Mirvac Retail Sub SPV Pty Ltd
Dewatering Management Plan

Harbourside Shopping Centre Redevelopment, 2-10 Darling Drive
Sydney, NSW

25 January 2024

62851/147518 (Rev 4)

JBS&G Australia Pty Ltd

www.jbsg.com.au

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Abbreviations

Term	Definition
AHD	Australian Height Datum
ANZG	Australia and New Zealand Guidelines
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soil Management Plan
AST	Aboveground Storage Tank
bgs	Below Ground Surface
Btoc	Below top of Casing
Council	City of Sydney
DA	Development Application
DLWC	Department of Land and Water Conservation
DMP	Dewatering Management Plan
DP	Deposited Plan
GAC	Granular Activated Carbon
ha	Hectare
HEPA	Heads of EPA Australia
JBS&G	JBS&G Australia Pty Ltd
kL	Kilolitre
Km	Kilometre
ML	Megalitre
Mirvac	Mirvac Retail Sub SPV Pty Limited
NATA	National Association of Testing Authorities
NRAR	Natural Resources Access Regulator
NSW	New South Wales
OEH	Office of Environment and Heritage
PAH	Polycyclic aromatic hydrocarbons
PASS	Potential Acid Sulfate Soils
PFAS	Per and poly-fluoroalkyl substance
TSS	Total Suspended Solids

1. Introduction

JBS&G Australia Pty Ltd (JBS&G) was engaged by Mirvac Retail Sub SPV Pty Limited ACN 122 863 521 (Mirvac, the Client) as trustee of the Mirvac Harbourside Sub Trust (Developer) for the provision of environmental (contaminated land) services associated with the development site known as Harbourside (the site) and surrounds (ancillary works areas). The site and ancillary works area are respectively located at 2 to 10 and 1 Darling Drive, Sydney NSW as shown on **Figure 1 and Figure 2** The site is legally identified as Lot 1 Deposited Plan (DP) 776815, Part Lot 300 DP836419, Part Lot 2015 DP 1234971 and Part SP49259 and occupies an area of approximately 2.05 hectares (ha).

The Harbourside Concept Approval (State Significant Development SSD 7874) has been approved by the Department of Planning and Environment (DPE) and includes a multilevel basement, four to five level retail and commercial building across the majority of the site and construction of a residential apartment tower within the central portion. The development plans are provided in **Appendix A** and shown on **Figure 2b**.

In accordance with *Part 5 of the Water Act 1912*, a dewatering licence application will be prepared by JBS&G on behalf of Mirvac and submitted to the Natural Resources Access Regulator (NRAR). This Dewatering Management Plan (DMP) forms part of the dewatering licence application.

This DMP documents the proposed dewatering activities and procedures to be put in place to ensure dewatering activities do not impact upon the quality of surrounding surface waters, including the receiving surface waters, and to ensure compliance with the anticipated licence conditions.

2. Proposed Development Details

Based on information and design plans (included in **Appendix A**) provided by Mirvac, the proposed development will include a multi-storey commercial tower, comprising approximately 31 000 m^2 of gross floor area, with ground level retail uses and surrounding public realm improvements.

A multi storey basement will cover the central portion of the site, with an approximate excavation area of 4 900 m^2 (**Figure 2**). The basement construction will include the excavation of overlying fill materials and underlying natural soil and bedrock (sandstone) and generally comprising slab-on-grade construction with bulk excavation levels of approximately -13.5 m Australian Height Datum (AHD). The proposed basement will be accessed from Darling Drive.

3. Site Condition and Surroundings

The location and layout of the site are shown in **Figure 1 and Figure 2**. The site details are summarised in **Table 3.1**.

Table 3.1 Site Identification

Element	Details
Legal definition	Lot 1 DP 776815, Part Lot 300 DP836419, Part SP49259 and Part Lot 2015 DP 1234971
Site Address	2 to 10 Darling Drive, Sydney NSW
Approximate Area	2.05 hectares (ha)
Local Government Authority	City of Sydney Council (Council)
Geographic Coordinates	Refer to **Figure 1**
Registered Owner	Place Management NSW (previously owned by Sydney Harbour Foreshore Authority), Leased by Mirvac Retail Sub SPV Pty Limited
Previous land uses	Various industrial and commercial, including railway goods yard
Current land use	Commercial (shopping centre, restaurants and ancillary infrastructure)
Proposed land use	Mixed uses (commercial and residential)

3.1 Site Condition

The site was inspected by one of JBS&G's environmental consultants, who was trained and experienced in contamination assessments, on various dates between November and December 2021.

The site comprised a large commercial shopping centre on the western side of Cockle Bay. The centre of the site was occupied by a large on-grade multi-storey commercial building which housed retail outlets and restaurants. The site was almost entirely covered by hardstand pavements and/or building footprints with only minor areas of unsealed garden beds/tree pits.

The eastern and southern portions of the site were open air public domain/shopping promenades, partially extending over a suspended ground floor slab overlying Cockle Bay. The area was primarily used as a pedestrian thoroughfare and restaurant seating areas. The southwestern site portion, abutting the adjoining Sofitel Hotel development and Iron Wharf Drive, was a pedestrian thoroughfare associated with taxi rank infrastructure. The north-western site portion included the Harbourside Shopping Centre loading dock, driveways and service areas, partially underlay the Darling Drive overpass. The northern site portion contained the western footing of Pyrmont Bridge and a portion of land fringing the bridge footing, being paved public open pedestrian space.

The dock as used for storage and delivery of goods for restaurants and retailers. The majority of the area comprised truck/contractor parking spaces, internal roads, cold storage containers and waste services infrastructure. Two primary areas of waste storage/processing were present on site, including organic waste bins underneath the Darling Drive ramp, a waste oil above ground storage tank (AST), two waste compactor/storage units in the northwest corner of the dock.

Dozens of service cover lids and cut marks within hardstand pavements (indicating underground service trenches) were present throughout the Harbourside Shopping Centre dock and driveways and the northern site portion.

3.2 Surrounding Land Uses

The current land uses of adjacent properties are summarised following:

- North: directly north of the site, beyond Pyrmont Bridge is the Australian National Maritime Museum;
- East: the eastern boundary abuts Cockle Bay. A small pedestrian jetty runs adjacent the site boundary approximately 3 m into the bay;
- South: to the south of the site lies the International Convention Centre (ICC) building beyond which is by the Western Distributor Motorway overpass and Tumbalong Park public open/recreational space; and
- West: Iron Wharf Lane and Sofitel Sydney Darling Harbour Hotel development are located to the southwest of the site. To the west lies Darling Drive beyond which are the L1 Light Rail tracks, then the Novotel Sydney on Darling Harbour Hotel development.

3.3 Topography and Drainage

A review of regional topographical data via the Spatial Information exchange (SIX Maps[1]) indicates the site is situated at an elevation of between 2 m and 10 m Australian Height Datum (AHD). The entire site has been artificially levelled to accommodate structures, pavements and hardstands. The eastern portion of the site, abutting Cockle Bay comprises a suspended slab overlying Cockle Bay and is the lowest topographical feature. The highest portion of the site is the northern tip, comprising the western footing of Pyrmont Bridge. The balance of the site is generally flat with a minor fall in grade from west to east.

3.4 Acid Sulfate Soils

Review of the *Prospect/Parramatta Acid Sulfate Soil Risk Map* (DLWC 1997) indicates that the site is located within an area classed as 'disturbed terrain'. Areas having this classification may include filled areas which often occur following reclamation of low-lying swamps for urban development. Other areas with this classification may include areas which have been mined, dredged, or have undergone heavy ground disturbance through general urban development. DLWC (1997) state soil investigations are required to assess these areas for acid sulfate soil (ASS) potential.

Previous investigations identified that the site was underlain by fill materials and natural marine clays. Natural marine clays were reported to contain potential acid sulfate soils (PASS) with the potential for fill material beneath the water table to also be PASS/Acid Sulfate Soil (ASS) requiring management during development, noting the majority of natural soils which may contain ASS properties were likely removed as part of site development activities (construction of existing basements).

An Acid Sulfate Soil Management Plan (ASSMP) has been prepared for the site to manage potential impacts during site redevelopment (JBS&G 2021[2]).

3.5 Geology and soil

Reference to the eSPADE NSW Soil and Land Information database (OEH 2021) indicates that the site is underlain by Hawkesbury Sandstone Formation (medium to coarse grained quartz sandstone, very minor shale and laminate lenses) and Quaternary sediments (silty to peaty quartz sand, silt and clay. Ferruginous and humic cementation in places. Common shell layers).

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1 *Six Maps website, https://maps.six.nsw.gov.au/* Accessed 28 March 2022.

2 *Acid Sulfate Soil Management Plan Harbourside Shopping Centre Redevelopment – 2 to 10 Darling Drive, Sydney, 2000*. JBS&G Australia Pty Ltd 59123/136012 (Rev 0) dated 30 March 2021 JBS&G (2021)

The site was identified to be situated on disturbed terrain (xx) soil landscape which consists of turfed fill areas commonly capped with up to 40 cm of sandy loam or up to 60 cm of compacted clay over fill or waste materials (OEH 2021). The soil profile consists of four main horizons with various properties as described in **Table 3.2**. The soil ranges from high to low permeability with a large range in acidity (pH 3.5 – pH 9.0). There is the potential for acid sulfate soils (ASS), potential acid sulfate soils (PASS) and or production of hazardous ground gases from the marine sediments.

Table 3.2: Soil Type Summary

Soil Horizon	Typical depth (m)	Soil Description Summary
xx1	0-0.15	Loose black sandy loam. Brittle when dry, crumbly when moist. Generally, Nepean River alluvium or Elderslie soil series. Appears as a topsoil (A1 horizon). Moderately acidic (pH 5.0) to neutral (pH 7.5).
xx2	0.15-0.80	Compacted mottled clay. Usually used as a compacted impermeable cover for hazardous buried materials. Colour is highly variable. Extremely acidic (pH 3.5) to slightly alkaline (pH 8.0). Ironstones are occasionally present.
xx3	0.15->1.50	Variable transported fill. May consist of any type of soil or regolith material. If often includes demolition rubble and industrial and household wastes. Colour, texture, structure, fabric, degree of compaction, porosity and pH vary markedly.
xx4	0.15->1.50	Dark dredged muds and sands. Sands, sandy loams to silty clay loams and sandy clays. Appears as subsoil. Colour varies from black to yellowish brown. Charcoal, shells, or shell fragments are commonly present. This material swell, is highly saline and neutral (pH 7.0) to moderately alkaline (pH 9.0) when first dredge, but acidity may increase dramatically following drainage and oxidation.

Previous investigations (JBS&G 2022a[3], JBS&G 2022b[4] and DP 2023[5]) have identified fill material underlying the site ranging in depth from 2.7 m below ground surface (bgs) within the central portion of the site to 11.85 m bgs within the southern site extent. Fill materials were noted to generally comprise light brown sand, dark grey gravelly sand, light brown gravelly sand and grey sandy clay. No gross amount of anthropogenic material has been encountered during investigations. Natural sandy clay marine deposits (2.7 to 5.55 m bgs) and grey clay (11.85 m to 12.85 m bgs) were encountered underlying fill materials. Sandstone bedrock was encountered beneath natural material. Cross sections of the underlying lithology are provided as **Figures 3a** and **3b**.

3.6 Hydrology

As outlined in **Section 3.1** the site is covered with hardstand and/or the building footprint and no water bodies were identified within the site boundary, other than where the concrete ground slab extends out over Cockle Bay in the east of the site. Any precipitation falling onto the site is anticipated to be directed to the stormwater system via surface drains and/or the roof of Harbourside. Cockle Bay is the closest water body to the immediate east of the site.

3.7 Hydrogeology

A search of licensed groundwater bores within 500 m of the site was undertaken through the National Groundwater Information System (BoM 2020[6]). The search did not identify any bores within this search area.

[3] *Harbourside Due Diligence Contamination Assessment, 2 to 10 Darling Drive, Sydney NSW*. Prepared by JBS&G Australia Pty Ltd, ref 62851/143492 (Rev 0) dated 4 February 2022 (JBS&G 2022a)

[4] *Detailed Site Investigation – Harbourside Shopping Centre Redevelopment 2-10 Darling Drive, Sydney*. JBS&G Australia Pty Ltd, ref: 59123/134845 (Rev 1) dated 28 September 2022. JBS&G (2022b)

[5] *Groundwater Inflow Assessment, Proposed Harbourside Redevelopment,* Darling Harbour, Sydney. Douglas Partners Pt Ltd. ref: Project 200004.01/R.007 (Rev 1) dated 23 October 2023. DP (2023)

[6] *National Groundwater Information System,* accessed 16 February 2020, http://www.bom.gov.au/water/groundwater/explorer/map.shtml. BoM (2021)

During the previous intrusive investigations (JBS&G 2022) five soil boreholes were converted to groundwater monitoring wells. The wells were dipped with use of an interface probe and depth to standing water level (SWL) and total depth was measured, as presented in **Table 3.3**.

Table 3.3: Onsite Groundwater Monitoring Well Data

Groundwater Monitoring Well	Co-ordinates (MGA 56)	Depth to SWL (m btoc)	Total Depth (m btoc)	Date/Tide
BH01/MW01	E: 333414 N: 6250752	2.462	9.671	28/01/2021 / High to Low
BH08/MW02	E: 333383 N: 6250709	1.321	3.061	28/01/2021 / High to Low
BH07/MW03	E: 333453 N: 6250484	3.062	5.083	28/01/2021 / High to Low
BH04/MW04	E: 333422 N: 6250642	2.462	4.972	11/02/2021 / Low to High
BH06/MW05	E: 333429 N: 6250576	2.671	10.679	11/02/2021 / Low to High

DP (2023) reported groundwater was encountered at depths of between 1.5 and 3.5 m, consistent with that observed by JBS&G (**Table 3.3**). Given the site locality groundwater is not considered to be a potable resource. DP (2023) reported that groundwater is present within fill, natural soils and the Hawkesbury Sandstone and that groundwater underlying the site is recharged by the tidal waters of Darling Harbour and surface water infiltration into sandy layers following rainfall events (expected to be limited by hardstand pavements). DP reported the groundwater table extends across the fill and natural soil profiles and appears to be linked.

Groundwater within the deeper sandstone bedrock is likely to be discontinuous and limited/controlled by the spacing, continuity and aperture of the bedding planes, faults and joints. Further, groundwater will be influenced by the degree of hydraulic conductivity to the adjacent water of Darling Harbour.

On a regional scale, based on local topography, geology and reported depths to groundwater, groundwater flow is anticipated to be to the east.

4. Site Dewatering

Based on development plans provided by Mirvac (**Appendix A**), dewatering will be required to enable construction of the development. Dewatering activities will occur for an anticipated duration of approximately 18 months, as discussed below. Requirements for the recording and reporting of water take are provided in **Section 9** of this report and are consistent with the reporting requirements outlined in the water supply work approval (Approval number: 102A124897), as provided in **Appendix E**.

4.1 Drawdown Requirements

The geotechnical investigation, DP (2023) (**Appendix B**) identified one aquifer at the site comprising the fill, natural soils and sandstone bedrock materials with significant tidal influence from the adjacent Cockle Bay.

The excavation will extend to a depth of -13.2 m AHD to allow construction of the multi storey basement within the central portion of the site (**Figure 2**). To facilitate construction of the basement a drawdown of approximately 0.5 m below the proposed bulk excavation level will occur to ensure a dry excavation during works (DP 2023).

4.2 Dewatering Methodology

Based on design plans (**Appendix A**) and advice from DP (2023), groundwater seepage to the excavation will be removed by a sump-and-pump methodology. The basement retention system will comprise interlocking secant pile walls with partial cut off into medium strength sandstone bedrock, above the proposed bulk excavation level. The lower portion of the basement excavation will be undertaken via vertical cut faces during construction.

While the secant pile wall will control flows from the fill/unconsolidated sediments groundwater inflow is not expected to be uniform, and there is the potential for localised fracture zones within the sandstone bedrock to influence seepage during basement excavation. Inflow rates have been adopted on the baseline case (which is expected to be moderately conservative) as presented by DP (2023). Should inflows be excessive additional grouting to seal major rock defects/areas of inflow will be required.

It is envisaged the submersible pump(s) will be used to pump from the sumps to a treatment system prior to discharge to the nearest Place Management NSW stormwater asset for water discharge point adjacent to the southern boundary of the site. Detailed plans providing the location of each groundwater works area and the discharge point are provided in **Appendix D**.

As discussed in **Section 3.4**, should ASS/PASS be encountered, the material(s) will be managed in accordance with the ASSMP (JBS&G 2021) prepared for the site.

5. Receiving Water Body

As discussed in **Section 3.6**, the nearest surface water receptor is Cockle Bay located directly east of the site, which forms part of Sydney Harbour. Sydney Harbour discharges to the Pacific Ocean approximately 8.5 km northeast of the site.

Cockle Bay is situated adjacent to the Sydney business district which is considered to be a moderately to highly urbanised marine water system, subject to tidal fluctuations and periodic surface water/stormwater (freshwater) influence (particularly during prolonged and/or heavy rainfall events).

Approval to discharge to Place Management NSW's stormwater infrastructure in proximity to the basement excavation is provided in **Appendix C**, noting that any other relevant approvals will be obtained by the appointed Civil Works Contractor.

6. Groundwater Quality and Discharge Requirements

As per the groundwater quality advice letter (JBS&G 2022c[7]) submitted as part of the dewatering licence application, groundwater impacts inclusive of heavy metals (cadmium, copper, iron (including ferric iron), lead, mercury, nickel, and zinc), per and poly-fluoroalkyl substances (PFAS), polycyclic aromatic hydrocarbons (PAHs) and nutrients (ammonia and to a lesser degree, nitrate) have been identified at the site in exceedance of the adopted water quality criteria presented in ANZG (2018[8]) and HEPA (2020[9]). Groundwater pH was reported between 5.9 and 10 pH units across the site. All other individual concentrations of contaminants of potential concern (COPCs) are below the adopted water quality criteria presented in ANZG (2018) and HEPA (2020) and considered reflective of the commercial/urban environmental setting.

Based on review of the available data (as per JBS&G 2022c) and the limitations provided in **Section 11**, evaluation of current groundwater conditions has identified that groundwater extracted at the site during basement construction activities is considered suitable for discharge to stormwater subject to treatment of extracted groundwater for removal (to suitable levels) of heavy metals, PFAS, PAHs, and nutrients, pH adjustment as well as total suspended solids (TSS) should elevated TSS occur.

To ensure concentrations of COPC in extracted groundwater decline to levels suitable for discharge, as established in **Section 7,** anticipated treatment procedures to resolve water quality issues may include (but are not limited to):

- pH: adjustment via the addition of lime to raise the pH, or acid to reduce pH as appropriate;
- Reduction of PFAS, PAH, and nutrient concentrations via the use of filtration system, including a GAC/ion exchange filter, and/or temporary detention of water (waffle tank or similar) and/or flocculant treatment;
- Turbidity/total suspended solids: the use of filtration, flocculation and/or settlement of sediment via the use of a settlement waffle tank, application of alum, gypsum, or commercially available flocculant or similar; and
- Heavy metals: combination of ion exchange resin, pH adjustment and commercially available flocculant to reduce individual heavy metal concentrations which are slightly above acceptance standards.

Water quality monitoring will be completed during works to ensure appropriate water quality levels are maintained with respect to discharge to the stormwater system. It is proposed to discharge groundwater to the Place Management NSW stormwater system. Correspondence that Place Management NSW are, in principle, accepting of the discharge water from basement excavation activities is provided in **Appendix C**.

Water samples will be analysed for potential contaminants at the site (heavy metals, PFAS, PAHs, nutrients concentrations, pH and TSS) concurrently with dewatering activities. Samples will be collected weekly by JBS&G, Mirvac's appointed environmental consultant, and submitted to a National Association of Testing Authorities (NATA) accredited laboratory for analysis to ensure reported contaminant threshold concentrations do not materially change from that reported in JBS&G (2022c), and are in compliance with the adopted disposal criteria presented in **Section 7**. In

[7] *Groundwater Quality Advice, Harbourside, Sydney, NSW*, JBS&G Australia Pty Ltd, 62851/147330, 18 November 2022 (JBS&G 2022c)

[8] *Australia and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG) https://www.waterquality.gov.au/anz-guidelines accessed 23 March 2022 (ANZG 2018)

[9] *PFAS National Environmental Management Plan Version 2.0. National Chemicals Working Group of the Heads of EPAs Australia and New Zealand dated January 2020 HEPA (2020)*

addition, daily field monitoring of pH and suspended sediment levels will be completed by construction staff (Civil Work Contractor) during dewatering activities, with records retained on site.

Where sampling identifies exceedances of the criteria specified in **Section 7** additional treatment achieve the appropriate standard will be required. Should project considerations not allow for treatment and reassessment, contingency measures, as discussed in **Section 10**, will be adopted.

The volume of extracted groundwater disposal is required to be recorded using a calibrated flow meter with the records to be provided to JBS&G weekly. It is the responsibility of the Civil Work Contractor to ensure compliance with the anticipated dewatering license and the requirements of this DMP.

7. Groundwater Quality Criteria

In order to establish appropriate criteria for assessment of water quality in relation to suitability for discharge to the environment (i.e. stormwater system), reference has been made to:

- Council dewatering requirements;
- NSW *Protection of the Environment Operations Act 1997* (POEO Act) and the included definition of pollution of waters;
- Environmental values as defined in ANZG (2018) as "*a measurable quantity (threshold) or condition of an indicator for a specific community value below or, for some stressors, above which we consider to be a low risk of unacceptable effects occurring*"; and
- NSW Government (2006[10]) '*Environmental Objectives for Water Quality and River Flow*' as an appropriate source of environmental values for the Sydney Harbour and Parramatta River catchment.
- *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)*, National Environment Protection Council (NEPC 2013); and
- *Guidelines for Managing Risk in Recreation Waters*. Australian Government National Health and Medical Research Council 2008 (NHMRC 2008).

Based on the above, and considering the duration of the proposed dewatering program, key values in establishing appropriate criteria for this assessment and the relevant source criteria are considered to be:

- Aquatic Ecosystems: ANZG (2018) and HEPA (2020) Trigger Values for Marine, 95% Protection of Species[11];
- NHMRC (2008) thresholds for recreational waters, superseding recreational values previously presented in ANZECC/ARMCANZ (2000) as per NEPC (2013); and
- Health Screening Levels – Commercial/Industrial (HSL-D) for petroleum hydrocarbons. NEPC (2013)

Site specific criteria adopted for this assessment are presented in **Table 7.1**.

[10] *'NSW Water Quality and River Flow Objectives'*, NSW Government, Published 28 June 2006, Reference NSW Government (2006).

[11] It is noted Cockle Bay is a highly disturbed marine environment, and as such, consideration to 80% species protection may be given (as applicable) for assessment of suitability of discharge water to the receiving environment.

Table 7.1 – Threshold Criteria (all units in mg/L unless otherwise noted)

Parameter Type	Analyte	Threshold Criteria
Physical Parameters	pH	7.0-8.5 (pH units)[a]
	Total Suspended Solids	50
Metals and Metalloids	Arsenic (Total)	0.0023
	Cadmium	0.0007 [b]
	Chromium (Cr VI)	0.0044
	Chromium (Total)	0.0274
	Copper	0.0013
	Iron (including ferrous)	0.3[c]
	Lead	0.0044
	Manganese	0.08
	Mercury (Inorganic)	0.0001[b]
	Nickel	0.07
	Zinc	0.015
Polycyclic Aromatic Hydrocarbons (PAHs)	Benzo(a)Pyrene (B(a)P)	0.2 (µg/L)
	Anthracene	0.4 (µg/L)
Total Petroleum Hydrocarbons (TPH)	C_{10}-C_{36} Fraction	0.6 & No odours or visible impact
Volatile Organic Compounds (VOCs)	Benzene	0.7
Nutrients	Ammonia (as N)	2.15
	Nitrate (as N)	2.4
Per and Poly Fluoroalkyl Substances (PFAS)	Perfluorooctanesulfonic acid (PFOS)	0.00023[b] (µg/L)
	Perfluorooctanoic acid (PFOA)	19 (µg/L)

Note:

a) pH range was adopted from NSW Government (2006) 'Environmental Objectives for Water Quality and River Flow' as an appropriate source of environmental values for the Sydney Harbour and Parramatta River catchment.

b) For bio-accumulative compounds, the 99 % DGV was adopted in lieu of alternative screening criteria for bioaccumulation effects. In practice, the 99 % DGV will be adopted only where specifically recommended by ANZG (2018)

c) Canadian Guideline Value was adopted as no environmental values was present in ANZG (2018).

8. Groundwater Level Monitoring

To facilitate the requirements of the anticipated licenced dewatering consent conditions, groundwater levels beyond the basement extent will be monitored. Groundwater levels will be monitored at locations up-gradient and down-gradient of the excavation, beginning at least three months prior to dewatering activities, during, and for six months following finalisation of dewatering activities to verify the lack of impacts associated with dewatering activities at the site, or alternatively, to provide data in the assessment of contingency plan implementation.

Groundwater level loggers are currently installed at three wells (located cross, down, and up gradient of the site) with measurements recorded on an hourly basis. Groundwater level monitoring is to be conducted prior to, during, and after required dewatering, as per the requirements of the water supply works approval. Data is and will be reviewed on a regular basis during and immediately following the completion of dewatering activities by Mirvac's appointed environmental consultant.

Weekly sampling is undertaken by JBS&G, and samples forwarded to a NATA accredited laboratory for analysis for a range of contaminants, as outlined in **Table 7.1**.

It is further understood that daily measurements of physicochemical parameters (e.g. pH, temperature, and turbidity) are currently being by the civil works contractor.

The purpose of the groundwater level monitoring will be to satisfy the requirements of the dewatering licence consent conditions. Should there be other requirements for groundwater monitoring beyond which is outlined above (i.e., other DA conditions), relevant data obtained by Mirvac's appointed environmental consultant will be provided to Mirvac/their appointed geotechnical consultant or other relevant parties for review/interpretation.

This data will subsequently be provided to NRAR on completion of the works.

9. Groundwater Volume Extraction Estimates and Recording

Based on modelling advice provided by DP (2023), the scenario for construction dewatering was developed on the sensitivity case as a conservative measure. Should infiltration rates be greater than those estimated in DP 2023, the contingency in **Section 10** will be implemented.

The quantity of groundwater to be extracted has been estimated (DP 2023) using the following assumptions regarding site conditions and proposed staging of works:

- Basement excavation footprint – approximately 4,900 m^2;
- Site standing water level (as adopted in DP (2023)): 1.1 m AHD;
- Basement bulk excavation level – approximately -13 m AHD (dewatering to -13.5 mAHD);
- Soil porosity: 30% for fill, negligible for sandstone
- Initial dewatering volume (drainage) as outlined by DP (2023) is 308 m^3 / day reducing to 292 m^3 / day with a cumulative total for the first years' construction period being 107 megalitres (ML); and
- Construction period of approximately 24 months (730 Days).

Based on the above parameters and information presented by DP (2023), initial drawdown and maintenance drawdown for the total saturated basement envelope, it has been estimated that a maximum of approximately 214 ML will be extracted over the 24-month period.

Anticipated licence conditions will require monitoring of the following:

- Actual volume of groundwater pumped during the dewatering works (as kL or ML);
- The discharge rate (L/s); and
- The duration of pumping (number of days or weeks).
- A calibrated flowmeter should be installed and regular (i.e., daily) record keeping implemented to satisfy this requirement.

In addition, the results of pH and suspended sediments testing prior to the commencement of pumping and daily thereafter for the period of operation is required to be documented.

Where a water meter is installed on a water supply work, the meter reading must be recorded in the logbook before taking water. This reading must be recorded every time water is to be taken.

The following information must be recorded in the logbook for each period of time that water is taken:

- Date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time;
- the access licence number under which the water is taken;
- the approval number under which the water is taken; and
- the volume of water taken for domestic consumption and/or stock watering.

During dewatering and for up to five years following the cessation of dewatering, the logbook must be made available for inspection when requested by the relevant licensor (i.e. DPE).

10. Contingency

In the event that water quality monitoring (as outlined in **Section 7**) identifies exceedances of the adopted criteria and water treatment activities either cannot be undertaken as outlined in **Section 6** or fail to improve the quality sufficiently for off-site disposal, the following will be considered:

- Upgrading of the water treatment plant; and/or
- Implementation of a Trade Waste Permit with Sydney Water for a temporary connection to sewer for discharge of impacted water.

Reinjection of extracted groundwater is currently not proposed to be undertaken as part of the construction and dewatering methodology. In the event that amendments to the disposal strategy comprise reinjection of water, assessment and/or treatment will be completed prior to and during works to ensure that contaminated water that may represent an unacceptable risk to intrinsic groundwater or surface water conditions is not reinjected. In the event that reinjection is adopted, required controls are to be established to ensure reinjection rates will not exceed extraction rates, thereby minimising the potential for changes in groundwater flow regimes beyond the extent of the construction works zone. However, it is noted that reinjection of groundwater would require additional Water NSW approval, and the potential for re-injection would be limited in sandstone bedrock.

In the event that excessive groundwater seepage occurs during excavation activities additional grouting will be required to seal major rock defects/areas of inflow to manage the flows (as prescribed by DP 2023). As outlined in **Section 6**, daily discharge volumes are to be monitored to ensure compliance with the dewatering licence conditions of approval.

11. 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 report has been prepared specifically for the client for the purposes of the commission, and no warranties, express or implied, are offered to any third parties and no liability will be accepted for use or interpretation of this report by any third party.

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. This report should not be amended in any way without prior approval by JBS&G, or reproduced other than in full including all attachments as originally provided to the client by JBS&G.

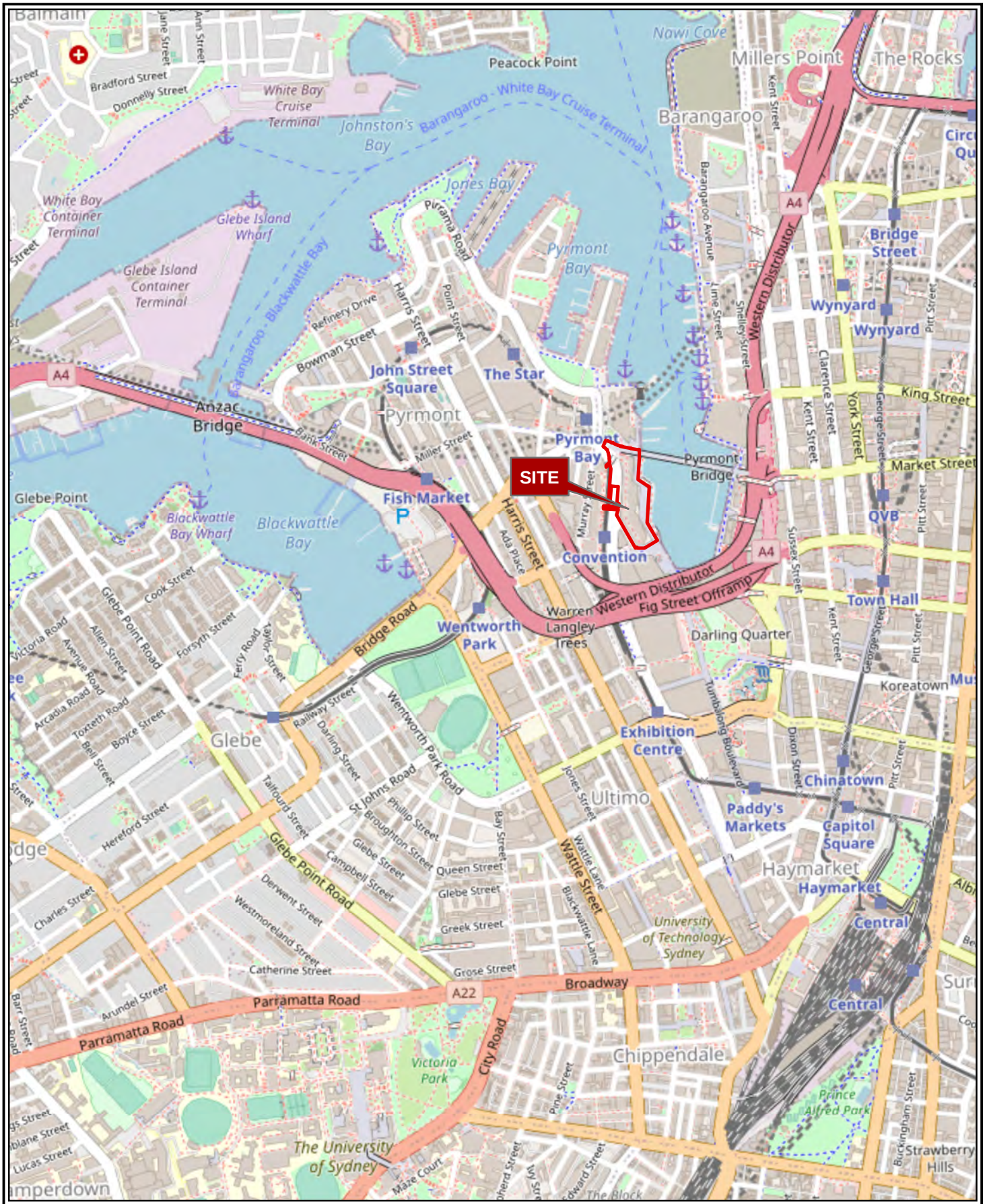
Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the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

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. 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 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.

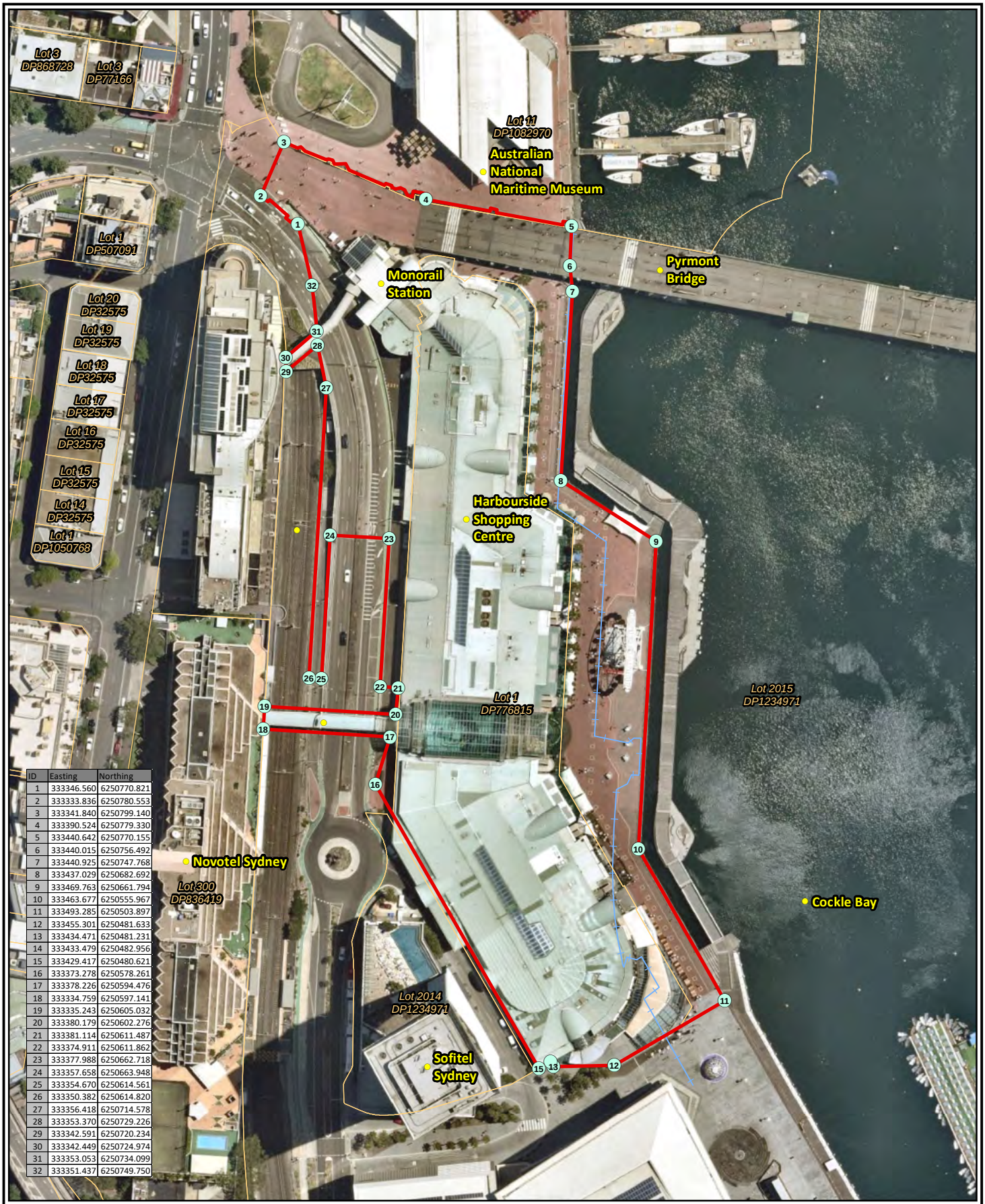
Figures



Legend:
Approximate DA Boundary - The Site

Scale 1:15,000 (0 180 360 metres)		**Harbourside Shopping Centre, Darling Harbour**
Coord. Sys. GDA 1994 MGA Zone 56		**SITE LOCATION**
Job No: 62851		
Client: Mirvac		**FIGURE 1**
Version: R07 Rev 0	Date 16/09/2022	JBS&G
Drawn By: AB	Checked By: DS	

File Name: N:\Projects\Mirvac\62851 Harbourside Remediation Works\GIS\Maps\R07 Rev 0\62851_01_SiteLocation.mxd



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2	333333.836	6250780.553
3	333341.840	6250799.140
4	333390.524	6250779.330
5	333440.642	6250770.155
6	333440.015	6250756.492
7	333440.925	6250747.768
8	333437.029	6250682.692
9	333469.763	6250661.794
10	333463.677	6250555.967
11	333493.285	6250503.897
12	333455.301	6250481.633
13	333434.471	6250481.231
14	333433.479	6250482.956
15	333429.417	6250480.621
16	333373.278	6250578.261
17	333378.226	6250594.476
18	333334.759	6250597.141
19	333335.243	6250605.032
20	333380.179	6250602.276
21	333381.114	6250611.487
22	333374.911	6250611.862
23	333377.988	6250662.718
24	333357.658	6250663.948
25	333354.670	6250614.561
26	333350.382	6250614.820
27	333356.418	6250714.578
28	333353.370	6250729.226
29	333342.591	6250720.234
30	333342.449	6250724.974
31	333353.053	6250734.099
32	333351.437	6250749.750

Legend:

- Approximate DA Boundary - The Site
- NSW Cadastre (DFSI, 2022)
- Structures Below the Harbour Promenade - Seaward Extent
- Site Features

Scale 1:1,750 (0 20 40 metres)

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 62851

Client: Mirvac

Version: R07 Rev 0 | Date 16/09/2022

Drawn By: AB | Checked By: DS

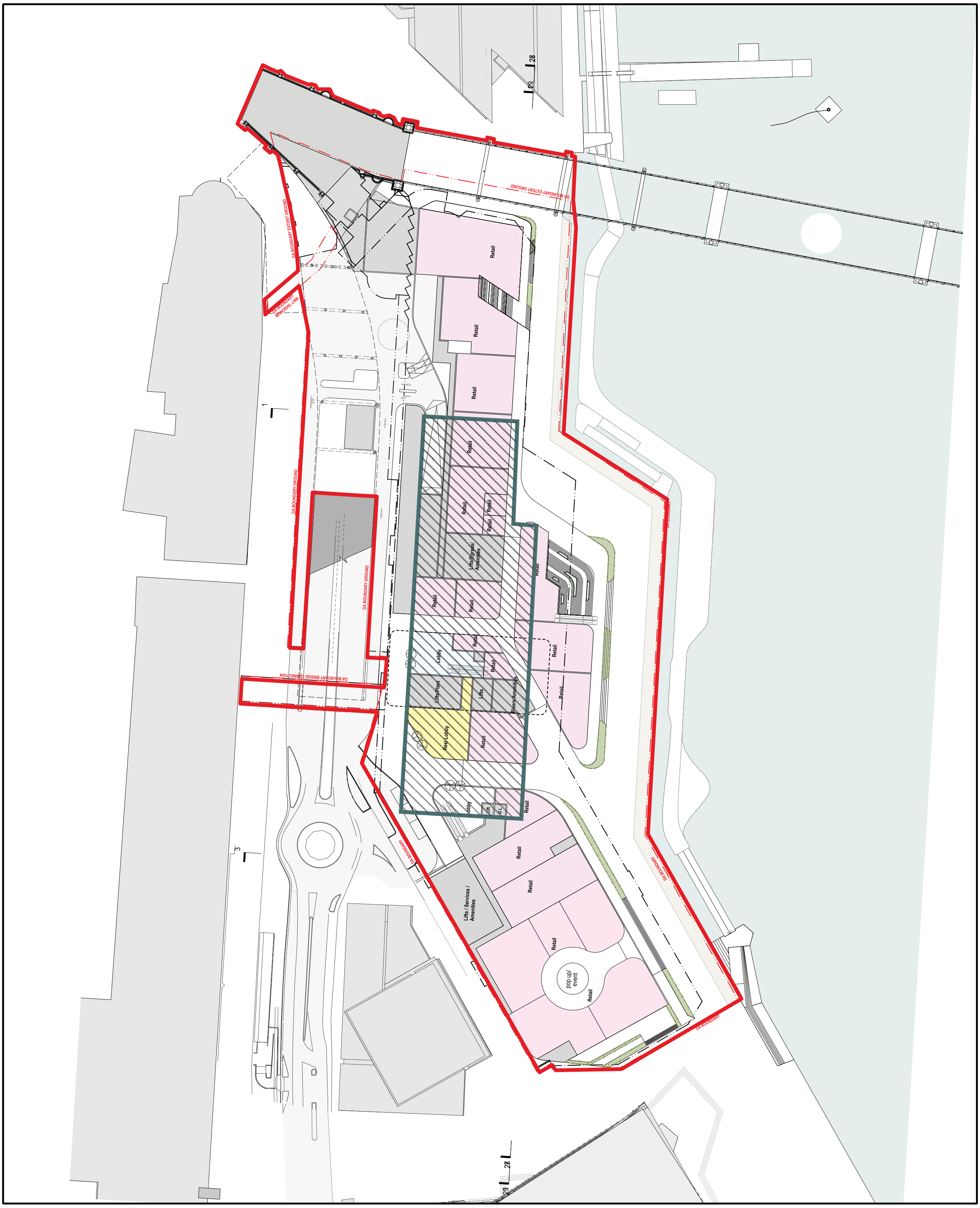
Harbourside Shopping Centre, Darling Harbour

SITE LAYOUT

FIGURE 2A

JBS&G

File Name: N:\Projects\Mirvac\62851 Harbourside Remediation Works\GIS\Maps\R07 Rev 0\62851_02a_SiteLayout.mxd
Reference: www.nearmap.com.au - 20201206



Legend:

- Approximate DA Boundary - The Site
- Basement Extent

Landuse

- RETAIL
- COMMERCIAL
- RESIDENTIAL

Scale 1:1,750 — 0 20 40 metres

Coord. Sys. GDA 1994 MGA Zone 56

Job No: 62851

Client: Mirvac

Version: R07 Rev 0

Date 16/09/2022

Drawn By: AB

Checked By: DS

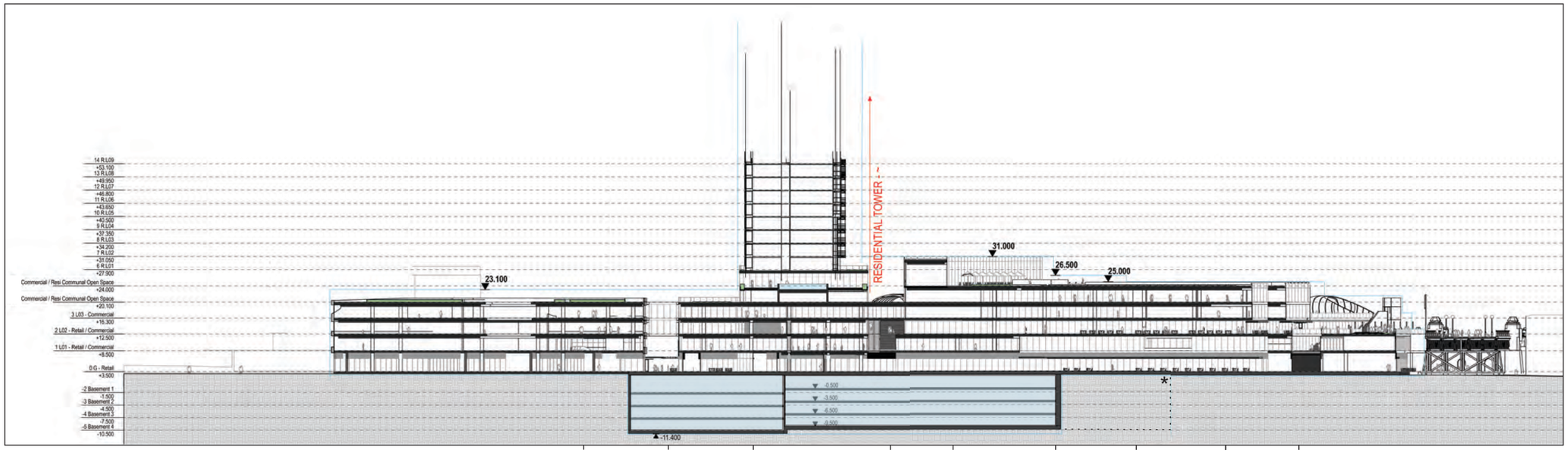
Harbourside Shopping Centre, Darling Harbour

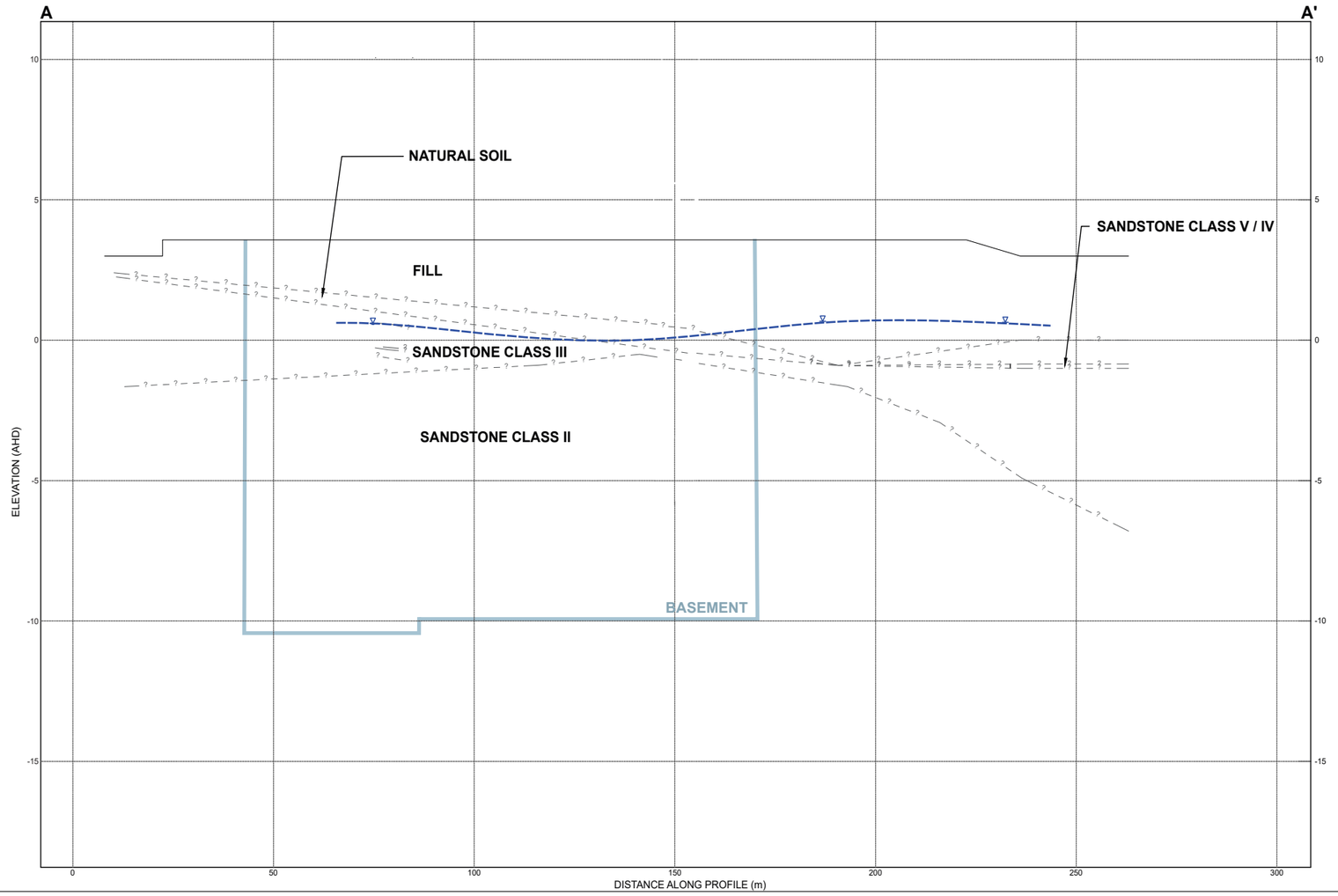
PROPOSED SITE LAYOUT

FIGURE 2B

JBS&G

File Name: N:\Projects\Mirvac\62851 Harbourside Remediation works\GIS\Maps\R01 Rev 1 - ASSMP\62851_02b_ProposedSiteLayout.mxd
Reference: SSDA1-303 Indicative Plan Only - Ground Floor Retail (Costing)





Legend:

TESTS / OTHER

- N - Standard penetration test value
- — ? — - Interpreted geotechnical boundary
- ▽ - Water level
- Basement
  Note: Northern basement extent varies from design diagram ~35m south - Dotted line denotes original location on plans *
  SSDA1-318 Indicative Only - Section (23.1)

JBS&G

Job No: 62851	
Client: Mirvac	
Version: R07 Rev 0	Date: 16/09/2022
Drawn By: AB	Checked By: DS

0 12.5 25
metres

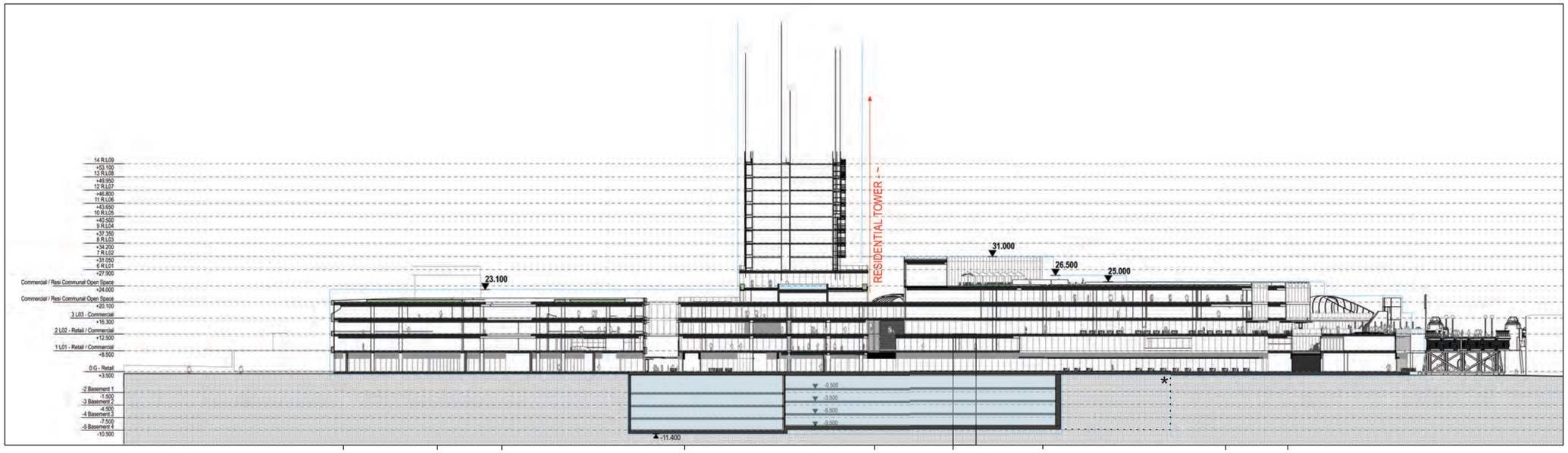
Coord. Sys. GDA 1994 MGA Zone 56

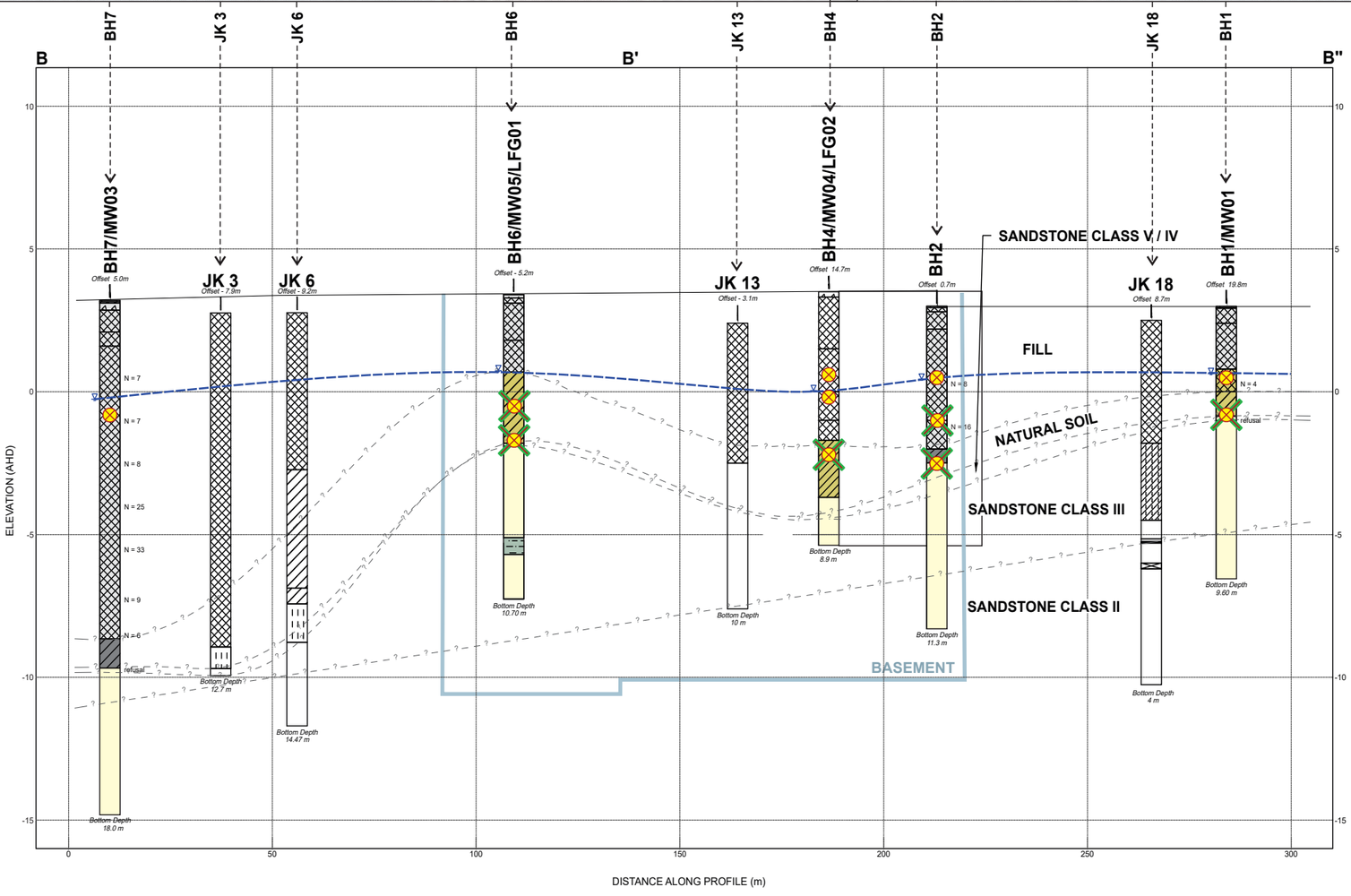
Harbourside Shopping Centre
Darling Harbour, NSW

Cross Section A-A'

FIGURE 3A

Document Path:
Reference:





Legend:

- Filling
- Concrete
- Pavers
- Bricks
- Clay
- Sandy Clay
- Silty Sandy Clay
- Silty Sand
- Sand
- Siltstone
- Sandstone
- ASS Sample Location
- ASS Exceedance

TESTS / OTHER

- N - Standard penetration test value
- — ? — - Interpreted geotechnical boundary
- - Water level

Basement
Note: Northern basement extent varies from design diagram ~35m south - Dotted line denotes original location on plans *
SSDA1-318 Indicative Only - Section (23.1)

JBS&G

Job No: 62851	
Client: Mirvac	
Version: R07 Rev 0	Date: 16/09/2022
Drawn By: AB	Checked By: DS

0 12.5 25
metres

Coord. Sys. GDA 1994 MGA Zone 56

Harbourside Shopping Centre
Darling Harbour, NSW

Cross Section B-B"

FIGURE 3B

Document Path:
Reference:

Appendix A Proposed Development Design Plans

NOVOTEL HOTEL

IBIS HOTEL

50 MURRAY STREET

ICC HOTEL SOFITEL

U/S 14.000

U/S 15.500

DA BOUNDARY BRIDGE CONNECTION

DA BOUNDARY BRIDGE CONNECTION

EASTERN DISTRIBUTOR MOTORWAY LINK

DA BOUNDARY EXTENT GROUND

DA BOUNDARY GROUND

21.750

25.000

ENVELOPE UNDER DARLING DRIVE

DA BOUNDARY GROUND

BASEMENT ENVELOPE EXTENT

BASEMENT ENVELOPE EXTENT

BASEMENT ENVELOPE EXTENT

17.600

25.000

DA BOUNDARY

OUTLINE OF TOWER ENVELOPE
SEE DRAWING SSDA1-101 ENVELOPE PLAN - TOWER

E 333400
N 6250650

E 333400
N 6250700

31.000

26.500

13.750

RL23.100

14.000

20.500

15.500

DA BOUNDARY

DA BOUNDARY

DA BOUNDARY

DA BOUNDARY

DA BOUNDARY EXTENT GROUND

BOUNDARY LEGEND

PROPOSED STAGE 1 DA BOUNDARY

LOT BOUNDARY

BASEMENT ENVELOPE EXTENT

PODIUM

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Approved Application No: SSD 7874

Granted on: 25 June 2021

Signed: AW Sheet No: 1 of 10

fjmt

Envelope Plan - Podium

Mirvac - Harbourside

0 5 10 20m

1:500 @ A1 22/12/20

For Approval **SSDA1-100**

NOVOTEL HOTEL

IBIS HOTEL

50 MURRAY STREET

ICC HOTEL SOFITEL

DARLING DRIVE

DA BOUNDARY BRIDGE CONNECTION

DA BOUNDARY BRIDGE CONNECTION

DA BOUNDARY EXTENT BUNN ST BRIDGE

DA BOUNDARY EXTENT BUNN ST BRIDGE

DA BOUNDARY GROUND

DA BOUNDARY GROUND

DA BOUNDARY MEMORIAL LINK

DA BOUNDARY EXTENT GROUND

DA BOUNDARY EXTENT GROUND

DA BOUNDARY

DA BOUNDARY

DA BOUNDARY

DA BOUNDARY

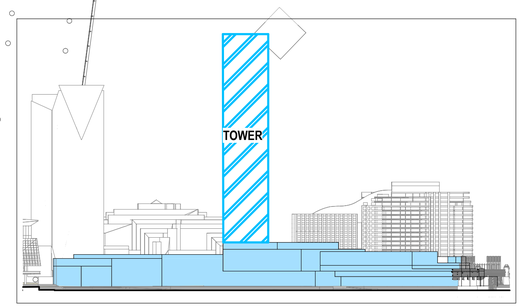
166.950

PODIUM ENVELOPE BELOW
SEE DRAWING SSDA1-100
ENVELOPE PLAN - PODIUM

BOUNDARY LEGEND

PROPOSED STAGE 1 DA BOUNDARY

LOT BOUNDARY



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fjmt

Envelope Plan - Tower

Mirvac - Harbourside

0 5 10 20m

1:500 @ A1 08/10/2020

For Approval **SSDA1-101**

DA BOUNDARY EXTENT GROUND

DA BOUNDARY GROUND

DA BOUNDARY GROUND

DA BOUNDARY

DA BOUNDARY EXTENT GROUND

SALTWATER CULVERTS

SALTWATER CULVERTS

DA BOUNDARY

DA BOUNDARY

Planning, Industry & Environment

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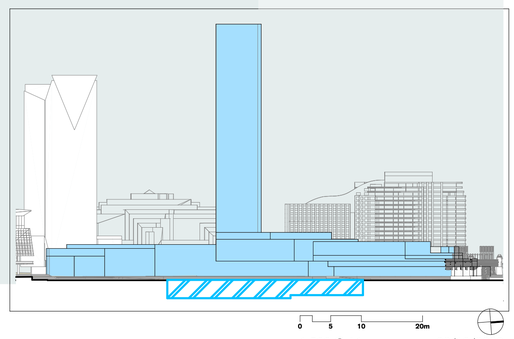
Signed: AW Sheet No: 3 of 10

BOUNDARY LEGEND

LOT BOUNDARY

WATERFRONT & PYRMONT BRIDGE SETBACKS



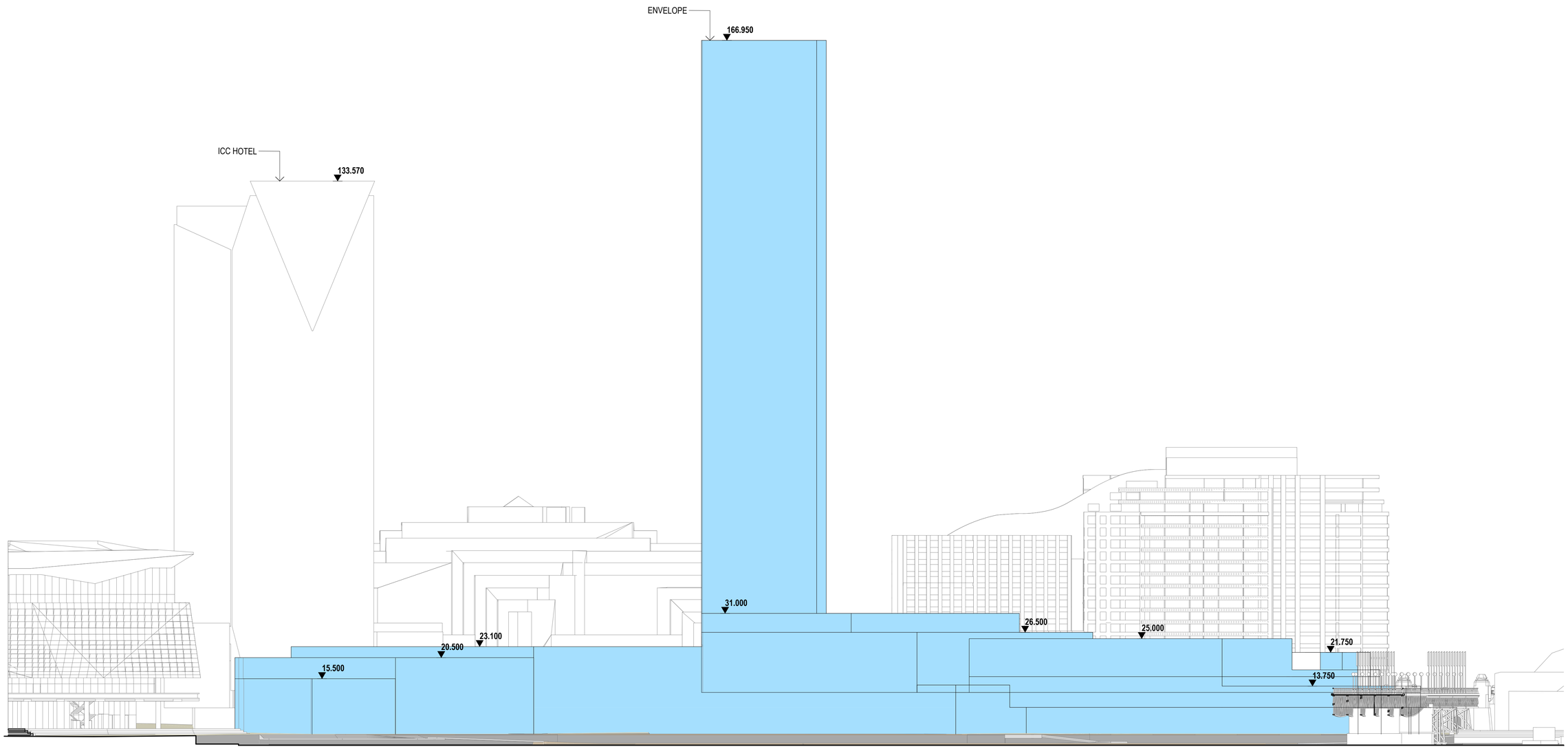
fjmt

Envelope Plan - Basement

Mirvac - Harbourside

1:500 @ A1 08/10/2020

For Approval **SSDA1-102**



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Granted on: 25 June 2021

Signed: AW Sheet No: 4 of 10

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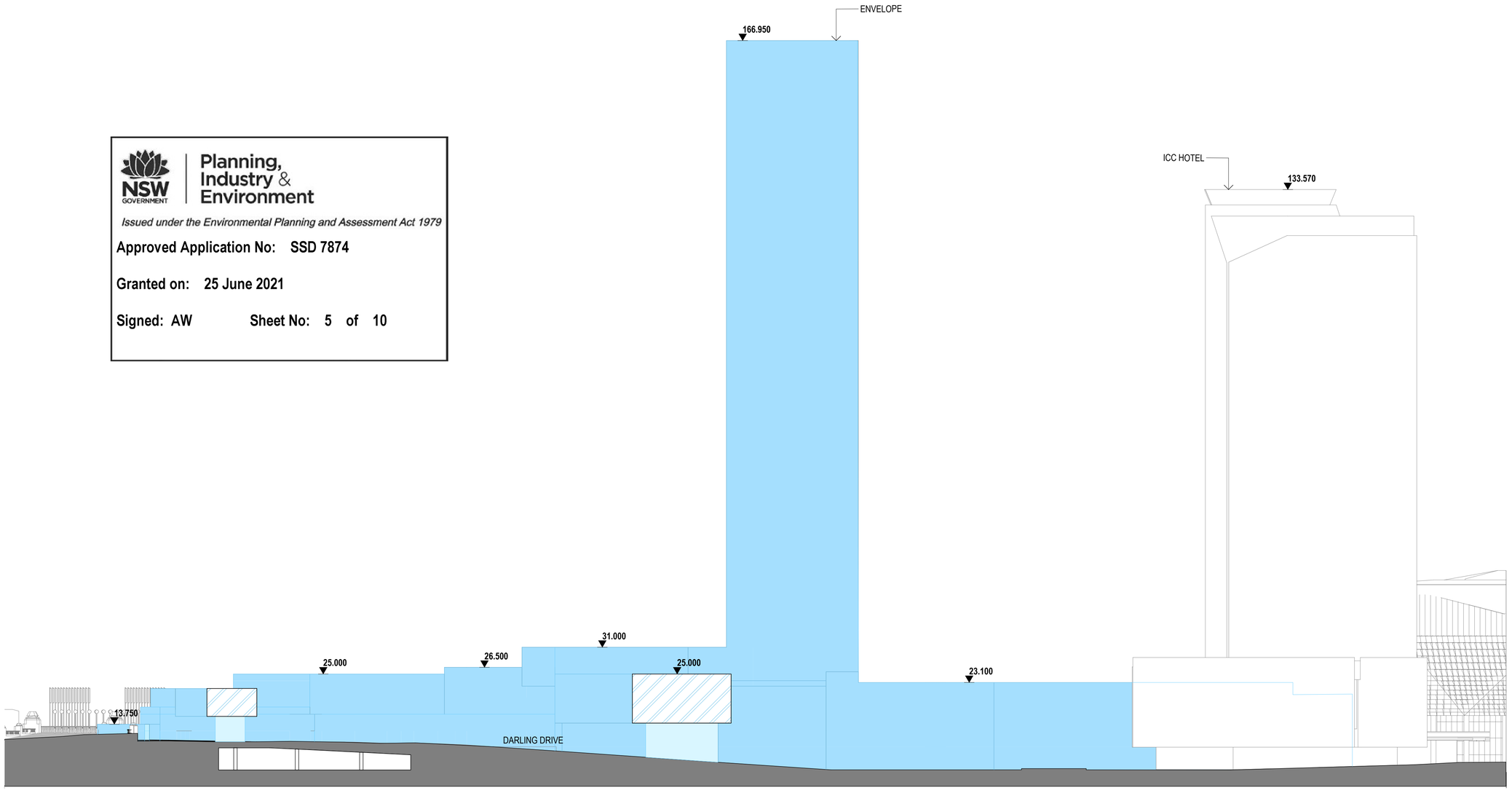
Approved Application No: SSD 7874

Granted on: 25 June 2021

Signed: AW Sheet No: 5 of 10



fjmt

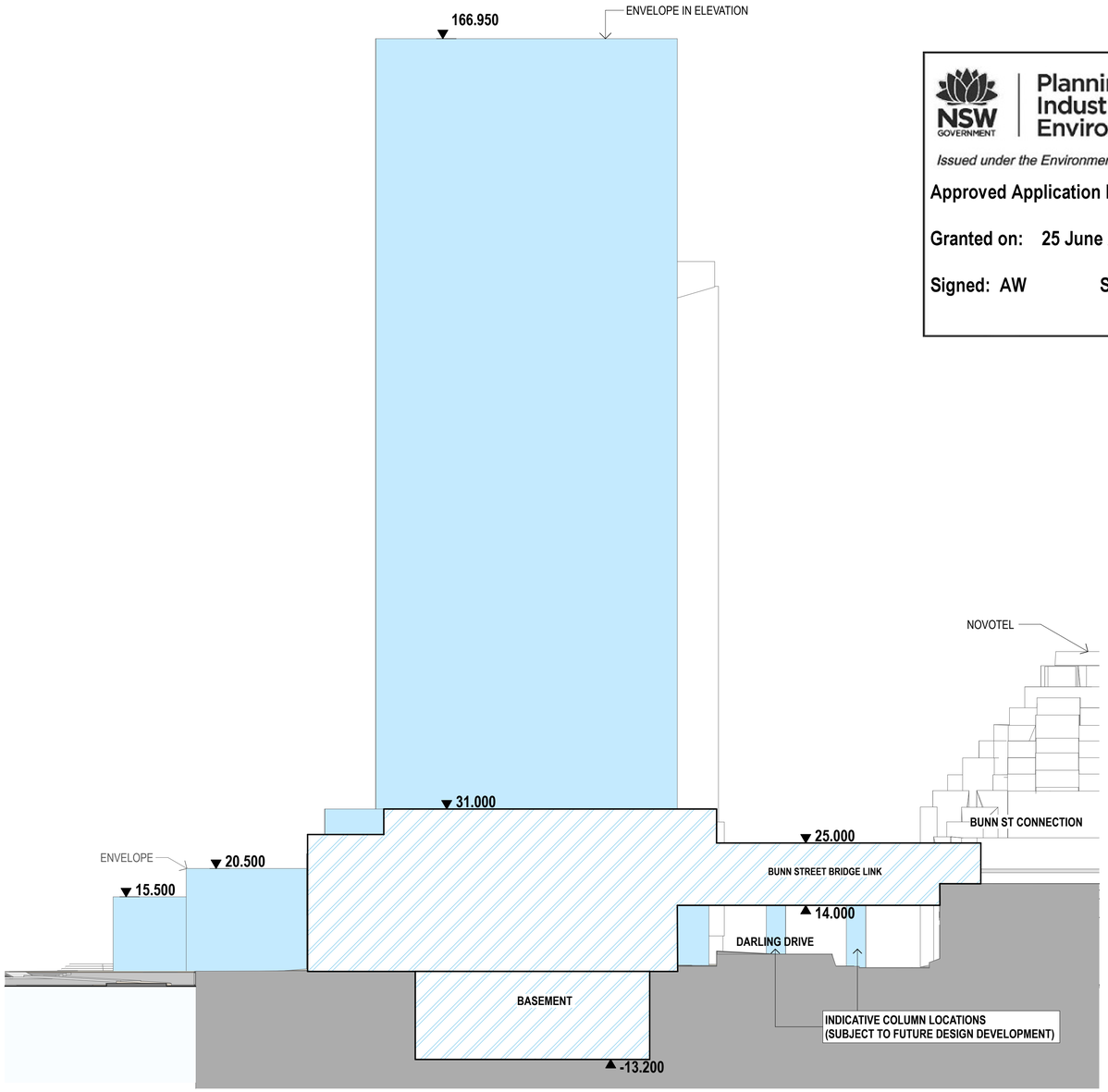
Envelope West Elevation

Mirvac - Harbourside

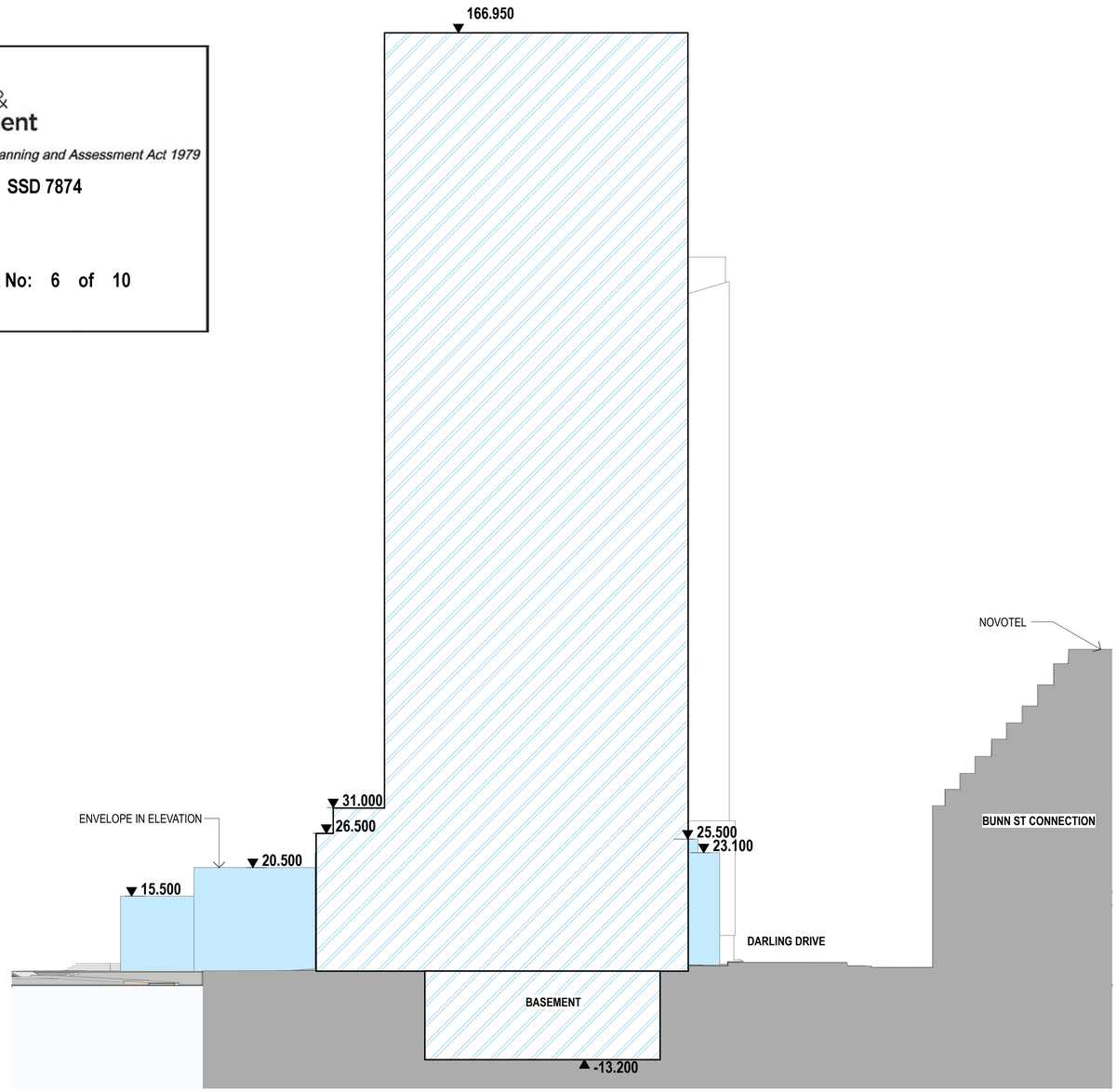
0 5 10 20m

1:500 @ A1 08/10/2020

For Approval **SSDA1-104**



SECTION ENVELOPE Section 1
1:500



SECTION ENVELOPE SECTION 2
1:500

fjmt

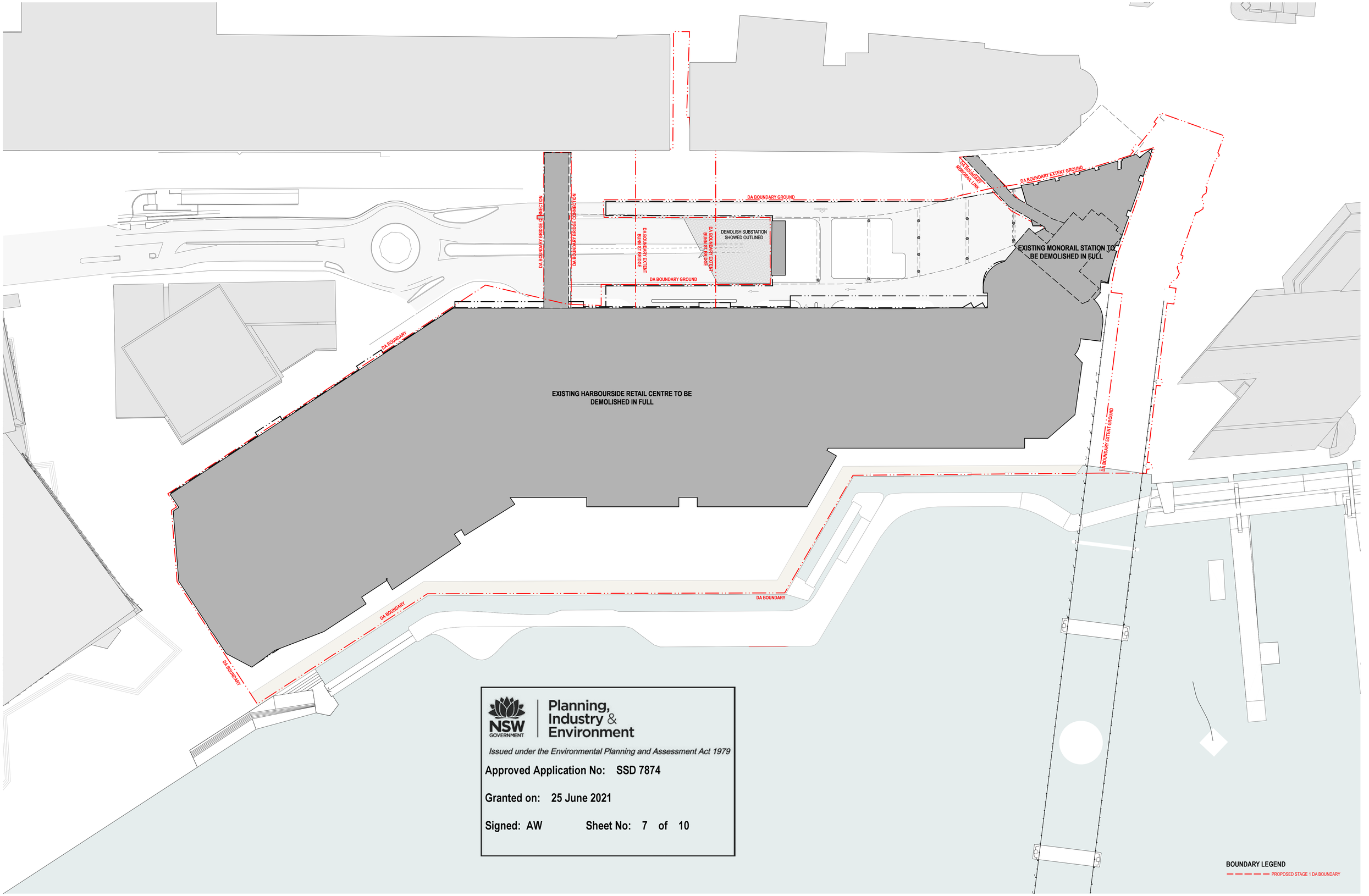
Envelope Cross Sections

Mirvac - Harbourside

0 5 10 20m

1:500 @ A1 08/10/2020

For Approval **SSDA1-105**



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BOUNDARY LEGEND

PROPOSED STAGE 1 DA BOUNDARY

fjmt

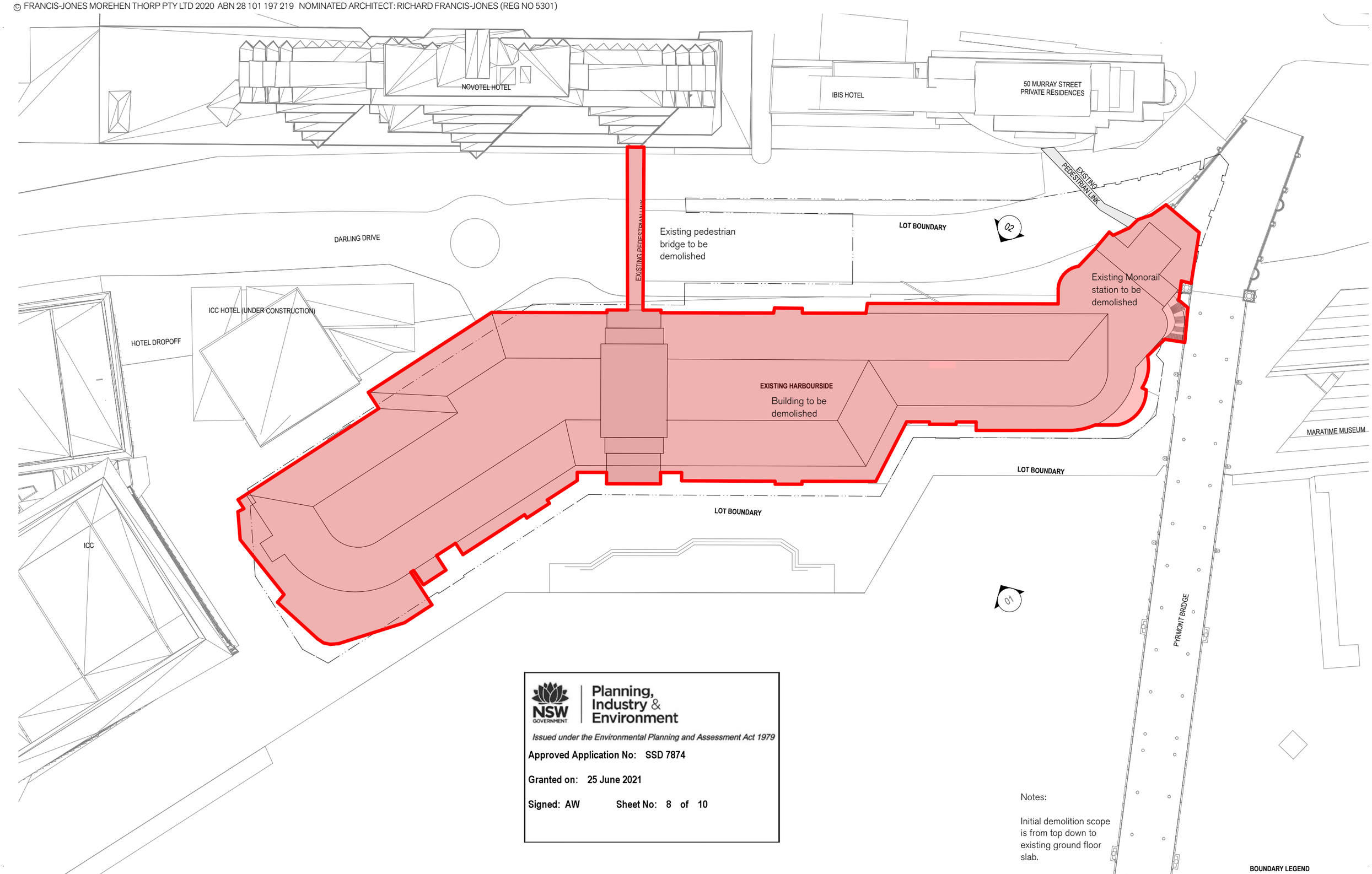
Demolition Plan - Existing Harbourside & Monorail Station

Mirvac - Harbourside

0 5 10 20m

1:500 @ A1 08/10/2020

For Approval **SSDA1-200**



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Signed: AW Sheet No: 8 of 10

Notes:

Initial demolition scope is from top down to existing ground floor slab.

BOUNDARY LEGEND

LOT BOUNDARY

For Demolition

0 10 20 50m

1:1000 @ A3

08/10/2020

fjmt

Site Plan - Demolition

Mirvac - Harbourside

For Approval

SSDA1-2101

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Granted on: 25 June 2021

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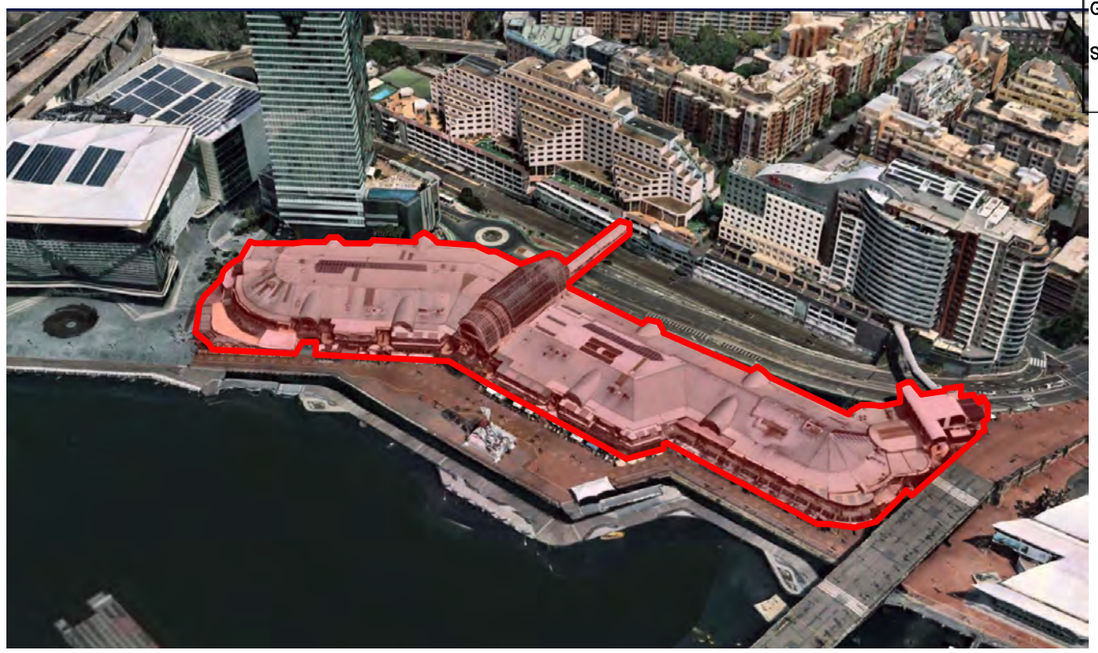
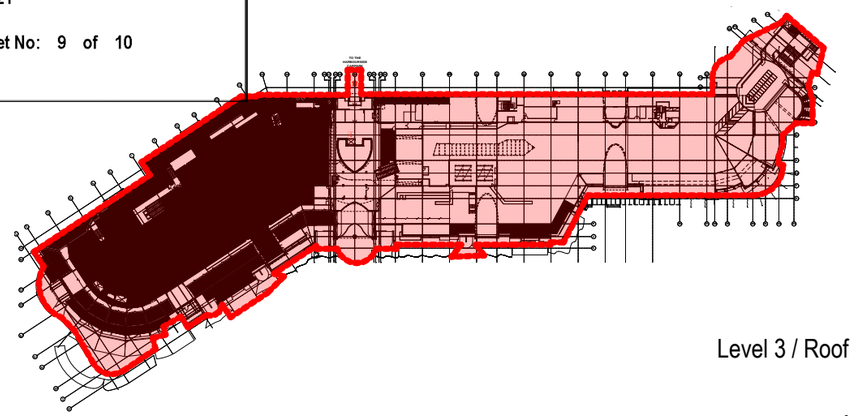
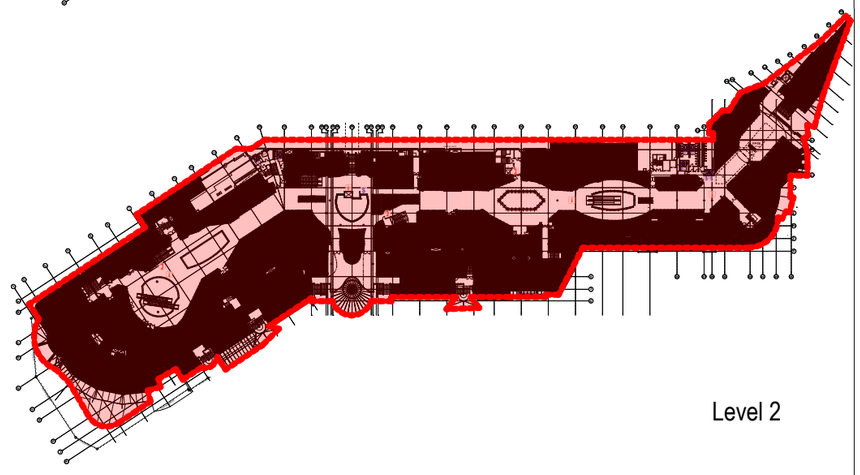


Aerial Photo 01

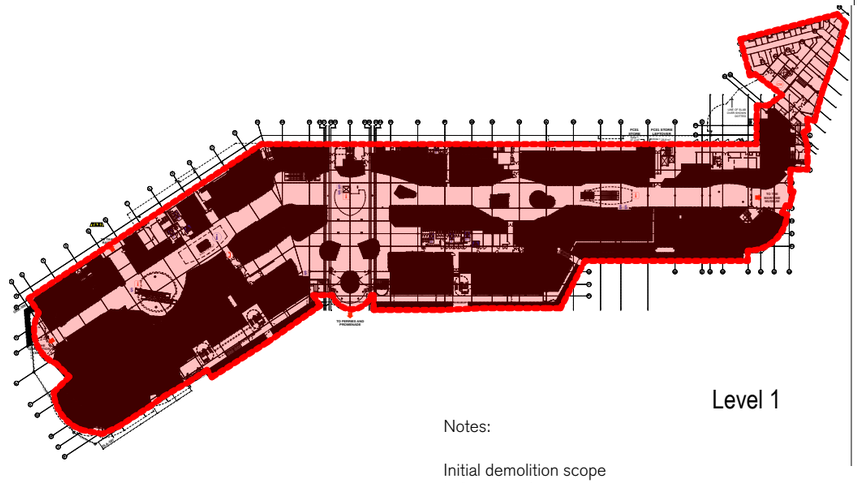
Aerial Photo 02



Level 3 / Roof



Level 2



Level 1

Floor plans
NTS

Notes:

Initial demolition scope is from top down to existing ground floor slab.

For Demolition

fjmt

Aerial Photo & Floor Plans - Demolition

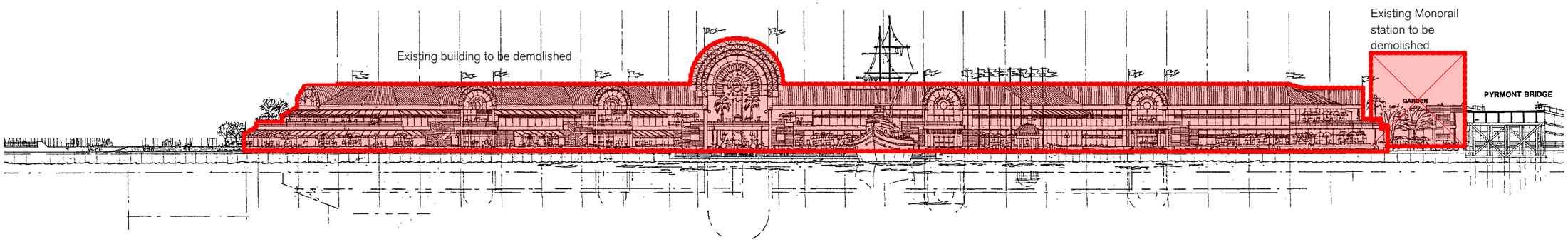
Mirvac - Harbourside

Not to Scale @ A3

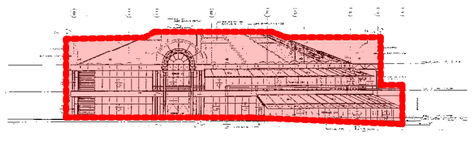
For Approval

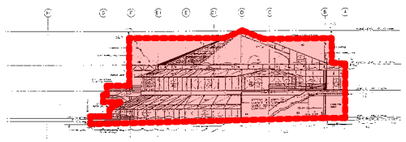
08/10/2020

SSDA1-2102



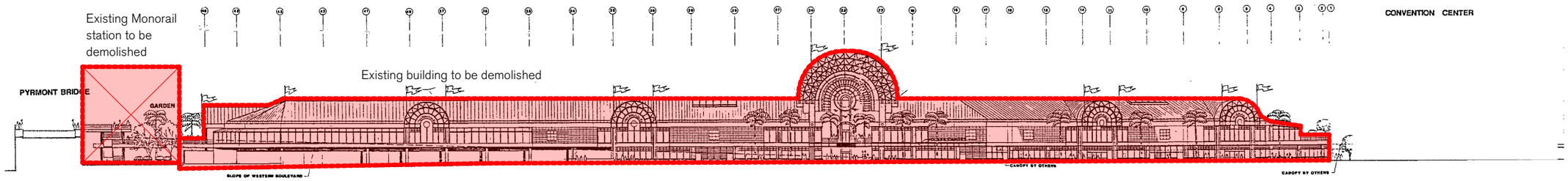
East Elevation - Demolition





South Elevation - Demolition

North Elevation - Demolition



West Elevation - Demolition

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Granted on: 25 June 2021

Signed: AW Sheet No: 10 of 10

Notes:

Initial demolition scope is from top down to existing ground floor slab.

fjmt

Elevations - Demolition

Mirvac - Harbourside

0 10 20 50m

1:1000 @ A3

08/10/2020

For Approval

SSDA1-2103

Appendix B Geotechnical Investigations

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
96 Hermitage Road
West Ryde NSW 2114
PO Box 472
West Ryde NSW 1685
Phone (02) 9809 0666

Mirvac Projects Pty Ltd
Level 20, 200 George Street
Sydney NSW 2000

Project 200004.01
24 October 2023
R.007.Rev1
JH

Attention: Stephen Chamberlain

Groundwater Inflow Assessment
Proposed Harbourside Redevelopment
Darling Harbour, Sydney

1. Introduction

This report presents the results of a groundwater inflow assessment for the construction phase of the project that was undertaken by Douglas Partners Pty Ltd (DP) for the proposed Harbourside Redevelopment at 2 – 10 Darling Drive, Darling Harbour. The work was commissioned by Mirvac Projects Pty Ltd.

It is understood that the project will involve the demolition of the existing Harbourside shopping centre followed by the construction of a new building incorporating four basement levels over the central portion of the site, six levels of retail and commercial space over entire site, and a 41-storey residential tower built over the central portion of the retail/commercial footprint. The basement construction will require excavation to depths of approximately 16 m below the existing ground surface.

This assessment is based on the results of previous geotechnical investigations carried out by DP and Jeffery & Katauskas Pty Ltd (J&K) on site and the investigation on the adjacent International Convention Centre (ICC) Hotel development by Coffey Geotechnics Pty Ltd (Coffey).

Numerical modelling of the proposed excavation has been carried out to assess seepage inflow rates during the proposed basement construction period, to assist in the application for a construction dewatering approval. It is understood that the basement floor and walls will be waterproofed (i.e. tanked) for the long-term and therefore an assessment of the long-term groundwater inflow is not included herein.

In addition, comments from DPE Water have been received in relation to SSD-49295711 and these comments have been addressed in this Rev1 report as outlined in Table A.

Table A: DPE Water comments and Douglas Partners' responses

Item	DPE Water Comment	Response
a	Include an estimate of the maximum annual volume of groundwater that would be taken during the construction phase and following construction, to determine the volume of water that must be licensed.	Table 3 shows the maximum annual volume (9 ML) for the baseline case. Table 4 shows the maximum annual volume (107 ML) for the sensitivity case. The licence is based on the sensitivity case.
b	Include an estimate of staged (e.g. weekly or monthly) cumulative water take.	Refer to data in Tables 3 and 4.
c	Provide an assessment against the 'minimal impact considerations' of the Aquifer Interference Policy (2012), including a description of mitigation and remediation options and appropriate scientific studies to demonstrate that the impacts would not prevent the long-term viability of groundwater dependent ecosystems or significant sites if the level 1 minimal impact considerations are exceeded.	Refer to Section 7.11.
d	Describe how actual water take would be measured and reported.	Refer to Section 7.7.
e	Include a trigger action and response procedure (TARP), inclusive of agency notification, that: i. Establishes trigger levels based on predicted take for each stage identified in (b) above; ii. Describes the response actions if groundwater take reaches or exceeds the trigger levels. This should include identifying requirements for obtaining additional licenced water entitlement, re-estimating water take for both the construction and post-construction phases if the volume of water extracted during the first 28 days of construction exceeds the predicted take for that period, and documenting and reporting procedures.	Refer to Section 7.8.
f	Describe how the design and construction of the building(s) will: i. prevent obstruction to groundwater flow by using sufficient permanent drainage beneath and around the outside of the structure to ensure that any groundwater mounding shall not be greater than 10% above the pre-development level; and ii. prevent any elevated water table from rising to within 1.0 m below the natural ground surface.	Refer to Section 7.9.

Item	DPE Water Comment	Response
g	Detail mitigation measures to limit post-construction groundwater take to less than or equal to 3 ML/year if the applicant intends to rely on an exemption under Section 21(6) of the Water Management (General) Regulation 2018. This may require the structure to be fully watertight for the anticipated life of the building (including when the water table is unusually elevated).	Refer to Section 7.10.
h	Document how dewatering volumes would be reported to DPE Water during and following the cessation of dewatering activities.	Refer to Section 7.7.

2. Referenced Documents

The following documents were referenced in preparing this report:

- *"Report on Geotechnical Investigation – Harbourside Redevelopment, 2-10 Darling Drive, Darling Harbour"*, ref: 200004.00.R.001.Rev0, dated 1 March 2021 prepared by DP. The report included borehole logs from J&K (1985) and Coffey (2013) investigations;
- *"Geotechnical Investigation Report for SSDA6, Sydney International Exhibition and Entertainment Precinct – ICC Hotel"*, ref: GEOTLCOV24303AH-AH, Rev 1, dated 26 August 2013, prepared by Coffey;
- Report titled "*Preliminary Groundwater Assessment Report – Harbourside, Darling Harbour*", ref: GEOTLCOV25340AA-AE, Rev 1, dated 19 February 2016, prepared by Coffey; and
- Structural Drawing Set titled *"Harbourside Development – Site Retention"*, Project No. 6401, ref: ST-SK-003 Series, Drawing Status: *"For Information",* prepared by Enstruct Group Pty Ltd (Enstruct).

3. Site Description

The Harbourside site is located on the western side of Darling Harbour. It is bounded by Pyrmont Bridge and the Australian National Maritime Museum to the north, Darling Harbour to the east, the International Convention Centre (ICC) and the Sofitel Hotel to the south, and Darling Drive and the light rail corridor to the west. The areas to the north, east and south of the existing building are typically paved public walkways. Loading docks and back-of-house facilities are located on the western side of the building.

The ground surface over the site is relatively level with surface levels at or about RL 3 m, relative to Australian Height Datum (AHD). A seawall is located between the site and Darling Harbour. The site area is approximately 15,000 m^2.

4. Geology and Hydrogeology

The *Sydney 1:100 000 Geological Series Sheet* shows that the site is close to a boundary between Hawkesbury Sandstone (medium to coarse-grained sandstone with minor shale and laminite lenses) and Quaternary-aged alluvium and estuarine sediment (silty/peaty sand, silt, clay, common shell layers). The area to the south of Darling Harbour is mapped as having man-placed fill placed over the Quaternary sediments as a result of land reclamation works.

An extract of the geological mapping is provided in Figure 1.

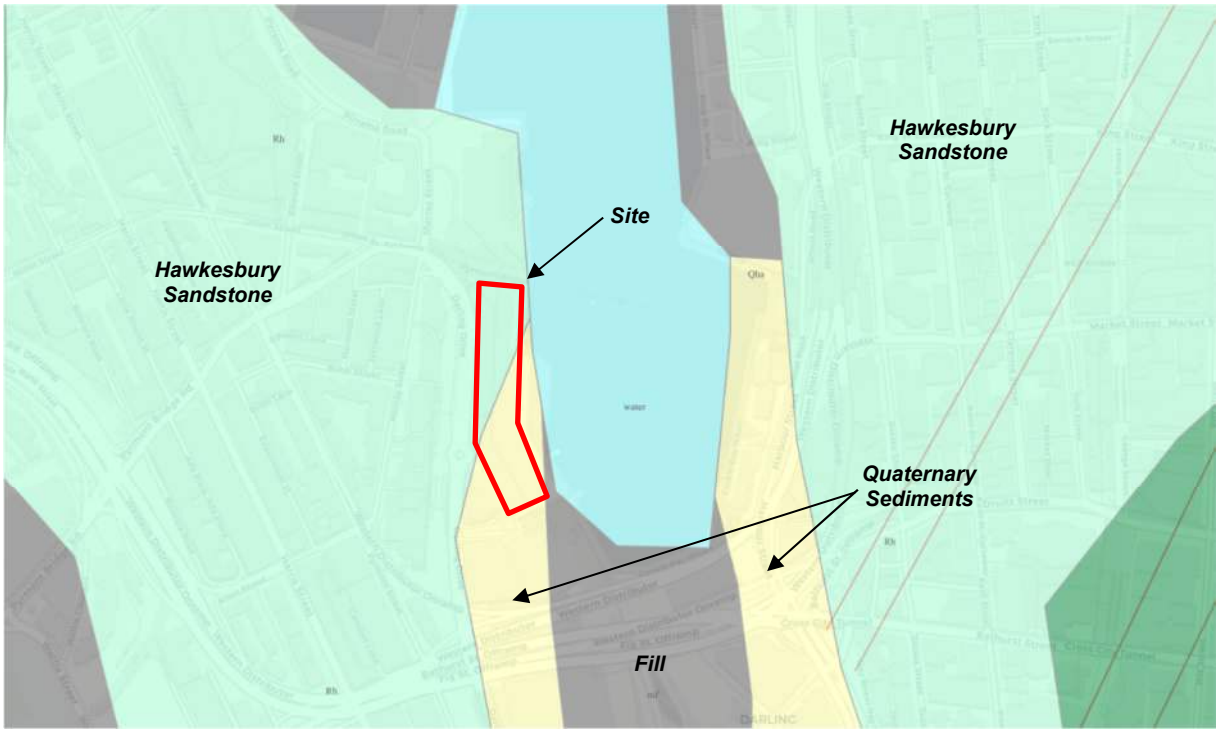


Figure 1: Extract of geological mapping

The site topography and geology would suggest that groundwater is likely to flow in an easterly direction towards Darling Harbour.

5. Groundwater Monitoring

Four boreholes (BH1, BH6, BH7 and BH8) drilled during the DP (2021) investigation were converted into temporary groundwater monitoring wells at the completion of drilling. This involved inserting Class 18 uPVC screen and casing to the required depth, backfilling the screened length with gravel, plugging the top of the gravel with bentonite pellets and backfilling the casing with drilling spoil.

The construction details of the groundwater monitoring wells are provided in Table 1.

Table 1: Construction Details of Groundwater Monitoring Wells

Well Location	RL of Ground Surface	RL of Top of Screen	RL of Base of Screen	Screened Material
BH1	3.0	-2.1	-6.6	Sandstone
BH6	3.4	-2.8/3.4*	-7.3/1.3*	Sandstone / Fill
BH7	3.2	1.0	-2.0	Fill
BH8	2.1	1.1	-0.9	Fill

Notes: All levels are in metres and relative to AHD; *Nested wells (2) installed in BH6

All well locations are shown on Drawing 1 attached.

Groundwater was observed at depths of between 1.5 m and 3.5 m (between RL 0.7 m and RL -0.3 m AHD) during augering in the boreholes. The groundwater levels are expected to be influenced by climatic events as well as tidal fluctuations within Darling Harbour.

6. Geotechnical and Hydrogeological Model

The site is underlain by between 2.7 m and 11.9 m of fill which appears to have been placed over either a thin layer of natural soil or bedrock. The fill is generally sandy with varying proportions of gravel, boulders and clay. The natural soils comprise soft clays and loose sands, with some organic clay encountered in BH7.

The bedrock profile generally consists of a thin layer of weathered sandstone overlying medium, medium to high and high strength sandstone. The rock levels are relatively consistent along the western side of the site but do vary, and generally fall to the south, along the eastern side. In the vicinity of the basement excavation, the medium strength or better sandstone was encountered below levels of between RL 0 m and RL -7 m AHD.

Groundwater level measurements from groundwater monitoring wells on site, screened in both soils and the sandstone bedrock, were generally within the range between the low tide and high tide levels (i.e. RL-0.8 m and RL1.1 m AHD, reported by Roads and Maritime Services (RMS) for Fort Denison), which indicates that there is a relative consistent permanent (perennial) groundwater table within fill, natural soils, and the Hawkesbury Sandstone bedrock, recharged by the constant water source from the tidal water supply at Darling Harbour and the surface infiltration into sandy layers following rainfall events. The groundwater tables in fill / natural soils and in sandstone appeared to be linked.

The seepage within the sandstone bedrock is likely to be controlled by discontinuities in the rock such as the spacing, continuity and aperture of the bedding planes, faults and joints, together with the degree of hydraulic connection to the sea water in the adjacent Darling Harbour. The seams and other fractures in the weathered rock may also be acting as temporary water storage. Therefore, groundwater inflow is not expected to be uniform around the site and is probably concentrated around localised fracture zones that connect to the sea water.

7. Groundwater Modelling

7.1 Methodology

Groundwater modelling was undertaken to assess the potential inflow rates into the proposed basement during construction.

Two 2-dimensional (2D) numerical (finite element method) models were developed for the site. The modelling was carried out using the 2D hydrogeological software SEEP/W (a component of GeoStudio 2019 R2, Version 10.1.1.18972) developed by GEOSLOPE International Ltd. Both steady-state and transient flow conditions were modelled in the analysis.

7.2 Model Geometry

For the purpose of the analysis, DP has selected two cross-sections (Sections A-A' and B-B'), both running in an east-west direction. Section A-A' intercepts the southern and central part of the site, whereas Section B-B' intercepts the northern part where the width of the basement footprint and the distance to the harbour differ. The locations of the model sections and the corresponding contributory perimeters are shown in Figure 2.

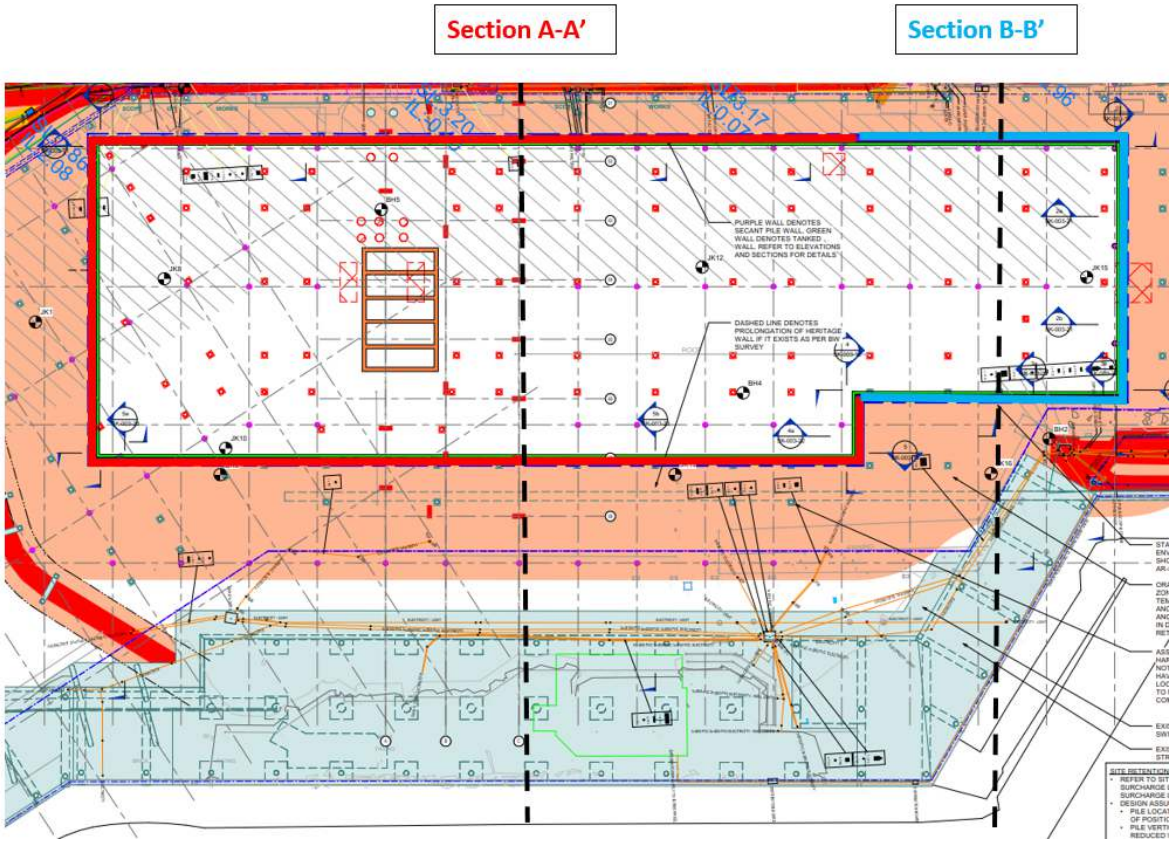


Figure 2: Location of Model Sections

The substrata surrounding the proposed basement was simulated as a multi-layered numerical model to represent the subsurface conditions surrounding the site and to allow the vertical flow components to be simulated more accurately.

The geological units were subdivided into two layers corresponding to the main soil and rock units for the numerical model. The aquifer boundaries of the model, with constant head boundary conditions, were extended approximately 50 m towards the land side and between 12 m and 22 m towards the harbour side.

The geological units were simulated by assigning two materials with different hydraulic conductivities (permeabilities) to the model layers. Details of the layering are provided in Figures 3 & 4. The soil and sandstone layers were assigned as SEEP/W saturated/unsaturated materials.

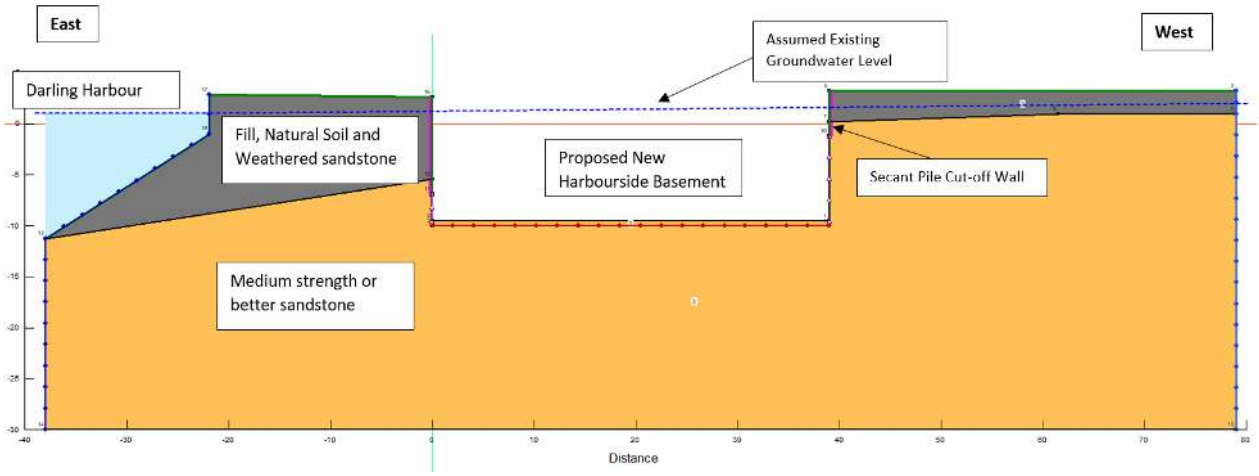


Figure 3: Model Geometry and Geological Units – Section A-A'

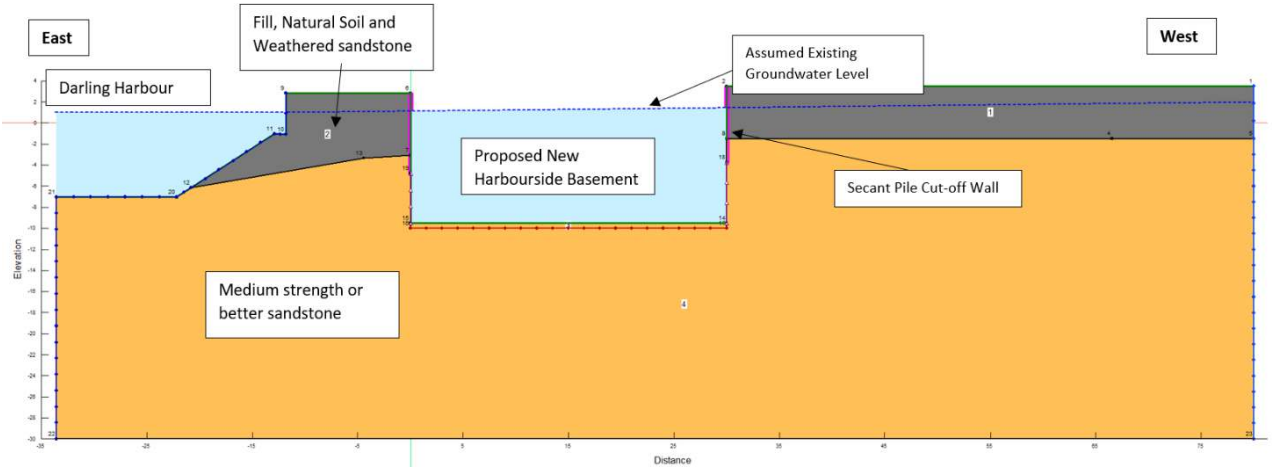


Figure 4: Model Geometry and Geological Units – Section B-B'

7.3 Boundary Conditions and Hydraulic Parameters

A constant head boundary was assigned as RL 1.1 m AHD at the location of Darling Harbour, corresponding to the Highest Astronomical Tide level. The constant head at the land side far boundary was assumed as RL 2 m AHD, in order to generate a gentle hydraulic gradient (ie. approximately 1%) towards Darling Harbour to simulate the effect of minor surface water infiltration.

Hydraulic parameters required for the multi-layer model include horizontal (K_h) and vertical (K_v) hydraulic conductivities, as well as the volumetric water content curves. The permeability or hydraulic conductivity of the rock units will vary according to changes in the secondary structural features, such as joints and fractures, along which groundwater will flow. Changes in the clay content of the rock fractures, as well as their orientation and interconnection, will cause changes in the rock mass permeability.

The adopted hydraulic conductivity value of slightly fractured Hawkesbury Sandstone was based on the average values suggested by Pells (2019) for Class III/II sandstone as the baseline value and increased by 20 times for the sensitivity analysis case, to account for the effect of potentially highly permeable geological features such as fracture zones with a strong hydraulic connection to the harbour.

The hydraulic conductivity of fill / natural soils was based on our previous experience in similar materials.

The hydraulic conductivity curves for unsaturated material types were estimated using the Van Genuchten formulas, which is a built-in function in SEEP/W. The permeability for each model unit adopted is summarised in Table 2.

Table 2: Model Layer Summary

Model Layer	Layer Represents	Model Case	Adopted Horizontal Hydraulic Conductivity (m/s)	Anisotropic Ratio (kv / kh)
1	Fill & Natural Soils (including weathered rock)	Both	1.0×10^{-4}	1
2	Sandstone – Medium strength or better	Baseline	1.0×10^{-7}	0.33
		Sensitivity	2.0×10^{-6}	0.1

7.4 Basement Shoring Wall and Dewatering

It is understood that the basement retention will comprise interlocking secant pile walls with partial cut-off into medium strength sandstone bedrock, above the proposed bulk excavation level. The lower portion of the basement excavation will be undertaken via vertical cut faces during construction without hydraulic barriers.

The secant wall depths / levels of the secant pile walls depend on the depths to the sound sandstone bedrock to provide the effective hydraulic cut-offs. The adopted toe levels of the secant piles were based on the current design levels indicated in Enstruct's drawing set for site retention, as follows:

- Section A-A': RL -6.9 m for the east side and RL -1.1 m for the west side;
- Section B-B': RL -4.8 m for the east side and RL -3.7 m for the west side.

All basement walls were simulated using an 'interface element' with a hydraulic conductivity of 1 x 10^{-9} m/s.

The subsoil drainage and the sump were simulated by a horizontal boundary condition of 'Zero Hydraulic Pressure' at RL -10.0 m, 0.5 m below the proposed bulk excavation level to allow for a drainage layer / sump to be installed beneath.

7.5 Groundwater Modelling Simulations

The model was run under various transient conditions which included an assumed construction dewatering period of up to 1 year to assess the dewatering flow rates required for the site and the effect on the water level.

The model simulations comprised:

Run 1 – A transient scenario to estimate the volume of water removed by sump-and-pump in phases of dewatering (i.e. 1 day, 3 days, 7 days, 14 days, 30 days, 2 months, 3 months, 4 months, 8 months and 1 year) in the basement during construction.

Run 2 – A long-term steady-state scenario.

7.6 Groundwater Modelling Results

The inflow rates obtained from the modelling represent the estimated total rate of groundwater flowing into the excavation and the volume (per unit time) requiring extraction via the dewatering system, in order to dewater the basement excavation during construction.

The SEEP/W results are based on a two-dimensional model, which assumes the excavation is much longer than its width (i.e. the plane-strain condition). In order to convert these predictions to more realistic values, the following expression proposed by Kavvadas et al (1992) was used to adjust the analytical results to allow for the actual length to width ratio of the proposed basement.

$$\frac{qo}{q} = 0.7 + 0.3\left(1 - \frac{B}{L}\right)$$

where: qo is the predicted 'realistic' inflow rate
q is the inflow rate from 2D modelling
B is the width of the excavation (in-plane of the 2D model)
L is the length of the excavation (out-of-plane of the 2D model)

The proposed basement is approximately rectangular shaped, 39 m wide and 125 m long, respectively. A reduction factor of 0.9 is therefore calculated. The average inflow rates predicted from the model have been reduced using this reduction factor to account for the basement shape.

Groundwater inflow into the 'Seepage Face' and 'Zero Hydraulic Pressure' boundaries representing open cuts of the sandstone rock faces and the subsoil drainage layer was monitored throughout the model simulations using a mesh cross section. The inflow rates represent the estimated total rate of groundwater flowing into the excavation and the volume (per unit time) requiring extraction via the dewatering system (sump-and-pump) in order to dewater the basement excavation during construction.

Simulated results for the baseline case are summarised in Table 3. During the early stages of construction, inflow rates will be higher and will then gradually decrease as the hydraulic gradient around the excavation decreases. Inflows during early dewatering works are predicted to be about 33 m^3/day. Towards the end of the first-year construction period, inflows are predicted to be about 24 m^3/day. The total cumulative dewatering volume for the construction is about 9 ML/year.

Table 3: Predictive Model Simulated Inflow Results – Baseline Case

Elapsed Time (day)	Dewatering Flow Rate (m^3 / day)			Cumulative Total
	Section A-A'	Section B-B'	Total Inflow	
1	23.4	9.5	33	9 ML (First Year Construction Period)
3	18.4	7.4	26	
7	17.8	7.1	25	
14	17.7	6.9	25	
30	17.7	6.8	25	
60	17.7	6.7	24	
90	17.8	6.6	24	
120	17.8	6.6	24	
240	17.8	6.5	24	
365	17.8	6.5	24	
Afterwards	17.8	6.5	24	

The results for the sensitivity case are summarised in Table 4, which indicate that when a higher horizontal permeability of 2.0 x 10^{-6} m/s was adopted, the unit inflow is predicated to increase by more than 10 times.

Ultimately, the inflow rates are sensitive to the nature and frequency of the defects presented in sandstone that are to be intersected by the basement excavation. The estimates given above for the baseline case are expected to be moderately conservative, whereas those for the sensitivity case are expected to represent an unlikely occurrence of highly permeable rock defects. If the inflow rates presented in either case are deemed difficult to be managed by the proposed pumping and treatment

facilities, consideration could be given to grouting to seal major rock defects and major hydraulic connections to the harbour, in order to reduce the groundwater inflow.

Table 4: Predictive Model Simulated Inflow Results – Sensitivity Case

Elapsed Time (day)	Dewatering Flow Rate (m^3 / day)			Cumulative Total
	Section A-A'	Section B-B'	Total Inflow	
1	217.2	91.1	308	107 ML (First Year Construction Period)
3	211.7	88.0	300	
7	210.8	87.1	298	
14	209.8	86.6	296	
30	208.3	86.2	294	
60	207.1	86.0	293	
90	206.5	86.0	292	
120	206.3	86.0	292	
240	206.2	86.0	292	
365	206.2	86.0	292	
Afterwards	206.2	86.0	292	

7.7 Flow Rate Measurement

The dewatering contractor is to use a flow meter connected to the discharge pipe(s) to record flow rates for comparison with the estimates. This data should be stored in a suitable electronic format to enable reporting to the regulatory authority in accordance with the conditions of approval/water access licence.

7.8 Trigger Action and Response Procedure (TARP)

The dewatering approvals and procedures have been based on the sensitivity case to allow for increased inflows due to rock defects etc. and prevent delays once the works have commenced. As such, both the baseline case and sensitivity case inflows form part of the trigger system. The adopted triggers are provided in Table 5.

Table 5: Trigger Levels for Notifications

Measurement Period	Green Trigger Flow Rate (m^3/day)	Orange Trigger Flow Rate (m^3/day)	Red Trigger Flow Rate (m^3/day)
After 1 day	≤ 33	≤ 308	> 308
After 7 days	≤ 25	≤ 298	> 298
After 14 days	≤ 25	≤ 296	> 296
After 30 days	≤ 25	≤ 294	> 294

Responses to the trigger levels are as follows:

- GREEN: Flow levels are equal to or less than the baseline case and therefore works can continue.
- ORANGE: Flow levels are greater than the baseline case, indicating defects are present in the rock leading to greater inflows than the baseline case. However, works can still continue as the approvals and procedures are based on the sensitivity case volumes. The defects should be assessed by the geotechnical engineer to check whether any stabilisation measures are required (e.g. grouting).
- RED: Additional approvals should be sought from the regulatory authority for the higher inflows experienced unless grouting works can reduce the inflows to below the approved rates. Additional analysis to determine expected inflows during the construction period should be undertaken by back-analysing permeability rates based on pumped volumes.

All flow volumes should be reported to the regulatory authority in accordance with the conditions of approval/water access licence.

7.9 Groundwater Mounding

Analysis was also undertaken to assess the mounding impacts associated with the construction of the tanked basement. The analysis assumed that there is no permanent drainage beneath or around the outside of the tanked structure which is a conservative assumption. The results are provided in Tables 6 and 7 and indicate a maximum 0.7 m mounding immediately in front of the proposed basement cut-off wall on the up-gradient side (i.e. western side). This elevated level is no greater than 10% above the pre-development level and is not shallower than 1.0 m below the natural ground surface in this area.

Table 6: Assessed Groundwater Level Changes – Section A-A'

Construction Stage	Groundwater Level in Model (RL m AHD)	
	Down-gradient (East)	Up-gradient (West)
Pre-development	1.1	1.3
During Excavation	1.0	1.9
After Basement Tanking	1.0	2.0
Maximum Level Change	**-0.1 m (drawdown)**	**+0.7 m (mounding)**

Table 7: Assessed Groundwater Level Changes – Section B-B'

Construction Stage	Groundwater Level in Model (RL m AHD)	
	Down-gradient (East)	Up-gradient (West)
Pre-development	1.1	1.4
During Excavation	1.0	2.0
After Basement Tanking	1.0	2.0
Maximum Level Change	**-0.1 m (drawdown)**	**+0.6 m (mounding)**

7.10 Long-Term Groundwater Inflow

The basement is to be constructed as a fully-tanked structure over its full depth using a cast-in-situ concrete floor slab/walls. As such, there should be no groundwater flow into the structure in the long-term. In practice, minor seepage may occur in localised areas however this is likely to be of negligible volume.

7.11 Groundwater Dependent Ecosystems

A search of the relevant database indicates that there are no known groundwater dependent ecosystems (GDEs), registered groundwater users or culturally significant sites within a 500 m radius of the proposed basement excavation. It is highly unlikely that the proposed construction dewatering will cause any variation in the water table or water pressure head losses beyond 500 m, and therefore it is considered to be in compliance with the 'minimal impact' criteria set out in the NSW Aquifer Interference Policy (2012).

8. Limitations

Douglas Partners (DP) has prepared this report for the Harbourside Redevelopment at 2 – 10 Darling Drive, Darling Harbour in accordance with instructions received from the client. The report is provided for the use of Mirvac Projects Pty Ltd for this project only and for the purpose(s) described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during previous investigations. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations.

The assessment of atypical safety hazards arising from this advice is restricted to the groundwater components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd

Reviewed by

Joel Huang
Senior Associate

Peter Oitmaa
Principal

Attachments: About this Report
Drawing 1
Structural Drawings – Basement Retention

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

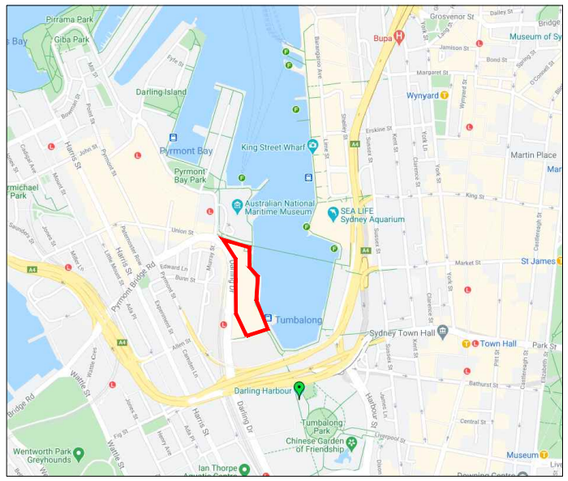
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.



SITE LOCALITY

NOTE:
1: Base image from MetroMap.com.au (Dated 04.12.2020)

0 5 10 20 30 40 50 75 100 125m

1:1250 @ A3

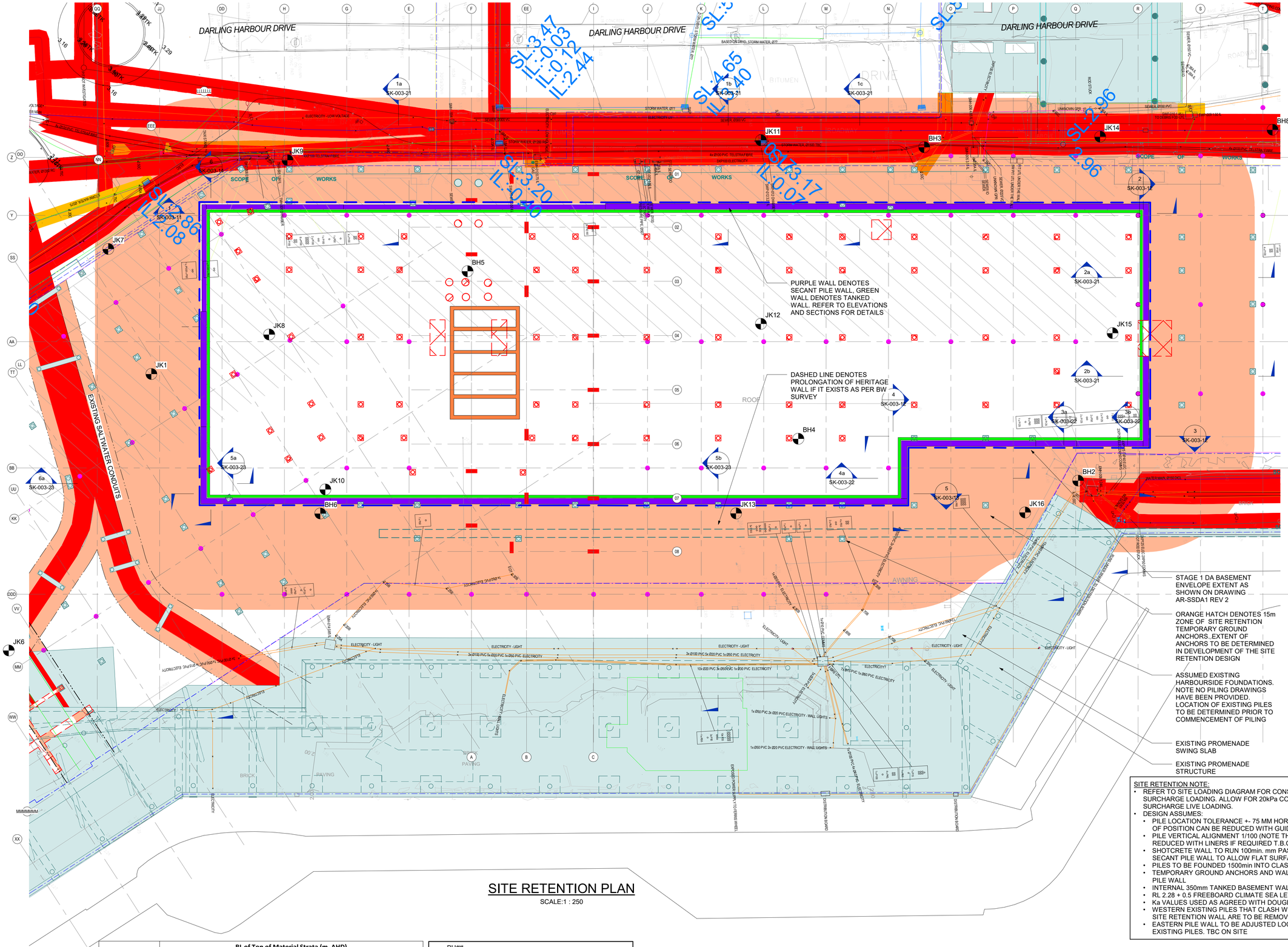
LEGEND

- Borehole Location and Number (DP)
- Borehole Location and Number (JK, 1985)
- Borehole Location and Number (Coffey, 2013)
- Site Boundary
- Geological Cross Section
- Proposed Basement Outline

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Mirvac Projects Pty Ltd		TITLE: **Borehole Locations**	PROJECT No: 200004.00
OFFICE: Sydney	DRAWN BY: CJ	**Harbourside Redevelopment**	DRAWING No: 1
SCALE: 1:1250 @ A3	DATE: 12.02.2021	**2 - 10 Darling Harbour, Sydney**	REVISION: 2

A1



SITE / SHORING NOTES

GEOTECHNICAL REPORT
- THE CONTRACTOR SHALL OBTAIN A COPY OF THE GEOTECHNICAL REPORT 200004.00.R.001.Rev0 BY DOUGLAS PARTNERS AND ADHERE TO THE RECOMMENDATIONS CONTAINED THEREIN.

SITE SURVEY
- SURVEY INFORMATION PROVIDED AS REFERENCE ONLY. PLEASE REFER TO LATEST SURVEY INFORMATION.

SPECIFICATION
- THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE STRUCTURAL AND OTHER SPECIFICATIONS.

DUST CONTROL
- THE CONTRACTOR IS TO ENSURE THAT THE DUST PREVENTION METHODS ADOPTED ARE SUFFICIENT TO MEET THE REQUIREMENTS OF THE SYDNEY CITY COUNCIL. IT IS THE CONTRACTORS' RESPONSIBILITY TO ACQUAINT THEMSELVES WITH THE REQUIREMENTS.

SITE SETOUT
- REFER TO THE ARCHITECTS DRAWINGS FOR THE ACCURATE SETOUT OF ALL BUILDINGS, DRIVEWAYS, PARKING AREAS ETC. NOTE BULK EARTHWORKS PLAN IS INDICATIVE ONLY. CALCULATE AND CUT BATTERS FROM ARCHITECT'S PLANS AND SURVEY. CROSSOVER PROFILES TO COUNCIL REQUIREMENTS.

GENERALLY
- PROCEED WITH BULK EARTHWORKS AND SHORING TO PROVIDE A STABLE SUBGRADE AND WORK SPACE FOR THE CONSTRUCTION OF THE PROPOSED DEVELOPMENT. REDUCE SITE TO LEVELS INDICATED AND DISPOSE OF ALL UNWANTED MATERIAL LEGALLY.

SUPERVISION
- A GEOTECHNICAL ENGINEER IS TO PROVIDE LEVEL 1 SUPERVISION (AS3798) FOR ALL EARTHWORKS DURING THE COURSE OF CONSTRUCTION. AT THE COMPLETION OF THE BULK EXCAVATION CONTRACT, THE GEOTECHNICAL ENGINEER IS TO PROVIDE CERTIFICATION THAT THE WORKS HAVE BEEN CARRIED OUT IN ACCORDANCE WITH BULK EARTHWORKS SPECIFICATION.
- GEOTECHNICAL SUPERVISION AND ROCK MAPPING OF ALL EXCAVATION FACES IS TO BE UNDERTAKEN

DRAINAGE DURING CONSTRUCTION
- PROVIDE ADEQUATE DRAINAGE DURING CONSTRUCTION TO ENSURE MINIMUM DISRUPTION FROM RAIN.

SERVICES
- DURING EXCAVATION COORDINATE WITH ALL SERVICES INCLUDING SEWER, GAS AND POWER.
- THE CONTRACTOR IS TO OBTAIN A COPY OF SERVICES LOCATOR DRAWINGS AND ENSURE ALL ANCHORS AVOID ALL SERVICES.

BULK EARTHWORKS PROCEDURE AND SPECIFICATION
- AT THE COMPLETION OF THE BULK EARTHWORKS, THE CONTRACTOR SHALL PROVIDE TEMPORARY OR PERMANENT DRAINAGE TO ENSURE NO SURFACE WATER IS RETAINED ON THE SITE, OR THAT NO SURFACE WATER FLOW DETRIMENTALLY SCOURS THE PREPARED BASE.

GEOTECHNICAL ENGINEER NOTES:
- EXCAVATION TO BE CARRIED OUT UNDER GEOTECHNICAL ENGINEER'S SUPERVISION.
- GEOTECHNICAL ENGINEER TO COMMENT ON SUITABILITY OF THE SUBCONTRACTORS METHOD OF EXCAVATION AS REMOVAL PROCEEDS.

HYDRAULICS ENGINEER
- DURING EXCAVATION COORDINATE WITH ALL HYDRAULIC ENGINEERS REQUIREMENTS FOR SEWER, GAS AND STORMWATER LINES.

AS-BUILT DRAWING
- PROVIDE AN AS-BUILT DRAWING PREPARED BY A REGISTERED SURVEYOR TO CONFIRM BULK EARTHWORKS IS COMPLETED TO REQUIRED DIMENSIONS AND LEVELS.

DILAPIDATION REPORT
- THE APPROVED SHORING WALL CONTRACTOR SHALL PREPARE A DILAPIDATION REPORT OF STREET, FOOTPATH AND ROAD FEATURES PRIOR TO INSTALLATION OF SHORING WALL.

COMPACTION NOTES
- COMPACTION BEHIND INTERNAL FORMED RETAINING WALL BY EXCAVATION CONTRACTOR USING HAND HELD RAMMERS TO ACHIEVE 98% MODIFIED DENSITY.
- COMPACT IN MAXIMUM 300mm THICK LAYERS AT OPTIMUM MOISTURE CONTENT OF ±3%.

CONTRACTORS NOTES
- INFERRED SUBSURFACE CONDITIONS HAVE BEEN ASSUMED OR PREPARED BY INTERPOLATION AND/OR EXTRAPOLATION FROM DISCRETE GEOTECHNICAL BORE HOLE DATA AND AS SUCH THE CONDITIONS SHOWN ARE AN INTERPRETATION AND MUST BE CONSIDERED AS A GUIDE ONLY. LOCAL VARIATIONS OR ANOMALIES IN GROUND CONDITIONS CAN OCCUR IN THE NATURAL ENVIRONMENT, PARTICULARLY BETWEEN DISCRETE TEST HOLE LOCATIONS.
- SPECIFIC SUPPORT REQUIREMENTS CAN ONLY BE ASSESSED DURING EXCAVATION. VERIFICATION OF THE GEOTECHNICAL ASSUMPTIONS AND/OR MODEL AND SITE RETENTION SYSTEM IS AN INTEGRAL PART OF THE DESIGN PROCESS. THE CONTRACTOR SHALL MAKE ALLOWANCE TO ENGAGE THE ABOVE MENTIONED GEOTECHNICAL ENGINEER TO CARRY OUT FULL TIME INSPECTIONS AS THE EXCAVATION PROGRESSES FOR THE PURPOSE OF INVESTIGATION, CONSTRUCTION VERIFICATION AND PERFORMANCE MONITORING.
- DESIGN OF GROUND ANCHORS TO BE D&C BY THE CONTRACTOR. DETAILS AND CALCULATIONS TO BE SUBMITTED FOR APPROVAL PRIOR TO COMMENCEMENT OF WORKS.
- SOIL/ROCK RL'S ARE BASED ON DOUGLAS PARTNERS GEOTECHNICAL INVESTIGATION REPORT, REFER TO ABOVE MENTIONED DOCUMENT. THIS MAY VARY FROM ACTUAL SITE CONDITIONS
- CONTRACTOR TO LOCATE ALL SERVICES ON AND AROUND THE SITE AND ENSURE ALL GROUND ANCHORS AND ROCK BOLTS AVOID ALL SERVICES.
- CONTRACTOR TO DEVELOP SEQUENCING OF WORKS ALLOWING FOR ALL SERVICES RELOCATION REQUIREMENTS AND SUBMIT SEQUENCING METHODOLOGY FOR APPROVAL PRIOR TO COMMENCEMENT OF WORKS.
- ALL GROUND ANCHORS TO BE LOCATED TO AVOID NEW BUILD FLOOR AND COLUMN STRUCTURES SHOWN ON THE ELEVATIONS.
- REFER TO GEOTECHNICAL ADVICE FOR EXCAVATION AND METHODOLOGY AND MONITORING REQUIREMENTS.

SITE RETENTION NOTE:
- REFER TO SITE LOADING DIAGRAM FOR CONSTRUCTION SURCHARGE LOADING. ALLOW FOR 20kPa CONSTRUCTION SURCHARGE LIVE LOADING.
- DESIGN ASSUMES:
  - PILE LOCATION TOLERANCE +- 75 MM HORIZONTAL (NOTE OUT OF POSITION CAN BE REDUCED WITH GUIDE RAILS T.B.C.)
  - PILE VERTICAL ALIGNMENT 1/100 (NOTE THAT THIS CAN BE REDUCED WITH LINERS IF REQUIRED T.B.C.)
  - SHOTCRETE WALL TO RUN 100min. mm PAST FRONT FACE OF SECANT PILE WALL TO ALLOW FLAT SURFACE FOR MEMBRANE.
  - PILES TO BE FOUNDED 1500min INTO CLASS III SANDSTONE
  - TEMPORARY GROUND ANCHORS AND WALERS TO SECANT PILE WALL
  - INTERNAL 350mm TANKED BASEMENT WALL.
  - RL 2.28 + 0.5 FREEBOARD CLIMATE SEA LEVEL T.B.C.
  - Ka VALUES USED AS AGREED WITH DOUGLAS PARTNERS
  - WESTERN EXISTING PILES THAT CLASH WITH THE PROPOSED SITE RETENTION WALL ARE TO BE REMOVED PRIOR TO PILING.
  - EASTERN PILE WALL TO BE ADJUSTED LOCALLY TO AVOID EXISTING PILES. TBC ON SITE

SITE RETENTION PLAN

SCALE:1 : 250

Strata	RL of Top of Material Strata (m, AHD)							
	BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8
Surface/Filling	3.0	3.0	2.5	3.5	3.5	3.4	3.2	2.1
Natural Soils	0.0	-2.0	-0.5	-3.7	0.5	0.7	-8.7	-
Class V/IV	-0.9	-2.6	-	-4.4	-0.3	-1.8	-9.7	-0.9
Class III Rock	-1.0	-3.6	-	-4.5	-	-5.7	-9.8	-1.1
Class II Rock	-4.9	-6.4	-	-	-0.4	-	-11.8	-1.4
Base of Borehole	-6.6	-8.3	-1.0	-5.4	-4.9	-7.3	-14.8	-6.1
Groundwater	0.6	0.4	-0.1	0.0	0.5	0.7	-0.3	0.6

NOTE: INFORMATION REPORTED FROM THE GEOTECHNICAL REPORT 200004.00.R.001.Rev0 BY DOUGLAS PARTNERS

BH## DENOTES BORE HOLE LOCATION BY DOUGLAS & PARTNERS (2021)

C## DENOTES BORE HOLE LOCATION BY COFFEY (2013)

JK## DENOTES BORE HOLE LOCATION BY JEFFERY & KATAUSKAS (1985)

NOTE:
BH1, BH6, BH7 AND BH8) WERE CONVERTED INTO TEMPORARY GROUNDWATER MONITORING WELLS AT THE COMPLETION OF DRILLING

WIP

Rev.	Date	Description

STRUCTURAL / CIVIL CONSULTANT

enstruct

enstruct group pty ltd

Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT

mirvac

PROJECT NAME

HARBOURSIDE DEVELOPMENT

PROJECT NUMBER: 6401

DRAWING TITLE

SITE RETENTION GA

SCALE AT A1: As indicated
DRAWN BY: JDB
CHECKED BY: MOS

DRAWING STATUS

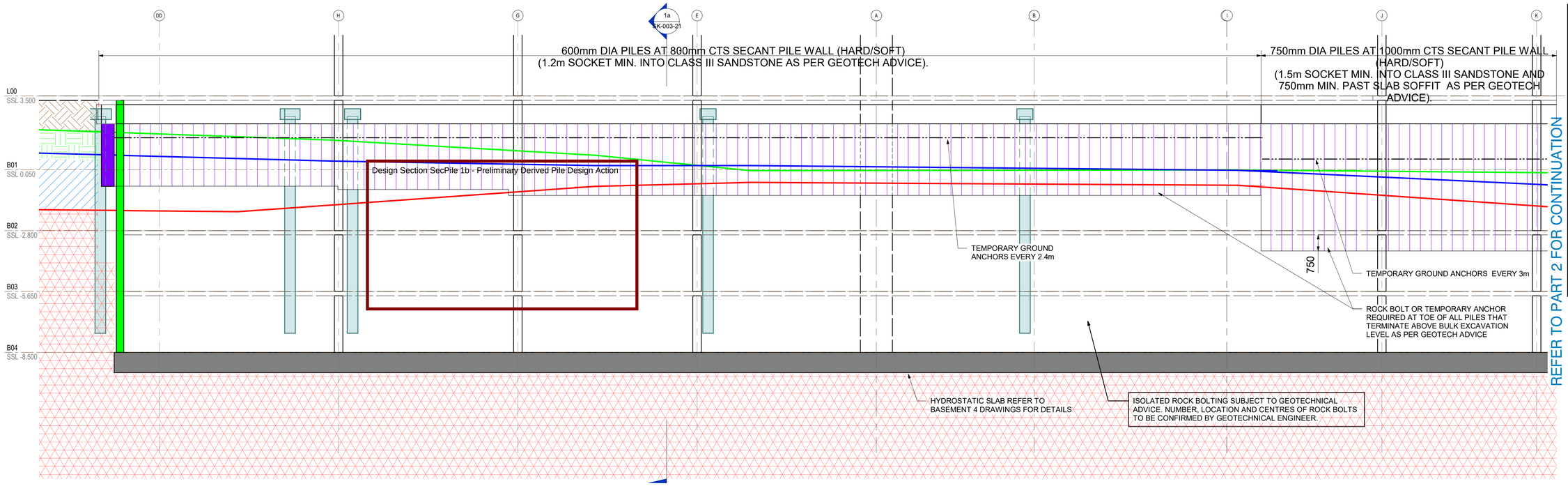
FOR INFORMATION

DRAWING NUMBER REV.

ST-SK-003-00

17/06/2022 12:55:22 PM

A1



EARTHWORKS LEGEND :

- DENOTES GROUND / FILL
- DENOTES CLASS V & IV ROCK
- DENOTES CLASS III ROCK
- DENOTES CLASS II ROCK

NOTE:

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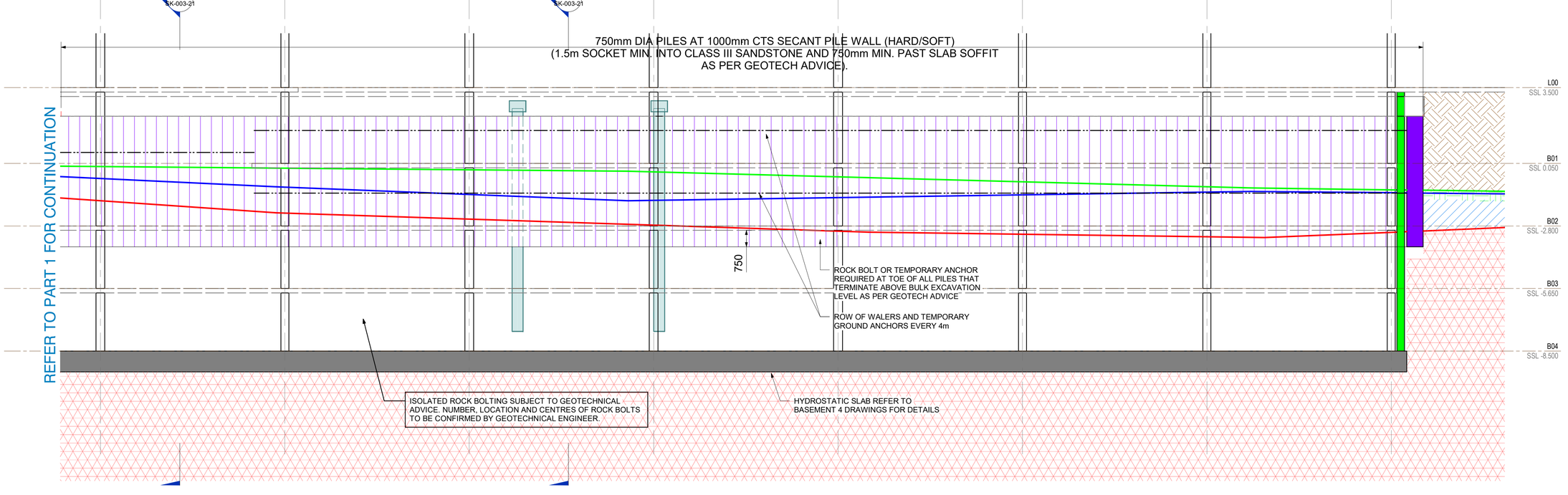
- DRAWING IS TO BE READ IN CONJUNCTION WITH NOTE ON DRAWING 003-00

SITE RETENTION ELEVATION 1 - PART 1

SCALE: 1 : 100



SITE RETENTION ELEVATION 1 - PART 2

SCALE: 1 : 100

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PROJECT NAME

HARBOURSIDE DEVELOPMENT

PROJECT NUMBER: 6401

DRAWING TITLE

SITE RETENTION ELEVATIONS SHEET 1

SCALE AT A1: As indicated
DRAWN BY: JDB
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DRAWING STATUS

FOR INFORMATION

DRAWING NUMBER REV.

ST-SK-003-11

17/06/2022 12:48:55 PM

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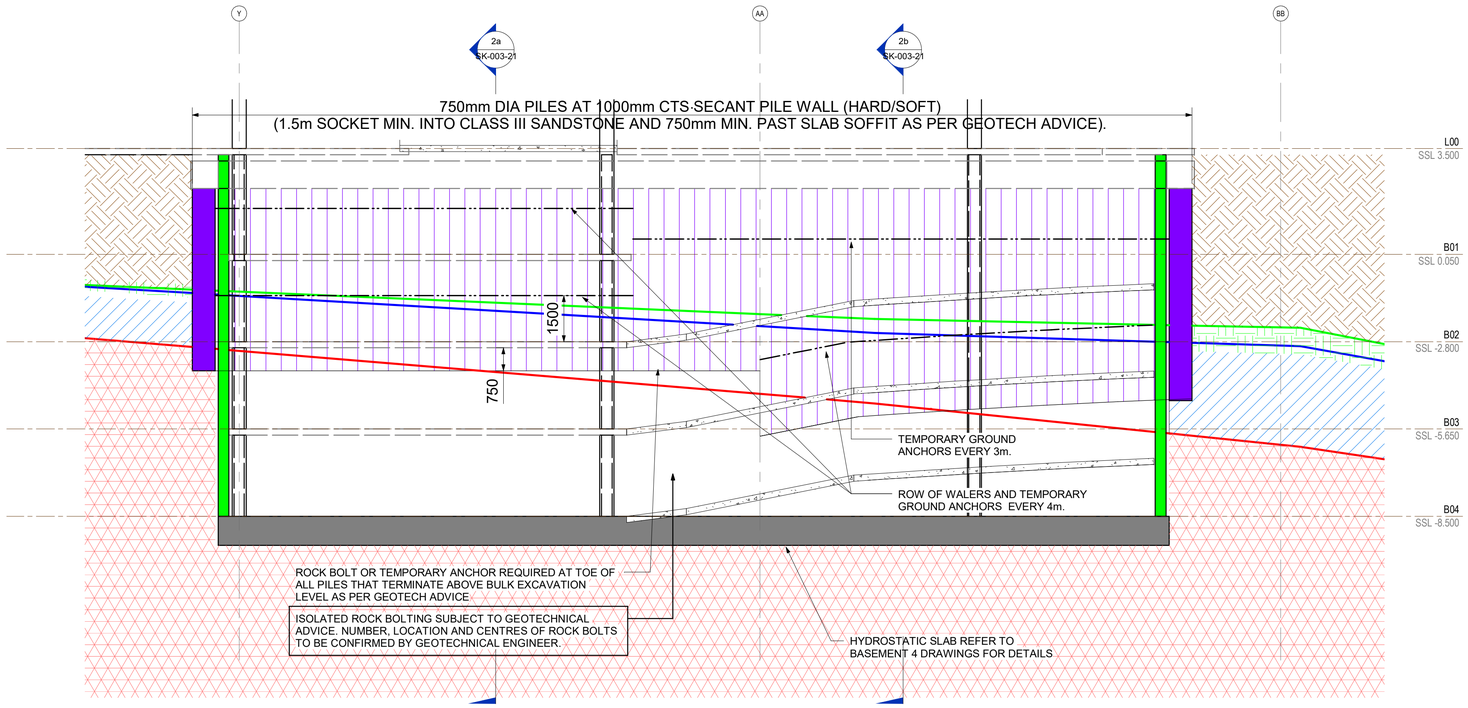
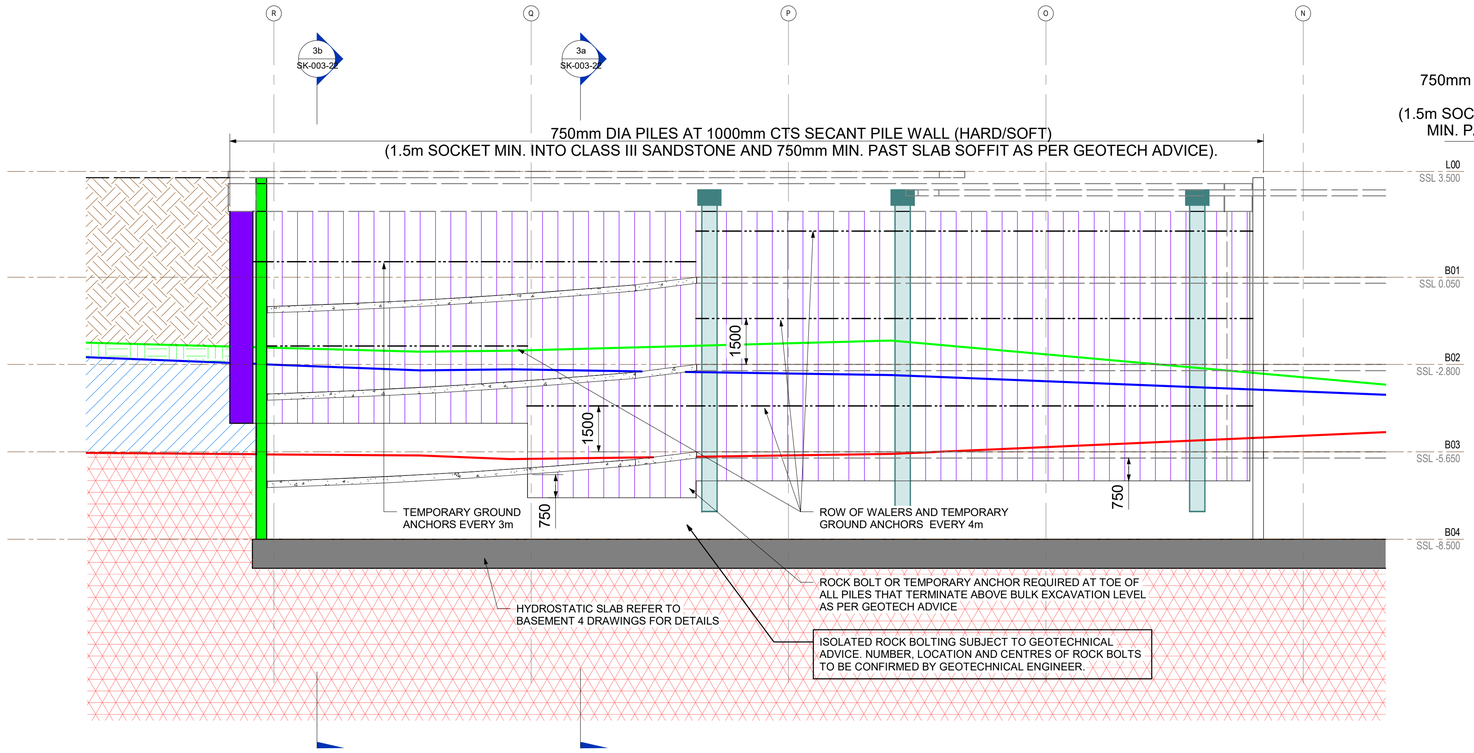


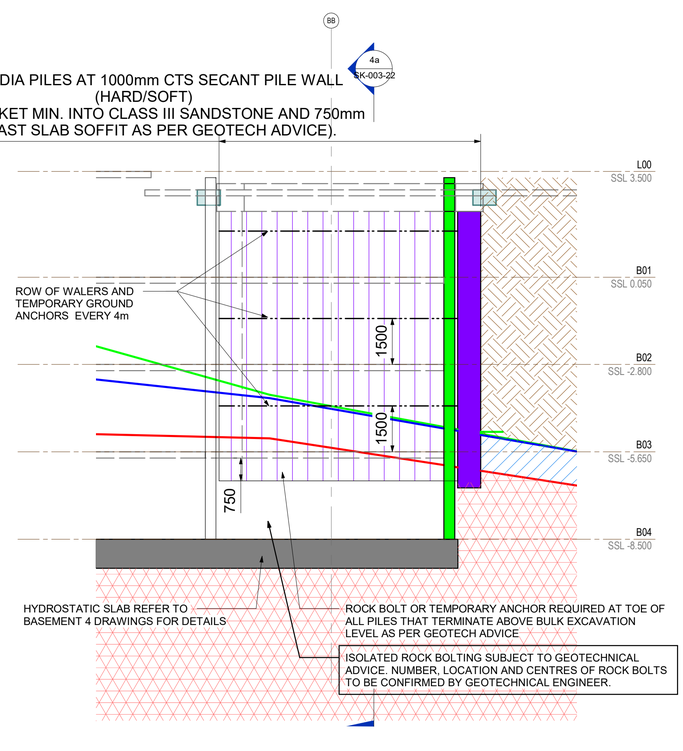
SITE RETENTION ELEVATION 2

SCALE: 1 : 100



SITE RETENTION ELEVATION 3

SCALE: 1 : 100



SITE RETENTION ELEVATION 4

SCALE: 1 : 100

EARTHWORKS LEGEND :

- DENOTES GROUND / FILL
- DENOTES CLASS V & IV ROCK
- DENOTES CLASS III ROCK
- DENOTES CLASS II ROCK

NOTE:

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PROJECT NAME

HARBOURSIDE DEVELOPMENT

PROJECT NUMBER: 6401

DRAWING TITLE

SITE RETENTION ELEVATIONS
SHEET 2

SCALE AT A1: As indicated
DRAWN BY: JDB
CHECKED BY: MOS

DRAWING STATUS

FOR INFORMATION

DRAWING NUMBER REV.

ST-SK-003-12

17/06/2022 12:49:00 PM

A1

EARTHWORKS LEGEND :

- DENOTES GROUND / FILL
- DENOTES CLASS V & IV ROCK
- DENOTES CLASS III ROCK
- DENOTES CLASS II ROCK

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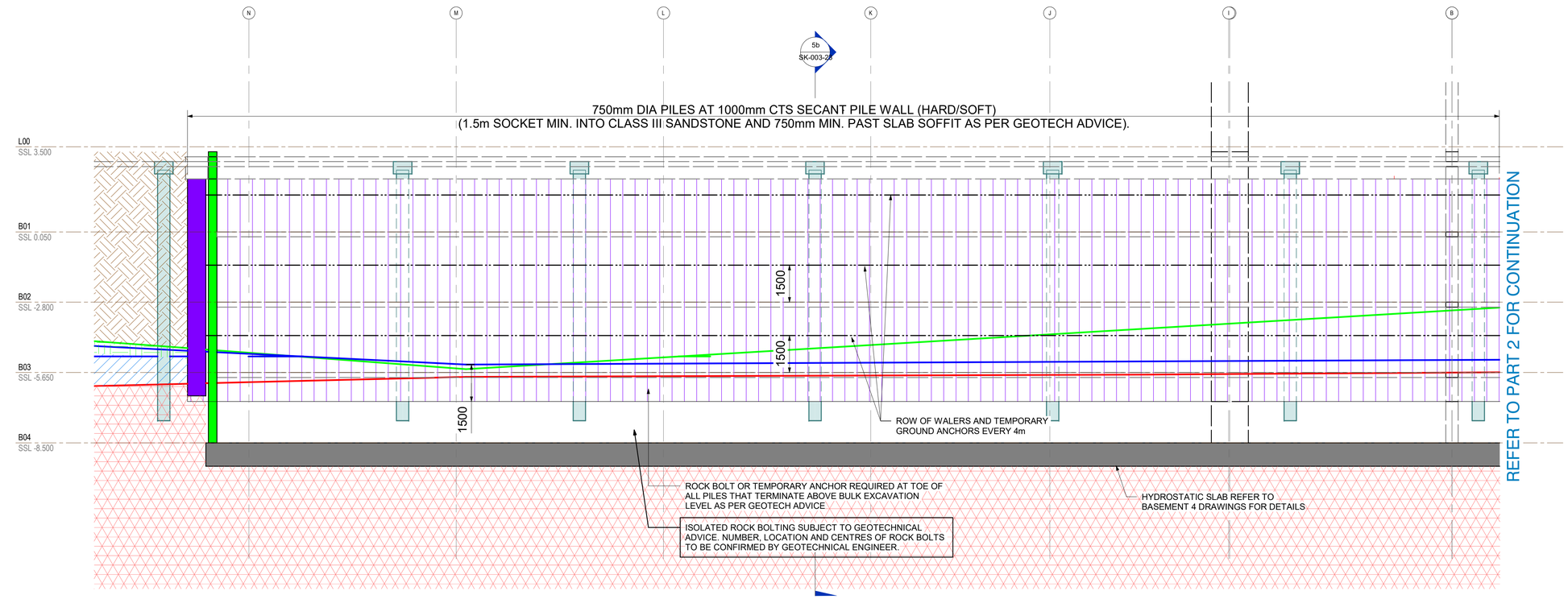
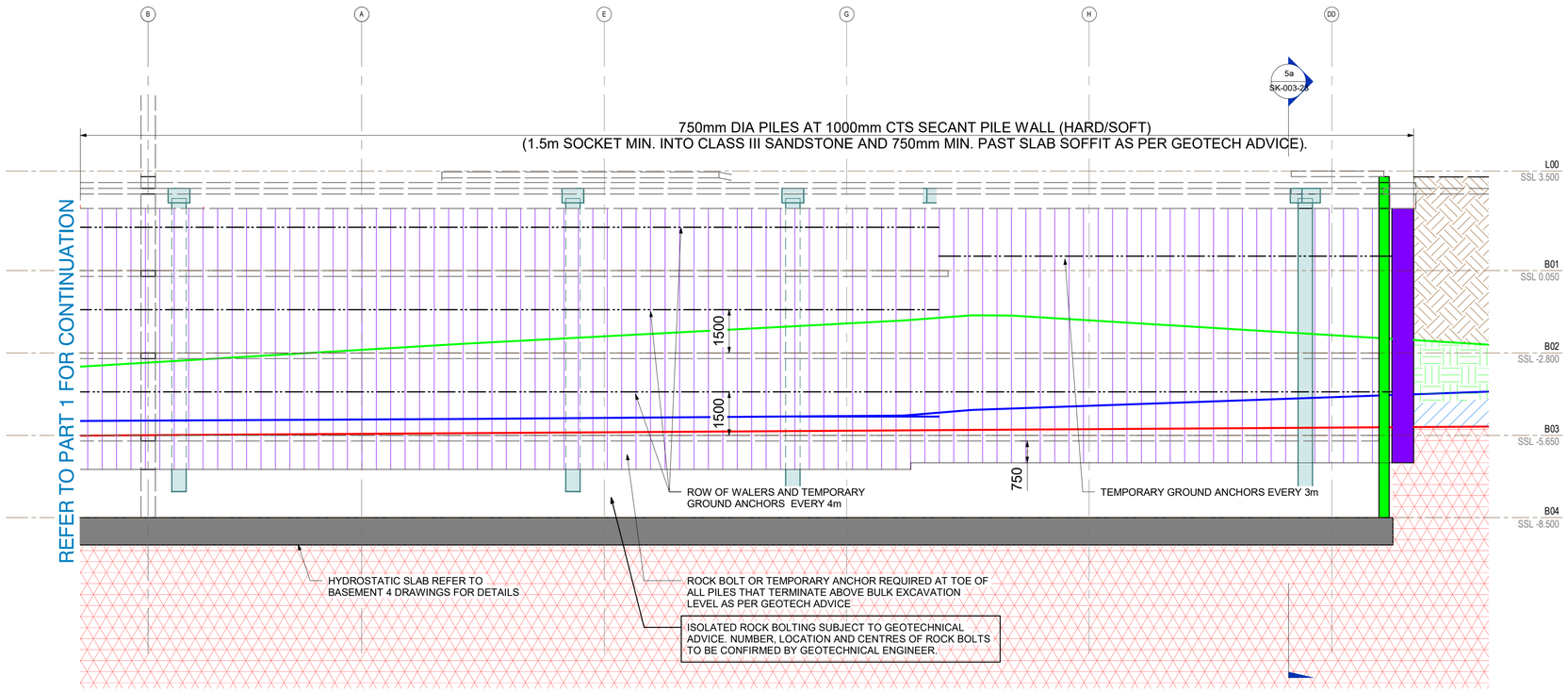


SITE RETENTION ELEVATION 5 - PART 1

SCALE: 1 : 100



SITE RETENTION ELEVATION 5 - PART 2

SCALE: 1 : 100

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PROJECT NAME

HARBOURSIDE DEVELOPMENT

PROJECT NUMBER: 6401

DRAWING TITLE

SITE RETENTION ELEVATIONS SHEET 3

SCALE AT A1: As indicated
DRAWN BY: JDB
CHECKED BY: MOS

DRAWING STATUS

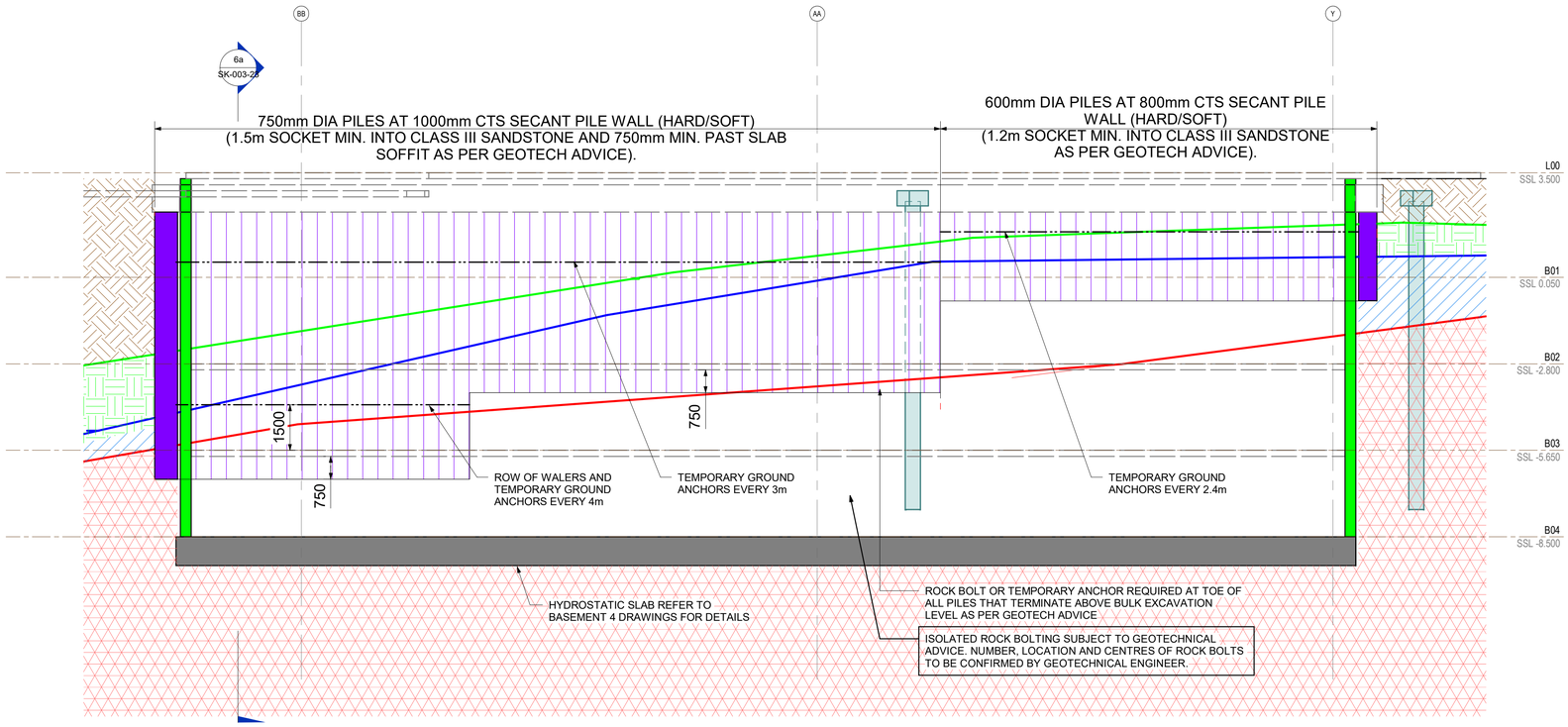
FOR INFORMATION

DRAWING NUMBER REV.

ST-SK-003-13

17/06/2022 12:49:05 PM

A1



SITE RETENTION ELEVATION 6

SCALE: 1 : 100

EARTHWORKS LEGEND :

- DENOTES GROUND / FILL
- DENOTES CLASS V & IV ROCK
- DENOTES CLASS III ROCK
- DENOTES CLASS II ROCK

NOTE:

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Telephone (02) 8904 1444
http: //www.enstruct.com.au

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PROJECT NAME
HARBOURSIDE DEVELOPMENT

PROJECT NUMBER: 6401

DRAWING TITLE
SITE RETENTION ELEVATIONS
SHEET 4

SCALE AT A1: As indicated
DRAWN BY: JDB
CHECKED BY: MOS

DRAWING STATUS
FOR INFORMATION

DRAWING NUMBER REV.
ST-SK-003-14

17/06/2022 12:49:09 PM

Appendix C Place Management NSW Connection Correspondence

Transport for NSW

20 December 2022

Ms Eliza Potter
Assistant Development Manager
Mirvac
Level 28
200 George Street
SYDNEY NSW 2000

Dear Ms Potter

Re: Landowner's Consent Application – LOC Reference Number: #11759
Address: Harbourside Shopping Centre, 2-10 Darling Drive, Darling Harbour

Thank you for your application seeking Land Owner's Consent (LOC) from Place Management NSW (PMNSW) for the following works:

- **Permission to discharge treated groundwater to the existing PMNSW Stormwater assets in accordance with dewatering management plan**

PMNSW has considered your application and based on the information provided, grants landowner's consent.

You will need to seek final approval from the NSW Department of Natural Resources Access Regulator (NRAR) for the Dewatering licence.

For Further Assistance:

If you require any further information of wish to discuss the contents of this letter, please contact Michelle King on 02 9240 8806.

Yours sincerely

Katarina Simunic
A/Director, Leasing & Commercial

Place Management NSW
Placemaking NSW
Cites and Active Transport
Level 2, 66 Harrington Street, Sydney NSW 2000
PO Box N408, Grosvenor Place NSW 1220

Tel: 02 9240 8500

Appendix D Groundwater Works Area Plan

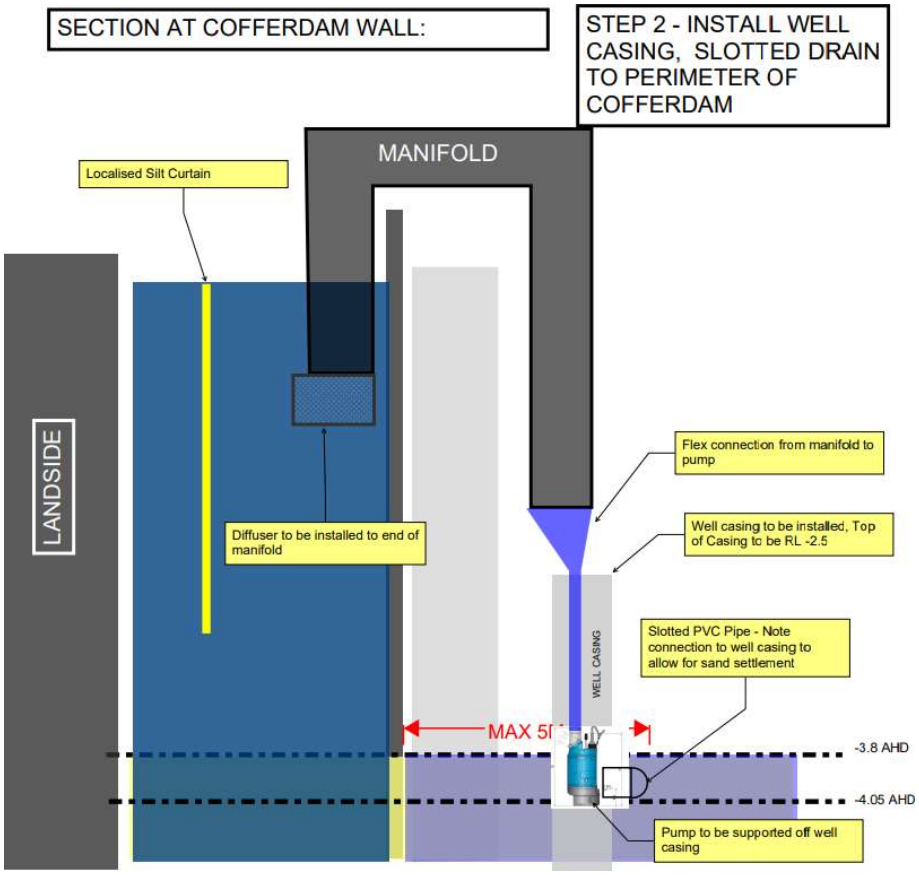
Methodology

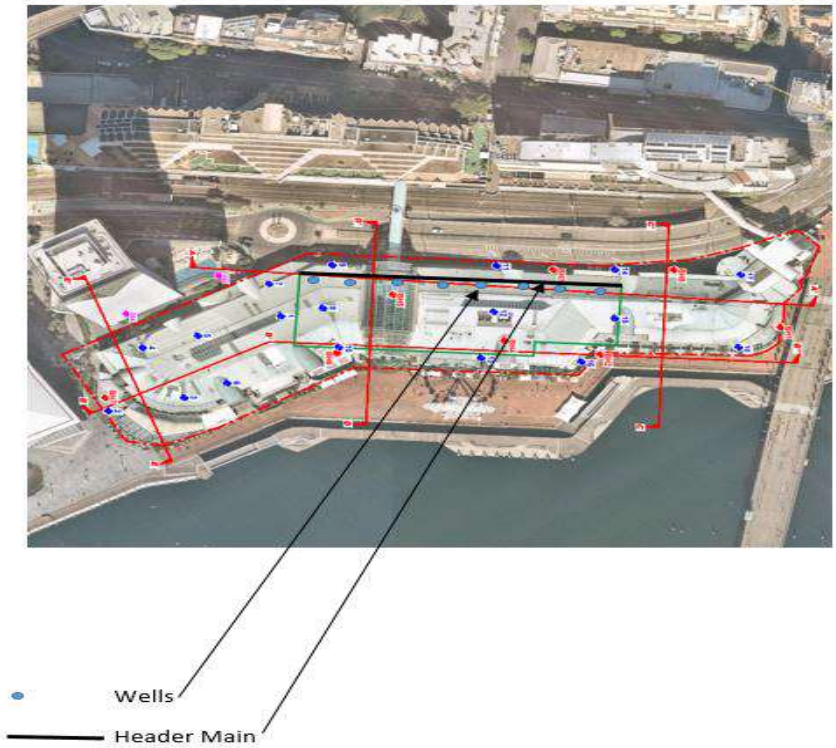
Each sump well to be installed approx. **every 16m along the 135m secant piled** excavation.

Additional wells may need to be located within the excavation if highly permeable crevices or dykes are encountered, these additional wells can be discharged either to manifold or to Sediment tank directly, pending on constructability.

These wells to be dug to depth utalising an excavator,(by Others) wells will need to be **1-2 m below excavation invert.** Approx 500mm x 500 to accommodate a 300mm engineered well.

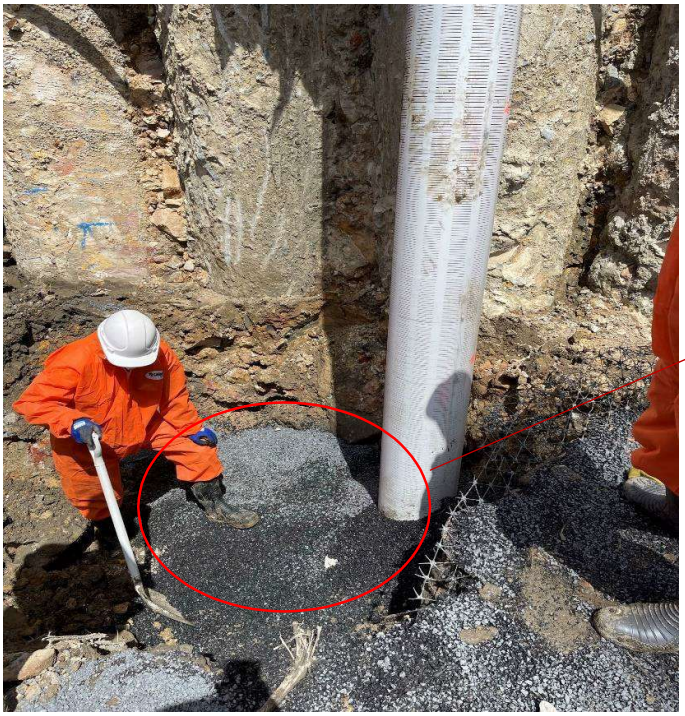
See below detail drawing for recent Sydney Fish Market Project.





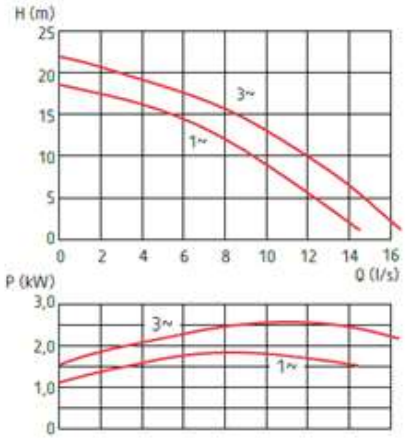
Each screen has a series of 1.5mm slots, end caps are also to be used reducing the risk of sand/rubble pushing through the center of the well.

300mm Sump well with end cap.



6-10mm washed gravel placed below and around the well casing, allowing the water to infiltrate and keep the fine particles out.

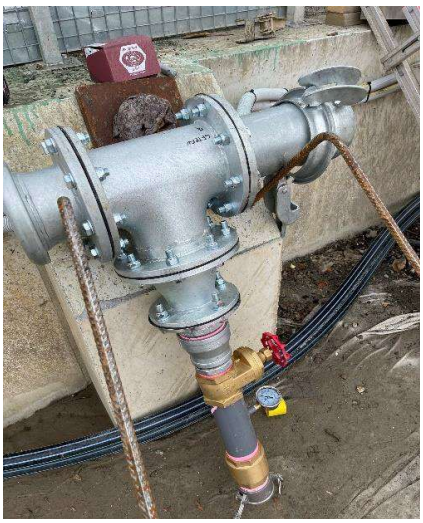
MINETTE



Technical data	1~	3~
Discharge connection	3"	3"
Rated output	1,5 kW	2,2 kW
Max power consumption	1,9 kW	2,7 kW
Shaft speed	2830 RPM	2800 RPM
Rated current at 230 V	8,4 A	8,1 A
Rated current at 400 V	-	4,5 A
Throughlet: ∅ 9 mm Weight: 29 kg Height: 676 mm Diameter: ∅ 240 mm		

Specifications can be changed without notice.

The electric air cooled submersible will then be lowered to the required RL, enabling the water to be pumped from the well to our purpose built 26,000l sedimentation tank, from the tank under gravity the water can be discharged to a point away from the excavation.



Our 75mm to 150mm manifold system to suit our sump pumps. Designed to create positive flow only without any back flow on any pumps. This minimizes the head pressure on the pumps and the ability to work on pumps for maintenance purpose.

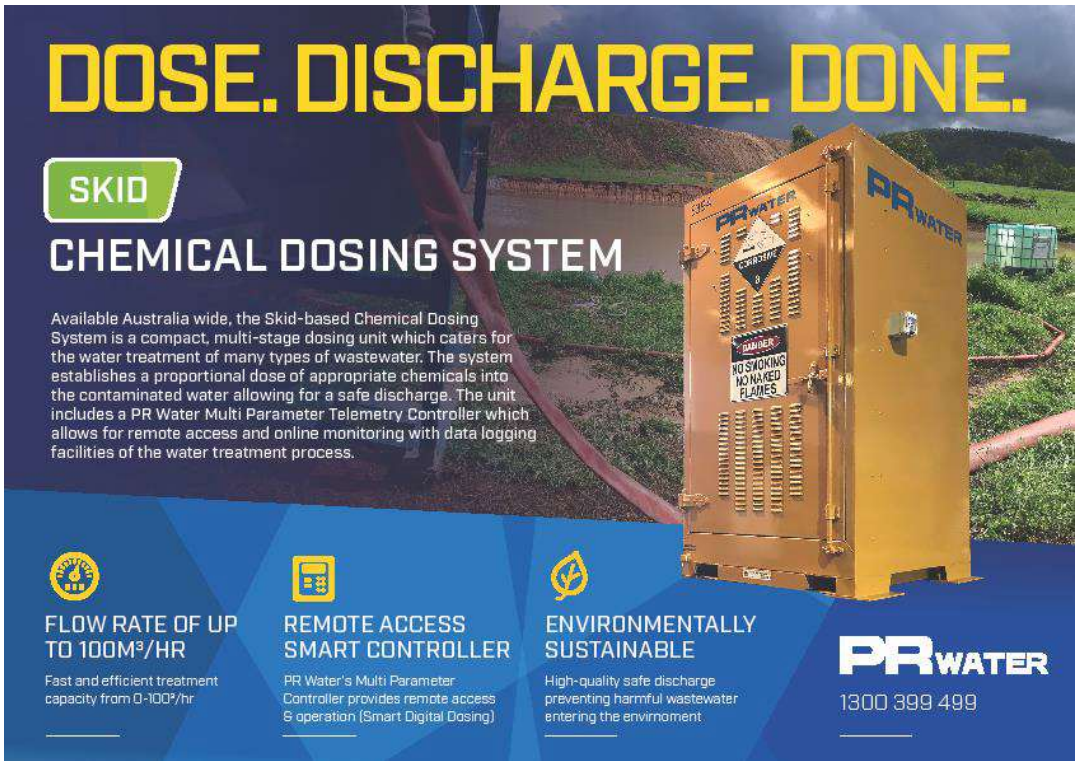
26,000L
Sediment tank

These tanks contain internal baffle/ walls, which helps in settling solid. Commonly used in most construction project to manage their site water.

Standby Generator

Our 100KVA generator unit will be tied to the mains supply that powers our sump pumps. This will need to be a 3-phase supply and split over the 8 pumps that are required. This means that the pumps on each phase have the ability to detect power loss. The 250amp Auto-change over switch will have the ability to detect this change and advise the 100KVA generator to start within 10 seconds. Once the mains power supply comes back live, the 250amp Auto-change over switch will again detect this change in the system thus advising the Generator to shut down.

Chemical Dosing and Treatment Unit



Quotation Valid for 30 days **Kennards Hire Pty Ltd ABN: 69 001**

HB60 LAMELLA CLARIFIER

The PR Water Siltbuster HB60 Lamella Clarifier excels in water treatment and the removal of solid particles from contaminated water. As a mobile water treatment plant, the HB60 Lamella Clarifier has a large settlement area and treats water via gravity separation. PR Water's HB60 clarifier has a nominal flow rate of 40m3/hr while maintaining a minimal unit footprint, this ensures the treatment process is as efficient as possible.

The HB60 Lamella Clarifier's are pre-assembled. Multiple units can be used parallel to each other to increase the surface area for the settlement of solid particles, accelerating the gravity separation process and flow rate. The Lamella Clarifiers have no moving parts, minimal maintenance and have high durability, complying with ISO Standards.

To provide effective recovery of suspended particles the PR Water HB60 Settlement unit is normally operated at flow rates of up to 40 m3/hr. However, when treating rapidly settling solids or when operated in conjunction with a PR Water Chemical Dosing System the flow rate can be increased up to the hydraulic capacity of the unit (80 m3/hr).

The solids (sludge) collected by the unit settle within the unit's hopper and are easily removed by the opening of a gate valve, eliminating the need for the unit to be taken offline for emptying, beneficial for applications where near continuous operation is required.

How it works:

PR Water's Lamella Clarifiers are designed to encourage laminar flow throughout the unit. Gravity forces the flocculated/settleable solids to remain below the lamella plates and settle in the sludge collection hopper at the bottom of the clarifier. The clarified water makes its way to the surface and flows under a floating objects barrier, the treated water then flows through the discharge outlet.

Product Features:

- Nominal Flow Rate of 40m3/hr
- Max Flow Rate of 80m3/hr

(SKID) CHEMICAL DOSING SYSTEM

The skid-based PR Water Dosing System is a multi-stage chemical dosing system which specializes in chemical pre-treatment. The skid-base is mobile and compact, ideal for projects with limited space. After the contaminated water has been treated the chemical dosing system produces a high-quality discharge that meets Australian regulatory requirements and can be safely released into the environment.

The Dosing System comes pre-assembled and equipped with a user-friendly control panel which provides remote access and online monitoring. The control panel is used to establish a proportional dosing of chemicals during the water treatment process. The Chemical Dosing System often aids lamella clarifiers in the treatment of contaminated water allowing for a larger range of wastewater to be treated.

The skid-based Chemical Dosing Unit is regularly supplied as a part of PR Water's complete dewatering and water treatment packages where the treated suspended solids are recovered in a PR Water Lamella Clarifier.PR Water's water treatment package: Chemical Dosing System, Lamella Clarifier, Pump & Generator.

How it works:

The skid-based dosing system can measure, control and regulate pH levels as well as use a large range of chemicals to cater for the required treatment depending on the type of wastewater.
PR Water's expert team will offer ongoing support including, the sampling, analysing and treatment of specified wastewater.

Product Features:

- Provides a controlled quantity of coagulants and flocculants
- 0-100m3 per hour treatment capacity
- 4" Flow Meter
- Dosing pump controlled by mulit-parameter controller
- Lockable doors
- Eye wash station
- Spill control kit
- Internal lighting
- Safety Data Sheets (SDS) on weatherproof bag.
- Dimensions – 1.2m Long x 1m Wide x 2m High, Dry weight 400kg.

Appendix E Water Supply Works Approval

Department of Planning and Environment

Mr Andrew Colangelo
Mirvac Retail Sub SPV Pty Ltd
Level 28, 200 George Street
SYDNEY NSW 2000
Email: andrew.colangelo@mirvac.com

Our ref: 10WA124897; A031236

Contact: Mr Stephen John Chamberlain, Email: stephen.chamberlain@mirvac.com
Mr Chris Kauffman, Email: ckauffman@jbsg.com.au

Date: 17 August 2023

Dear Mr Colangelo

Water Supply Works Approval [10WA124897]

I refer to the application made by Sydney Water Corporation for a water supply work approval issued under s.95 of the *Water Management Act 2000.* The Department of Planning and Environment–Water has determined to grant the approval which takes effect from the date of this notice.

The Statement of Approval is attached which includes the terms and conditions of the approval.

The extraction volume 107 ML has been included on the conditions applied to the approval for the dewatering activity as an extraction limit—note that if this volume is exceeded then the proponent may be referred to the Natural Resources Access Regulator for possible compliance action.

The metering of pumped groundwater volumes shall be carried out by the proponent using instruments that meet the NSW Government's requirements for water meters and relevant Australian standards.

The measurement of groundwater levels and sampling of water quality during the dewatering activity shall be carried out by the proponent from at least three monitoring bores distributed across the site that will be able to access groundwater for the entire period of the activity.

Groundwater monitoring must be in accordance with the 'Minimum requirements for building site groundwater investigations and reporting – information for developers and consultants'.

Right of Appeal: If you are dissatisfied with the terms and conditions of this approval, the *Water Management Act 2000* provides for a right of appeal to the Land and Environment Court in certain circumstances. This approval will take effect 28 days from the date of this notice provided no appeals are lodged within this period. If an appeal is made against the decision within this appeal period, the approval can only take effect after disposal of the appeal. Subject to the appeals process and the approval subsequently taking effect, this approval provides you with a right to construct the specified water supply work(s) and/or use water subject to the conditions specified in this approval and any water restrictions that may be in place.

Please contact waterlicensing.servicedesk@dpie.nsw.gov.au if you require further information.

Yours faithfully

Department of Planning and Environment

Anisul Afsar
Water Regulation Officer
Department of Planning and Environment—Water

Statement of Approval

Water Management Act 2000

Approval details

Approval number	10WA124897
Status	CURRENT*
Approval kind	Water Supply Works
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023
Date of effect	Should an appeal be made against the granting of this approval, this approval will not take effect until the appeal is finally disposed of.
Expiry date	16/08/2025
Approval holder(s)	Schedule 1
Water supply works	Schedule 2
Conditions	Schedule 3

Contact for service of documents

Name	STEPHEN JOHN CHAMBERLAIN
Address	Level 28 200 George Street Sydney NSW-2000

* **Note: An approval has effect for such period as is specified in the approval, or if the period is extended under section 105, that extended period. If an application for extension of an approval is lodged before the approval expires, the term of the expiring approval is extended until either the date of the final decision on the application, or a date fixed by the Minister for the approval, whichever is the later date. An approval which has expired can be the subject of an application to extend it but it needs to be accompanied by a statutory declaration of the reasons for the delay in making the application. If the Minister accepts these reasons the term of the approval is taken to have been extended, and the application may be dealt with, as if the application had been made before the approval expired.**

  It is an offence under the Water Management Act 2000 to breach a term or condition of the approval or to construct and use works to which the approval does not relate. It is also an offence to use works the subject of an approval if the approval has expired, been surrendered or cancelled.

Schedule 1 - Approval holders

The holders of this approval are:

Approval holder(s)	ACN (if applicable)
MIRVAC RETAIL S U B S P V PTY LIMITED	122 863 521

Important notice - change of landholder or contact

Please advise the Office in the event of any of the following, as soon as practicable:

- If there is a change in the ownership or occupation of the land benefited by this approval (see Schedule 2). Under the Water Management Act 2000, an approval is typically held by the owner or lawful occupier of the benefited land. Consequently, a change in occupation may cause a change in your legal obligations as an approval holder.*
- If there is a change to the contact person. You will be required to lodge a written statement signed by all the holders.*
- If there is a change to the mailing address for the nominated contact person. This should be done by the contact person in writing.

** An updated Statement of Approval will be issued free of charge*

Schedule 2 - Water supply works

Part A: Authorised water supply works

Subject to the conditions of this approval, in relation to each numbered work in the table, the holders of this approval are authorised to construct and use a water supply work of the type shown at the location specified:

Work 1

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Work 2

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Work 3

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Work 4

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Work 5

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Work 6

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Work 7

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Work 8

Specified work	100mm Submersible Pump
Specified location	1//776815 Whole Lot
Management zone (if applicable)	
Water source	Sydney Basin Central Groundwater Source
Water sharing plan	Greater Metropolitan Region Groundwater Sources 2023

Schedule 3 - Conditions

The approval is subject to the following conditions:

Plan conditions

Water sharing plan ***Greater Metropolitan Region Groundwater Sources 2023***

Take of water

MW0655-00001 Any water supply work authorised by this approval must take water in compliance with the conditions of the access licence under which water is being taken.

Monitoring and recording

MW0482-00001 Where a water meter is installed on a water supply work authorised by this approval, the meter reading must be recorded in the logbook before taking water. This reading must be recorded every time water is to be taken.

This condition ceases to apply to a work on the day that the recording and reporting requirements apply to that work under the Water Management (General) Regulation 2018.

MW0484-00001 Before water is taken through the water supply work authorised by this approval, confirmation must be recorded in the logbook that cease to take conditions do not apply and water may be taken.

The method of confirming that water may be taken, such as visual inspection, internet search, must also be recorded in the logbook.

If water may be taken, the:
A. date, and
B. time of the confirmation, and
C. flow rate or water level at the reference point in the water source
must be recorded in the logbook.

MW2336-00001 The purpose or purposes for which water is taken, as well as details of the type of crop, area cropped, and dates of planting and harvesting, must be recorded in the logbook each time water is taken.

This condition ceases to apply to a work on the day that the recording and reporting requirements apply to that work under the Water Management (General) Regulation 2018.

MW2337-00001

The following information must be recorded in the logbook for each period of time that water is taken:
A. date, volume of water, start and end time when water was taken as well as the pump capacity per unit of time, and
B. the access licence number under which the water is taken, and
C. the approval number under which the water is taken, and
D. the volume of water taken for domestic consumption and/or stock watering.

This condition ceases to apply to a work on the day that the recording and reporting requirements apply to that work under the Water Management (General) Regulation 2018.

MW2338-00001

The completed logbook must be retained for five (5) years from the last date recorded in the logbook.

MW2339-00001

A logbook must be kept, unless the work is metered and fitted with a data logger. The logbook must be produced for inspection when requested by the relevant licensor.

Reporting

MW0051-00001

Once the approval holder becomes aware of a breach of any condition on this approval, the approval holder must notify the Minister as soon as practicable. The Minister must be notified by:
A. email: water.enquiries@dpi.nsw.gov.au,
or
B. telephone: 1800 353 104. Any notification by telephone must also be confirmed in writing within seven (7) business days of the telephone call.

Other conditions

Take of water

DS7743-00001

The approval holder must obtain a Water Access Licence in the Sydney Basin Central Groundwater Source and ensure that they have sufficient water available in their account before dewatering unless an exemption applies.

DS8449-00001

In accordance with the greatest volume determined in the documents provided, an extraction limit of 107 megalitres per year (ML/year), for up to two years, applies to the approval.

DK6548-00001

Approval holder must conduct activities associated with taking water in accordance with the provisions of the Dewatering Management Plan.

Environmental matters

DK6532-00001

A. All dewatering at the site must be undertaken in accordance with the requirements of the Managing Urban Stormwater Manual, Volume 1, Soils and Construction 2004, as amended or replaced from time to time.
B. These control measures must include the use of mitigation controls such as a sediment fence between the sump water release outlet and the waterway. Control measures must be maintained until work is completed.

DK7839-00016

Water treatment and disposal must be in accordance with Dewatering Management Plan prepared for Harbourside Shopping Centre Redevelopment dated 18 November 2022, document number 62851/147518, prepared by JBS&G Australia Pty Ltd. Discharge of treated water into the stormwater system must be within the guidelines outlined by Dewatering Management Plan and Australian and New Zealand Environment and Conservation Council (ANZECC). If contaminant levels exceed guideline levels water must be transferred to sewerage treatment works.

Monitoring and recording

DS7744-00001

The approval holder must monitor the following and formally record all results with the date and time references for each entry for inclusion in a dewatering report:
a. dewatering volumes (weekly meter readings) during the construction period,
b. groundwater levels (continuous or daily measurements) during the construction period, and
c. water quality (weekly sampling and analysis) during the construction period.

Reporting

DS8124-00001

The approval holder must provide a copy of the dewatering report and all monitoring data to DPE Licensing and Approvals within eight weeks of the completion of construction.

Glossary

cease to take - Cease to take conditions means any condition on this approval, or on the access licence under which water is proposed to be taken, that prohibits the taking of water in a particular circumstance.

domestic consumption - Domestic consumption is the use of water for normal household purposes in domestic premises situated on the land.

licensor - WaterNSW or DPI Water, depending on which organisation administers your licences and/or approvals

logbook - A logbook is a document, electronic or hard copy, that records specific required information.

metered water supply work - A metered water supply work is a water supply work fitted with a data logger and a water meter that complies with Australian Standard AS 4747: Meters for non-urban water supply.

stock watering - Stock watering is the use of water for stock animals being raised on the land. It does not include the use of water for the raising of stock animals on an intensive commercial basis (kept in feedlots or buildings for all, or a substantial part, of the period during which the stock animals are being raised).

water meter - A water meter is a device that measures the volume of water extracted over a known period of time. Examples of a water meter include a mechanical meter, electromagnetic meter, channel meter with mobile phone, or an authorised meter equivalent.

General Notes

All conditions on an approval require compliance. An appeal to the Land and Environment Court against a decision to impose certain conditions on an approval can be made within 28 days after the date the decision is made. Conditions identified with the first letter "**D**" are those that can be appealed during the appeal period.

The words in this approval have the same meaning as in the *Water Management Act 2000*

Note: The words in this approval have the same meaning as in the WMA

END OF STATEMENT

Document Distribution

Rev No.	Copies	Recipient	Date
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3	1 x electronic	Stephen Chamberlain (Mirvac) Gary Shaw (Mirvac) Oliver Maxwell (Mirvac)	16/11/2023
4	1 x electronic	Stephen Chamberlain (Mirvac) Daniel Corry (Mirvac)	25/01/2024

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Daniel Saeed Chris Kauffman	Greg Dasey	Matthew Bennett	Draft for client review	18/11/2022
2	Daniel Saeed	Matthew Bennett	Matthew Bennett		18/10/2023
3	Daniel Saeed	Matthew Bennett	Matthew Bennett		16/11/2023
4	Daniel Saeed	Matthew Bennett	Matthew Bennett		25/01/2024