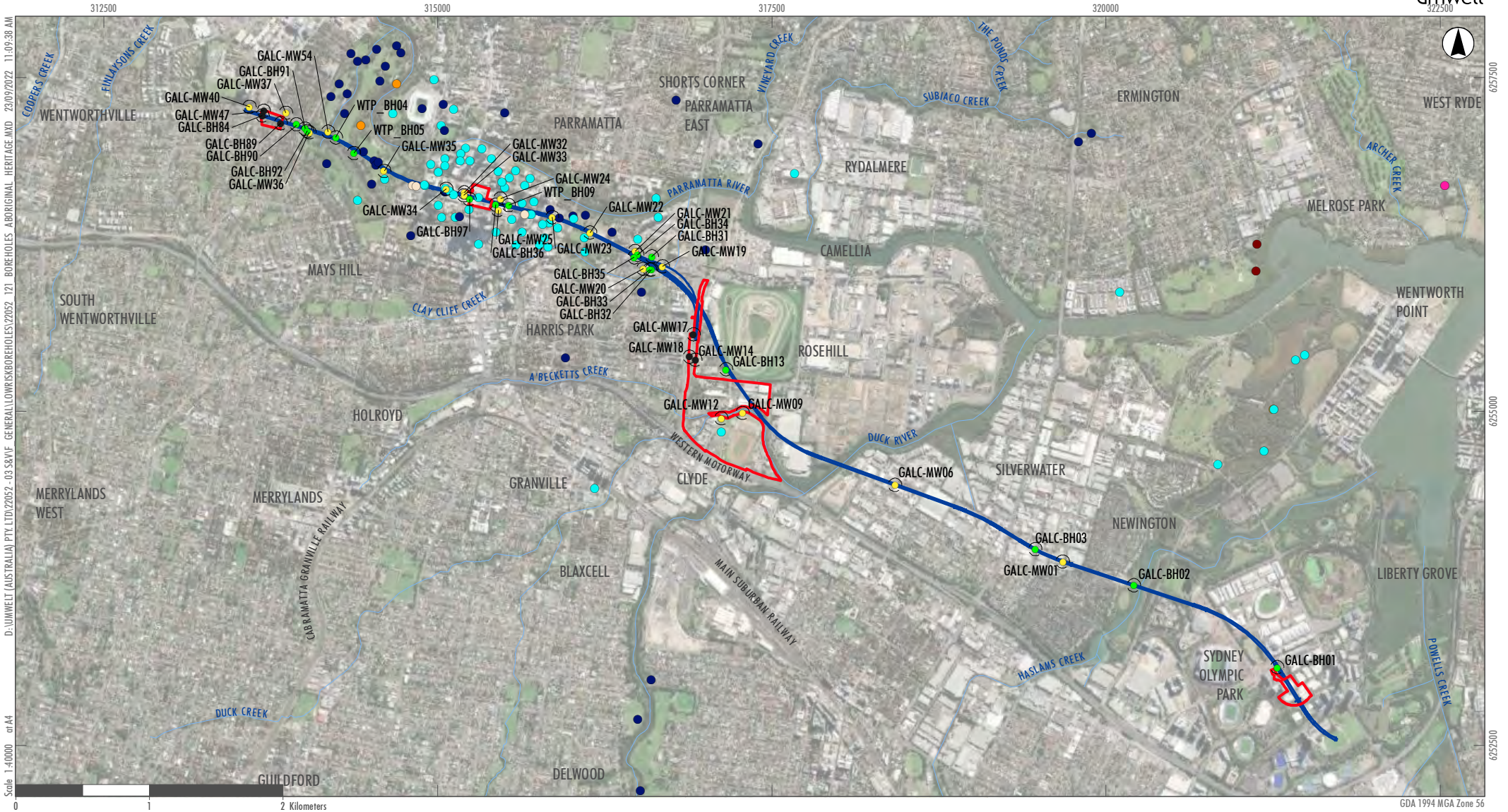
## Appendix D – Heritage Context



Legend

- |                                        |                                                |                           |                             |
|----------------------------------------|------------------------------------------------|---------------------------|-----------------------------|
| Approved Surface Construction Boundary | Boreholes                                      | World Heritage Properties | <b>Local Heritage</b>       |
| Tunnel Alignment                       | Boreholes with Monitoring Wells                | Commonwealth Heritage     | Conservation Area - General |
| Drainage Line                          | Boreholes/Monitoring Wells removed from the CA | National Heritage Places  | Item - General              |
| 50m Search Buffer                      |                                                | State Heritage Act        | Item - Archaeological       |
|                                        |                                                |                           | Item - Landscape            |

APPENDIX D.1  
Heritage Context



Legend

- Approved Surface Construction Boundary
- Tunnel Alignment
- Drainage Line
- Boreholes
- Boreholes with Monitoring Wells
- Boreholes/Monitoring Wells removed from the CA
- 50m Search Buffer
- AHIMS Sites**
- Cultural Shell Deposit
- Culturally Modified Tree
- Grinding Groove
- Hearth
- Open artefact site
- PAD

APPENDIX D.2  
Heritage Context

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## **Appendix E – Construction Noise and Vibration Impact Assessment (CNVIA)**



**To:** Candice Somerville  
**From:** M. Bruck / S. Luzuriaga  
**Date:** 4 October 2022  
**Subject:** Sydney Metro West WTP  
 NVIA Geotechnical Investigations (Low Risk)

**At:** GLC  
**At:** SLR Consulting Australia Pty Ltd  
**Ref:** 610.30644-M07a-Low Risk Sites-v1.0-20221004.docx

## 1 Introduction

SLR Consulting has been engaged by Gamuda & Laing O’Rourke Consortium (GLC) to provide noise and vibration advice in relation to the Sydney Metro West Western Tunnelling Package. This Construction Noise and Vibration Impact Assessment (NVIA) has been prepared to assess potential noise and vibration impacts associated with Geotechnical Investigations along the project alignment during approved hours and out-of-hours (OOH) assessment periods.

All work on or adjacent to roads would be carried out in accordance with a relevant Traffic Control Plan (TCP) and/or Road Occupancy Licence (ROL) to facilitate safe work near live traffic. Where an ROL cannot be obtained for the approved project hours and/or proposed works cannot be undertaken safely during these hours, some works will be required to be undertaken outside of approved project hours (ie Out of Hours Work, OOHW).

## 2 Overview of Proposed Work

**Table 1** presents an overview of key information relevant to this NVIA. **Table 2** presents the Construction Scenarios and Equipment. The construction equipment and locations included in the assessment are based on information contained in the scope of works supplied on 9 August 2022 from project team, and subsequent updates. Further detail of existing conditions, management levels and assessment methodology are outlined in the Detailed Noise and Vibration Impact Statement (DNVIS).

**Table 1 Details of proposed work**

Item	Description		
CNIA Reference	M07a		
Works Type	Geotechnical Investigations (Low Risk)		
Location	Westmead to Sydney Olympic Park		
Assessment Periods (refer CNVMP)	<b>Approved Project Hours (AH)</b>	<b>OOHW1 (Evening)</b>	<b>OOHW2 (Night)</b>
	Monday -Friday (7am – 6pm)	Monday -Friday (6pm – 10pm)	Monday -Friday (10pm – 7am)
	Saturday (8am – 6pm)	Saturday (6pm – 10pm)	Saturday (10pm – 8am)
	Sunday / Public Holidays (Nil)	Sun. / P. Holidays (8am -6pm)	Sun. / P. Holidays (6pm -7am)
Ambient Acoustic Environment at Nearest Receiver	The acoustical environment along the project alignment changes depending on the area of interest but is generally dominated by road traffic noise and ‘urban hum’.		
Noise Modelling	ISO 9613:2 algorithm in SoundPLAN v8.2		
Results Presentation	Free field – no façade reflections		

**Table 2 Construction Scenarios and Equipment**

			Total Lw (dBA)	Excavator 3-6T + hydraulic Hammer <sup>3</sup>	Lighting Tower	Saw – Concrete <sup>3</sup>	Tipper Truck	Truck - Vacuum (NDD)	Water Cart	Tracked Hydraulic Drilling Rig	Hand tools (electric)	Light Vehicle (accelerating) <sup>2</sup>
<b>Sound Power Level (Lw)</b>				115	80	118	103	109	107	114	102	96
<b>Estimated utilisation per period (%)</b>				20%	100%	20%	20%	100%	50%	100%	50%	25%
ID	Construction Scenario	Assessment Period										
W.001	Non-Destructive Digger (NDD)	AH (Day) / OOHW2 (Night)	<b>118</b>	1	1	1	1	1	1			
W.002	Drilling Operations	AH (Day) / OOHW2 (Night)	<b>114</b>		1					1		4
W.003	Reinstatement	AH (Day) / OOHW2 (Night)	<b>105</b>		1						1	

Note 1: Individual Sound Power Levels (Lw) for key activities have been adopted from the DEFRA Noise Database, AS2436, TfNSW *Construction Noise and Vibration Strategy* and Sydney Metro *Construction Noise and Vibration Standard*.

Note 2: Taken from *Road Traffic Noise Prediction Model “ASJ RTN-Model 2013” Proposed by the Acoustical Society of Japan – Part 2: Study on Sound Emission of Road Vehicles*, OKADA et al, *Internoise 2014*, and accounts for vehicles accelerating.

Note 3: The ICNG requires ‘annoying’ activities (eg saw operations) to have a 5 dB ‘penalty’ applied to the source sound power level.

A total of 30 borehole (BH) /monitoring well (MW) locations have been assessed as part of this geotechnical investigation scope of work. Following the heritage and ecological constraints review, these locations were divided into three categories:

- Low environmental risk: *BH03, BH13, BH90, BH91, MW01, MW06, MW37, MW40*
- Moderate environmental risk: *BH01, BH02, BH31, BH32, BH33, BH34, BH35, BH36, MW19, MW20, MW21, MW24, MW25*
- High environmental risk: *BH05, BH92, BH97, MW22, MW23, MW34, MW35, MW36, MW54*

This assessment addresses the low environmental risk locations only.

### 3 Assessment Criteria

#### 3.1 Noise Management Levels

The noise management levels (NMLs) for residential (**Table 3**) and other sensitive receivers (**Table 4**) have been adopted from the Construction Noise and Vibration Management Plan (CNVMP). Project-specific NMLs for residential receivers were determined for each Noise Catchment Area (NCA). During out-of-hours work (OOHW) the residential NML is determined as 5 dB above the Rating Background Noise level (RBL) (ie RBL + 5dB).

NMLs for other sensitive receivers have been adopted from the Interim Construction Noise Guideline (ICNG), Sydney Metro - Construction Noise and Vibration Standard (CNVS), *AS2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors*, and previous assessments undertaken for the Sydney Metro West Project (eg EIS and modification reports).

**Table 3 Project Residential NMLs**

NCA	Receiver Type	Representative Logger Location	Noise Management Level ( $L_{Aeq(15minute)} - dBA$ )				Sleep Disturbance Screening Level (52 dBA or RBL +15 dB whichever is higher) ( $L_{Amax} dBA$ )
			Approved Construction Hours (RBL+10dB)	Out of Hours (RBL+5dB)			
			Day	Day <sup>1</sup>	Evening	Night	
NCA01	Residential	B.02	58	53	51	46	56
NCA02	Residential	B.01	59	54	52	42	52
NCA03	Residential	B.03	68	63	58	48	58
NCA04	Residential	B.04	61	56	53	46	56
NCA05	Residential	B.05	60	55	54	50	60
NCA06	Residential	B.06	62	57	56	49	59
NCA07	Residential	B.07	56	51	49	46	56
NCA08	Residential	B.08	58	53	53	51	61
NCA09	Residential	B.09	58	53	51	46	56

Note 1: Daytime out of hours is 7 am to 8 am on Saturday, and 8 am to 6 pm on Sunday and public holidays

**Table 4 NMLs for ‘Other Sensitive’ Receivers**

Land Use	Assessment Period	Noise Management Level $L_{Aeq(15minute)}$ (dBA)	
		Internal	External
<b>ICNG ‘Other Sensitive’ Receivers</b>			
Classrooms at schools and other educational institutions	When in use	45	55 <sup>1</sup>
Hospital wards and operating theatres	When in use	45	65 <sup>2</sup>
Places of worship	When in use	45	55 <sup>1</sup>
Active recreation areas (characterised by sporting activities and activities which generate noise)	When in use	-	65
Passive recreation areas (characterised by contemplative activities that generate little noise)	When in use	-	60
Commercial	When in use	-	70
Industrial	When in use	-	75

Land Use	Assessment Period	Noise Management Level L <sub>Aeq</sub> (15minute) (dBA)	
		Internal	External
<b>Non-ICNG 'Other Sensitive' Receivers</b>			
Hotel <sup>3</sup>	Day / Evening	50	70 <sup>2</sup>
	Night-time	40	60 <sup>2</sup>
Café / Bar / Restaurant <sup>3</sup>	When in use	50	70 <sup>2</sup>
Child Care Centres – Sleeping areas <sup>4</sup>	When in use	40	50 <sup>1</sup>
Public Building	When in use	50	60 <sup>1</sup>
Recording Studio	When in use	25	45 <sup>2</sup>
Theatre/Auditorium	When in use	30	50 <sup>2</sup>
Rosehill Gardens Racecourse Stables <sup>5</sup>	When in use	-	60

- Note 1: It is assumed that these receivers have windows partially open for ventilation which results in internal noise levels being around 10 dB lower than the external noise level.
- Note 2: It is assumed that these receivers have fixed windows which conservatively results in internal noise levels being around 20 dB lower than the external noise level.
- Note 3: Adopted from AS2107.
- Note 4: Adopted from *Association of Australian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment*.
- Note 5: Adopted from the ICNG – passive recreation.

### 3.2 Vibration Guidelines

The effects of vibration from construction work can be divided into three categories:

- Those in which the occupants of buildings are disturbed (**human comfort**). People can sometimes perceive vibration impacts when vibration generating construction work is located close to occupied buildings. Vibration from construction work tends to be intermittent in nature and the *Assessing Vibration: a technical guideline* (AVTG) (DEC, 2006) provides criteria for intermittent vibration based on the Vibration Dose Value (VDV).
- Those where the integrity of the building may be compromised (**structural/cosmetic damage**). If vibration from construction work is sufficiently high, it can cause cosmetic damage to elements of affected buildings. Industry standard cosmetic damage vibration limits are specified in British Standard BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*, BSI, 1993 and German Standard DIN 4150 Part 3-2016 *Structural vibration – Effects of vibration on structures*, Deutsches Institute fur Normung, 1999.
- Those where building contents may be affected (**building contents**). People perceive vibration at levels well below those likely to cause damage to building contents. For most receivers, the human comfort vibration criteria are the most stringent and it is generally not necessary to set separate criteria for vibration effects on typical building contents. Exceptions to this can occur when vibration sensitive equipment, such as electron microscopes or medical imaging equipment, are in buildings near to construction work, refer Sydney Metro *Construction Noise and Vibration Standard*.

Based on the equipment and activities identified for the geotechnical investigation work vibration impacts are not expected for human comfort, structural/cosmetic damage or building contents. Given the limited potential for any vibration impacts to occur, no further assessment of construction vibration is considered necessary.

## 4 Assessment Findings

Noise modelling was conducted in accordance with the method outlined in the DNVIS. A summary of the number of buildings where NML exceedances were predicted for the various work scenarios is shown in **Table 6** to **Table 7**. Maps of the predicted (worst-case) noise impacts are presented in **Appendix A** (Approved Hours) **Appendix B** (OOHW). As the timing of all work locations has not yet been confirmed, noise impacts are presented for both approved hours and OOHW for all work locations. It is noted that most of the work locations will be undertaken during approved hours.

The assessment shows the predicted impacts based on the exceedance of the management levels, as per the categories in **Table 5**.

**Table 5 Exceedance Bands and Impact Colouring**

Exceedance of Management Level	Impact Colouring
No exceedance	
1 to 10 dB	
11 dB to 20 dB	
21 dB to 30 dB	
>30 dB	

The noise impact maps in **Appendix A** and **Appendix B** present the worst-case predicted noise impacts (ie when work is occurring closest to each receiver). It is noted that there may be up to three crews working simultaneously during the geotechnical investigations. Recommendations are provided in **Section 5** to avoid cumulative impacts.

The assessment is generally considered conservative as the calculations assume several items of construction equipment are in use at the same time within individual scenarios. In reality, there would frequently be periods when construction noise levels are much lower than the worst-case levels predicted as well as times when no equipment is in use and no noise impacts occur.

**Table 6 Construction Noise Assessment – Low Risk Work Locations – Approved Hours**

Work ID	Assessment Period	Exceedance Category Above NML	Number of Receivers with NML Exceedance									
			Residential Receivers									Other Sensitive Receivers
			NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08	NCA09	All NCAs
W.001	Approved Hours (AH)	1-10 dB	26	32	-	-	-	-	38	-	-	38
		11-20 dB	17	9	-	-	-	-	5	-	-	12
		20-30 dB	1	7	-	-	-	-	4	-	-	-
		>30 dB	-	-	-	-	-	-	-	-	-	-
		HNA <sup>1</sup>	-	-	-	-	-	-	-	-	-	-
W.002	Approved Hours (AH)	1-10 dB	24	15	-	-	-	-	18	-	-	24
		11-20 dB	7	8	-	-	-	-	6	-	-	3
		20-30 dB	-	4	-	-	-	-	-	-	-	-
		>30 dB	-	-	-	-	-	-	-	-	-	-
		HNA <sup>1</sup>	-	-	-	-	-	-	-	-	-	-
W.003	Approved Hours (AH)	1-10 dB	12	5	-	-	-	-	7	-	-	4
		11-20 dB	-	7	-	-	-	-	-	-	-	-
		20-30 dB	-	-	-	-	-	-	-	-	-	-
		>30 dB	-	-	-	-	-	-	-	-	-	-
		HNA <sup>1</sup>	-	-	-	-	-	-	-	-	-	-

Note 1: Highly noise affected, based on ICNG definition (i.e. predicted LAeq(15minute) noise at residential receiver is 75 dBA or greater).

**Table 7 Construction Noise Assessment – Low Risk Work Locations - OOHW**

Work ID	Assessment Period	Exceedance Category Above NML	Number of Receivers with NML Exceedance									
			Residential Receivers									Other Sensitive Receivers
			NCA01	NCA02	NCA03	NCA04	NCA05	NCA06	NCA07	NCA08	NCA09	All NCAs
W.001	OOHW2 (Night)	1-10 dB	130	303	-	-	-	-	91	-	-	25
		11-20 dB	24	74	-	-	-	-	16	-	-	8
		20-30 dB	19	20	-	-	-	-	-	-	-	-
		>30 dB	1	11	-	-	-	-	-	-	-	-
		SD <sup>1</sup>	92	270	-	-	-	-	76	-	-	-
W.002	OOHW2 (Night)	1-10 dB	75	202	-	-	-	-	30	-	-	13
		11-20 dB	18	46	-	-	-	-	3	-	-	3
		20-30 dB	13	10	-	-	-	-	-	-	-	-
		>30 dB	1	8	-	-	-	-	-	-	-	-
		SD <sup>1</sup>	53	103	-	-	-	-	47	-	-	-
W.003	OOHW2 (Night)	1-10 dB	19	54	-	-	-	-	8	-	-	3
		11-20 dB	16	11	-	-	-	-	-	-	-	-
		20-30 dB	1	6	-	-	-	-	-	-	-	-
		>30 dB	-	2	-	-	-	-	-	-	-	-
		SD <sup>1</sup>	22	40	-	-	-	-	12	-	-	-

Note 1: Sleep Disturbance Screening Level – (L<sub>Amax</sub>)

## 5 Conclusion and Recommendations

Noise emissions from the project have been predicted at the surrounding receivers. Worst-case noise levels are expected to exceed the noise management level (NML) by up to '11 - 20 dB' at the closest 'other sensitive' receivers and by up to '> 30 dB' at the closest residential receiver during OOHW2 (Night). Impacts are predicted to be lower during the approved project hours, where receivers are less sensitive to construction noise.

A number of mitigation and management measures have been recommended below. Where feasible and reasonable these should be applied to the project to control and minimise the impacts during construction as far as practicable.

Consider the following recommendations (where feasible and reasonable) during commencement of each work scenario:

- Implement mitigation measures identified within the CNVMP and DNVIS
- Implement additional mitigation measures identified within the CNVMP and DNVIS
- Ensure the minimum sized equipment necessary to complete the work are used
- Implement portable noise barriers around noise intensive activities (ie drill rig, concrete saw and hydraulic hammer)
- Where multiple crews work simultaneously during the geotechnical investigations. Crews should avoid working within 500 m of each other to avoid cumulative impacts.
- Provide respite periods for noise intensive activities
- Shut down plant and machinery, including vehicles when not in operation
- Undertake noise monitoring during works to confirm noise predictions. Monitoring locations should be targeted to most affected receivers (**Appendix A and B**), or representative locations nearby.

Checked/ Authorised by: DL
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## APPENDIX A – NOISE IMPACT MAPS (APPROVED HOURS)

Figure A1 W.001: Non-Destructive Digger (NDD) - AH



Figure A2 W.001: Non-Destructive Digger (NDD) - AH

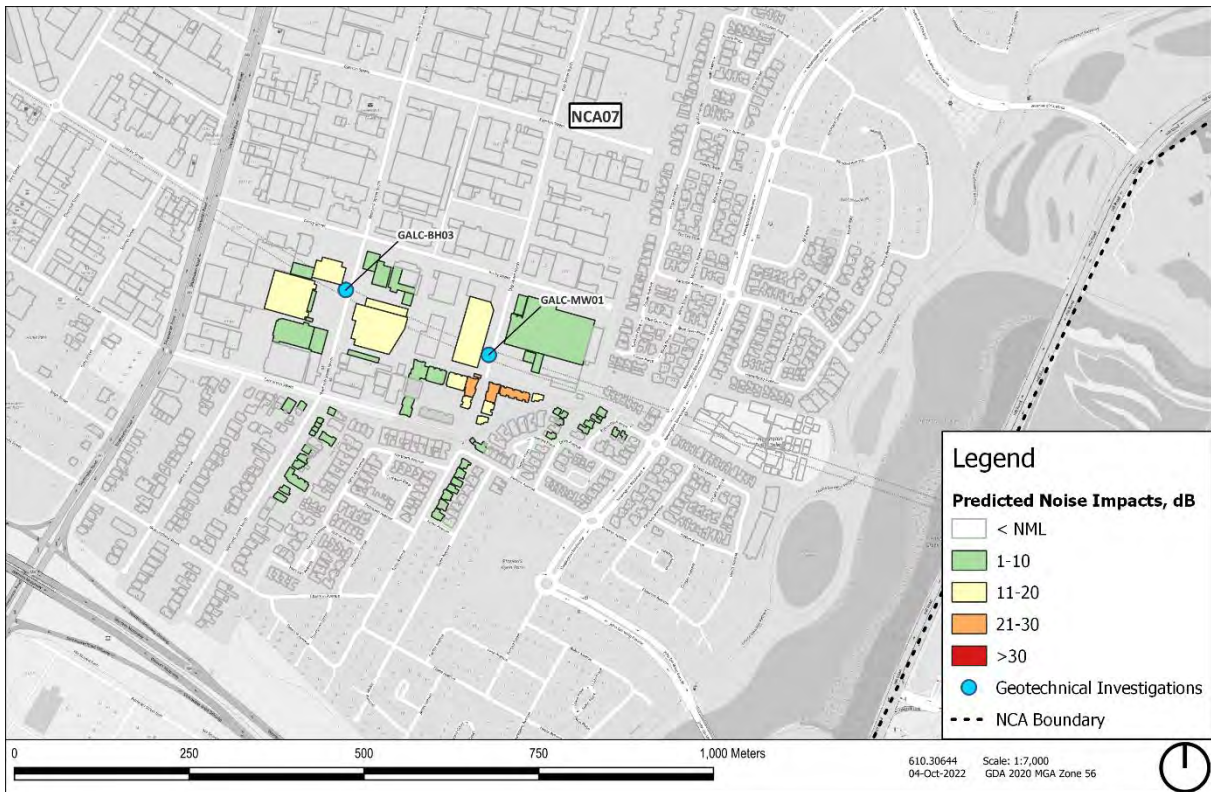


Figure A3 W.002: Drilling Operations - AH



Figure A4 W.002: Drilling Operations - AH

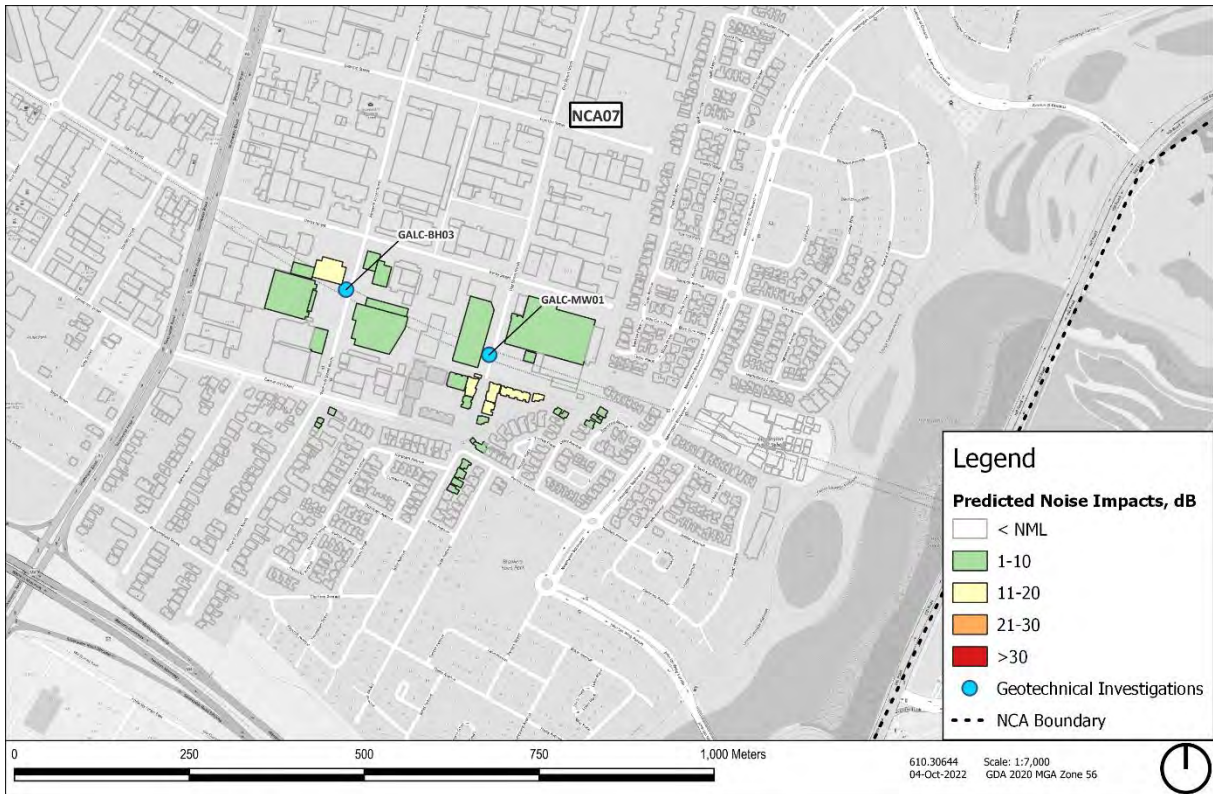


Figure A5 W.003: Reinstatement - AH

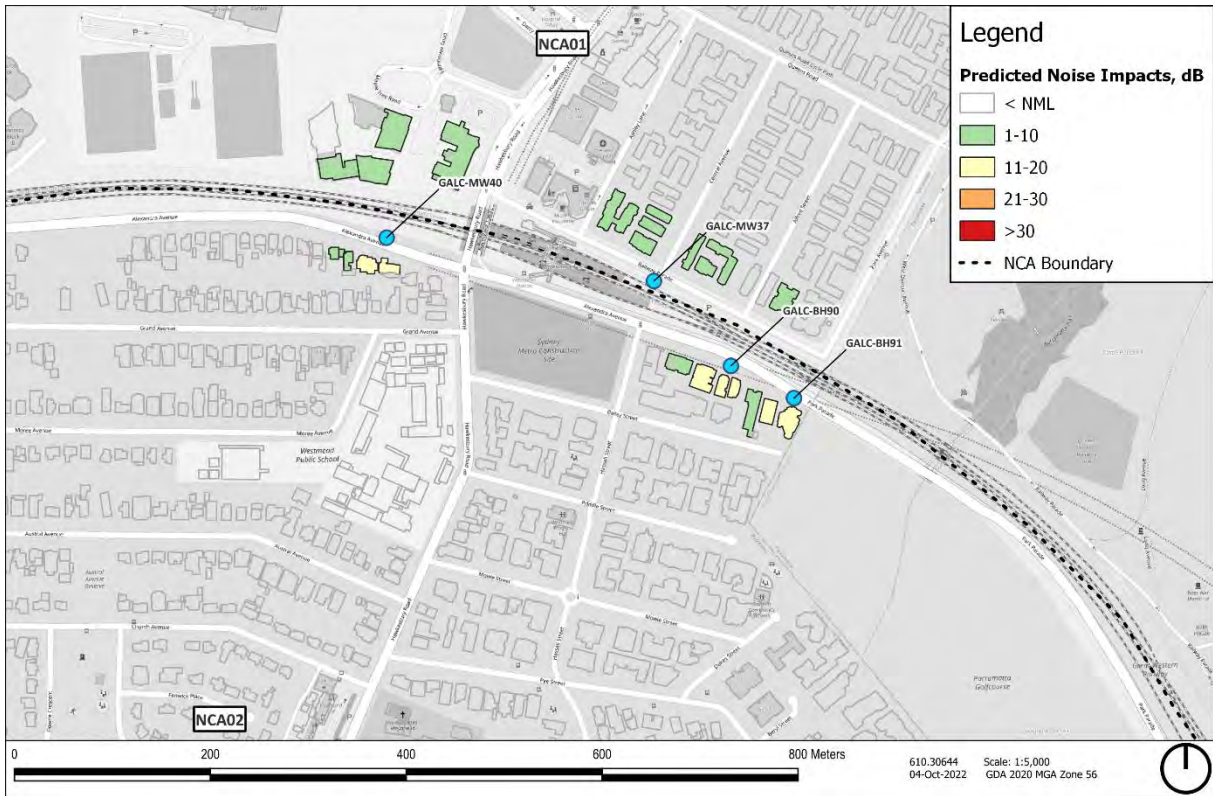
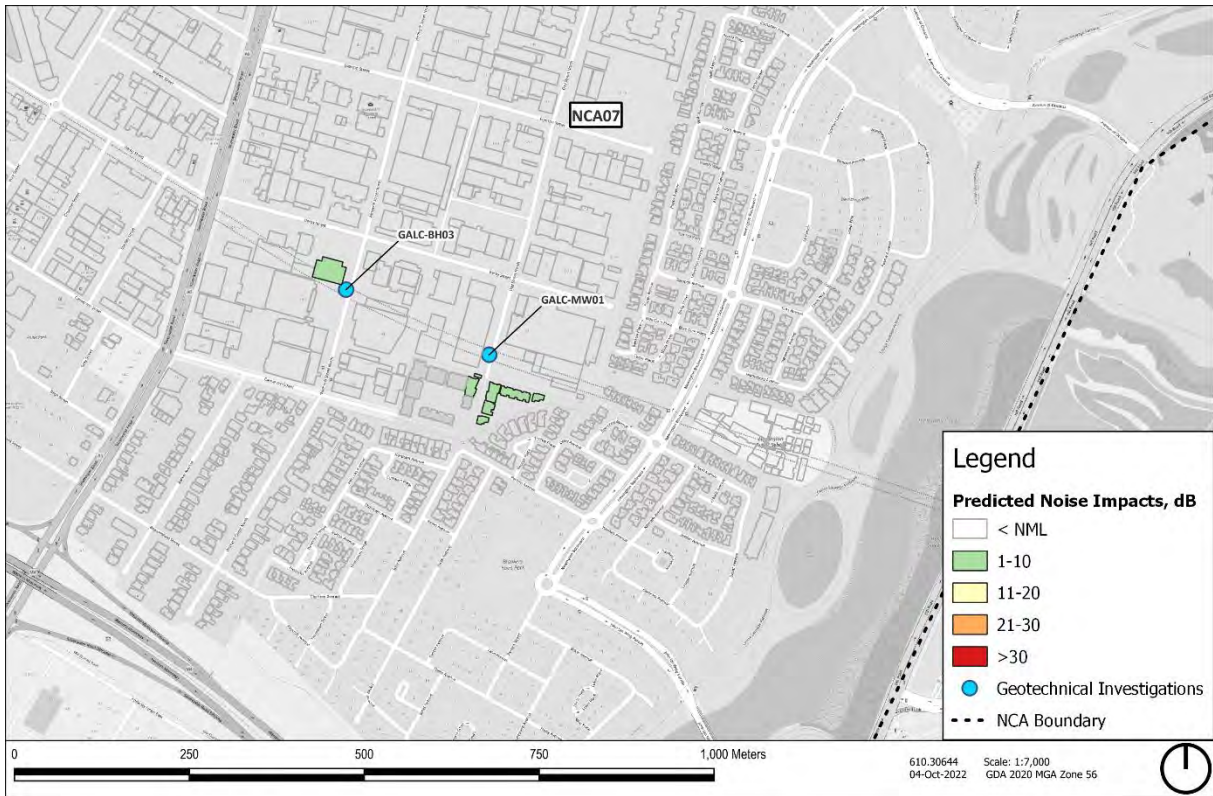


Figure A6 W.003: Reinstatement - AH



## APPENDIX B – NOISE IMPACT MAPS (OOHW2)

Figure B1 W.001: Non-Destructive Digger (NDD) - OOHW2



Figure B2 W.001: Non-Destructive Digger (NDD) - OOHW2

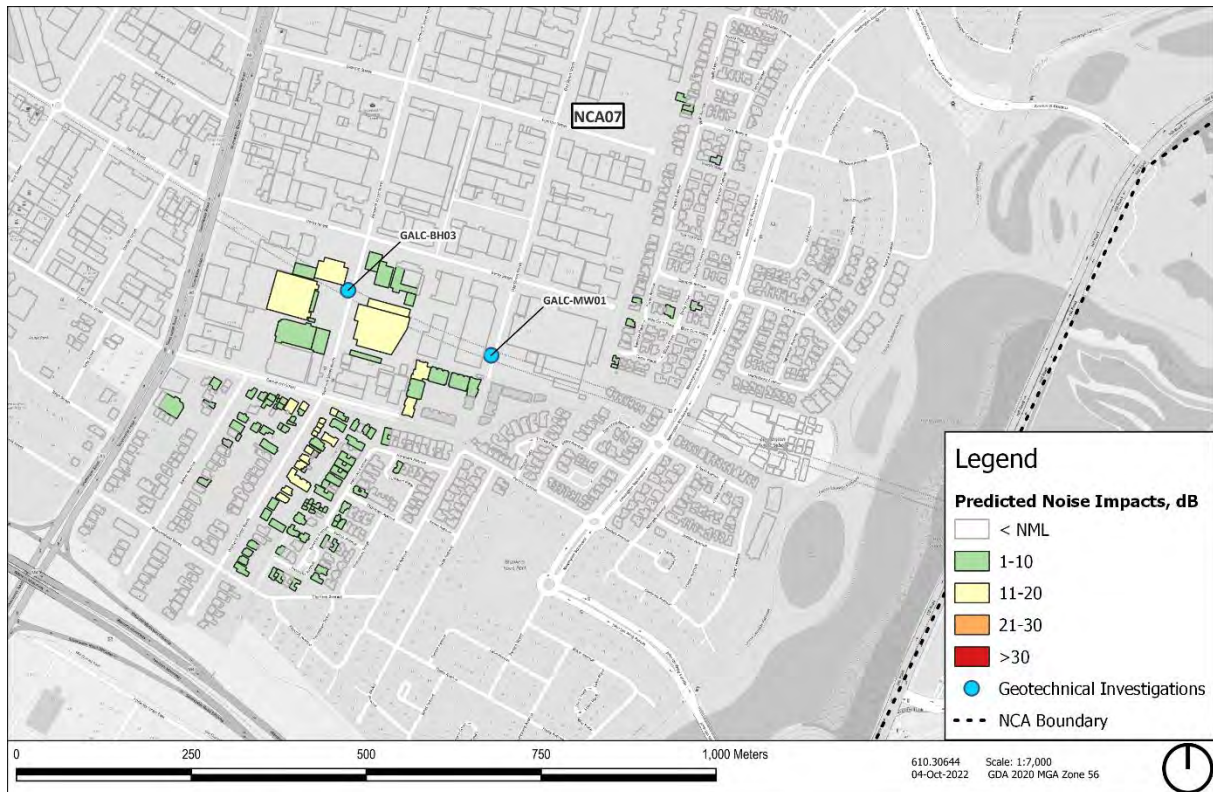


Figure B3 W.002: Drilling Operations - OOHW2



Figure B4 W.002: Drilling Operations - OOHW2

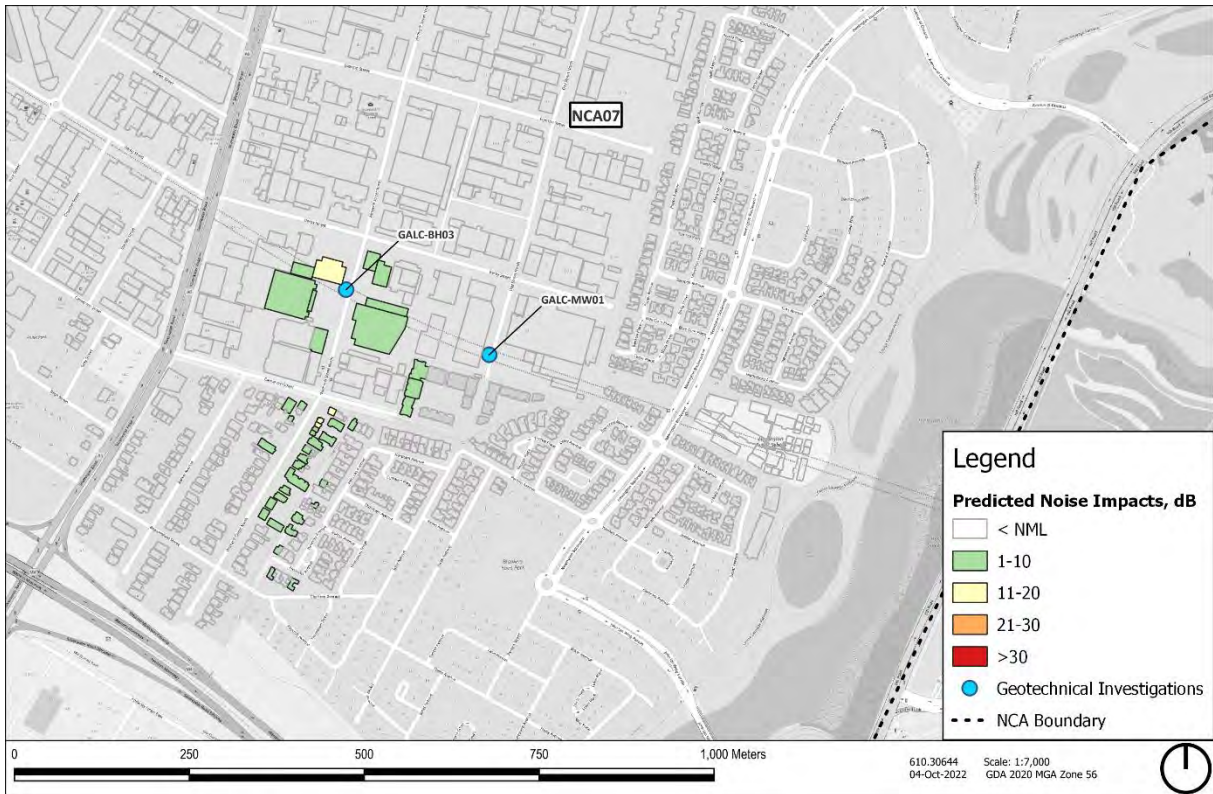
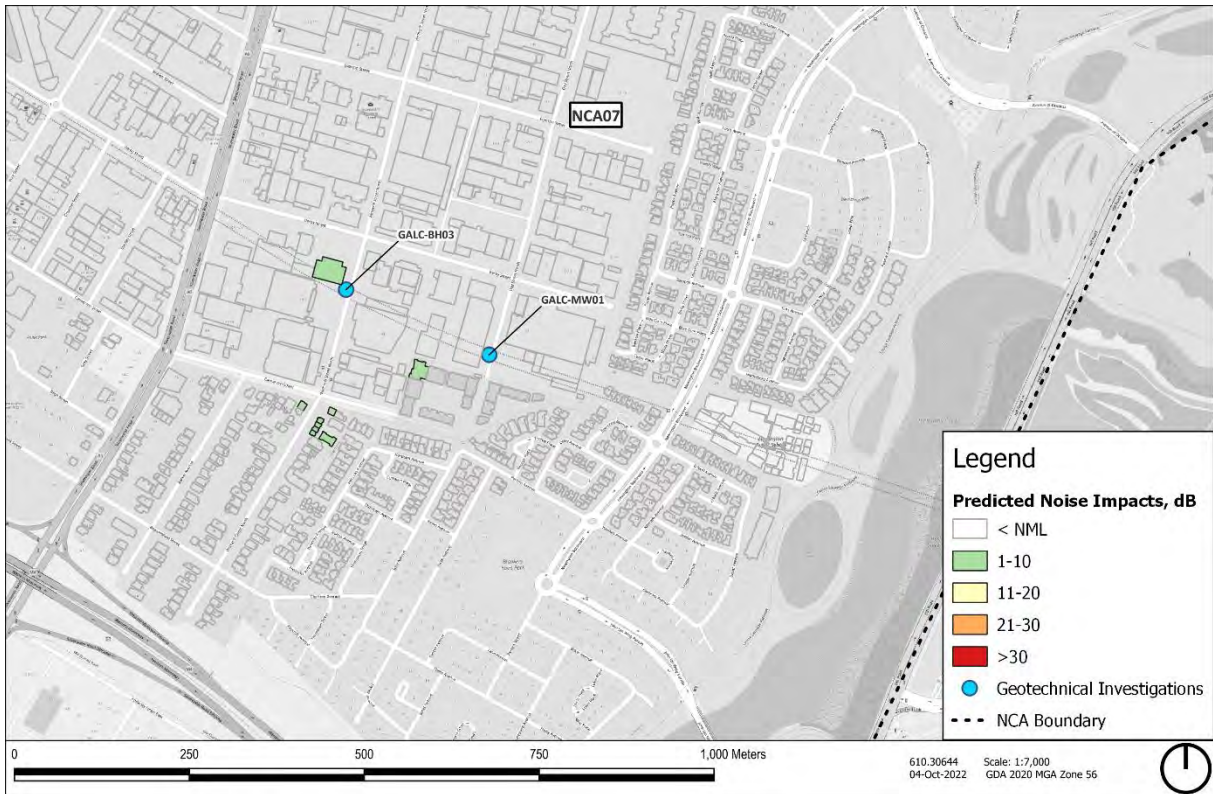


Figure B5 W.003: Reinstatement - OOHW2



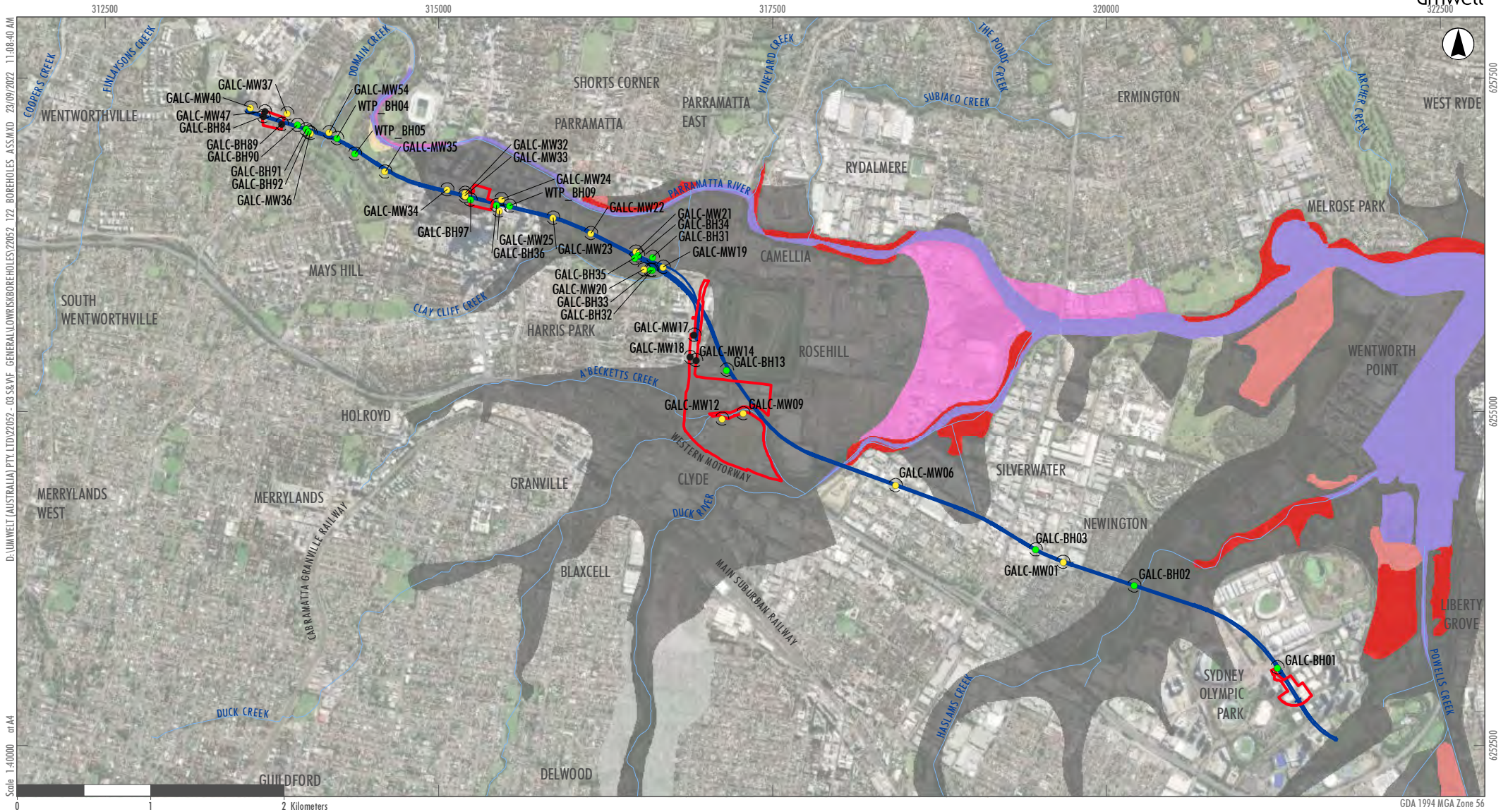
Figure B6 W.003: Reinstatement - OOHW2





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## Appendix F – Acid Sulfate Soil Risk Map



Legend

- Approved Surface Construction Boundary
- Tunnel Alignment
- Drainage Line
- Boreholes
- Boreholes with Monitoring Wells
- Boreholes/Monitoring Wells removed from the CA
- 50m Search Buffer
- Acid Sulfate Soil Risk**
- High Risk 0-1m
- High Risk 1-2m
- High Risk 2-4m
- High Risk Sediments
- Low Risk above 4m
- No Risk
- Disturbed Terrain

APPENDIX F  
Acid Sulfate Soil Risk

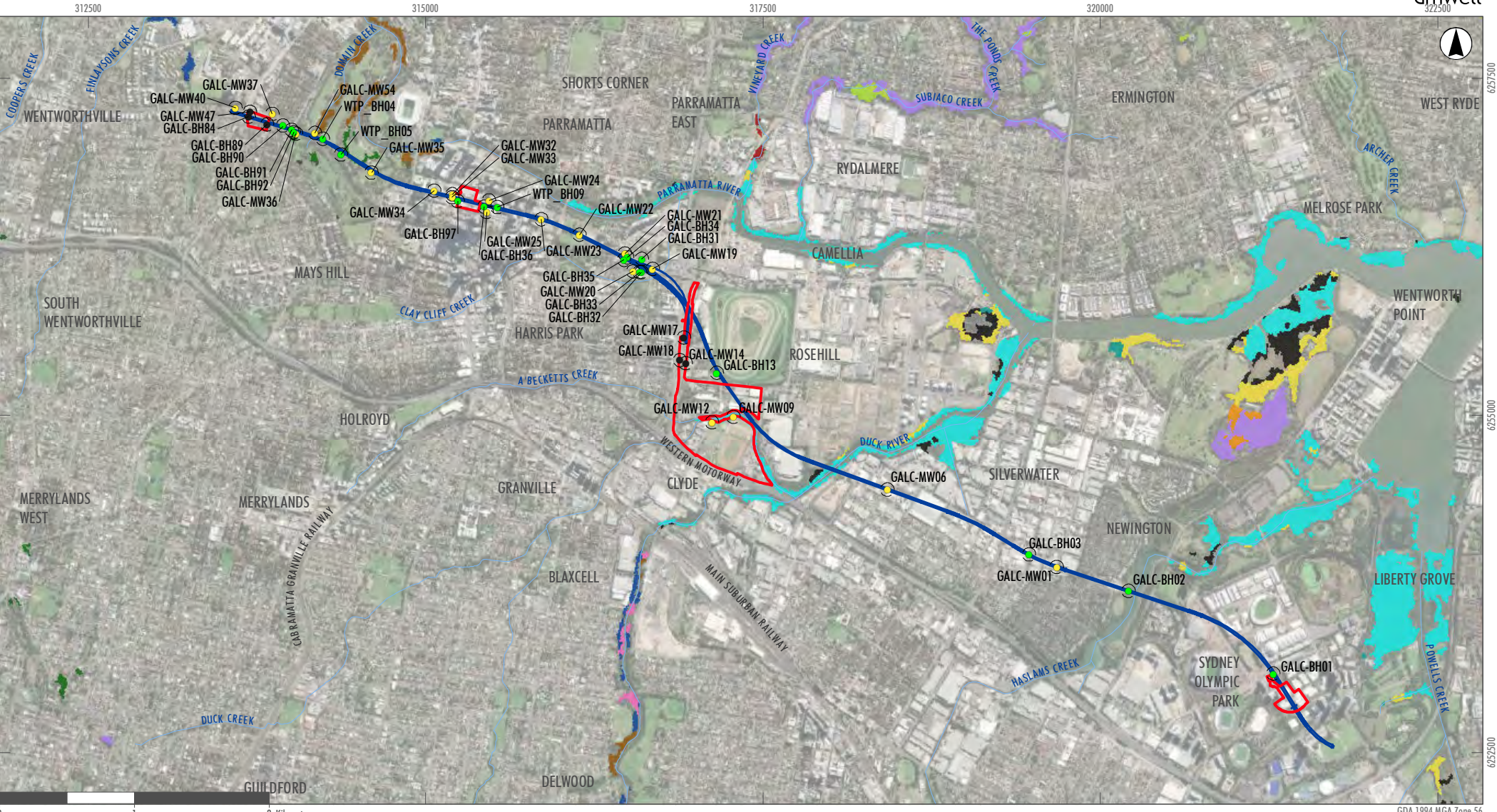




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## Appendix G – Native Vegetation

D:\UMWELT (AUSTRALIA) PTY. LTD\22052 - 03 S&VF - GENERAL\LOWRIS\BOREHOLES\22052 123 BOREHOLES NATIVE VEGETATION.MXD 23/09/2022 11:07:37 AM



**Legend**

- |                                                                                                                                       |                                                                                     |                                                                                                                                                                           |                                                                                                                                                                                            |                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <span style="border: 1px solid red; display: inline-block; width: 15px; height: 10px;"></span> Approved Surface Construction Boundary | <span style="color: green;">●</span> Boreholes                                      | <span style="background-color: #90EE90; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Native Vegetation                             | <span style="background-color: #FFD700; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 3448, Castlereagh Ironbark Forest                        | <span style="background-color: #000080; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 4023, Coastal Valleys Swamp Oak Riparian Forest |
| <span style="color: blue;">—</span> Tunnel Alignment                                                                                  | <span style="color: yellow;">●</span> Boreholes with Monitoring Wells               | <span style="background-color: #90EE90; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 3136, Blue Gum High Forest              | <span style="background-color: #40E0D0; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 3963, Estuarine Reedland                                 | <span style="background-color: #8B4513; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 4024, Cumberland Blue Box Riverflat Forest      |
| <span style="color: blue;">—</span> Drainage Line                                                                                     | <span style="color: black;">●</span> Boreholes/Monitoring Wells removed from the CA | <span style="background-color: #CCCCFF; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 3262, Sydney Turpentine Ironbark Forest | <span style="background-color: #FF69B4; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 3972, Sydney Creekflat Wetland                           | <span style="background-color: #FFFF00; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 4028, Estuarine Swamp Oak Twig-rush Forest      |
| <span style="border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> 50m Search Buffer                    |                                                                                     | <span style="background-color: #3CB371; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 3320, Cumberland Shale Plains Woodland  | <span style="background-color: #8B0000; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 4006, Northern Paperbark-Swamp Mahogany Saw-sedge Forest | <span style="background-color: #00CED1; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 4091, Grey Mangrove-River Mangrove Forest       |
|                                                                                                                                       |                                                                                     |                                                                                                                                                                           |                                                                                                                                                                                            | <span style="background-color: #2F4F4F; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PCT : 4097, Samphire Saltmarsh                        |

**APPENDIX G  
Native  
Vegetation**

Image Source: ESRI (2021) Data source: DFSI (2021)