Waterloo OSD Project

Basement

Air Quality Management Plan

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John Holland Group

Air Quality Management Plan – Construction Works

Waterloo Over Station Development – Basement

15 February 2023

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JBS&G Australia Pty Ltd

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Abbreviations

Term	Definition
ACM	Asbestos Containing Material
AHD	Australia Height Datum
AIOH	Australian Institute of Occupational Hygienists
AQA	Air Quality Assessment
AQMP	Air Quality Management Plan
ASS	Acid sulfate soil
AST	Above ground storage tank
bgs	below ground surface
BTEX	Benzene, toluene, ethylbenzene, xylene
CBD	Central Business District
CLM Act	Contaminated Land Management Act 1997
COPC	Contaminant of potential concern
DA	Development Application
DDR	Dust Deposition Rates
DEMP	Demolition Environmental Management Plan
DP	Deposited Plan
DSI	Detailed Site Investigation
EPA	NSW Environment Protection Authority
HMBS	Hazardous Materials Building Survey
JBS&G	JBS&G Australia Pty Ltd
JHG	John Holland Group
LAA	Licensed Asbestos Assessor
LPI	NSW Land and Property Information
NATA	National Association of Testing Authorities (NATA)
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
OSD	Over Station Development
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential acid sulfate soil
PCB	Polychlorinated biphenyls
PFAS	Per-and-poly-fluoroalkyl substances
$PM_{(2.5/10)}$	Particle Matter (number indicates particle diameter in micrometres/micron)
POEO Act	Protection of the Environment Operations Act 1997
PPE	Personal Protective Equipment
RAP	Remedial Action Plan
RCS	Respirable Crystalline Silica
RL	Relative Level
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SPOCAS	suspension peroxide oxidation combined acidity
SSD	State Significant Development
SVOC	Semi-volatile organic compounds
SWA	SafeWork Australia
SWNSW	SafeWork New South Wales
TRH	Total Recoverable Hydrocarbon
TSP	Total Suspended Particulate
UST	Underground storage tank
VOC	Volatile Organic Compound

1. Introduction

1.1 Introduction and Background

JBS&G Australia Pty Ltd (JBS&G) was engaged by John Holland Group Pty Ltd (JHG, the client) to prepare this air quality management plan (AQMP) for the development site known as the Waterloo Metro Quarter Over Station Development (OSD) Basement Carpark (herein referred to as 'the site').

Development consent for the development works at the site has been obtained from the Department of Planning as SSD 10438. The consent conditions require that prior to the commencement of construction works on the basement, an AQMP must be prepared for the works which is separate to the AQMP approved for the critical state significant infrastructure (CSSI) works at Waterloo Station. Specifically Conditions C23 to C25 of SSD 10438 which relate to the requirements of this AQMP are summarised in **Table 1.1** below.

Table 1.1: Requirements of AQMP as Specified in Consent SSD10438

SSD 10437 Conditions C23 to C25	Addressed in
"C23. Prior to the commencement of any earthwork or construction, the Applicant shall:	
(b) prepare an Air Quality Management Sub-Plan (AQMP) for the development, independent of the AQMP approved with the CSSI station works. The AQMP must be submitted to the Planning Secretary for approval and a copy provided to the Certifying Authority. The Sub-Plan must include, as a minimum, the following elements:	**Sections 2** to **7** of this AQMP
(i) be prepared by a suitably qualified and experienced expert in accordance with the EPA's Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (the Approved Methods);	Engagement of JBS&G's Team for air quality impact for preparation of this AQMP. See **Section 1.3** for author qualifications.
(ii) relevant environmental criteria to be used in the day-to-day management of dust and volatile organic compounds (VOC/odour);	**AQMP01, Appendix B**
(iii) mission statement;	**Section 1.3**
(iv) dust and VOCs/odour management strategies consisting of: • *objectives and targets;* • *risk assessment;* • *suppression improvement plan.*	**Section 5.3 and AQMP01, Appendix B**
(v) monitoring requirements including assigning responsibility (for all employees and contractors);	**Section 5.3**
(vi) communication strategy; and	**AQMP07, Appendix B**
(vii) system and performance review for continuous improvements.	**AQMP05, Appendix B**
C24. The Sub-Plan must detail management practices to be implemented for all dust and VOC/odour sources at the site. The Sub-Plan must also detail the dust, odour, VOC and semi-volatile organic compounds (SVOC) monitoring program (eg. frequency, duration and method of monitoring) to be undertaken for the project.	**Section 5.3 and AQMP01, Appendix B**
C25. The Applicant must also develop and implement an appropriate comprehensive Reactive Air Quality and Odour Management Plan which will incorporate an Ambient Air Monitoring Program and Reactive Management Strategy to ensure that the assessment criteria are met during the works."	**AQMP04, Appendix B**

1.2 Objective and Scope of work

The objective of the AQMP is to provide a plan designed to ensure that the requirements of conditions C23 to C25 of SSD 10438 are met, and that potential onsite and offsite air quality impacts which may occur as a result of the proposed development are controlled and/or mitigated in an acceptable manner. The plan requires the implementation of a number of ongoing monitoring and management measures pertaining to the proposed demolition/construction works. The AQMP is intended to form part of the Construction Framework Environmental Management Plan (CFEMP, document ID: WMQ-BMNT-JHG-PM-MPL-0005) being prepared for the site by JHG.

1.3 Mission Statement

In light of the objectives listed above, the mission statement for this AQMP is considered to be as follows.

This AQMP has been prepared to ensure that construction activities occurring as part of the Basement carpark for the over station development (OSD) at the Waterloo Metro Quarter are managed to:

- meet NSW Environment Protection Authority (EPA) endorsed air quality and odour objectives;
- provide a reactive monitoring regime to allow early detection of air quality and odour issues associated with construction, and allow a realtime assessment of various activities on the site; and
- effectively manage excavation/construction activities to prevent potential offensive odour and/or unacceptable emissions to air.

This AQMP has been prepared by JBS&G's air quality assessment team, and details of the JBS&G personnel who have been involved with this document are presented in **Table 1.2**.

Table 1.2: Details of JBS&G Personnel Involved with AQMP Preparation

Name	Position	Qualifications and Experience	Role in AQMP
Matthew Parkinson, CEnvP-SC	Senior Principal	Bachelor of Engineering (Environmental) (Hons) Master of Property Development Matthew is a Senior Principal Environmental Consultant with over 25 years' experience as a specialist in air quality management in the context of site remediation and redevelopment. Matthew has thorough knowledge of NSW EPA Guidelines for air quality assessment and modelling, and has had previous air quality impact assessments (AQIAs) and AQMPs for site redevelopments approved directly by the NSW EPA air modelling team.	AQMP Technical Director
Sumi Dorairaj, CEnvP- SC	Principal	Bachelor of Engineering (Environmental) (Hons) Master of Engineering Science (Groundwater Studies) Sumi is a Principal Environmental Consultant with over 10 years' experience as a specialist in air quality management as part of site contamination and redevelopment projects. Sumi has thorough knowledge of NSW EPA Guidelines for air quality assessment and modelling. She has assisted Matthew in gaining approval of previous AQIAs and AQMPs from the NSW EPA in addition to preparing numerous AQIAs and AQMPs for remediation and redevelopment works in NSW.	AQMP Author

Notes:
CEnvP- SC = Certified Environmental Practitioner - Site Contamination Specialist with the Environment Institute of Australia and New Zealand (EIANZ).

2. Site and Project Details

The Environmental Impact Statement (EIS) prepared for development at the site in '*Environmental Impact Statement, Waterloo Metro Quarter Over Station Development Basement Carpark, Detailed State Significant Development Application*' Urbis Pty Ltd, document WMQ-BSMT-EIS-RPT-003 revision 5, dated 26 October 2020 (Urbis 2020) presented a comprehensive discussion of site details. The details which are relevant with respect to management of potential dust and air quality impacts are summarised in the following sections.

2.1 Site Area

The Waterloo Metro Quarter is located within the City of Sydney Local Government Area (LGA). The site is situated about 3.3 kilometres south of Sydney CBD and eight kilometres northeast of Sydney International Airport within the suburb of Waterloo.

The Waterloo Metro Quarter site comprises land to the west of Cope Street, east of Botany Road, south of Raglan Street and north of Wellington Street (**Figure 2**). The heritage-listed Waterloo Congregational Church at 103–105 Botany Road is within this street block but does not form a part of the Waterloo Metro Quarter site boundaries.

The Waterloo Metro Quarter site is a rectangular shaped allotment with an overall site area of approximately 1.287 hectares.

The Waterloo Metro Quarter site comprises the following allotments and legal description at the date of this report. Following consolidation by Sydney Metro, the land will be set out in Lot 190 in deposited plan (DP) 1257150. The Waterloo Metro Quarter OSD Basement Capark (i.e. the site) has an area of approximately 5,700m^2.

The boundaries of the overall site are shown on **Figure 1**, and the current site layout is shown on **Figure 2**.

2.2 Proposed Development - Waterloo Metro Quarter

The Waterloo Metro Quarter OSD comprises four separate buildings, a basement carpark and public domain works adjacent to the Waterloo Metro station.

Separate SSD DAs were submitted concurrently for the design, construction and operation of each building in the precinct;

- Southern precinct SSD-10437;
- Basement Car Park SSD-10438 (i.e. for the area of the site covered by this AQMP);
- Central precinct SSD-10439; and
- Northern precinct-SSD-10440.

While Urbis (2020) provides an overview of all precincts, the details presented in here have been limited to the area of the site (i.e. the Basement Carpak) as appropriate for the AQMP.

2.2.1 Basement Carpark

The consent received for SSD-10438 permits construction of the following facilities at the site:

- Excavation and construction of a two-level basement structure within Waterloo Metro Quarter, comprising:
    - 155 car spaces, 13 motorcycle spaces and 315 bicycle parking spaces;
    - a ground floor slab to cap the basement on which future buildings of the Northern Precinct (SSD 10438) and Central Precinct (SSD 10439) will be constructed;

- end-of-trip facilities and storage; and
- staged stratum subdivision.

The extent of these works on the site in the context of the full Waterloo Metro Quarter development are shown in **Figure 3**.

2.3 Surrounding Environment

The area surrounding the site consists of a mix of commercial, residential and light industrial uses, civic uses and open space. Urbis (2020) provided the following summary of land uses on adjacent properties to the site or on properties across adjacent roadways to the OSD area:

- North: Raglan Street forms the northern boundary of the site. On the northern side of Raglan Street is a mix of one and two-storey commercial buildings with ground floor retail. Further to the north is Redfern Station and Town Centre which is characterised by a mix of residential, retail and student accommodation uses. Redfern Park is located approximately 500m north-east of the site and is a well-used recreational space with a grassy recreational park, sports fields, grandstand, and children's playground;
- East: Waterloo Estate, comprising land bounded by Cope, Raglan, George, Wellington, Gibson, Kellick, Pitt and McEvoy streets, which has an approximate site area of 12.32 hectares (approximately 65% of the total estate). It currently comprises 749 social housing dwellings owned by the NSW Land and Housing Corporation, 125 privately owned dwellings, and some commercial properties on the south-east corner of Cope and Wellington Streets;
- South: Land to the south of the site is characterised by a mix of low to mid rise industrial, commercial and residential buildings. Immediately to the south of the site on the opposite side of Wellington Street is the Cauliflower Hotel, a locally listed heritage item. Further to the south along Botany Road are a mix of residential apartments and row of terraces. Alexandria Park, a large area of public open space is located to the south-west of the site. Green Square Station and Green Square Town Centre are located approximately 800m south of the site.
- West: Botany Road forms the western boundary of the site. Beyond Botany Road to the west are two and three-storey commercial and light industrial buildings, as well as a five-storey mixed use residential flat building. Further to the west is the Alexandria Park Heritage Conservation Area (HCA). The HCA comprises a mix of late nineteenth-century houses including one to three-storey terraces and cottages. The area also includes corner shop buildings, industrial and warehouse buildings. South Eveleigh is a business and technology centre in Eveleigh, located approximately 400m north-west of the site.

The nearest sensitive receptors to the site are shown on **Figure 4**.

2.4 Meteorological Conditions

Average climatic data obtained indicated the site's meteorological setting is characterised by average minimum temperatures which vary from 10.5^{o}C in July to 20.5 ^{o}C in February; average maximum temperatures which vary from 17.3 ^{o}C in July to 24.8 ^{o}C in January; average annual rainfall of approximately 1079 mm with rainfall greater than 1 mm occurring on an average of 100 days per year; monthly rainfall varies from 60 mm in September to 125 mm in July.

3. General Air Quality in the City of Sydney

Air quality in the Sydney region is impacted by a range of air pollution emissions sources including major industry, motor vehicles and watercraft, commercial operations and leaking pipes and tanks as well as from domestic activities such as solid fuel heaters. Major pollutants that may potentially be emitted by the proposed earthworks have been identified as follows:

Fine Particles

Particles (or particulate matter) in the atmosphere come from a wide variety of sources, including soil (dust), vegetation (pollens and fungi), sea salt, fossil fuel combustion, biomass burning and industrial activities. Particles in the atmosphere typically exhibit a bi-modal size distribution with a peak in the range of 0.1-2.5µm and a second peak in the range 2.5-50µm. As a result, particles with a diameter of up to 2.5µm ($PM_{2.5}$) are commonly referred to as fine particles. There is also a distinction in the health effects of different sized particles. Particles up to about 10µm (PM_{10}) diameter are inhaled, whereas larger particles are not. On this basis, the term 'fine particles' is often used to refer to PM_{10}.

Coarse Particles

Coarse particles remain in the air for relatively short periods of time and are therefore generally not carried long distances. As a result, coarse particles tend to be a local rather than a regional problem, occurring close to industrial sources such as metal processing plants and mining operations. The level of particles in the atmosphere is determined by measurement of their mass. In the greater metropolitan area two methods of measurement are commonly used, total suspended particulates (TSP) and dust deposition rates (DDR). While the mass determined by these measures will include fine particles, these will generally only make a small contribution. Therefore, measurements of TSP and DDR are used to provide an indication of the level of coarse particulates in the atmosphere.

Concerns about coarse particles are generally more in terms of nuisance such as damage to or soiling of materials, or adverse effects on sensitive vegetation through surface coating.

Air Toxins

Another group of air pollutants which can be hazardous to human health, even at low levels, are toxic compounds known as air toxins. This group includes chemicals such as benzene, formaldehyde, chlorinated hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and dioxins. Trace amounts of many of these chemicals have been detected in air in urban environments in a number of areas around the world.

In recent years there has been increasing community concern about air toxins in ambient air and the associated health effects. These compounds may cause cancer, gene mutation, reproductive malfunction, affect foetal development, or have neurotoxic effects. While the levels that endanger public health have not been established, it is believed that even very low levels, particularly under long term exposure, could have adverse effects. Many air toxins are highly volatile and evaporate readily into the air following inhalation.

Odour

Odour is measured using panels of people who are presented with samples of odorous gas diluted with decreasing quantities of clean odour-free air. The panellists report when the smell becomes detectable. Odour in air is quantified in terms of "odour units" which is the number of dilutions required to bring the odour to a level at which 50% of the panellists can just detect the odour. This process is known as olfactometry.

Background levels of odour in the environment can vary enormously based on a range of factors.

3.1 Regulatory Requirements

Demolition activities on site will be required to be completed in accordance with several sections of environmental and occupational health and safety legislation and associated regulations. The primary Acts, Regulations and Guidelines are listed below with a brief summary of their applicability. Please note that this list is not intended to be a comprehensive listing of acts and regulations. The site owner and contractors are required to satisfy themselves that all applicable permits, licences and legislation have been obtained and their conditions satisfied.

Environmental Planning & Assessment Act 1979

The overarching Act to institute a system of environmental planning and assessment for NSW.

Work Health and Safety Act, 2011

The overarching Act for NSW setting law relating to employee health and safety and employer responsibilities.

Work Health and Safety Regulation, 2017

Sets Regulations and details the duties for employers to achieve required employee health and safety performance.

Protection of the Environment Operations Act 1997

The POEO Act is the key piece of environment protection legislation administered by the EPA.

***National Environment Protection (Ambient Air Quality) Measure* (NEPC 2021)**

National guidelines for the assessment of ambient air quality. These guidelines provide national air quality standards and criteria for a range of pollutants.

Protection of the Environment Operations (Clean Air) Regulation 2021

Guidelines outlining regulatory requirements for various activities which may affect air quality, including air impurities emitted from activities or plant.

Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2016

NSW regulatory guidelines outlining the methods for detailed quantitative and qualitative air quality assessments from stationary sources.

***Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition, 2005, Australia National Occupational Health and Safety Commission* (NOHSC 2005)**

Guidelines for the assessment of airborne asbestos fibres including relevant workplace exposure standards.

4. Proposed Construction Works

4.1 Proposed Construction and Demolition Works

As discussed in **Section 2.2** the site is proposed to be redeveloped as a two level basement carpark structure, including the ground floor cap and end of trip facilities (EOTF) and staged stratum subdivision.

Table 4.1 provides a broad summary of the works required to complete the proposed redevelopment.

Table 4.1: Proposed Plan of Site Redevelopment Works

Task	Description
1	**Site Establishment** including: - Installation of Hoardings (along site boundaries); - Installation of Gates and Other Physical Security Measures; - Project Office Setup (likely within site boundaries); and - Setup of Workforce Accommodation (likely atop hoarding in the first stage of works until able to be relocated within the site area).
2	Remediation of and Contamination and Archaeological Investigations (will be completed under a separate (and existing consent). These impacts with respect to air quality have therefore not been considered as part of this AQMP.
3	**Excavation and Shoring.** This will broadly comprise: - Shoring wall piling and temporary anchors; - Destress Station Box anchors within the OSD basement; - Bulk excavation of the full basement extent; and - Detailed excavation of basement features.
4	**Construction of Basement Substructure.** This will broadly comprise: - Construction of the basement foundations, installation of pile foundations and pile caps;
5	**Construction of Basement Structures.** This will broadly comprise construction of the following elements: - Core structures (lift pits) - Basement hydrostatic slab on ground (SOG) - Buttress walls and perimeter walls - Suspended slabs - Walls and ceiling - Services, finishes and equipment - Commissioning and testing

The construction of building 1 and building 2 atop the basement SOG will occur following completion of the basement structures.

4.2 Timeline and Staging

Urbis (2020) estimated that the construction works for the proposed site development will be undertaken over a period of 4.5 years.

4.3 Equipment

Various plant and equipment will be used for completion of the proposed redevelopment works. Two tower cranes will be required along with:

- a number of hoists and loading platforms;
- one or more piling rigs for foundation installation;
- static concrete booms for concrete supply; and
- heavy vehicles and/or excavators for structural demolition, movement of materials onto and across the site.

5. Potential Sources of Air Emissions

The remediation action plan (RAP) prepared for the OSD (JBS& 2023) states that for the area of the basement carpark (i.e. the northern block) the previous investigations have identified that fill based soils within the northern block include a small number of highly localised areas of impact. The localised impacts include some heavy metals, total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAHs) and/or asbestos. In addition, some volatile organic compounds (VOCs) in soil vapour were identified in a small (and localised) section of the proposed basement at shallow depths (i.e. 1.5 m bgs). As such the RAP presents a plan to remediate these localised areas prior to the completion of bulk excavation across the proposed OSD basement area, including a set of specific controls which will need to be implemented for the duration to prevent unacceptable emissions to air from occurring. It is noted that the RAP (JBS&G 2023) approach has been approved by the NSW EPA accredited Contaminated Sites Auditor who has been appointed to the project.

With respect to the proposed basement development works the RAP states that:

"It is anticipated that the bulk excavation of the basement (that will extend to depths of approximately 7.5 m bgs) will result in the removal of most of the previously identified impacts within site fill. The bulk excavation of the basement will also result in the removal of on-going source materials to soil vapour impacts within the southern portion of the block. Based on the previous investigation results, it is anticipated that the bulk excavation of natural materials at depth, will require management in accordance with an ASSMP (to be prepared elsewhere) prior to off-site disposal."

As such it is considered that following successful remediation of localised soil impacts in accordance with the RAP (JBS&G 2023), any emissions to air resulting from the bulk or detailed excavation of *in-situ* soils on the site will not be a source of common urban contaminants. Therefore the main potential sources of emissions to air for this project will be the proposed construction works. Furthermore given that the likelihood of emissions to air arising from the proposed works is very low, it is also considered that the unexpected find protocol (UFP) as provided in the JHG CFEMP can be used to manage any instances when emissions to air are elevated (if any).

Based on the anticipated scope of construction works required at the site (**Section 4**), several potential sources of air emissions have been identified which are summarised in **Table 5.1**. Each type of emission is briefly described in **Sections 5.1** and **5.2**.

Table 5.1 Summary of Potential Air Emissions (Demolition Phase)

Works	Potential Air Emissions
Bulk and detailed excavation (completed after site remediation)	Particulates, including dust
Haulage of excavated soil across site roads	Particulates, including dust
Handling and management of piling spoil	Particulates, including dust
New basement and SOG construction	Particulates (i.e. dust) and intermittent odours
Operation of heavy vehicles	Exhaust emissions

Asbestos has not been included in the list of potential air emissions given that the proposed remediation works to be completed prior to basement excavation will be required to remove all known detections of asbestos identified across the full basement area. As such emissions of asbestos to air from the proposed basement construction cannot reasonably be expected to occur.

It is also noted that Conditions C23 to C25 of consent SSD 10438 make specific reference to emissions to air of SVOCs and VOCs during the proposed constructions works. However given that the sole localised area of VOCs / SVOCs impact on the site will be remediated prior to basement construction, similar to asbestos impacts discussed above, it is considered that the likelihood of emissions to air of VOCs or SVOCs due to the proposed scope of redevelopment works is negligible.

5.1 Particulates (Dust)

Excavation of fill and soil underlying the site will be completed by large plant used to disturb and dig up the existing subsurface strata. Excavated materials will then be stockpiled on site for transport off-site at a later stage. The greatest potential for the release of particulates will be during excavation of these materials an the site. To a lesser extent the walls and floors of the resulting excavations will also act as a source of particulate emissions to air for the duration of bulk and detailed excavation works.

Piling and the transport/handling of piling spoil will also take place with limited potential for particulate emissions.

Particulate emissions as potentially generated from the stockpiling of materials are considered to be minimal.

Without implementation of adequate mitigations measures, dust emissions from the activities listed in **Table 5.1** would result in reduced local air quality and dust deposition at nearby sensitive receivers to the construction works on the site.

5.2 Odour

Odour is a sensory response to the inhalation of one or more chemicals in the air we breathe. A person's perception of an odour can vary significantly depending on the sensitivity of the person, the acuteness of the person's sense of smell and the connotations that the odour bestows on that person. Odour may affect a person's quality of life and can have a large range of effects including stress and other physical symptoms.

5.3 Exhaust Emissions

It is anticipated a range of fuel powered plant, machinery and equipment will be required to facilitate demolition and construction activities, however no bulk fuel storage is anticipated on site. As such, potential emissions/air quality impacts have been identified as principally associated with exhaust fumes generated by plant, machinery or equipment use.

Diesel and petroleum combustion is a well-known process and regulated in accordance with relevant emission standards as prescribed by the NSW EPA. Exhaust emissions will be anticipated from construction machinery as engaged on the site. However, noting the proximity of the site to the Sydney central business district (CBD) with substantial motor vehicle activity, these are anticipated to be insignificant in comparison to existing levels of exhaust-based constituents in the surrounding area.

5.4 Required Emissions and Controls

With the exception of exhaust, all emissions listed in **Table 5.1** have the potential to become significant. As such a program of controls and air monitoring should be undertaken throughout the duration of the works as summarised in **Table 5.2.**

Table 5.2: Key Features of Air Quality Management Required During the Proposed Redevelopment

ID	Mitigation Measure	Responsibility	Duration
Administration of AQMP and Monitoring Requirements			
01	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site[1].	JHG Project Manager	Prior to and during construction.
02	Display the name and contact details of person(s) accountable for air quality issues on the site boundary[2].	JHG Construction Manager	During Works
03	Develop plans for dust, odour and VOC management as part of the AQMP. The AQMP may include monitoring of dust deposition, dust flux,	JHG Construction Manager	During Works

	realtime PM10 continuous monitoring and/or visual inspections		
04	Record all dust and air quality complaints.	JHG Construction Manager	During Works
06	Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book[1].	JHG Construction Manager	During Works
05	Make the complaints log available to the local authority when asked.	JHG Construction Manager	During Works
07	Undertake weekly on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, odour and VOCs, record inspection results, and make the log available to the local authority when asked.	JHG Construction Manager	During Works
08	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Environmental Consultant	During Works
09	Obtain weekly confirmation from the project environmental consultant that no change has occurred in the broader environmental policies, objectives and targets that are relevant to this AQMP.	JHG Construction Manager	During Works
Project Actions to Reduce Air Quality Impacts			
10	Spraying formations and exposed work areas, as required, to suppress dust using water carts and other suitable equipment	JHG Construction Supervisors All personnel	During Works
11	Minimise traffic on exposed areas – create designated haul roads	All personnel	Prior to works
12	When using machinery to handle dusty/dust-generating materials, minimise the distance between where the material is stored and its final location	All personnel	Prior to works
13	Cover haul vehicles loads & ensure tail gates are closed when operating on public roads. Vehicles carrying loose or potentially dusty material to or from the Project area should be adequately covered	All personnel	During Works
14	Water would be sprayed on unsealed access roads and open areas during conditions conducive to dust generation	All personnel	During Works
15	On-site vehicle speed limits would be established and enforced to prevent dust emissions	All personnel	During Works
16	Stockpiled material should be appropriately managed and shaped to reduce wind erosion and covered as appropriate	All personnel	During Works
17	During extreme weather events where dust generation cannot be effectively minimised (such as high winds), dust generating works would cease until adequate controls can be implemented or until adverse weather conditions subside	Construction Manager	During Works
18	Remove mud from haul vehicles prior to entering public roads. A wheel cleaning/washing system may be established for vehicles entering/leaving sit	All personnel	During Works
19	Reprogram dust generating work during periods of high wind	Construction Manager	During Works
20	Provide awareness training in the need to minimise dust during site inductions and toolbox talks	Construction Manager	During Works
21	Regular visual monitoring of dust generation	Construction Manager	During Works

22	Plant and equipment will be serviced and maintained in good working order to reduce unnecessary emissions from exhaust fumes. Maintenance of Plant & Equipment as per manufacturers requirements	All personnel	During Works
23	Plant, machinery and vehicles would be turned off while not in use, where safe to do so	All personnel	During Works
24	Construction plant, machinery or vehicles producing excessive visual exhaust would be turned off, tagged 'out of order' and not used	All personnel	During Works
25	All emission controls used on vehicle and equipment would comply with standards listed in Schedule 4 of the Protection of the Environment Operations (Clean Air) Regulation 2010	All personnel	During Works
26	In the event that odour emissions are generated beyond the site boundaries then, work would cease until the source and nature of the odour can be determined and an appropriate course of action carried out. This may include further assessment to determine potential impacts on the nearest sensitive receptors.	Construction Manager	During Works
27	If air quality complaints occur as a result of works, works would cease and dust/odour generating activities would be re-assessed to reduce community impact	Construction Manager	During Works

Notes:

1. AQMP to maintain stakeholder engagement under the protocols established under the project Community Consultation Strategy as required under Condition C13 of SSD 10438 and documented in the *'Waterloo Metro Quarter Community Communication Strategy: Station Construction and Over Station Development December 2022*' Document ID: CSWSWL-JHG-SWL-CL-PLN-000001, Revision 5.1.
2. This task is to be completed as per the requirements of the project CFEMP as required under Condition C19 of SSD 10438.

These controls have been defined in a set of air quality management procedures which are provided in **Appendix B**.

6. Recommendations

Based on the information and procedures detailed herein, and subject to the limitations in **Section 7**, JBS&G consider successful implementation of this AQMP will assist to mitigate the risk to site workers and users of surrounding areas from air emissions resulting from the proposed demolition works. JBS&G recommend that to successfully manage and/or monitor air quality impacts and emissions during redevelopment activities the following approach should be adopted:

- the following management and control measures provided in **Appendix B** should be implemented for the full duration of the excavation and basement construction program:
  - AQMP01: Dust, Odour, VOC and SVOC Hazard Control;
  - AQMP02: Air Quality Monitoring;
  - AQMP03: Reactive Management Procedure;
  - AQMP04: AQMP Incident Reporting;
  - AQMP05: AQMP Review and Continuous Improvement;
  - AQMP06: AQMP Training;
  - AQMP07: AQMP Communication Strategy; and
  - AQMP08: AQMP Continuous Improvement.

7. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

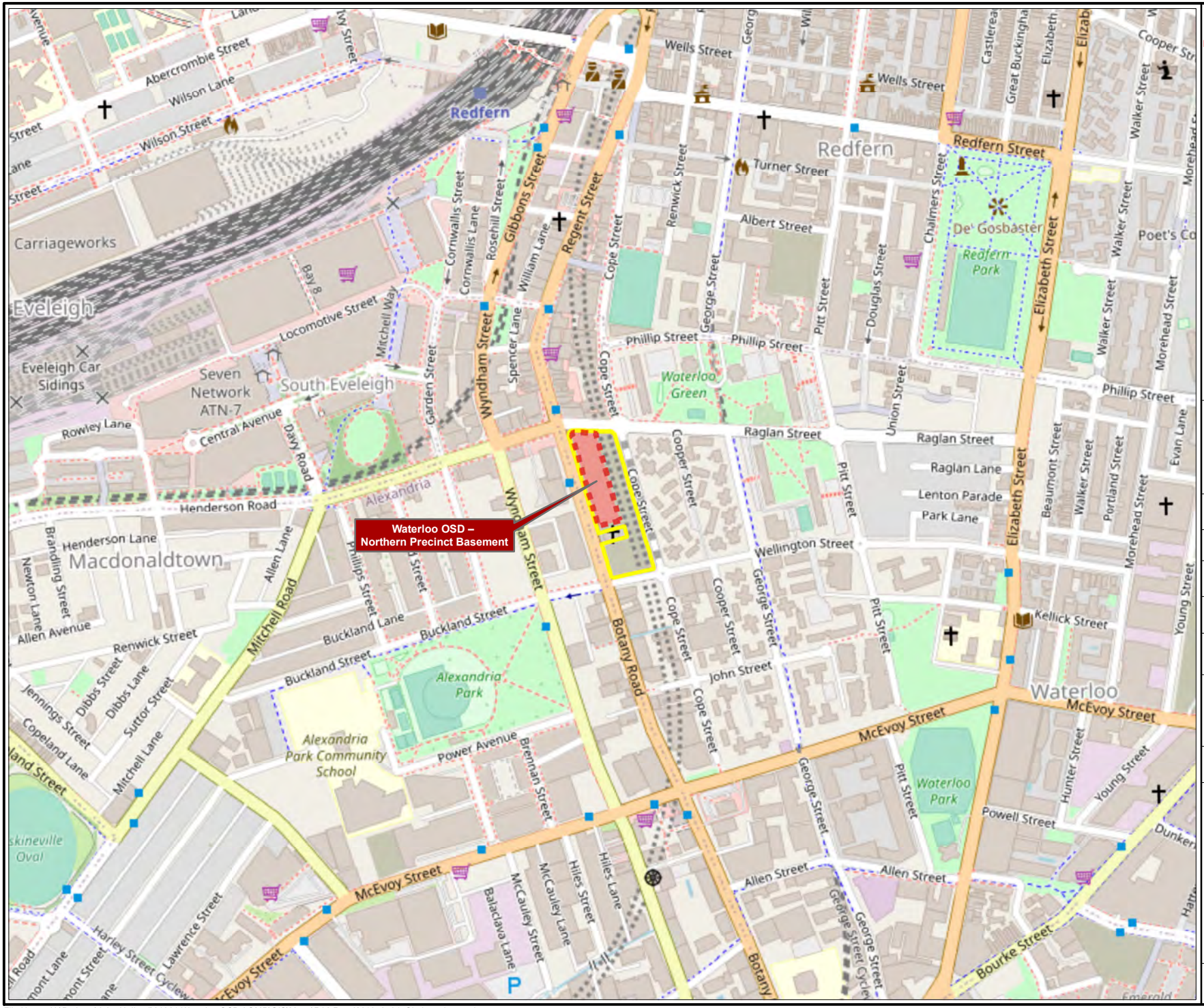
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend

- Waterloo OSD – Northern Precinct Basement
- Waterloo Metro Quarter Development Extent

JBS&G

Job No: 64061	
Client: John Holland	
Version: R01 Rev A	Date 19/01/2023
Drawn By: RF/AB	Checked By: SD
Scale 1:7,500	

0 90 180
metres

Coord. Sys. GDA 1994 MGA Zone 56

Waterloo OSD
Southern Precinct

49 Botany Road,
Waterloo, NSW

SITE LOCATION

FIGURE 1

File Name: N:\Projects\John Holland\64061 Waterloo OSD AQMP\GIS\Maps\R02 Rev A\61358_01_SiteLocation.mxd
Reference: Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA

Legend

- Waterloo OSD – Northern Precinct Basement
- Waterloo Metro Quarter Development Extent
- NSW Cadastre (2022)

JBS&G

Job No: 64061

Client: John Holland

Version: R01 Rev A	Date 19/01/2023
Drawn By: RF/AB	Checked By: SD

Scale 1:1,500

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metres

Coord. Sys. GDA 1994 MGA Zone 56

Waterloo Metro Quarter Development

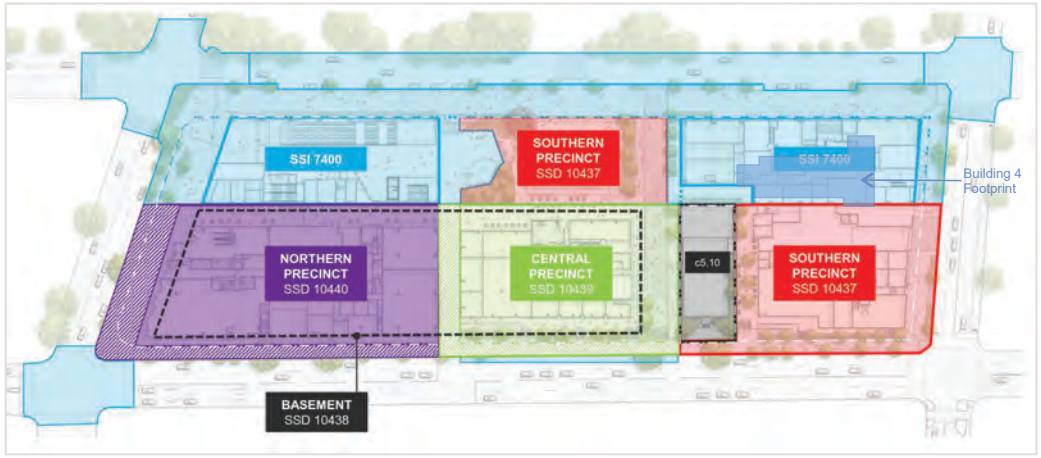
49 Botany Road, Waterloo, NSW

SITE LAYOUT

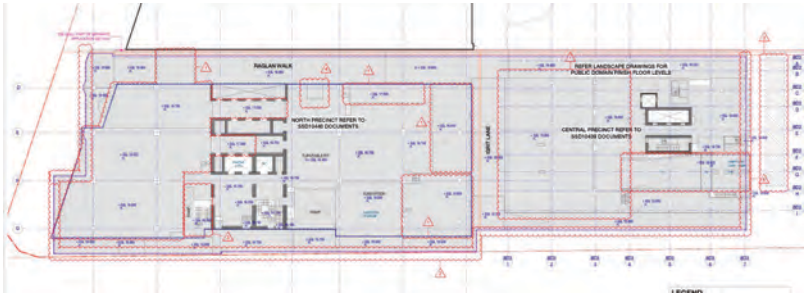
FIGURE 2

File Name: N:\Projects\John Holland\64061 Waterloo OSD AQMP\GIS\Maps\R02 Rev A\61358_02_SiteLayout.mxd
Reference: www.nearmap.com - Imagery 20210410

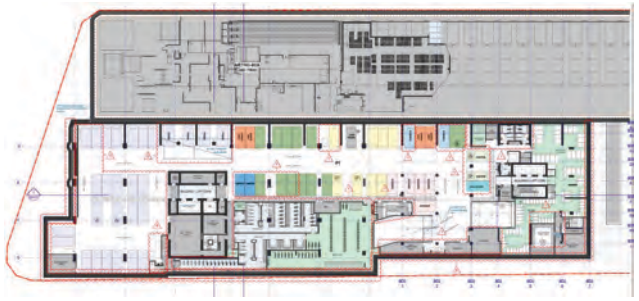
Waterloo Metro Quarter station site precinct identification (SSDA Boundaries)



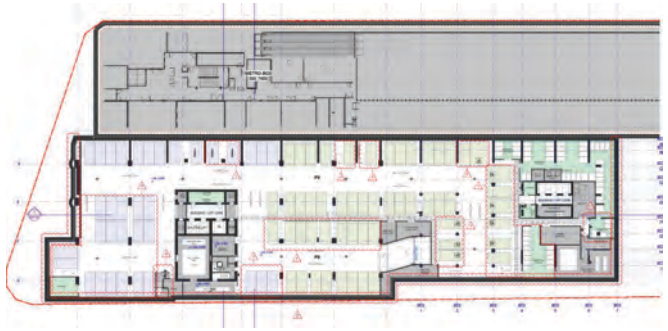
Approved concept SSDA building envelope – Southern Precinct



Proposed Basement Plan Level 00 Source: Woods Bagot



Proposed Basement Plan Level 01 Source: Woods Bagot



Proposed Basement Plan Level 02 Source: Woods Bagot

Legend

JBS&G

Job No: 64061

Client: John Holland

Version: R02 Rev A | Date 19/01/2023

Drawn By: RF/AB | Checked By: SD

Scale 1:1,500

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metres

Coord. Sys. GDA 1994 MGA Zone 56

Waterloo Metro Quarter Development

49 Botany Road, Waterloo, NSW

PROPOSED REDEVELOPMENT

FIGURE 3

File Name: N:\Projects\John Holland\64061 Waterloo OSD AQMP\GIS\Maps\R02 Rev A\61358_04_SensitiveReceptors.mxd
Reference: SSDA Boundaries - Source Turner, URBIS 2022 - Section 4.55(1A)

Legend

- Waterloo OSD – Northern Precinct Basement
- Waterloo Metro Quarter Development Extent
- NSW Cadastre (2022)
- Sensitive Receptors

JBS&G

Job No: 64061	
Client: John Holland	
Version: R01 Rev A	Date 19/01/2023
Drawn By: RF/AB	Checked By: SD

Scale 1:1,500

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metres

Coord. Sys. GDA 1994 MGA Zone 56

Waterloo Metro Quarter Development

49 Botany Road, Waterloo, NSW

SENSITIVE RECEPTORS

FIGURE 4

File Name: N:\Projects\John Holland\64061 Waterloo OSD AQMP\GIS\Maps\R02 Rev A\61358_04_SensitiveReceptors.mxd
Reference: www.nearmap.com - Imagery 20210410

Appendix A Design Plans

WMQ-BMNT-JBS&G-ES-MPL-0019_00

WATERLOO METRO QUARTER DEVELOPMENT BASEMENT

BASEMENT DA DRAWING LIST - SSD10438

SHEET NUMBER	SHEET NAME	SHEET ISSUE DATE	REVISION
WMQ-BMNT-WBG-AR-DRG-DA0001	COVER SHEET	11/03/22	E
WMQ-BMNT-WBG-AR-DRG-DA0090	BASEMENT - FLOOR PLAN LEVEL 00	11/03/22	E
WMQ-BMNT-WBG-AR-DRG-DA0091	BASEMENT - FLOOR PLAN LEVEL P1	11/03/22	F
WMQ-BMNT-WBG-AR-DRG-DA0092	BASEMENT - FLOOR PLAN LEVEL P2	11/03/22	F
WMQ-BMNT-WBG-AR-DRG-DA0101	BASEMENT - LONGITUDINAL SECTION 01	11/03/22	E
WMQ-BMNT-WBG-AR-DRG-DA0102	BASEMENT - CROSS SECTION 01	11/03/22	E
WMQ-BMNT-WBG-AR-DRG-DA0103	BASEMENT - CROSS SECTION 02	11/03/22	E
WMQ-BMNT-WBG-AR-DRG-DA0121	BASEMENT - DEEP PLANTER SECTION 01	11/03/22	E
WMQ-BMNT-WBG-AR-DRG-DA0122	BASEMENT - DEEP PLANTER SECTION 02	11/03/22	E
WMQ-BMNT-WBG-AR-DRG-DA0190	BASEMENT - AREA PLAN 01	11/03/22	E

1

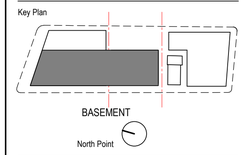
Recent revision history

#	Status	Description	Date
A		FOR INFORMATION (DA)	15.07.20
B		FOR APPROVAL	31.07.20
C		FOR APPROVAL	25.09.20
D		FOR APPROVAL	15.02.21
E		SECTION 4.55	11.03.22

Current Revision Amendments

#	Mark	Comments
E	1	REVISION UPDATED FOR APPROVAL

Key Plan



Client

Waterloo Integrated Station Development
A Joint Venture Project
JOHN HOLLAND
mirvac

NSW GOVERNMENT
sydney METRO

Consultant

W–B™
WOODS BAGOT

Project
WATERLOO METRO QUARTER DEVELOPMENT

Project number
121234

Size check
25mm

Checked
AL

Approved
SL

Sheet size
A1

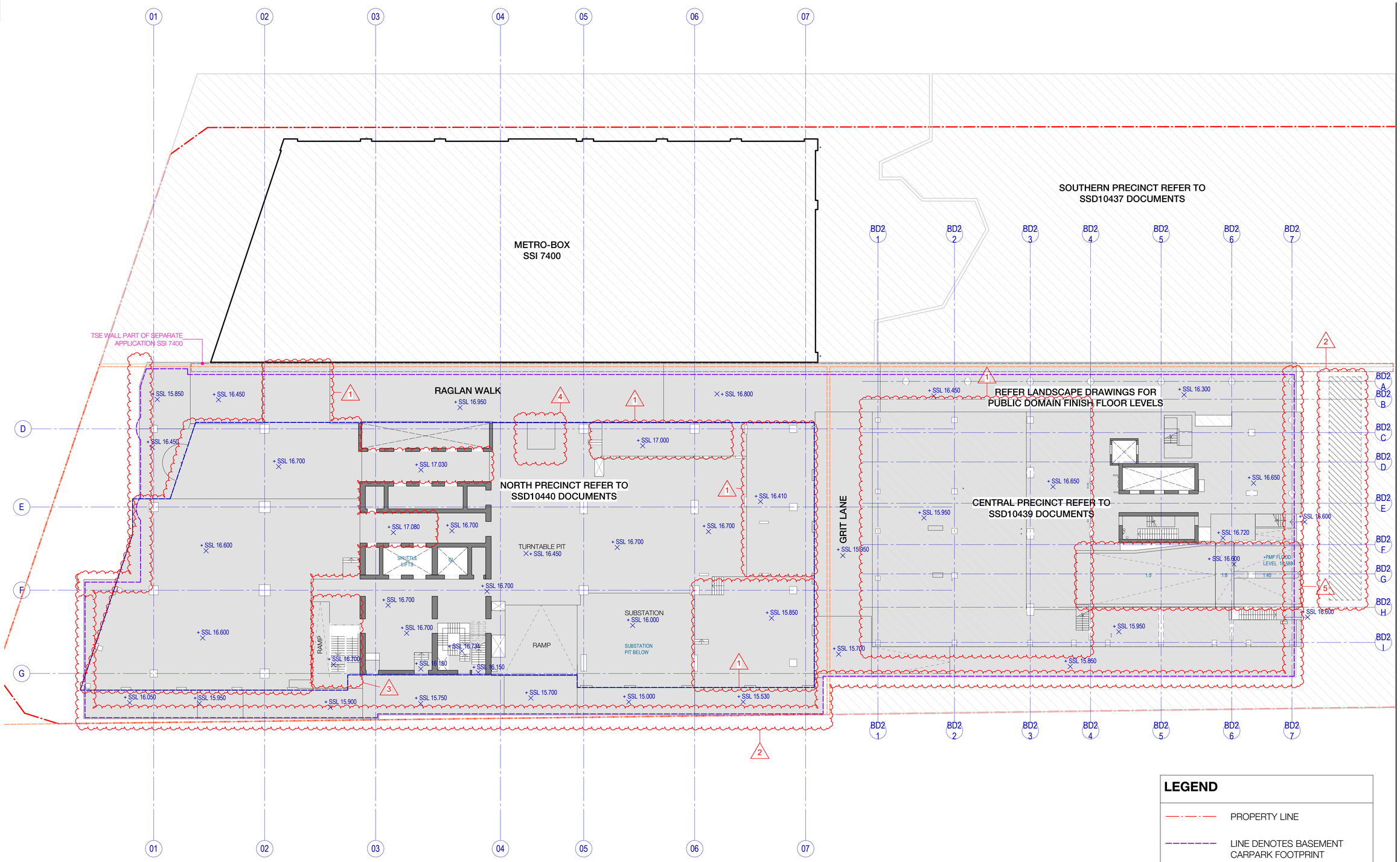
Scale

Sheet title
SSD10438
COVER SHEET

Status
SECTION 4.55

Sheet number
WMQ-BMNT-WBG-AR-DRG-DA0001

Revision
E



1 LEVEL GROUND BMNT
SCALE 1 : 200

LEGEND

- PROPERTY LINE
- LINE DENOTES BASEMENT CARPARK FOOTPRINT
- LINE DENOTES BUILDING FOOTPRINT
- INDICATIVE TSE WALL
- SSD DA PRECINCT BOUNDARY
- NOT IN SCOPE

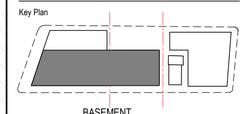
Recent revision history

#	Status	Description	Date
A		FOR INFORMATION (DA)	15.07.20
B		FOR APPROVAL	31.07.20
C		FOR APPROVAL	25.09.20
D		FOR APPROVAL	15.02.21
E		SECTION 4.55	11.03.22

Current Revision Amendments

#	Mark	Comments
E	1	SLAB LEVEL ADJUSTED FOR FLOOD LEVELS
E	2	PERIMETER WALL ADJUSTED
E	3	FIRE STAIR 01 ADJUSTED
E	4	LOADING DOCK HOIST PIT UPDATED
E	5	BASEMENT ACCESS RAMP ADJUSTED

Key Plan



BASEMENT

North Point

Client

Waterloo Integrated Station Development
A Joint Venture Project
JOHN HOLLAND
mirvac

NSW GOVERNMENT
sydney METRO

Consultant

W–B™
WOODS BAGOT

Project
WATERLOO METRO QUARTER DEVELOPMENT

Project number	Size check
121234	25mm

Checked	Approved	Sheet size	Scale
AL	SL	A1	1 : 200

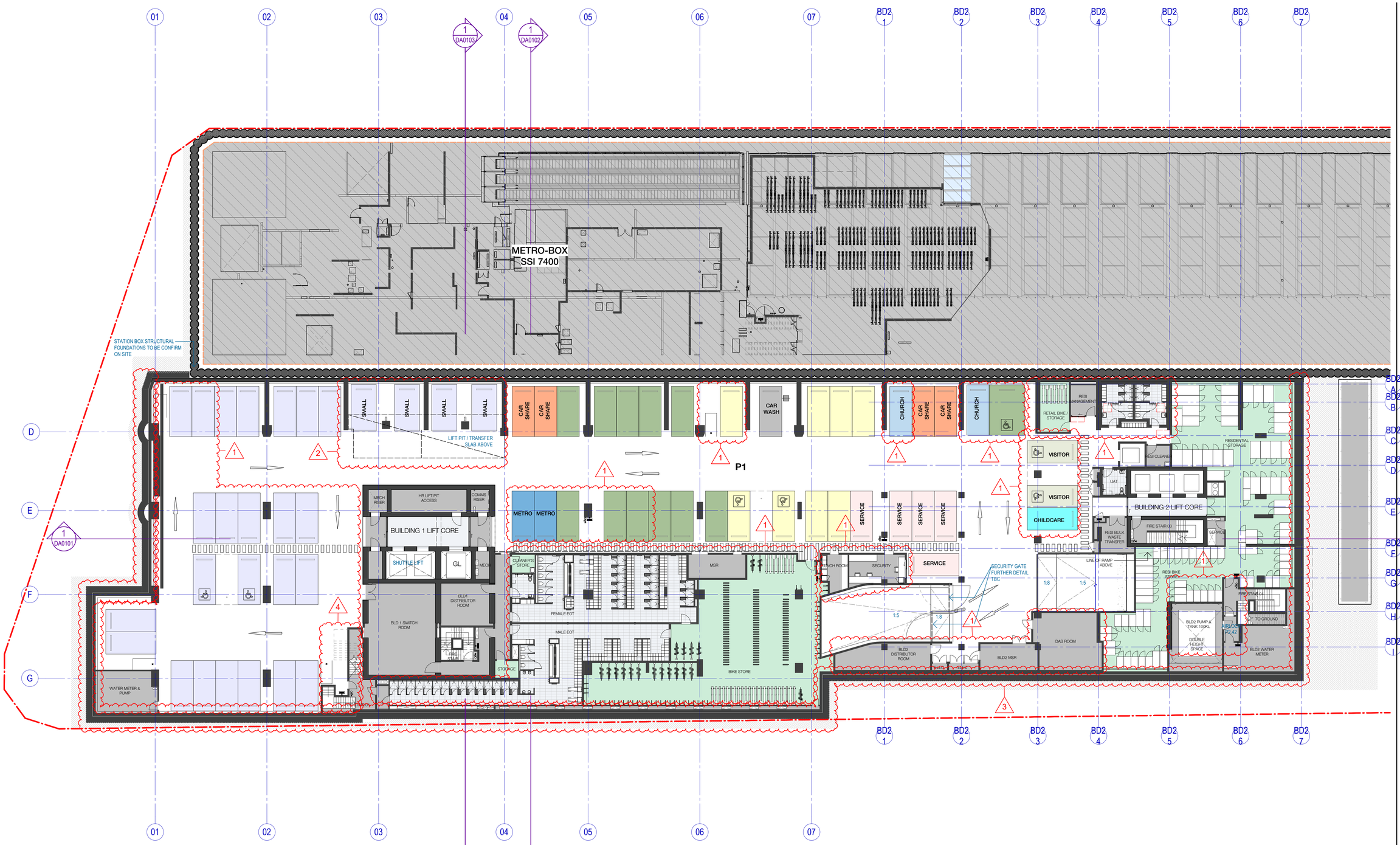
Sheet title
SSD10438
BASEMENT - FLOOR PLAN LEVEL 00

Status
SECTION 4.55

Sheet number
WMQ-BMNT-WBG-AR-DRG-DA0090 E

Revision

WMQ-BMNT-JBS&G-ES-MPL-0019_00



PARKING ALLOCATION

P1	
Affordable Housing	11
Affordable Housing - DDA	1
Car Wash	1
Care Share	4
Childcare	1
Church	2
Commercial	22
Commercial - DDA	2
Commercial - Small	4
Metro	2
Service	5

Social Housing	6
Social Housing - DDA	2
Visitor - DDA	2
P1: 65	65

P2	
Commercial	31
Commercial - Small	4
Residential	47
Residential DDA	8
P2: 90	90
Grand total: 155	155

MOTORCYCLE SPACES

P1	
Motorbike - Commercial	4
P1: 4	4

P2	
Motorbike - Commercial	2
Motorbike - Resi	7
P2: 9	9
Grand total: 13	13

BICYCLE SPACES

LEVEL	COMMERCIAL (END OF TRIP)	RESIDENTIAL (LOCKER)	RETAIL & CHILDCARE
P1 -	243	60	14
P2 -			
TOTAL	243	60	14

STORAGE ALLOCATION

RESIDENTIAL STORAGE

P2	
Storage	54
Storage Large	6
P2: 60	

P1	
Storage	30
P1: 30	
Grand total: 90	

Date generated 6/6/2022 10:17:51 AM BIM 360://Sydney Metro - Waterloo Station/WMQ-BLD1-WBG-AR-MDL-0001-RVT-R20.rvt

Recent revision history

#	Status	Description	Date
A		FOR INFORMATION (DA)	15.07.20
B		FOR APPROVAL	31.07.20
C		FOR APPROVAL	25.09.20
D		FOR INFORMATION	28.01.21
E		FOR APPROVAL	15.02.21
F		SECTION 4.55	11.03.22

Current Revision Amendments

#	Mark	Comments
F	1	LAYOUT UPDATED
F	2	LOW RISE LIFT PIT ADJUSTED
F	3	PERIMETER WALL ADJUSTED
F	4	FIRE STAIR 01 ADJUSTED
F	5	TABLE UPDATED

Key Plan

BASEMENT

North Point

Client

Waterloo Integrated Station Development
A Joint Venture Project
JOHN HOLLAND mirvac

NSW GOVERNMENT sydney METRO

Consultant

W–B™
WOODS BAGOT

Project
WATERLOO METRO QUARTER DEVELOPMENT

Project number
121234

Size check
25mm

Checked
AL

Approved
SL

Sheet size
A1

Scale
As indicated

Sheet title
SSD10438
BASEMENT - FLOOR PLAN LEVEL P1

Status
SECTION 4.55

Sheet number
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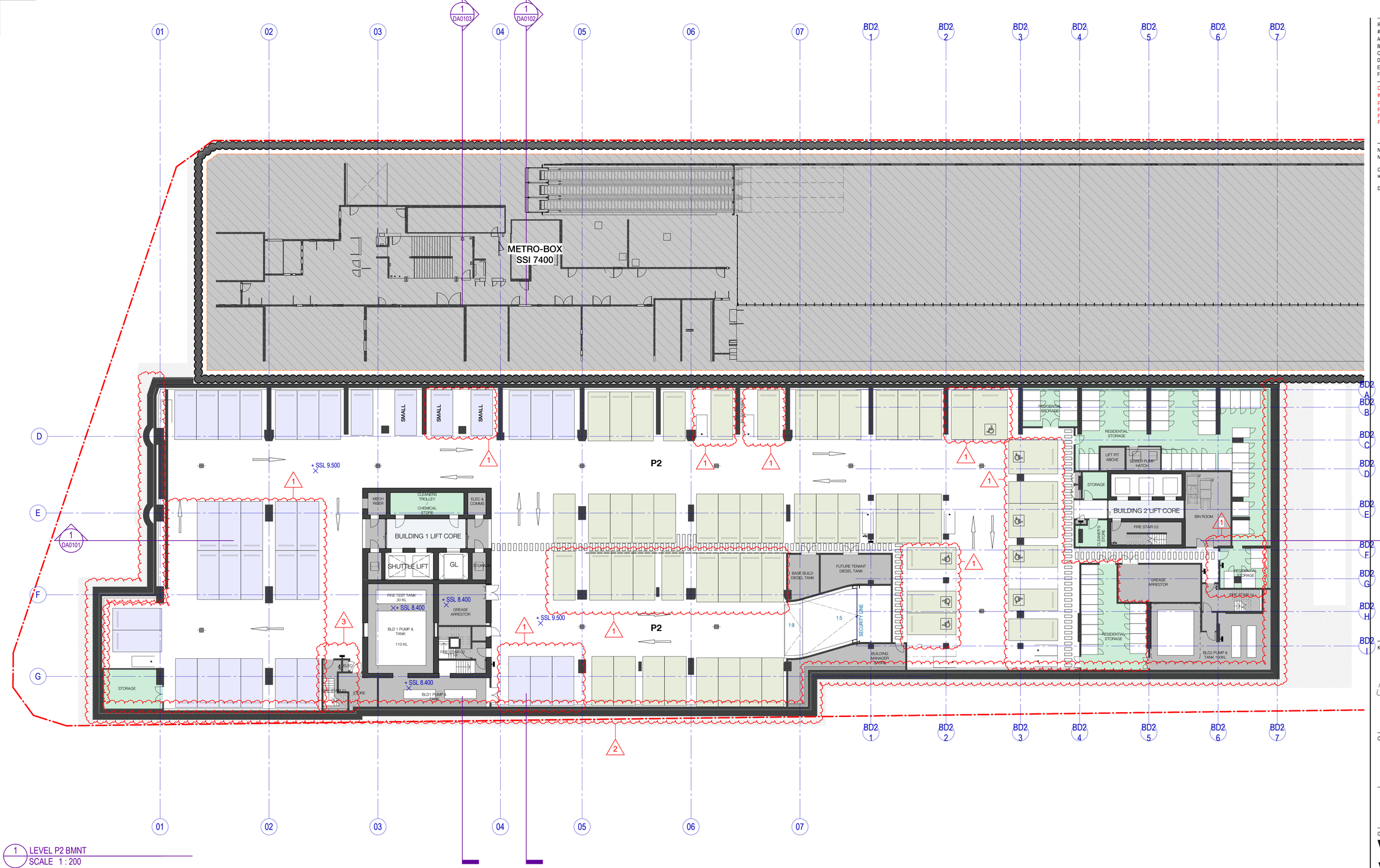
Revision
F

WMQ-BMNT-JBS&G-ES-MPL-0019_00



1 LEVEL P2 BMNT
SCALE 1 : 200

PARKING ALLOCATION

P1

Affordable Housing	11
Affordable Housing - DDA	1
Car Wash	1
Care Share	4
Childcare	1
Church	2
Commercial	22
Commercial - DDA	2
Commercial - Small	4
Metro	2
Service	5

Social Housing	6
Social Housing - DDA	2
Visitor - DDA	2
P1: 65	65

P2

Commercial	31
Commercial - Small	4
Residential	47
Residential DDA	8
P2: 90	90
Grand total: 155	155

MOTORCYCLE SPACES

P1

Motorbike - Commercial	4
P1: 4	4

P2

Motorbike - Commercial	2
Motorbike - Resi	7
P2: 9	9
Grand total: 13	13

BICYCLE SPACES

LEVEL	COMMERCIAL (END OF TRIP)	RESIDENTIAL (LOCKER)	RETAIL & CHILDCARE
P1	-		
P2	-		
TOTAL	243	60	14
	243	60	14

STORAGE ALLOCATION

RESIDENTIAL STORAGE

P2

Storage	54
Storage Large	6
P2: 60	

P1

Storage	30
P1: 30	
Grand total: 90	

Date generated 6/6/2022 9:42:23 AM BIM 360://Sydney Metro - Waterloo Station/WMQ-BLD1-WBG-AR-MDL-0001-RVT-R20.rvt

Recent revision history

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B		FOR APPROVAL	31.07.20
C		FOR APPROVAL	25.09.20
D		FOR INFORMATION	28.01.21
E		FOR APPROVAL	15.02.21
F		SECTION 4.55	11.03.22

Current Revision Amendments

#	Mark	Comments
F	1	LAYOUT UPDATED
F	2	PERIMETER WALL ADJUSTED
F	3	FIRE STAIR 01 ADJUSTED
F	4	TABLE UPDATED

Key Plan

BASEMENT

North Point

Client

Waterloo Integrated Station Development
A Joint Venture Project
JOHN HOLLAND
mirvac

NSW GOVERNMENT
sydney METRO

Consultant

W–B™
WOODS BAGOT

Project
WATERLOO METRO QUARTER DEVELOPMENT

Project number		Size check	
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Checked	Approved	Sheet size	Scale
AL	SL	A1	As indicated

Sheet title
SSD10438
BASEMENT - FLOOR PLAN LEVEL P2

Status
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Sheet number
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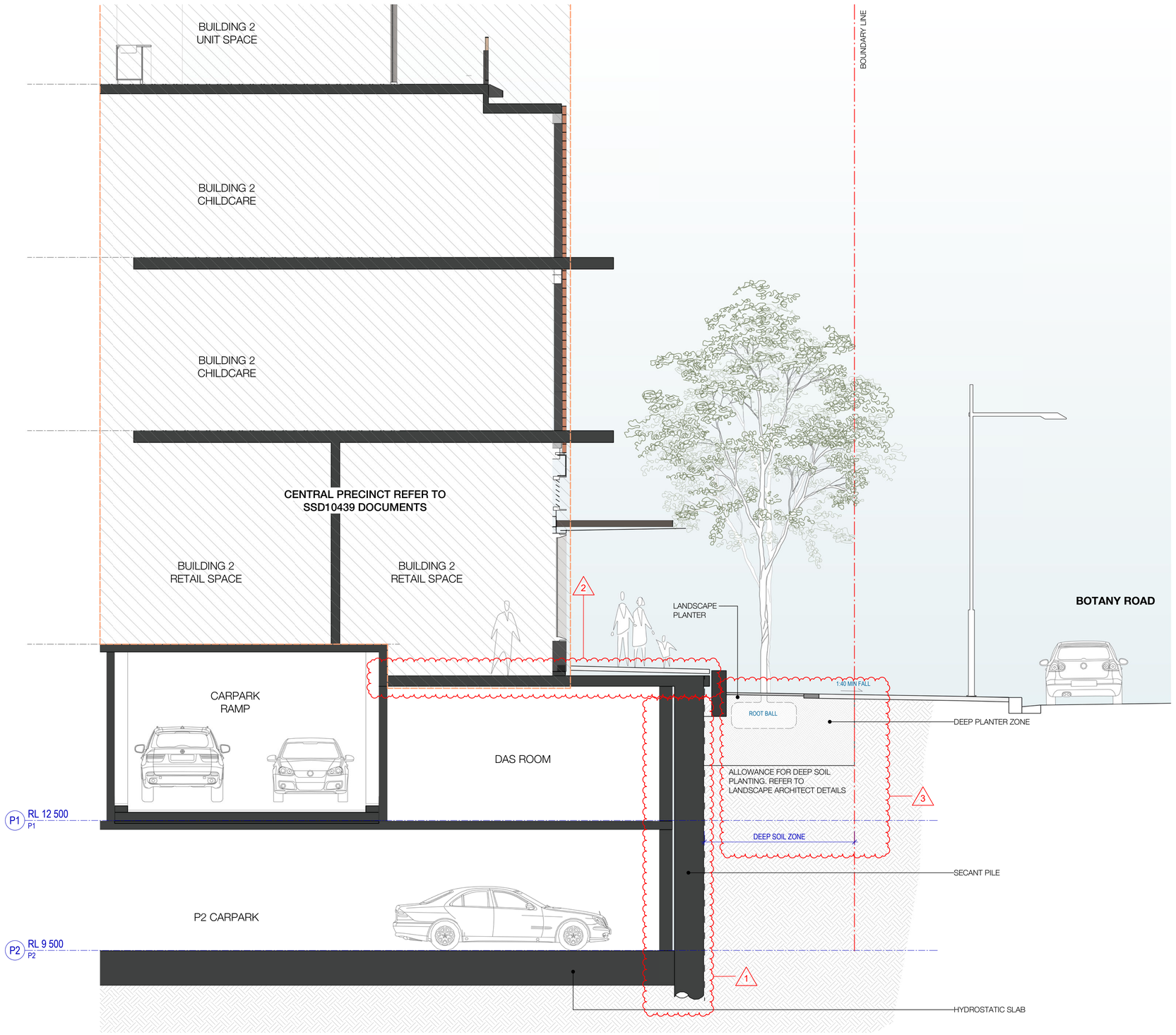

1 BASEMENT - DEEP PLANTER SECTION 01
SCALE 1 : 50

Recent revision history

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A		FOR INFORMATION (DA)	15.07.20
B		FOR APPROVAL	31.07.20
C		FOR APPROVAL	25.09.20
D		FOR APPROVAL	15.02.21
E		SECTION 4.55	11.03.22

Current Revision Amendments

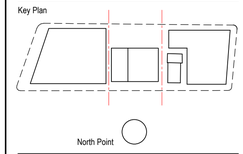
#	Mark	Comments
E	1	PERIMETER WALL ADJUSTED
E	2	SLAB LEVEL ADJUSTED FOR SERVICE HEIGHT CLEARNACE ON P1
E	3	LANDSCAPE DEEP SOIL ZONE UPDATED

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

Key Plan



North Point

Client

Waterloo Integrated Station Development
A Joint Venture Project
JOHN HOLLAND mirvac

NSW GOVERNMENT sydney METRO

Consultant

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Project

WATERLOO METRO QUARTER DEVELOPMENT

Project number	Size check
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Checked	Approved	Sheet size	Scale
AL	SL	A1	1 : 50

Sheet title

SSD10438
BASEMENT - DEEP PLANTER
SECTION 01

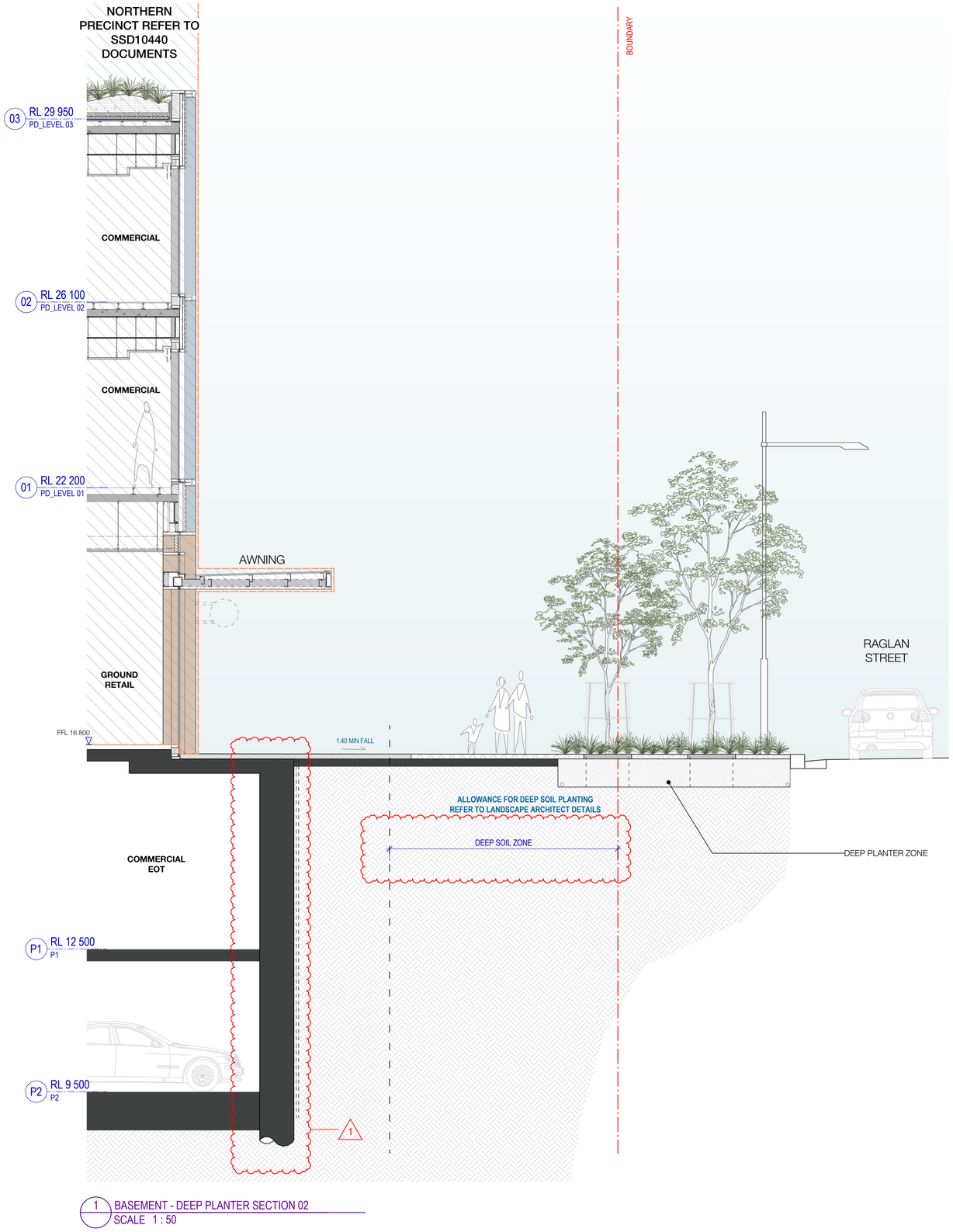
Status

SECTION 4.55

Sheet number

WMQ-BMNT-WBG-AR-DRG-DA0121 E

WMQ-BMNT-JBS&G-ES-MPL-0019_00



1 BASEMENT - DEEP PLANTER SECTION 02
SCALE 1 : 50

Recent revision history

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B		FOR APPROVAL	31.07.20
C		FOR APPROVAL	25.09.20
D		FOR APPROVAL	15.02.21
E		SECTION 4.55	11.03.22

Current Revision Amendments

#	Mark	Comments
E	1	PERIMETER WALL ADJUSTED

Key Plan

North Point

Client

Waterloo Integrated Station Development
A Joint Venture Project
JOHN HOLLAND mirvac

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Project
WATERLOO METRO QUARTER DEVELOPMENT

Project number	Size check
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Checked	Approved	Sheet size	Scale
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BASEMENT - DEEP PLANTER SECTION 02

Status
SECTION 4.55

Sheet number
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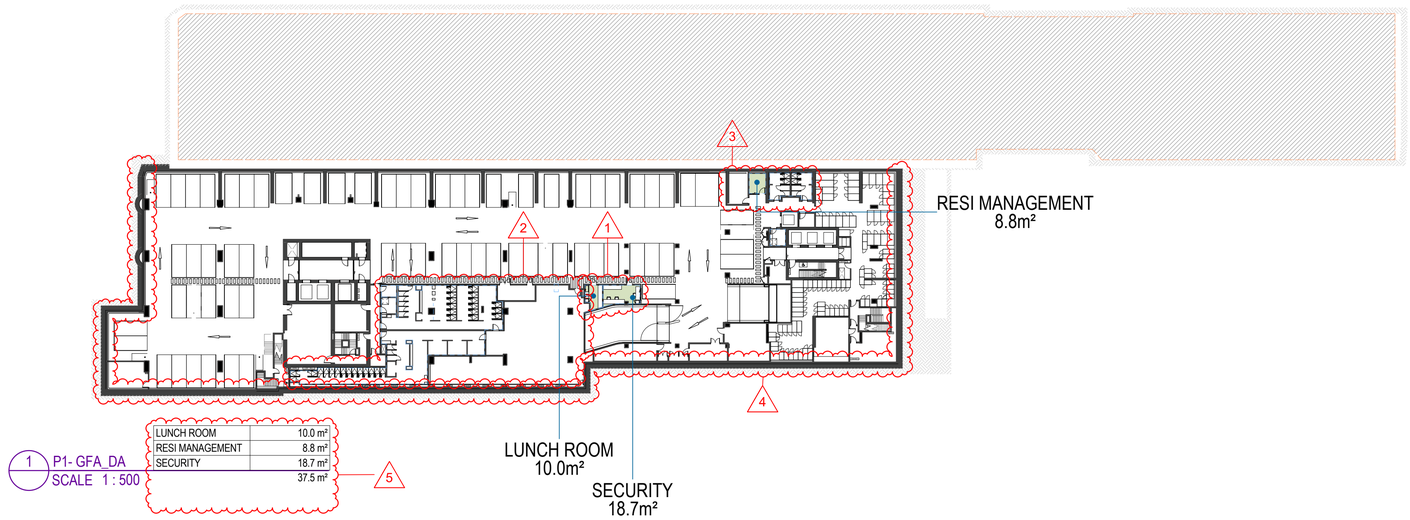
Revision

WMQ-BMNT-JBS&G-ES-MPL-0019_00



Recent revision history

#	Status	Description	Date
A		FOR INFORMATION (DA)	15.07.20
B		FOR APPROVAL	31.07.20
C		FOR APPROVAL	25.09.20
D		FOR APPROVAL	15.02.21
E		SECTION 4.55	11.03.22

Current Revision Amendments

#	Mark	Comments
E	1	LAYOUT UPDATED
E	2	LAYOUT UPDATED
E	3	LAYOUT UPDATED
E	4	PERIMETER WALL ADJUSTED
E	5	TABLE UPDATED

Notes

Contractor must verify all dimensions on site before commencing work or preparing shop drawings.

Do not scale drawings.

THE DEFINITION FOR GROSS FLOOR AREA IS SET OUT IN **SYDNEY LEP 2012** AS:

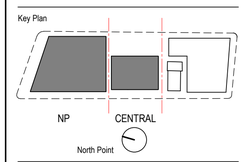
GROSS FLOOR AREA MEANS THE SUM OF THE FLOOR AREA OF EACH FLOOR OF A BUILDING MEASURED FROM THE INTERNAL FACE OF EXTERNAL WALLS, OR FROM THE INTERNAL FACE OF WALLS SEPARATING THE BUILDING FROM ANY OTHER BUILDING, MEASURED AT A HEIGHT OF 1.4 METRES ABOVE THE FLOOR, AND INCLUDES:

a) THE AREA OF A MEZZANINE, AND
b) HABITABLE ROOMS IN A BASEMENT OR AN ATTIC, AND
c) ANY SHOP, AUDITORIUM, CINEMA, AND THE LIKE, IN A BASEMENT OR AN ATTIC,

BUT EXCLUDES:

d) ANY AREA OF COMMON VERTICAL CIRCULATION, SUCH AS LIFTS AND STAIRS, AND
e) ANY BASEMENT:
  i) STORAGE, AND
  ii) VEHICULAR ACCESS, LOADING AREAS, GARBAGE AND SERVICES, AND
f) PLANT ROOMS, LIFT TOWERS AND OTHER AREAS USED EXCLUSIVELY FOR MECHANICAL SERVICES OR DUCTING, AND
g) CAR PARKING TO MEET ANY REQUIREMENTS OF THE CONSENT AUTHORITY (INCLUDING ACCESS TO THE CAR PARK), AND
h) ANY SPACE USED FOR THE LOADING OR UNLOADING OF GOODS (INCLUDING ACCESS TO IT), AND
i) TERRACES AND BALCONIES WITH OUTER WALLS LESS THAN 1.4 METRES HIGH, AND
j) VOIDS ABOVE A FLOOR AT THE LEVEL OF A STOREY OR STOREY ABOVE

Key Plan



Client

Waterloo Integrated Station Development
A Joint Venture Project
JOHN HOLLAND
mirvac

NSW GOVERNMENT
sydney METRO

Consultant

W–B™
WOODS BAGOT

Project

WATERLOO METRO QUARTER DEVELOPMENT

Project number	Size check
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Checked	Approved	Sheet size	Scale
AL	SL	A1	1 : 500

Sheet title

SSD10438
BASEMENT - AREA PLAN 01

Status

SECTION 4.55

Sheet number — Revision

WMQ-BMNT-WBG-AR-DRG-DA0190 E

WMQ-BMNT-JBS&G-ES-MPL-0019_00

Appendix B Air Quality Management Procedures

Dust, Odour, VOC and SVOC Hazards Control	AQMP01
Responsibility:	John Holland
Frequency:	All site works
Location:	Site
Objective:	To minimise dust, odour, VOC and SVOC emissions from demolition and construction

Procedure

Dust, Odour, VOC and SVOC Risk

The proposed excavation and construction works will have the potential to generate dust emissions and to a much lesser extent, odour, VOC and SVOC emissions. This is based on the findings of the remedial action plan (RAP, JBS&G 2023) for the site which confirmed there are only a handful of highly localised areas where contaminated soil is present. The RAP (JBS&G 2023) includes controls required during remediation of these areas to prevent unacceptable emissions to air occurring. As such once these remediation works are completed it is considered that for the remainder of the excavation and construction program standard dust controls will be sufficient to prevent the unlikely occurrence of unacceptable emissions to air of odour, VOC and SVOC. These controls as discussed below will be required, and would also require that implementation of the unexpected finds protocol (UFP) presented in the RAP and CFEMP continues during site development works.

Standards

All operations on site are to be conducted so that concentrations of airborne dust and other hazardous substances satisfy those stipulated in NSW EPA published and endorsed guidelines. These guidelines include:

- NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality' and
- Environmental criteria and monitoring requirements provided in NSW EPA (January 2017) '*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*' for parameters relating to dust i.e. PM_{10} and deposited dust.

Additionally, it will be required that visible dust emissions from the works are not observable leaving the boundary of the worksite (refer **AQMP02 Air Quality Monitoring**).

Control

Measures shall be undertaken to reduce airborne emissions from site activities including:

- The Work Health & Safety (WHS) plan (or similar) for the project should be referred to for the full list of PPE and decontamination requirements for the demolition and construction workforce.
- Water sprays used for dust suppression shall be used in the location of dust generating areas as a minimum should the results of realtime dust monitoring (as per **AQMP02 Air Quality Monitoring**) exceed the acceptable level. This may include pre-wetting of proposed demolition areas each day in addition to wetting during demolition;
- A water misting system will be established on site boundaries for use as required to prevent off-site emissions as a minimum should the results of realtime dust monitoring (as per **AQMP02 Air Quality Monitoring**) exceed the acceptable level;
- Stockpile heights shall be minimised where possible;
- Where stockpiles are to be left in place for significant periods of time, they shall be covered o routinely wetted to prevent dust emissions; and
- Where unfavourable meteorological conditions exist (i.e. strong winds directed west or south) site works shall be restricted to those with low potential for atmospheric emissions. This shall also include consideration of reduced production rates during these periods to minimise dust emissions.
- Spraying formations and exposed work areas to suppress dust using water carts and other suitable equipment
- Minimise traffic on exposed areas – create designated haul roads
- When using machinery to handle dusty/dust-generating materials, minimise the distance between where the material is stored and its final location
- Water would be sprayed on unsealed access roads and open areas during conditions conducive to dust

generation

- On-site vehicle speed limits would be established and enforced to prevent dust emissions
- Stockpiled material should be appropriately managed and shaped to reduce wind erosion and covered as appropriate
- During extreme weather events where dust generation cannot be effectively minimised (such as high winds), dust generating works would cease until adequate controls can be implemented or until adverse weather conditions subside
- Remove mud from haul vehicles prior to entering public roads. A wheel cleaning/washing system may be established for vehicles entering/leaving sit
- Reprogram dust generating work during periods of high wind
- Provide awareness training in the need to minimise dust during site inductions and toolbox talks
- Regular visual monitoring of dust generation
- Plant and equipment will be serviced and maintained in good working order to reduce unnecessary emissions from exhaust fumes. Maintenance of Plant & Equipment as per manufacturers requirements
- Plant, machinery and vehicles would be turned off while not in use, where safe to do so
- Construction plant, machinery or vehicles producing excessive visual exhaust would be turned off, tagged 'out of order' and not used
- All emission controls used on vehicle and equipment would comply with standards listed in Schedule 4 of the Protection of the Environment Operations (Clean Air) Regulation 2010
- In the event that odour emissions are generated beyond the site boundaries then, work should cease until the source and nature of the odour can be determined and an appropriate course of action carried out. This may include further assessment to determine potential impacts on the nearest sensitive receptors.
- If air quality complaints occur as a result of works, works would cease and dust/odour generating activities should be re-assessed to reduce community impact.
- Regular maintenance shall be undertaken of sprinkler heads, as used for dust control throughout the site, to prevent clogging.

Air Quality Monitoring	AQMP02
Responsibility:	John Holland
Frequency:	Duration of Demolition and Construction Works
Location:	Site boundaries
Objective:	To assess compliance with environmental standards for works

Procedure

A program of atmospheric monitoring shall be undertaken at site for the duration of construction works. The extent of required monitoring is summarised in the following table and described below.

Pollutant	Monitored as	Averaging Period	Undertaken	Action
Dust	Realtime PM_{10} measurements	30 seconds	Hourly for 1st two weeks of work	Trigger Value: 50µg/m^3 Any exceedance triggers **AQMP03** Reactive Management Procedure If trigger value is not exceeded during first two weeks and dust controls are being adopted then monitoring can be reduced to a daily visual confirmation (as per JHG air quality and dust management procedure SMCSWSWL_JHG_SWL_EM_PRO_00005).
	Dust gauge depositions	1 hour	Monthly gauges for the 1st 12 months of work	Trigger Value: 2g/m^2/month Any exceedance triggers **AQMP03** Reactive Management Procedure Monthly dust gauge use for the first 12 months of construction. Dust gauge monitoring can be terminated after the first 12 months of works provided the monthly results have not exceeded the trigger value.
Odours, VOCs and SVOCs	PID	30 seconds	Hourly for 1st two weeks of work	Trigger Value: 1.6 ppm Any exceedance triggers **AQMP03** Reactive Management Procedure If trigger value is not exceeded during first two weeks and dust controls are being adopted then monitoring can be reduced to a daily visual confirmation (as per JHG air quality and dust management procedure SMCSWSWL_JHG_SWL_EM_PRO_00005).

Further details for each of the air quality monitoring requirements are provided below.

Dusts – Realtime Particulate Monitoring

Assessment of realtime levels of dusts shall be undertaken by trained personnel observing site boundaries. Where visible dusts are found to be observable leaving the site boundary then actual site measurements shall be undertaken by a 'DustTrak' Aerosol Monitor. The averaged level of PM_{10} (particulate matter less than 10 microns in diameter) over a period of 30 seconds shall be required to be less than 50µg/m^3 at the downwind portion of the site boundary.

Where the acceptable level of dust is exceeded by real-time aerosol monitoring, then dust control measures as advised in **AQMP01** Dust and Airborne Hazard Control shall be implemented.

Dusts – Deposition Monitoring

Dust deposition monitoring shall be undertaken by dust deposition gauges maintained permanently at four locations on the site boundary (one north, one south, one east and one west). These locations have been determined on the basis of siting requirements in *AS2922-1997 'Ambient Air – Guide for Siting of Sampling Units'* to the extent possible. Collection and analysis of samples shall be undertaken in accordance with *AS3580.10.1-2003 'Methods for sampling and analysis of*

ambient air – Determination of particulate matter – Deposited matter – Gravimetric method'. Samples shall be collected and analysed monthly throughout the works.

Where the level of dust deposition exceeds 2g/m^2/month the implementation of **AQMP01** Dust and Airborne Hazard Control shall be reviewed.

Volatile Organic Compounds (VOCs) – Photo-Ionisation Detector(for Odours, VOCs and SVOC Monitoring)

Assessment for VOCs shall be undertaken using a photo-ionisation detector (PID) provided with a 10.6eV bulb. Prior to use and at least on a daily basis the calibration of the PID shall be checked by comparison to a fresh air and isobutylene standard. The calibration check shall be recorded as per the appropriate PID calibration forms.

VOC monitoring shall be undertaken at all times in the proximity of handling of malodorous materials. Contaminants identified on the project site which have potentially significant health impacts are considered to occur within malodorous materials. The identification of malodorous materials is an appropriate measure for the potential presence of significant levels of VOCs.

The PID shall be maintained by an attended operator within a distance of approximately 2m during all periods of handling malodorous materials. Where the operator is unable to safely remain within 2m of the works area (consequent of heavy equipment or otherwise) the PID may be affixed to an excavator or similar in proximity of the works. PID measurements shall be undertaken as one hour averages.

The action level to assess PID readings will be set at 1.6 ppm as based on 10% of the OH&S-based Benzene time-weighted average. Once sufficient daily VOC monitoring data has been collected the trigger level will be modified if needed. This initial trigger value is considered appropriate given that sensitive receptors are located within 50m of the site boundaries.

Diesel

Under the proposed development scenario, it is anticipated plant/equipment utilised at the site will meet the minimum emissions standards outlined by the NSW EPA (required for registration), and standard construction requirements (i.e. documentation of plant maintenance and service history checklists etc.). As such, it is not anticipated that active monitoring for diesel particulate is required as part of site development activities.

Notwithstanding, if identified as being required, diesel particulate monitoring can be conducted to assess potential exposure risks to site workers and/or offsite receptors as outlined by the Australian Institute of Occupational Hygienists.

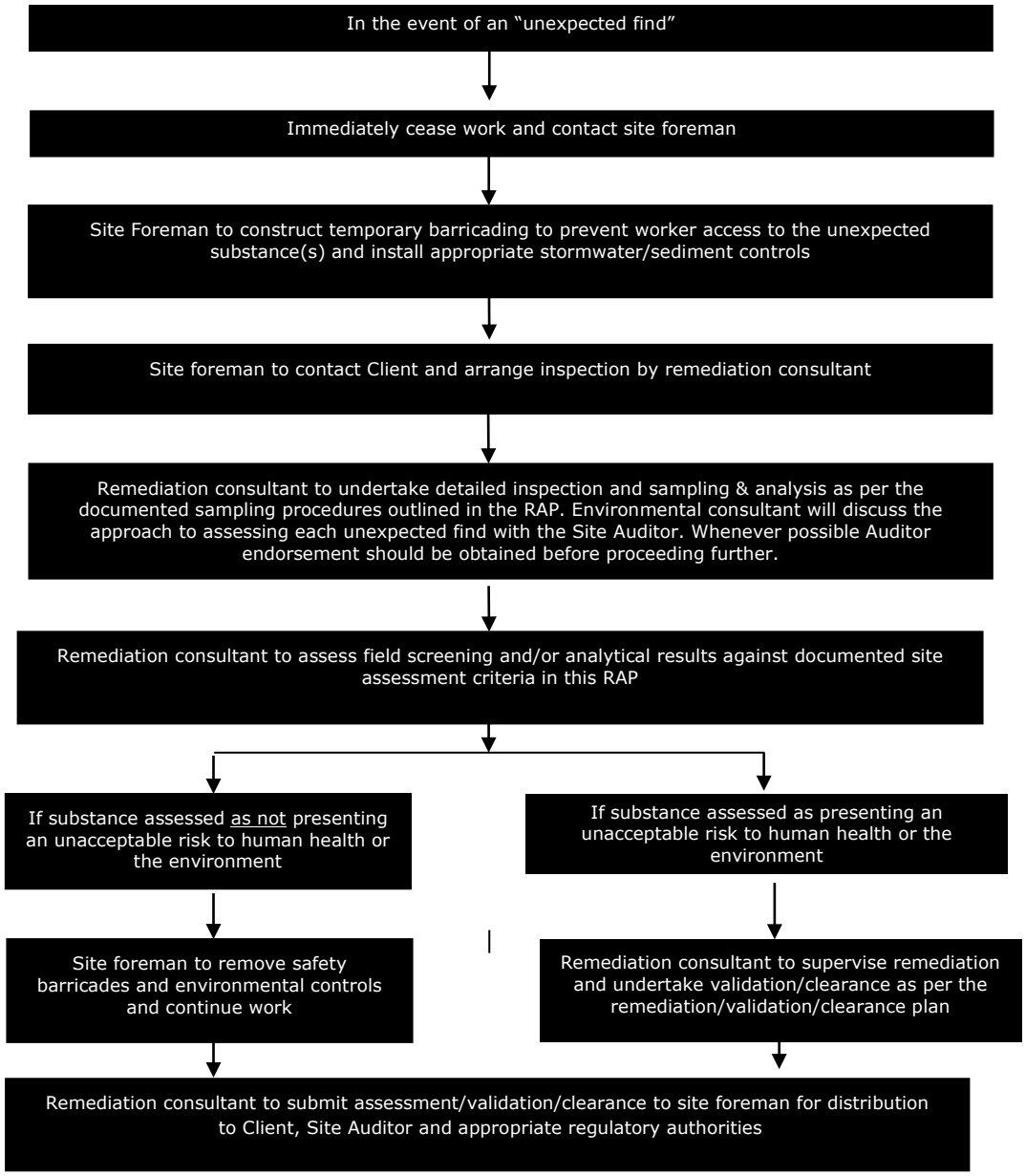
Reactive Management Procedure		AQMP03
Responsibility:	John Holland	
Frequency:	Duration of Demolition and Construction Works	
Location:	Site boundaries	
Objective:	To assess compliance with environmental standards for works	

The consent conditions C23 to C25 require that the AQMP include a reactive management procedure in the event that potential dust (as PM10) or odour emissions exceed the trigger values and a range of measures to minimise these.

Procedure

The reactive management procedure to be adopted will be the unexpected finds protocol (UFP) as provided for the site in the RAP (JBS&G 2023) based on the staged approach shown below. The UFP has been reviewed and endorsed by the NSW EPA accredited site auditor appointed to the site.

Flowchart AQMP 3.1 – Unexpected Finds Protocol (as per RAP, JBS&G 2023)



AQMP Incident Reporting		AQMP04
Responsibility:	John Holland	
Frequency:	As required in response to incidents and/or trigger level exceedance within the AQMP	
Objective:	To ensure the AQMP is implemented as intended.	

Procedure

JHG has prepared the '*Waterloo OSD Project Basement, Construction Framework Environmental Management Plan*' Document ID WMQ-BMNT-JHG-PM-MPL-0005 which includes a comprehensive compliance and corrective action framework which is intended to apply to all aspects of the Waterloo OSD Basement construction works.

In the event that an air quality incident (in the form for any air quality issues or complaints that occur on the site) or as dictated by the reactive management procedure, then JHG shall facilitate the completion of a written incident notification as per the requirements of Appendix 6 of '*Waterloo OSD Project Basement Construction Framework Environmental Management Plan*' Document ID WMQ-BMNT-JHG-PM-MPL-0005, which shall be retaining as part of the project records and be made available to the appointed certifier and the NSW Department of Planning & Environment.

AQMP Review		AQMP05
Responsibility:	John Holland	
Frequency:	Subsequent to environmental incidents. Subsequent to changes in scope of works.	
Location:	Not applicable	
Objective:	To ensure that the AQMP is current and appropriate for the site.	

Procedure

Subsequent to any environmental incidents on the site and/or a significant modification to the implemented scope of works, the AQMP shall be reviewed by JBS&G. All new copies of AQMP shall be re-distributed to all relevant parties by JBS&G. The JHG Project Environmental Management Plan as prepared for the project by John Holland will require to be updated with the provisions of any revised AQMP.

AQMP Training		AQMP06
Responsibility:	John Holland	
Frequency:	Throughout implementation of the CFEMP (WMQ-BMNT-JHG-PM-MPL-0005)	
Location:	-	
Objective:	To ensure that persons responsible for implementation of the AQMP are competent.	

Procedure

Any person who is required to be responsible for technical / monitoring activities in relation to the implementation of the AQMP shall:

- Be inducted as to the requirement and method of the specific activity by JBS&G or their nominated representative; and
- Have undertaken the 24 hour Health and Safety Training for Hazardous Waste / Materials under OSHA 29 CFR 1910:120 or equivalent.

AQMP Communication Strategy	AQMP07
Responsibility:	John Holland
Frequency:	Throughout implementation of the CFEMP (WMQ-BMNT-JHG-PM-MPL-0005)
Location:	-
Objective:	To develop and maintain community partnerships and relationships through managing community impacts

The consent conditions C23 to C25 require that the AQMP include a Communication Strategy. The Communication Strategy to be adopted will align with the overarching '*Waterloo Metro Quarter Community Communication Strategy: Station Construction and Over Station Development December 2022*' Document ID: CSWSWL-JHG-SWL-CL-PLN-000001, Revision 5.1. The minimum requirements of this strategy, relevant to air quality management only, are summarised below.

Procedure

Project Sector	Communication Type	Responsible Party	Frequency	Comments
Internal	Meetings	JHG Construction Manager	As required	Pre-start meeting – to identify requirements of this AQMP and the responsible parties for daily implementation and record keeping. Project Team Meetings – to review routine air quality monitoring results, discuss if results have exceeded **AQMP02** criteria and triggered **AQMP03** Reactive Management. Ensure appropriate record keeping takes place, and any changes are justified in writing
	Record keeping or written instructions	JHG Construction Manager	As required	Required weekly for initial period of high frequency air quality monitoring. Any reduction in the required monitoring frequency after the initial period is to be issued in a written instruction from the Environmental Consultant with justified based on available results. Required for any incident notification form that is triggered for air quality issue as per Appendix 6 of '*Waterloo OSD Project Basement Construction Framework Environmental Management Plan*' Document ID WMQ-BMNT-JHG-PM-MPL-0005.
External	Advice of Key Project Contacts (on site)	JHG Construction Manager	At least 5 days prior to start of works	Site signage and hoardings
	Advice of Key Project Contacts (off-site)	Stakeholder & Community Liaison team (S&CLT)	At least 5 days prior to start of works	Email updates, community notifications and newsletters
	Updates and Information about upcoming work	S&CLT	Every 6 months, and as required	Regular notifications and newsletters Doorknocks as required
	Receipt of concerns or complaints	S&CLT	As required	Operation of a 24hr community information line On-on-one meetings as required

AQMP Continuous Improvement		AQMP08
Responsibility:	John Holland	
Frequency:	Throughout implementation of the CFEMP (WMQ-BMNT-JHG-PM-MPL-0005)	
Location:	Not applicable	
Objective:	To ensure that the AQMP is current and subject continual improvement whenever possible.	

Procedure

Continuous improvement is built into this AQMP by the continual review of monitoring results against project air quality criteria and triggers, as provided in **AQMP02**.

Continuous improvement will also be achieved by the ongoing evaluation of environmental management performance and effectiveness of this AQMP against environmental policies, objectives and targets. Specifically this will occur by:

- The JHG Construction Manager seeking weekly confirmation from the project environmental consultant that no change has occurred in the broader environmental policies, objectives and targets that are relevant to this AQMP; and
- in the event that, over the course of the project, the relevant policies, objectives or targets change, then additional mitigations measures and or updates to the AQMP shall be implemented.