Douglas PARTNERS

GROUNDED EXPERTISE

Report on Geotechnical Investigation

Proposed Mixed Use Development

164-194 William Street, Woolloomooloo NSW

Prepared for William Street Residential Pty Ltd

Project 208700.01

25 August 2025

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Document History

Details

Project No.	208700.01
Document Title	Report on geotechnical investigation
Site Address	164-194 William Street, Woolloomooloo NSW
Report Prepared For	William Street Residential Pty Ltd
Filename	208700.01.R.001.Rev2

Status and Review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Peter Hunt (PRE0000448)	Hugh Burbidge	11 September 2024
Revision 1	Peter Hunt (PRE0000448)	Hugh Burbidge	04 June 2025
Revision 2	Peter Hunt (PRE0000448)	Hugh Burbidge	25 August 2025

Distribution of Copies

Status	Issued to
Revision 0	John Fitzgerald of Rebel Property Group on behalf of William Street Residential Pty Ltd
Revision 1	John Fitzgerald of Rebel Property Group on behalf of William Street Residential Pty Ltd
Revision 2	John Fitzgerald of Rebel Property Group on behalf of William Street Residential Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

Signature	Date
Author	25 August 2025
Reviewer	25 August 2025

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Douglas Partners acknowledges Australia's First Peoples as the Traditional Owners of the Land and Sea on which we operate. We pay our respects to Elders past and present and to all Aboriginal and Torres Strait Islander peoples across the many communities in which we live, visit and work. We recognise and respect their ongoing cultural and spiritual connection to Country.

Report on Geotechnical Investigation
Proposed Mixed Use Development
164-194 William Street, Woolloomooloo NSW

1. Introduction

This report prepared by Douglas Partners Pty Ltd (Douglas) presents the results of a geotechnical investigation undertaken for a proposed mixed use development at 164-194 William Street, Woolloomooloo NSW (the site). The investigation was commissioned by email from John Fitzgerald of Rebel Property Group on behalf of William Street Residential Pty Ltd instructing Douglas to proceed. The email was dated 30 July 2023 and the work was undertaken in accordance with Douglas' proposal 208700.01.P.001.Rev0 dated 12 July 2024.

It is understood that the proposed development of the site includes a mixed-use development comprising four buildings ranging from 6 to 18 stories with four basement levels. The site is shown on Drawing 1, Appendix B.

The aim of the investigation was to assess the subsurface soil and groundwater conditions across the site in order to provide comments for design to be issued with the Stage 2 Development Application.

The investigation included the drilling of four boreholes and the installation of three groundwater monitoring standpipes. The details of the field work are presented in this report, together with comments and recommendations on the items listed above. This report must be read in conjunction with all appendices including the notes provided in Appendix A.

A Detailed Site Investigation (DSI) has also been carried out by Douglas at the site. The results of the DSI and a Remediation Action Plan (RAP) have been reported separately.

2. Site Description

The proposed redevelopment at 164-194 William Street, Woolloomooloo has an approximately rectangular shaped footprint covering approximately 6,402 m^2. The ground surface levels fall towards the north-north-west at a grade of about 14%. The site is bounded by Forbes Street to the west, William Street to the south and Dowling Street to the east. Along the northern-boundary, the site is bounded by Judge Lane on the western half and a residential property on the eastern half.

The site is currently occupied by a medium-rise office building in the south-western quadrant, a low-rise office building in the south-eastern quadrant, a low-rise workshop building in the north-eastern quadrant and an at-grade carpark in the north-western quadrant.

Figure 1: Aerial photograph of site highlighted with red boundary.

3. Published Data

3.1 Geology

The Geological Survey of NSW Seamless Geology Web Map indicates that the site is underlain by Hawkesbury Sandstone of the Triassic Period that typically comprises medium to coarse-grained quartz sandstone with minor shale and laminite lenses.

The Geological Survey of NSW 1:100 000 Geological Series Sheet 9130 for Sydney (see Figure 2) indicates that the Woolloomooloo Fault Zone, which has an approximate north-easterly alignment, is located approximately 40 m north-west of the site.

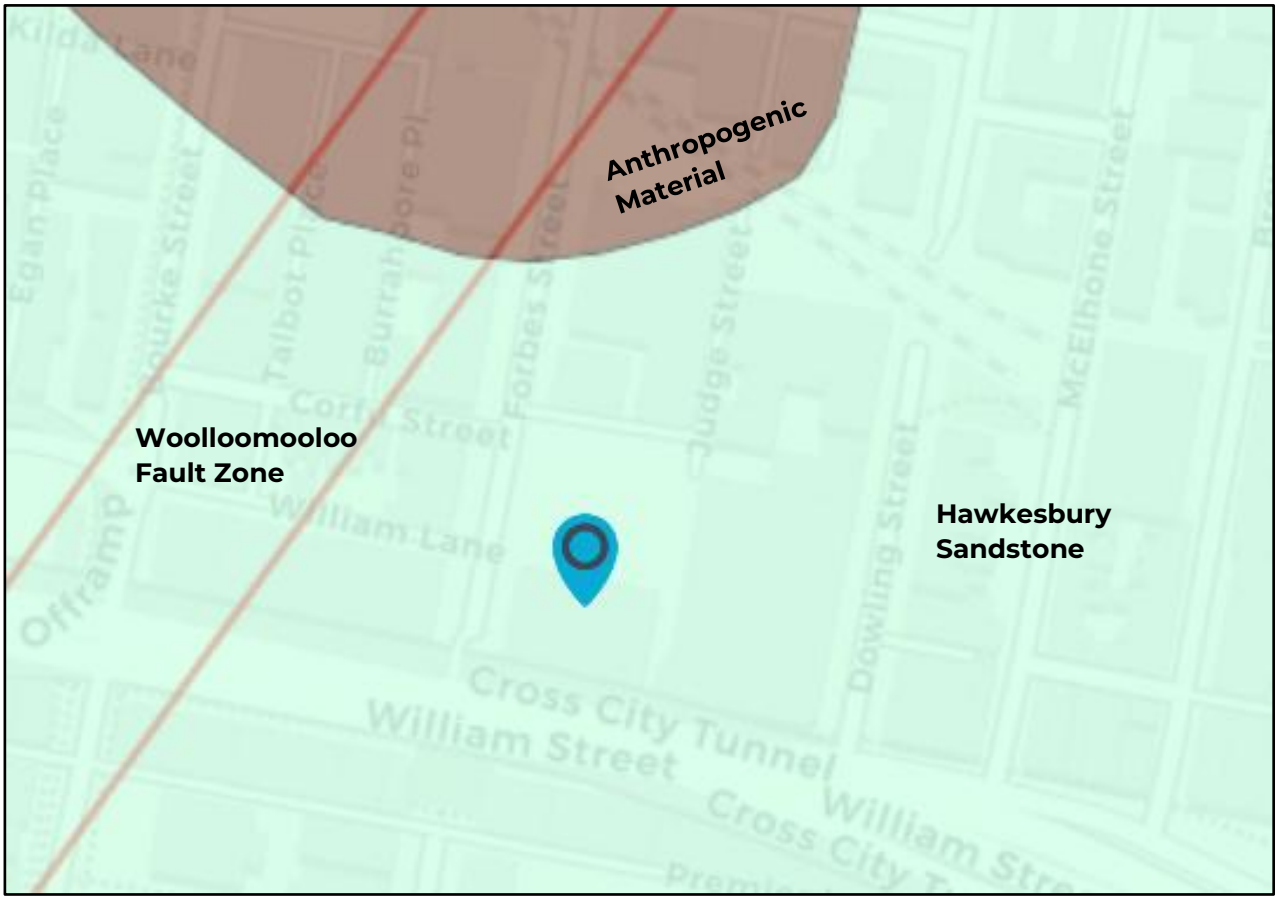

Figure 2: NSW Seamless Geology map with approximate site location with blue marker.

3.2 Soil Landscape

The Soil Conservation Service of NSW 1:100 000 Soil Landscape Series Sheet 9130 (Sydney) indicates that the site is located within the "Hawkesbury" colluvial soil landscape unit, near the border with the "Gymea Soils" landscape unit (see Figure 3). The map notes indicate that the Hawkesbury colluvial soil landscape unit can contain boulders (i.e., 'floaters'), although most of the colluvium material has probably been removed.

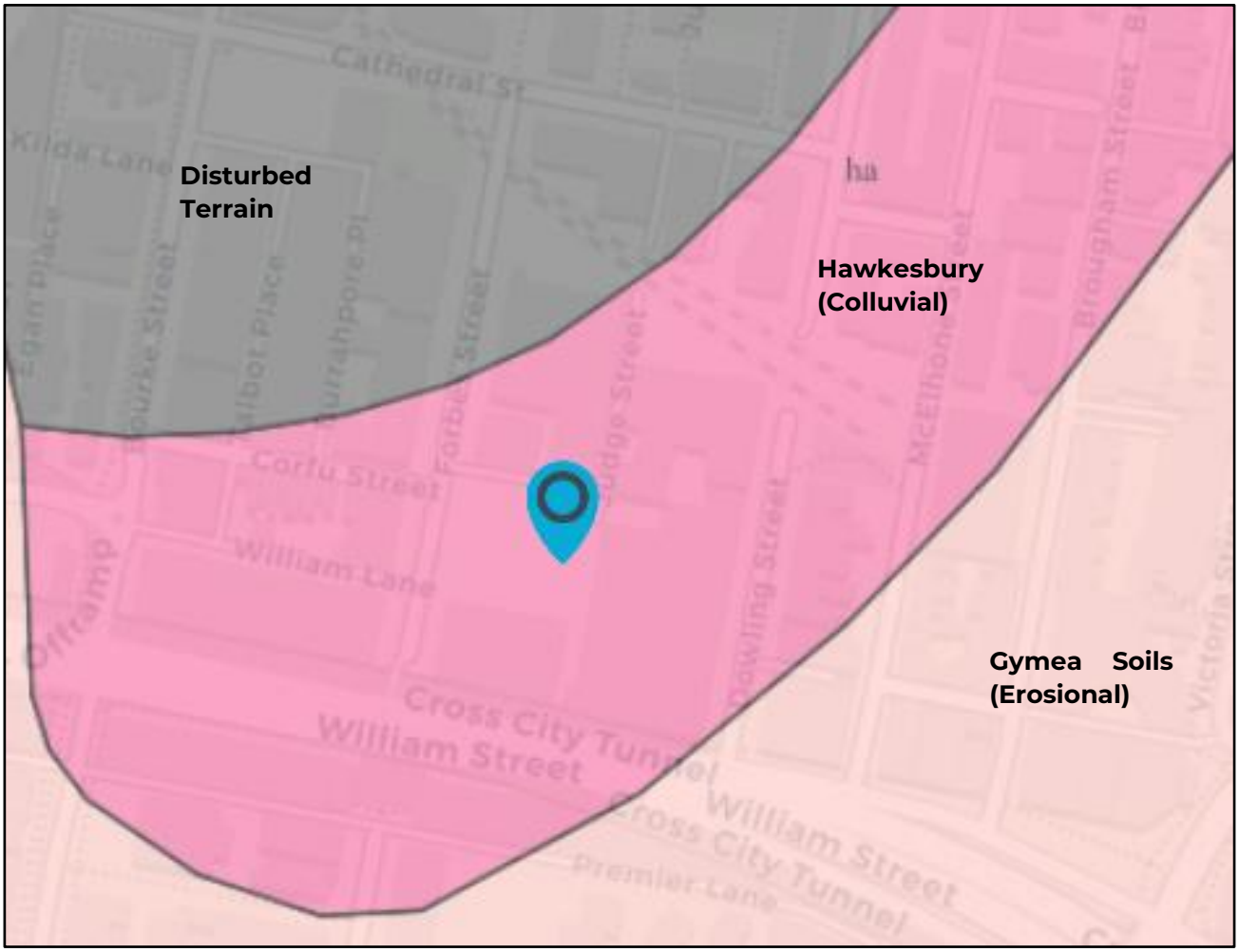

Figure 3: Excerpt of The Soils Landscape Sheet of Sydney 1:100 000 with site indicated with blue marker.

3.3 Acid Sulphate Soils and Salinity

The NSW Acid Sulphate Soils (ASS) Risk map for this area of the CBD shows the site as having "No data available". The closest area to the site where data is available is classified as a X2 Disturbed Zone area, located about 100 m north down the slope. Sheet 022 of the Sydney LEP 2012's Department of Planning and Environment Acid Sulphate Soil Maps, identifies the site as being a Class 5 area, defined as an area that does not have acid sulphate soil but is within 500 m of adjacent land that has acid sulphate soils.

Reference to the Atlas of Australia Acid Sulphate Soils shows that the site is in an area with an extremely low probability (1 - 5% chance) of occurrence in small, localised areas. The site generally slopes from approximately 25 m AHD in the south-east towards 13 m AHD in the north-west. Given the elevation of the site and reference top the maps, acid sulphate soils are not anticipated.

The NSW Salinity Potential map from the NSW Department of Infrastructure, Planning and Natural Resources does not indicate the site has any salinity potential.

3.4 Cross City Tunnel

The Cross City Tunnel (CCT) is understood to be located to the south of the site, beneath William Street. The CCT consists of three tunnels; the Eastbound Mainline, the Westbound Mainline and a ventilation tunnel. Based on available data, the Eastbound Mainline is the closest tunnel to the site, with the tunnel understood to be located just outside the boundary, but the reserve and stratum for the tunnel extending below the site. The Control Line for the Eastbound Mainline is understood to be at approximately RL[1] -13 m near the western boundary, ramping up to approximately RL -7.5 m near the eastern boundary of the site, with a slight curve away from the site to the east.

4. Field Work

4.1 Field Work Methods

Field work comprised drilling four (4) boreholes (BH201 to BH204) at the locations shown on Drawing 1, Appendix C. Detailed borehole logs and core photographs are provided in Appendix D. BH201 to BH204 were drilled to depths between 15 m and 20 m using a truck-mounted rig (BH202) and a track-mounted drill rig (BH201, BH203 and BH204).

Boreholes BH201, BH203 and BH204 were commenced using diatube coring, followed by diamond drilling methods to obtain NMLC sized core. BH202 was commenced using solid flight auger equipment, with Standard Penetration Tests (SPTs) carried out at regular depths in soil. BH202 was then cased and continued into underlying rock using diamond drilling methods to obtain NMLC sized core. The core samples retrieved from all boreholes were geotechnically logged and representative sections of core were strength-tested on site.

Boreholes BH201, BH203 and BH204 were reamed to 96mm diameter to allow installation of temporary groundwater monitoring standpipes (wells). The wells were constructed using 60 mm external diameter (50 mm internal diameter) Class 18 un-plasticised poly-vinyl (uPVC) pipe with screen sections, machine-slotted 0.4 mm apertures were installed with a bottom cap. A durable single sized (poorly graded) quartzose sand filter was placed around the screened section and sealed with a 4.7 m to 5.6 m bentonite seal to prevent any surface water from entering the filter zone. The remaining section of the borehole was backfilled with spoil and sand to the collar. The wells were finished with a gatic cover, installed flush with the surface (refer Appendix C for well locations and Appendix D for well construction details on the right-hand side of the respective logs).

Groundwater monitoring wells BH201 to BH203 were purged using a twister pump on 1 August 2024. Standing water level readings were taken before, during and after purging. Ground surface levels were determined from the survey data provided by Rebel Group (refer Appendix C).

[1] Reduced Level in metres relative to Australian Height Datum

4.2 Field Work Results

4.2.1 Subsurface Conditions

Details of the subsurface conditions encountered are given in the borehole logs included in Appendix C, together with notes defining classifications methods and descriptive terms. Photographs of the rock cores are provided with the relevant borehole logs. Sections showing the inferred stratigraphy across the site are provided in Appendix C. Outcrops of rock in nearby streets (e.g. McElhone Street) suggest the rockhead in this area may step down towards the harbour area.

The general sequence of subsurface materials encountered at the boreholes, in increasing depth order, can be summarised as follows:

Asphaltic Concrete/Concrete Slab/Fill	Generally, asphaltic concrete or concrete slab underlain by gravel or sandy gravel to depths of 0.2 m to 1.1 m within the basements (BH201, BH203 and BH204).
Sandy CLAY, Silty CLAY	Range of soil comprising sandy clay, clay and silty clay to 4.3 m were observed in BH202. Ironstone bands were observed below 2.5 m.
Sandstone (Hawkesbury Sandstone)	Initially low and/or medium strength, moderately to slightly weathered sandstone, grading to fresh and medium and/or medium to high strength. Fractured to slightly fractured.
Laminite (Hawkesbury Sandstone)	Low to medium strength, fresh with extremely weathered bands, encountered at depths between 10 m and 16.7 m. Fractured to slightly fractured.
Sandstone (Hawkesbury Sandstone)	Medium to high strength, fresh. slightly fractured to unbroken.

4.2.2 Standard Penetration Testing (SPT)

Three (3) SPTs were carried out in the fill and residual material at BH202, with blow counts (i.e., 'N' values) ranging from 8 to refusal. Refusal occurred in medium strength sandstone after initial penetration in weathered rock. The results indicate that the clays are generally stiff and very stiff, and the residual soil containing ironstone bands is hard.

4.2.3 Groundwater

No free groundwater was observed during auger drilling to depths of 4.0 m at borehole BH202. Boreholes BH201, BH203 and BH204 were drilled using water from surface and water observations were therefore obscured.

Major water loss was noted during rock coring BH201 (100% below roughly 16.0 m) and BH204 (100% below 18.2 m).

Details of the temporary observation wells construction are provided in

Table 1 and on the right-hand side of the respective borehole logs in Appendix C.

Table 1: Summary of Temporary Observation Well Construction

Location	Filter Zone (m)	Geology Along Filter Zone
BH201	7.5 to 15.8 (RL 9.7 to 1.4)	Sandstone and Laminite
BH202	5.7 to 15.10 (RL 8.8 to -0.6)	
BH203	5.2 to 15.05 (RL 10.0 to 0.15)	

* RL in brackets

Groundwater in the wells was purged on 1 August 2024. Water levels were measured at between RL 8.0 m and RL 13.0 m between 1 August and 14 August 2024. A summary of water level measurements is provided in Table 2 and graphs showing water levels recorded by a data logger installed in the wells are shown in Appendix F.

Table 2: Summary of Groundwater Levels from Manual Measurements

Location	Date	Surface (m AHD)	Water level Measurements in Wells	
			Depth (m, bgl)	Reduced Level (m, AHD)
BH201	01 Aug 2024 (before test/development)	17.2	9.2	8.0
	07 Aug 2024		9.5	7.7
	14 Aug 2024		9.1	8.1
BH202	01 Aug 2024 (before test/development)	14.5	3.1	11.4
	07 Aug 2024		3.3	11.2
	14 Aug 2024		3.0	11.5
BH203	01 Aug 2024 (before test/development)	15.2	2.5	12.7
	07 Aug 2024		2.5	12.7
	14 Aug 2024		2.2	13.0

5. Laboratory Testing

5.1 Aggressivity testing

Two (2) tests for aggressivity were carried out on selected soil samples. Testing included pH, chloride, sulphate and electrical conductivity. The detailed laboratory test report sheets are included in Appendix E, with the results summarised in Table 3.

Table 3: Results of Aggressivity Testing

BH No.	Depth (m)	pH	Chloride Cl (mg/kg)	Sulphate SO_4 (mg/kg)	EC (1:5 soil:water) (µS/cm)
BH202	1.0-1.45	4.3	98	490	450
BH202	2.5-2.95	4.7	10	110	91

Where EC = Electrical Conductivity

5.2 Point Load Index ($Is_{(50)}$) Tests

A total of one hundred and eleven (111) samples selected from the rock core were tested for both axial and diametral point load strength ($Is_{(50)}$). Axial and diametral point loads are shown as PL(A) and PL(D) on the borehole logs at the tested depths. Seventy-one (71) of the total samples were tested for axial point load strength ($Is_{(50)}$). The axial results ranged from 0.1 MPa to 1.7 MPa, which corresponds to low strength and high strength rock, respectively. The $Is_{(50)}$ results suggest Unconfined Compressive Strengths (UCS) of between about 2 MPa and 34 MPa based on a conversion factor of 20 as per AS1726. Note that the point load testing can be inaccurate in weathered (leached and ferruginous / iron cemented) or very low strength rock.

The results of axial point load testing plotted against RL are shown in Figure 4.

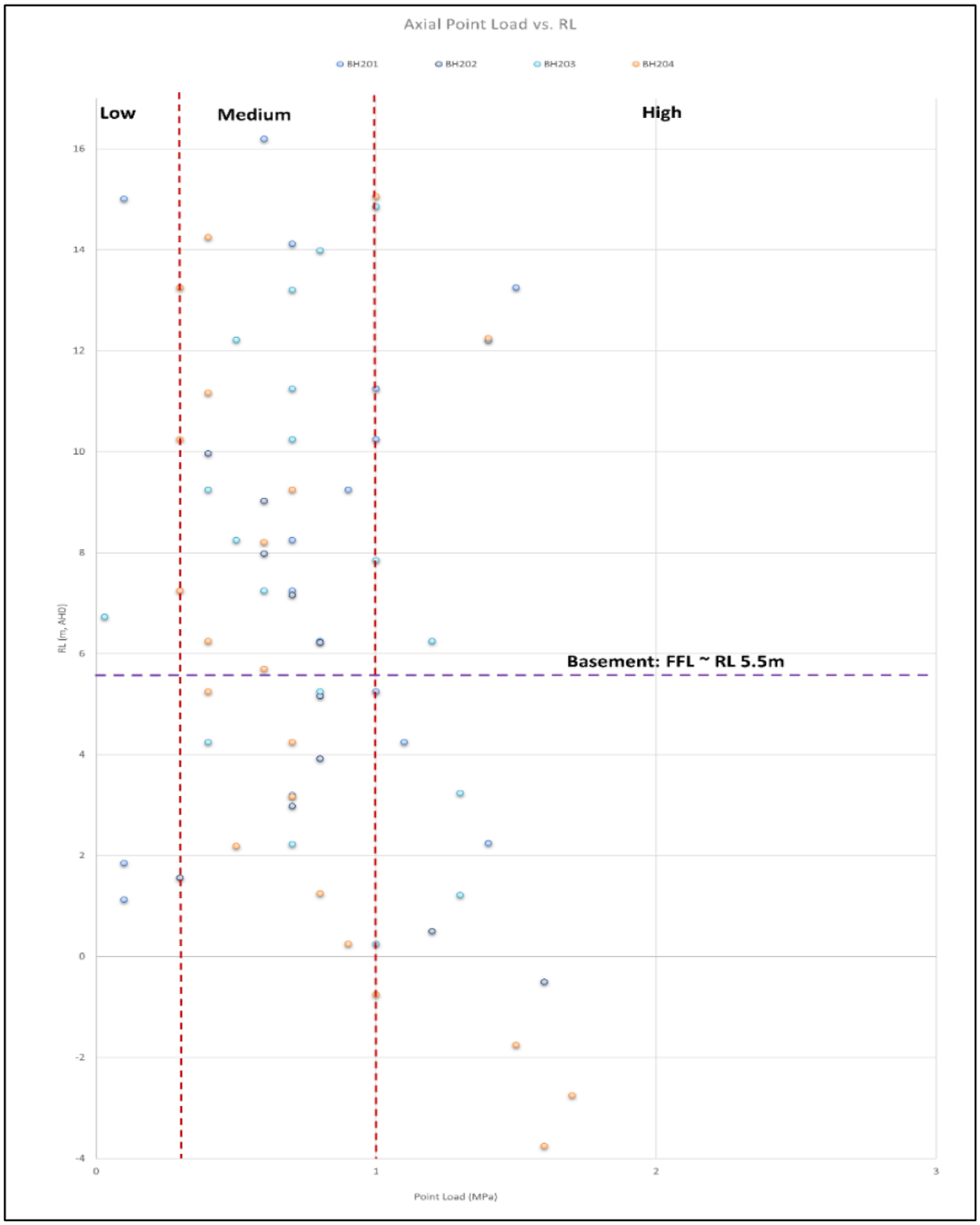

Figure 4: Plot of Point Load vs RL

5.3 Unconfined Compressive Strength Tests

Uniaxial compressive strength (UCS) testing was carried out on three (3) samples from various boreholes. The results of UCS testing are presented in Table 4 below, with the detailed reports provided in Appendix E.

Table 4: Summary of UCS Testing

Bore	Depth		Uniaxial Compressive Strength (MPa)
	Top (m)	Bottom (m)	
BH201	13.08	13.38	15.5
BH202	9.00	9.34	12.6
BH204	15.04	15.34	12.2

Corresponding Point Load values were compared with the UCS values. An approximate average conversion factor of 1:17 was determined ($Is_{(50)}$:UCS), slightly less than the conversion used in the borehole logs to determine strength.

6. Geotechnical Model

Geotechnical cross-sections are presented on Sections A-A', B-B' and C-C' in Appendix C. The interpreted geotechnical Unit boundaries are shown between boreholes. It should be noted that the subsurface conditions are only accurate at the borehole locations. The 'dashed' lines representing the Unit boundaries between boreholes are inferred from the borehole information, and therefore may not represent Unit levels between boreholes. Based on experience, the top of rock is likely to step down towards the harbour area.

A summary of the geotechnical units from the borehole information is provided in Table 5.

Table 5: Summary of Geotechnical Model

Geotechnical Unit	Description	Detailed Description
Unit 1	Fill / Residual Soils	Unit 1A: Fill comprising asphalt / concrete, sandy gravel, gravel, sandy clay and silty clay Unit 1B: Residual soils comprising low to high plasticity, stiff to hard clayey soils
Unit 2	Class IV and III Sandstone	Sandstone of low to medium strength, moderately to slightly weathered then fresh, with occasional low strength siltstone bands, highly fractured to fractured with some siltstone bands
Unit 3	Class III and II Sandstone	Sandstone of medium and / or medium to high strength, slightly weathered then fresh, with occasional low strength siltstone bands, fractured to slightly fractured with some clay seams
Unit 4	Class IV and III Shale	Laminite of low to medium strength, fresh, fractured with some high strength bands
Unit 5	Class II Sandstone	Predominantly sandstone of medium to high strength, fresh, slightly fractured

Notes: Rock Class in accordance with Bertuzzi & Pells (2002) Application of Classification to a General Rock Profile

The groundwater level recorded in the three observation wells (BH201, BH202 and BH203) typically ranged between about RL 8 m and RL 13 m.

7. Proposed Development

It is understood that the construction of a mixed-use development with retail as well as high rise residential apartments is proposed following the demolition of existing structures. It is further understood that the building will comprise four buildings ranging from 6 to 18 stories, over a basement carpark that will consist of four levels, with the lowest basement level having a finished floor level (FFL) of RL 3 m. A publicly accessible through-site link off Dowling Street that connects to Judge Lane and Forbes Street is also proposed a part of the development.

Comparison with existing ground surface levels around the site perimeter (refer drawings in Appendix B), it is expected that bulk excavation would vary in depth from about 9 m to 12 m from north-west to south-east.

8. Comments

8.1 Site Preparation and Earthworks

8.1.1 Excavation Conditions and Excavatability

Following demolition of existing structures, it is understood that the basement will require excavation to depths between 9 m to 12 m below the existing ground level / basement levels. Excavation to these depths will likely encounter soils (Unit 1) in the north-west corner of the site, but predominantly medium and / or medium to high strength sandstone (Unit 3) across the majority of the site (refer geotechnical cross-sections in Appendix C).

Prior to the commencement of any excavation, reference should be made to the SafeWork NSW Excavation Work Code of Practice – January 2020.

Excavation in fill, soil (Unit 1) and very low strength sandstone should be readily achievable using conventional earthmoving equipment such as a hydraulic excavator with bucket attachment.

Excavation of low to medium and higher strength rock (Units 2 to Unit 5) will require moderate to heavy ripping, large excavators equipped with hydraulic rock hammers and / or excavators with rock saws. The ease of excavation of the sandstone is directly related to the defect spacing and rock strength. Given the rock strength, it is essential that excavation contractors carry out independent excavatability assessments prior to tendering for excavation. Borehole samples / cores will be made available at Douglas' office for inspection within 6 months of the date of this report.

Detailed excavation for footings and service trenches / pits should be achievable using rock hammers, hydraulic rock saws or milling heads. Rock saws may also be required to reduce the risk of vibration affecting adjacent structures and inhabitants.

8.1.2 Excavation Induced Ground Movement (Stress Relief)

Locked-in stresses are present within the rock. During excavation, these stresses are released which generally results in lateral movement of the rock mass towards the excavation, dragging the overburden (and any structures) with it. Generally, units of stiffer rock (medium strength or stronger rock) will have higher horizontal locked-in stress. The amount of displacement that may occur is dependent on rock excavation depth, location of bedding planes and jointing in the rock mass, excavation face length and face orientation. As the maximum principal stress in Sydney is in the north-south direction, the north and south faces can be expected to experience the most movement as a result of stress relief. Although the east-west locked-in stress is less, the east and west faces will still experience substantial stress relief displacement.

Based on previous experience within Sydney, horizontal stress relief movement can vary from 0.5 to 2 mm/m depth of rock excavated. Maximum movement generally occurs near the crest, midpoint of the face, reducing to near zero in the corners of the excavation. Stress relief movement decreases horizontally with distance away from the excavation. Back from the crest of the excavation, movement can occur (albeit very minor) over a distance of up to three times the excavated rock depth with an initial reduction of approximately 1 to 1.5 mm per metre, reducing with distance from the face. This differential movement will give rise to strain in both the rock mass and the soil beyond the excavation. Most of the movement would be expected to occur progressively during the excavation. Heave may occur where relatively thin beds of competent rock are left in the base (bed separation due to buckling). Careful consideration should therefore be given to the effects of stress relief on the existing neighbouring structures, buildings and surrounding services. Any rock pillars that are formed between the proposed excavation and the neighbouring excavation will require careful assessment. The effect on any adjacent high-level footings will also require careful consideration.

8.1.1 Dilapidation Surveys

Dilapidation surveys should be carried out on surrounding infrastructure (including underground structures), buildings and pavements that may be affected by the basement excavation. The dilapidation surveys should be undertaken before the commencement of any excavation work, in order to document any existing defects so that any claims for damage due to construction related activities can be accurately assessed.

8.1.2 Disposal of Excavated Material

All surplus excavated materials will need to be disposed of in accordance with the Protection of the Environment Operations Act 1997 (POEO Act). All materials removed from the site are defined as waste under the POEO Act and must be disposed of in accordance with one of the following:

- Virgin excavated natural materials (VENM) as defined under the POEO Act, permitting beneficial reuse; or,
- A waste category meeting the criteria set out in the NSW EPA Waste Classification Guidelines 2014, with the materials disposed to a landfill licenced to receive the waste under the assigned classification or taken to a recycling facility licenced to receive the waste; or,
- Material complying with a Resource Recovery Order (RRO) as defined under the Protection of the Environment Operations (Waste) Regulation 2014, with complying materials able to be reused under certain conditions.

Refer to DP's Detailed Site Investigation (Ref 208700.00.R.001.Rev4) and DP's Remediation Action Plan (Ref 208700.00.R.002.Rev4) for further information.

8.1.3 Vibration

The use of heavy excavation equipment in bedrock will generate vibration which could cause damage to nearby structures (and could affect building inhabitants). It will be necessary to use appropriate excavation methods and equipment to keep ground vibration at adjacent buildings / structures within acceptable limits. The level of acceptable vibration is dependent on various factors including the type of structure (e.g., reinforced concrete, brick, etc.), its structural condition, founding conditions, the frequency range of vibration produced by the construction equipment, the natural frequency of the building and the vibration transmitting medium.

Ground vibration can be strongly perceptible to humans at levels above 2.5 mm/s peak particle velocity (PPV). This is much lower than the vibration levels required to cause structural damage to most buildings. The Standard AS / ISO 2631.2 – 2014 "Mechanical vibration and shock – Evaluation of human exposure to whole-body vibration – Vibration in buildings (1 Hz to 80 Hz)" suggests an acceptable daytime limit of 8 mm/s PPVi for human comfort.

Based on DP's experience and with reference to AS / ISO 2631.2, it is suggested that a maximum PPVi of 8 mm/s (measured at the first occupied level of existing buildings) be provisionally employed at this site for both architectural and human comfort considerations, although this vibration limit may need to be reduced if there are sensitive buildings or equipment in the area (such as heritage buildings).

DP maintains an extensive construction vibration database. As a preliminary estimate, Table 6 provides approximate minimum buffer distances for selected equipment, based on a set vibration limit of 8 mm/s (assuming that plant is appropriately sized for the ground conditions).

Table 6: Approximate buffer distances for selected Plant (PPVi 8 mm/s)

Excavation Plant		Distance from plant at which vibration attenuates to 8 mm/s	
Type	**Operating Weight**	**From DP Trial Maxima[1]**	**From DP Trial Average**
Rock saw on excavator[2]	-	1 m	0.5 m
Ripper on 20 t excavator	-	3 m	0.7 m
Rock Hammer	<500 kg	7 m	3 m
	501 – 1000 kg	8 m	3 m
	1001 – 2000 kg	13 m	5 m

Notes:
1. Smaller distances can generally be determined from individual trials, as indicated by those from trial averages.
2. Buffer distances for rock hammers may be slightly reduced by prior saw cutting along, or parallel to, excavation boundaries.
3. Loading effects from adjacent buildings may reduce vibration levels, to enable boundary saw cuts with few exceedances.

As the magnitude of vibration transmission is site specific, it is recommended that a vibration trial is undertaken at the commencement of rock excavation. The trial may indicate that smaller or different types of excavation equipment should be used for bulk (or detailed) excavation purposes.

8.1.1 Trafficability

Problems may be experienced with site trafficability during wet weather in areas where clayey filling or natural clay is exposed after demolition works. A layer of road-base gravel or recycled crushed concrete could be used to improve trackability on site where these soils are exposed (likely in the north-west corner of the site).

A working platform will likely be required for larger plant such as piling rigs, mobile cranes, etc. A working platform assessment should be carried out, based on the loads provided for the different rigs / cranes.

8.2 Excavation Support

Careful consideration must be given to the planning and design of excavations and excavation retention system(s), especially along the property boundaries where excessive deformation or failure can cause damage to nearby buildings, road infrastructure, footpaths, services, etc. Particular attention will need to be given to maintaining the existing shoring system(s) for the current basements in order to maintain stability during demolition of the existing structure.

All excavation faces along the perimeter of the site within Units 1 and 2 materials will require temporary and permanent retention. The retention system should be designed to support the soil and rock, taking into account allowable deformation limits and all surcharge loads, including construction loads (scaffolding, etc.), traffic loads, etc. Temporary retention is usually provided by shoring, typically supported with anchors, until the building provides the permanent support.

8.2.1 Batters / Excavation Faces

Battering of the excavation sides at safe angles may be possible along the northern boundary. Along the other boundaries, excavation is proposed up to the property boundary or has already been excavated to rock. Permanent batter slopes in filling / natural soils (Unit 1) materials should be designed for a maximum grade of 3H:1V. Temporary batters in filling / natural soils should be cut no steeper than 1.5:1 (H:V). Temporary batters in very low and low strength rock (Unit 2) should be cut no steeper than 1:1 but will be subject to inspection to confirm that there are no adversely oriented defects in the rock face. Batters over 3 m in height in any material will require analysis and should be designed individually.

All batters should be inspected and mapped every 1.5 m drop in excavation to check and confirm that stability is maintained. Temporary surcharges should be kept well clear (at least 3 m) of the crest of any temporary batters that may be constructed during excavation.

Vertically cut faces in medium strength or stronger sandstone are feasible except where adversely affected by jointing. It is recommended that all rock faces are inspected by a geotechnical engineer to confirm that the site conditions are consistent with design assumptions and to verify the stability of the faces and advise on any support requirements. It is recommended that the excavations are inspected every 1.5 m drop or every 1.0 m drop where excavation is extending below neighbouring foundations.

Note that rock mass support can only be finalised once the actual joint location, dip and dip direction have been determined by the geotechnical engineer / engineering geologist during excavation. All clay seams and shale layers (>50 mm thick) will require shotcrete protection to prevent future weathering and regression. Thick seams will, in addition to the shotcrete face protection, require rockbolt or anchor support.

8.2.2 Retaining / Shoring Walls

Shoring should be designed to support the soil (Unit 1) and weak rock (Unit 2), taking into account any surcharge loads. It is suggested that design of cantilevered shoring systems, or shoring with one row of anchors, be based on a triangular earth pressure distribution using the earth pressure coefficients provided in Table 7. Active lateral earth pressure coefficient (K_a) values may be used where some wall movement is acceptable. At rest lateral earth pressure coefficient (K_o) values should be used where the wall movement needs to be limited.

Table 7: Recommended Preliminary Design Parameters for Shoring Systems

Material	Unit Weight (kN/m³)	Earth Pressure Coefficient		Effective Cohesion c' (kPa)	Effective Friction Angle (°)
		Active (K_a)	At Rest (K_o)		
Fill and Residual Soils	20	0.3	0.5	2	25
Very Low to Low Strength Sandstone	22	0.15	0.3	10	25
Medium Strength Sandstone	24	0	0	-	-

Notes: The values above assume a level surface behind the wall.
It is assumed that the rock mass is free of adverse dipping joints and seams.
It should also be noted that the K_o and K_a design will not prevent stress relief movement.

The triangular earth pressure distribution on the back of the wall can be calculated as follows:

$$H_z = K(\gamma z + p)$$

Where: H_z = horizontal pressure at depth z
γ = unit weight of soil or rock
K = earth pressure coefficient
z = depth (m)
p = vertical surcharge pressure

If more than 1 row of anchors is required, then a trapezoidal earth pressure distribution should be used. Where there are no movement-sensitive structures in close proximity to excavations in rock, the maximum pressure can also be calculated using 4H kPa, applied as a rectangular pressure distribution (where H equals the depth to the top of self-supporting medium strength or stronger rock). Where the wall movement is to be minimised (i.e., close to adjacent buildings) the maximum pressure can be calculated using 6H kPa, applied as a rectangular pressure distribution. For heritage buildings or other movement-sensitive structures, where it is critical that deformation is controlled, it may be necessary to calculate the maximum pressure using 8H kPa, applied as a rectangular pressure distribution.

Additional surcharge loads, such as new and existing footings, pavement and construction related loads must also be allowed for in the design, as a rectangular earth pressure distribution, applied over the depth of influence.

The earth pressure loading described above does not include either earthquake loads or hydrostatic pressure due to the build-up of groundwater behind impermeable walls, both of which must be considered in the design. Unless positive drainage measures are incorporated to prevent water pressure build-up behind the walls, the full hydrostatic head should be allowed for in design while, at the same time, allowing for the soil unit weight to reduce to the buoyant condition.

Passive resistance for piles founded in rock below bulk / detailed excavation may be based on a working passive restraint of 3,000 kPa in medium strength or stronger sandstone (Unit 3 and Unit 5) or 1,000 kPa in low to medium strength laminite (Unit 4), provided the rock is not adversely affected by discontinuities. The first 0.5 m of rock socket below the final excavation level should not be taken into account for the purpose of passive restraint. The minimum socket depth should be equal to at least 1.0 m below the lowest level of any nearby excavation (including any detailed excavations), unless determined otherwise by analysis.

Staged excavation and inspection by a suitably qualified geotechnical engineer will be required to confirm that the rock in front of the wall / pile is not adversely affected by discontinuities, especially where passive resistance is relied upon. Similarly, the drilling of shoring piles should be inspected by a qualified geotechnical engineer to confirm the piles are founded in suitable material.

8.2.3 Ground Anchors and Rockbolts

It is anticipated that the building will support the shoring wall in the long term and therefore any ground anchors are expected to be temporary only. The use of permanent anchors, if required, would need careful attention to corrosion protection for which further geotechnical advice should be sought.

Post-stressed ground anchors, rockbolts and dowels (support elements) can be used to laterally support existing basement shoring walls, new shoring, underpinning works or unstable rock masses. These support elements should be bonded in stronger rock, inclined as required, but preferably not steeper than 30° below the horizontal. Table 8 provides ultimate and allowable bond stresses for design purposes.

Table 8: Anchor Bond Stresses

Material	Allowable Bond Stress (kPa)	Ultimate Bond Stress (kPa)
Low to Medium Strength Sandstone (Unit 2)	200	400
Medium Strength Sandstone (Unit 3)	350	800
Low to Medium Strength Laminite (Unit 4)	200	400
Medium to High Strength Sandstone (Unit 5)	600	1500

The values in Table 8 should be confirmed by pull-out tests prior to installation of support elements. Ultimately, it is the contractor's responsibility to ensure that the correct design values (specific to the support system and method of installation) are used and that the support element holes are carefully cleaned prior to grouting.

After support elements have been installed, it is recommended that temporary anchors are tested to 125% of their nominal working load and if required, permanent anchors are tested to 150% of their nominal working load (as per AS4678). Where stress relief or further unavoidable movement of the shoring is expected, it is recommended that the support elements are locked-off at a lower value than their working loads to accommodate the additional movement and subsequent increase in stress in the support elements. During construction, checks should be carried out to confirm that the load in the support elements is maintained and that losses due to creep or other causes do not occur.

Care should be exercised to ensure that anchors are installed progressively and stressed prior to excavation of the next drop to ensure that stability is maintained at all times.

Shorter support elements (i.e., rockbolts, dowels and pins) may be required to support any unstable rock wedges, slivers or blocks. Short dowels and pins may be required to support feather edges where sub-parallel joints intersect the face. Shotcrete with mesh (or fibrecrete) may be required where beds / seams of extremely low or very low strength rock are encountered within higher strength sandstone, secured with anchors, rockbolts, dowels or pins, as required.

The legal implications of the use of rock anchors extending onto neighbouring properties and public land will need to be considered. Approval should be sought from Council and adjacent property owners prior to installing any anchors. Due consideration should also be given to below-ground excavations, services, etc.

Anchors can also be used vertically as hold down anchors to resist temporary or long-term uplift of the core / walls. Hold down anchors should be designed in accordance with AS4678, with careful attention to corrosion protection if permanent. The designer should check the cone-pull-out failure mechanism using the appropriate cone angle for the rock mass. Note that the buoyant weight of the rock should be used below the water table.

8.3 Groundwater

The groundwater level recorded in the three observation wells (BH201, BH202 and BH203) ranged between RL 8 m and RL 13 m. Given the depth of the basement (proposed basement level at RL 5.5 m), the proposed excavation level will extend below the recorded water levels.

Seepage during construction and in the long term should be expected along the top of rock (particularly after periods of wet weather) and through the joints and bedding planes in the rock face. Seepage may be relatively minor during dry periods and will increase following and during wet periods. Based on the water levels measured on site, the groundwater level appears to drop towards the Cross City Tunnels which are understood to be drained tunnels.

An inflow assessment will be required to estimate the quantity of water anticipated to seep into the site during construction and in the long-term. Based on the site conditions, water levels and the expected low permeability of the rock mass, it is anticipated that seepage into the excavation should be readily controlled by perimeter drains, connected to a "sump-and-pump" system typically installed for drained basements. Approval from WaterNSW, however, will be required prior to designing and constructing a drained basement. A drained basement, if approved by DPIE Water, will require permanent subfloor drainage to direct seepage to the stormwater drainage system for which Council approval will be required. The disposal requirements of water collected on-site will be dependent on the chemical consumption of the water. Note that a drained basement will act as a low point to which groundwater will flow. Therefore, if present, any contamination within the surrounding groundwater system could flow into the basement and adversely affect the quality of the water collected on site.

Previous experience in Sydney is that seepage will likely contain relatively high levels of soluble iron that will form a precipitate in the form of a gelatinous ‘sludge’ when exposed to oxygen. This ‘sludge’ has the potential to block subsoil (gravel) drains and ‘seize’ pumps. Therefore, detailing of subfloor drains, sumps and pumps should incorporate provision for regular maintenance such as flushing and ‘rodding’ of drains and / or “baffle” pits.

Notwithstanding the above, it should be noted that groundwater levels are transient and may fluctuate over time, particularly, following periods of heavy rainfall.

8.4 **Foundations**

The proposed foundation arrangement is currently not known. It should be noted that foundations may need to be extended below the zone of influence of the tunnels, depending on their proximity to the Cross City Tunnels.

The design of new pad or strip footings may be based on the maximum allowable bearing pressure and modulus values given in Table 9.

Table 9: Recommended Design Parameters for Foundation Design

Foundation Stratum	Ultimate End Bearing Pressure (kPa)	Allowable End Bearing Pressure (kPa)	Field Elastic Modulus* (MPa)	Allowable Defects	Testing Requirements
Very stiff to hard residual soils (Unit 1B)	400	200	30 - 50	-	Dynamic Cone Penetrometer at each footing
Low to medium strength laminite and low to medium sandstone (Unit 2 and Unit 4)	8,000	2,000	300 - 500	< 10%	Minimum 2 cored bores and site inspection
Medium strength sandstone(Unit 3)	20,000	3,500	350 – 1,200	< 5%	Minimum 4 cored bores with spoon testing in at least 1/3 of footings.
Medium to high strength sandstone (Unit 5)	60,000	6,000	900 – 2,000	< 3%	Minimum cored bores for 50% of footings and spoon testing for the remainder

Notes:

- Values for sandstone and laminite are in accordance with Pells et al, AGS Dec 1998.
- Ultimate parameters are mobilized at large settlements (i.e., >5% foundation width).
- Additional analysis is required to calculate the modulus of subgrade reaction for individual footings.
- Allowable end bearing pressures to cause settlement of less than 1% of minimum footing dimension.

Defects such as bedding planes and weak seams can have a significant impact on the allowable bearing capacity and should be taken into consideration in the design. Spoon testing, where required, should extend below the footing base to a depth of at least 1.5 times the footing width or 2.5 m, whichever is shallower. Test holes for spoon testing should be at least 40 mm in diameter.

All foundations should be founded below the zone of influence of any existing or proposed service trenches. Generally, the zone of influence can be defined by the zone above a plane extending upwards at 45° from the base of the service trench (all footings affected to be assessed individually).

The foundation design parameters given in Table 9 assume that the foundation excavations are clean and free of loose debris prior to concrete placement. Foundations proportioned on the basis of the allowable bearing pressures in Table 9 would be expected to experience total settlements of less than 1% of the foundation width under the applied working load, with differential settlements between adjacent foundations expected to be less than half of this value.

All footings should be inspected by a geotechnical engineer prior to the placement of blinding, reinforcement and concrete to confirm that foundation conditions are suitable for the design

bearing pressures, and proof drilled or spoon tested as appropriate. If the material is not assessed as appropriate for the design or if weak seams or defects are encountered, footings may need to be deepened until suitable foundation material is reached or enlarged to reduce the bearing pressure to suit the ground conditions. Note that foundation settlement and differential settlement should be re-assessed if enlargement is being considered.

The allowable bearing pressure is generally reduced by half for all high-level footings bearing near the edge of a vertical excavation on competent, self-supporting (i.e., not affected by defects) medium strength or stronger sandstone. If high-level footings are proposed, inspection of the excavated face below the footing will be necessary to confirm that there are no observable defects or adversely dipping joints that may affect footing stability / performance. Investigation comprising horizontal coreholes may also be required to establish whether an adversely oriented joint is present behind the face and to determine the extent of such defect in the rock mass.

8.5 Ground Slabs

Floor slabs at basement level can be designed as a slab on ground, assuming proper compaction is given to the subgrade on which the slabs are cast (if not directly on rock).

As the proposed building is expected to be design as a drained basement, it will be necessary to provide under-floor drainage with subsoil drains and sumps to safeguard against uplift pressures.

8.6 Earthquake / Seismic Design and Site Classification

A Hazard Factor (Z) of 0.08 would be appropriate for the development site in accordance with Australian Standard AS 1170.4 – 2007 Structural design actions – Part 4: Earthquake actions in Australia.

Based on the results of the investigation, and with reference to AS1170.4, the site subsoil class is Class Ce (Shallow soil) due to areas where the soil surface layer is more than 3 m in depth. Provided the building is founded directly on rock and does not rely on the soil layers for lateral stability, the subsoil class can be upgraded to Class Be (rock).

8.7 Aggressivity

Aggressivity testing of soils and comparison of the results to the AS2159 Australian Standard indicates an exposure classification ranging from ‘mild’ to ‘moderate’ for concrete foundations, and ‘non-aggressive’ for steel foundations.

It is suggested that the design of foundations allow for a moderate exposure classification for buried concrete structures and non-aggressive classification for buried steel structures.

8.8 Geotechnical Considerations Relating to TfNSW Assets

The site has two adjacent roads which fall under the jurisdiction of Transport for New South Wales (TfNSW). These include William Street which is classified as a Regional Road and the Cross City Tunnel which is classified as a State Road. Both of these assets will be impacted by the proposed development through ground movement due to excavation and construction of the proposed development.

Where excavating and loading adjacent to TfNSW assets, reference should be made to Transport for New South Wales (TfNSW) Technical Direction GTD 2020 / 001, Version No. 01, dated 2 July 2020 for the requirements of TfNSW concurrence for developments where there is a risk that it may affect the infrastructure. An assessment of ground movement and monitoring requirements as well as instrumentation may be required by TfNSW prior to commencing construction.

The Cross City Tunnel (CCT) is owned and operated by Transurban. Beneath William Street there are three tunnels associated with the CCT; the Eastbound Mainline, the Westbound Mainline and a ventilation tunnel. Based on available data, the Eastbound Mainline is the closest tunnel to the site, with the tunnel understood to be located just outside the boundary, but the reserve and stratum for the tunnel extending below the site. From experience, Transurban require numerical analysis to assess the potential impact of the proposed development on the CCT. A risk assessment and monitoring strategy may also be required.

It is recommended that the design team familiarise themselves with the relevant documents for future consultation with TfNSW and contact Transurban for discussions on their requirements for the CCT and to gain detailed drawings showing the as-built location of the tunnels.

9. Additional Geotechnical Works and Conclusion

The substrata profile from William Street down to the existing basement level is currently unknown (expected to be similar profile to BH202). To confirm the subsurface profile from street level down to the existing basement level, we recommend that inspection slots are cut into the basement walls during the early demolition stages. These slots should be inspected and mapped by a geotechnical engineer to confirm parameters for shoring design and provide the subsurface profile in these areas. The slots should also be inspected by the structural engineer to confirm the existing shoring details.

An assessment on the impact of the proposed development on adjacent assets will be required once the design has been finalised and prior to construction. An Inspection Test Plan and Geotechnical Monitoring Plan will also be required.
Provided the advice in this report is followed, the site is considered suitable for the proposed development from a geotechnical point of view.

10. **Limitations**

Douglas Partners Pty Ltd (Douglas) has prepared this report (or services) for this project at 164-194 William Street, Woolloomooloo NSW in line with Douglas' proposal dated 12 July 2024 and acceptance received from John Fitzgerald of Rebel Property Group on behalf of William Street Residential Pty Ltd dated 13 July 2023. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of William Street Residential Pty Ltd for this project only and for the purposes as 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 Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas 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 Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas 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 advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical 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. Douglas 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 Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

This report provides specialist advice only and no part of it is considered a Regulated Design under the Design and Building Practitioner Act 2020 (NSW).

Appendix A

About this Report

About this Report

November 2023

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.

continued next page

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.

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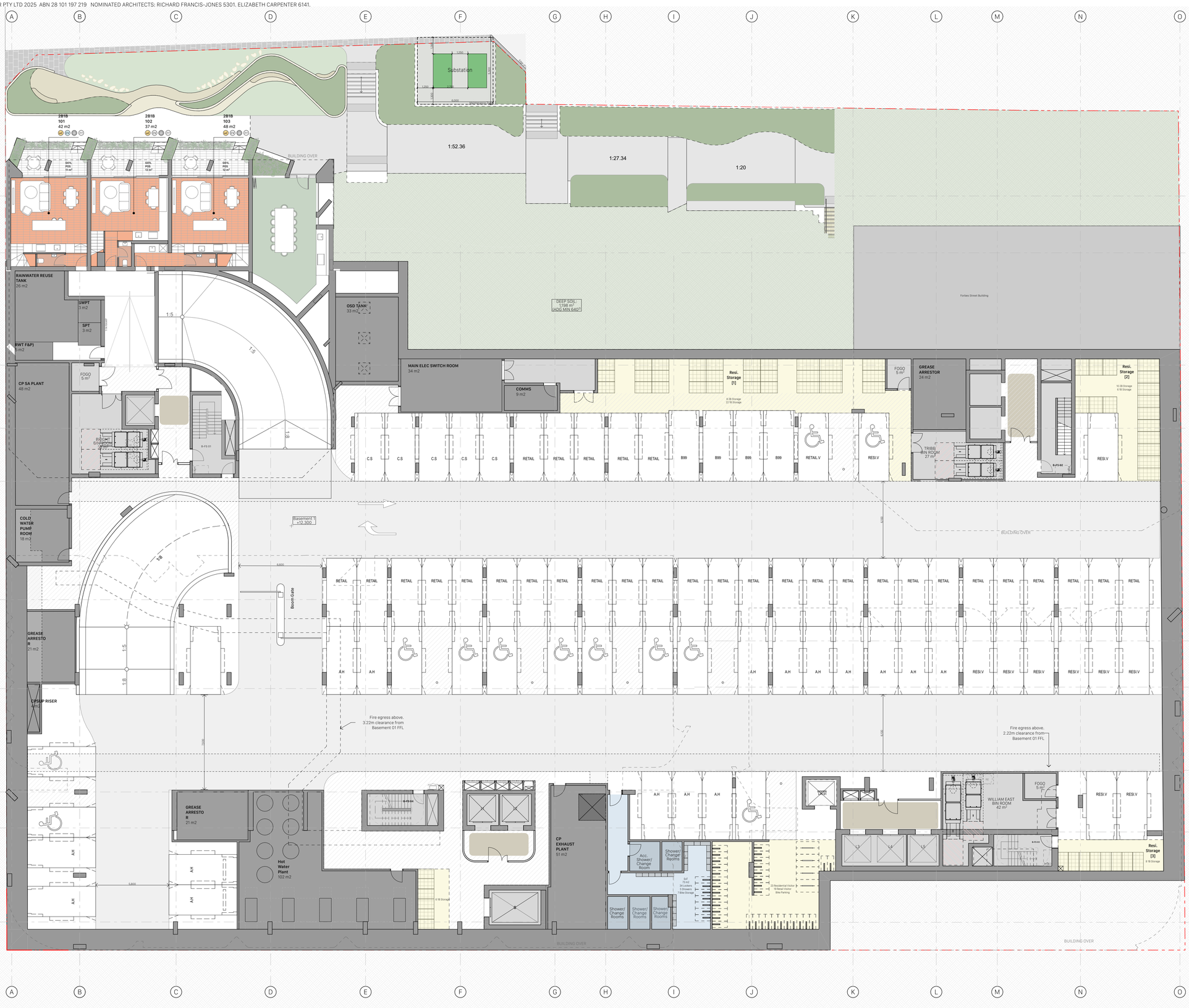
Appendix B

Development Drawings



Tribe Studio Architects
STUDIO BRIGHT
fjcstudio

General notes

- All dimensions and existing conditions shall be checked and verified by the contractor before proceeding with the work.
- All levels relative to 'Australian Height Datum'.
- Do not scale drawings.
- Use figured dimensions only.

Legend

CARPARKING SCHEDULE

Number required for Compliance in basement

Total Car Spaces = 238(HSEPP Rates)
Affordable = 26 (incl. 10 Accessible)
Standard = 212 (incl. 26 Accessible)

Bicycle Parking = 225(DCP Rate)
Motorbike Parking = 25 (DCP Rate)

B99 Service Vehicle (+ Loading Dock #) = 8
Car Share = 5

Current Overall Number shown as per drawing

Total Car Spaces = 340
Affordable = 26 (incl. 10 Accessible)
Standard = 263 (incl. 26 Accessible)
Retail = 32
Residential Visitor = 10
B99 Service Vehicle (+ Loading Dock #) = 8
Car Share = 5

Bicycle Parking = 273
Motorbike Parking = 25

Overall Basement Efficiency = 34.4%

BASEMENT 01 METRICS

Residential Car Spaces = 40
26 Affordable Housing (incl. 10 Accessible)
1 Standard Housing
10 Residential Visitor (incl. 1 Aceesible)

Retail Car Spaces = 32 (incl. 1 Accessible)

Car Share = 5
B99 = 4

Bike Storage = 49
7 Retail
19 Retail Visitor
23 Residential Visitor

Total = 79
Efficiency = 39.5%

SITE BOUNDARY
ENVELOPE OUTLINE

Room No.
B
m2
Q EV A AH
APP. NUMBER OF THE FLOOR
BEDROOM NUMBER INSIDE APARTMENT
APARTMENT INTERNAL AREA
AH- AFFORDABLE HOUSING UNIT
A- ADAPTABLE UNIT
CV- CROSS VENTILATION
SOLAR COMPLIANCE

ACOUSTIC PLENUM

Rev	Date	Description	By	Chk
1	20/8/2025	For BASIX	KY	

164-172 and 174-194 William St
Australia
164-172 and 174-194 William St
Woolloomooloo NSW 2011

General Arrangement Plans
Basement 01

Scale
No Scale @ A1

Project Code
H180W

First Issued
<DD/MM/YYYY>

Sheet No.
2000

Rev
1

for BASIX

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General notes
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- All levels relative to 'Australian Height Datum'.
- Do not scale drawings.
- Use figured dimensions only.

CARPARKING SCHEDULE

Number required for Compliance in basement

Total Car Spaces = 238(HSEPP Rates)
Affordable = 26 (incl. 10 Accessible)
Standard = 212 (incl. 26 Accessible)

Bicycle Parking = 225(DCP Rate)
Motorbike Parking = 25 (DCP Rate)

B99 Service Vehicle (+ Loading Dock #) = 9
Car Share = 5

Current Overall Number shown as per drawing

Total Car Spaces = 340
Affordable = 26 (incl. 10 Accessible)
Standard = 263 (incl. 26 Accessible)
Retail = 32
Residential Visitor = 10
B99 Service Vehicle (+ Loading Dock #) = 9
Car Share = 5

Bicycle Parking = 273
Motorbike Parking = 25

Overall Basement Efficiency = 34.4%

BASEMENT 02 METRICS

Residential Car Parks = 85
85 Standard Housing (incl. 10 Accessible)

Motor Bike = 9

Efficiency = 34.2%

SITE BOUNDARY
ENVELOPE OUTLINE

Room No.
B — APP. NUMBER OF THE FLOOR
n2 — BEDROOM NUMBER INSIDE APARTMENT
APARTMENT INTERNAL AREA
(Q) (CV) (A) (AH)
AH- AFFORDABLE HOUSING UNIT
A- ADAPTABLE UNIT
CV- CROSS VENTILATION
SOLAR COMPLIANCE

ACOUSTIC PLENUM

Rev	Date	Description	By	Chk
1	20/8/2025	For BASIX	KY	

164-172 and 174-194 William St
Australia
164-172 and 174-194 William St
Woolloomooloo NSW 2011

General Arrangement Plans
Basement 02

Scale
No Scale @ A1

Project Code
H180W

First Issued
<DD/MM/YYYY>

Sheet No.
2019

Rev
1

for BASIX

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General notes
- All dimensions and existing conditions shall be checked and verified by the contractor before proceeding with the work.
- All levels relative to 'Australian Height Datum'.
- Do not scale drawings.
- Use figured dimensions only.

CARPARKING SCHEDULE

Number required for Compliance in basement

Total Car Spaces = 238(HSEPP Rates)
Affordable = 26 (incl. 10 Accessible)
Standard = 212 (incl. 26 Accessible)

Bicycle Parking = 225(DCP Rate)
Motorbike Parking = 25 (DCP Rate)

B99 Service Vehicle (+ Loading Dock #) = 9
Car Share = 5

Current Overall Number shown as per drawing

Total Car Spaces = 340
Affordable = 26 (incl. 10 Accessible)
Standard = 263 (incl. 26 Accessible)
Retail = 32
Residential Visitor = 10
B99 Service Vehicle (+ Loading Dock #) = 9
Car Share = 5

Bicycle Parking = 273
Motorbike Parking = 25

Overall Basement Efficiency = 34.4%

BASEMENT 03

Residential Car Park = 86
86 Standard Housing (incl. 10 Accessible)

Motor Bikes = 8

Bike Parking = 112
112 Residential

Efficiency = 33.8%

SITE BOUNDARY

ENVELOPE OUTLINE

Room No.
B
m2
APP. NUMBER OF THE FLOOR
BEDROOM NUMBER INSIDE APARTMENT
APARTMENT INTERNAL AREA
AH- AFFORDABLE HOUSING UNIT
A- ADAPTABLE UNIT
CV- CROSS VENTILATION
SOLAR COMPLIANCE

ACOUSTIC PLENUM

Rev	Date	Description	By	Chk
1	20/8/2025	For BASIX	KY	

164-172 and 174-194 William St
Australia
164-172 and 174-194 William St
Woolloomooloo NSW 2011

General Arrangement Plans
Basement 03

Scale
No Scale @ A1

Project Code
H180W

First Issued
<DD/MM/YYYY>

Sheet No.
2020

Rev
1

for BASIX

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General notes
- All dimensions and existing conditions shall be checked and verified by the contractor before proceeding with the work.
- All levels relative to 'Australian Height Datum'.
- Do not scale drawings.
- Use figured dimensions only.

CARPARKING SCHEDULE

Number required for Compliance in basement

Total Car Spaces = 238(HSEPP Rates)
Affordable = 26 (incl. 10 Accessible)
Standard = 212 (incl. 26 Accessible)

Bicycle Parking = 225(DCP Rate)
Motorbike Parking = 25 (DCP Rate)

B99 Service Vehicle (+ Loading Dock #) = 9
Car Share = 5

Current Overall Number shown as per drawing

Total Car Spaces = 340
Affordable = 26 (incl. 10 Accessible)
Standard = 263 (incl. 26 Accessible)
Retail = 32
Residential Visitor = 10
B99 Service Vehicle (+ Loading Dock #) = 9
Car Share = 5

Bicycle Parking = 273
Motorbike Parking = 25

Overall Basement Efficiency = 34.4%

BASEMENT 03

Residential Car Park = 91
91 Standard Housing (incl. 6 Accessible)

Motor Bikes = 8

Bike Parking = 112
112 Residential

Efficiency = 30.9%

SITE BOUNDARY

ENVELOPE OUTLINE

Room No.
B
m2
0 CV A AH

APP. NUMBER OF THE FLOOR
BEDROOM NUMBER INSIDE APARTMENT
APARTMENT INTERNAL AREA
AH- AFFORDABLE HOUSING UNIT
A- ADAPTABLE UNIT
CV- CROSS VENTILATION
SOLAR COMPLIANCE

ACOUSTIC PLENUM

Rev	Date	Description	By	Chk
1	20/8/2025	For BASIX	KY	

164-172 and 174-194 William St
Australia
164-172 and 174-194 William St
Woolloomooloo NSW 2011

General Arrangement Plans
Basement 04

Scale
No Scale @ A1

Project Code
H180W

First Issued
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Sheet No.
2021

Rev
1

for BASIX

NOTE 12: LOT 54 IN DP 1049805 BETWEEN RL-0.6 TO RL-2.72 AND RL-12.7 TO RL-14.82

NOTE 13: PT LOT 52 ABOVE RL27.76

NOTE 14: SEE SHEET 13 FOR SECTIONS

LEGEND

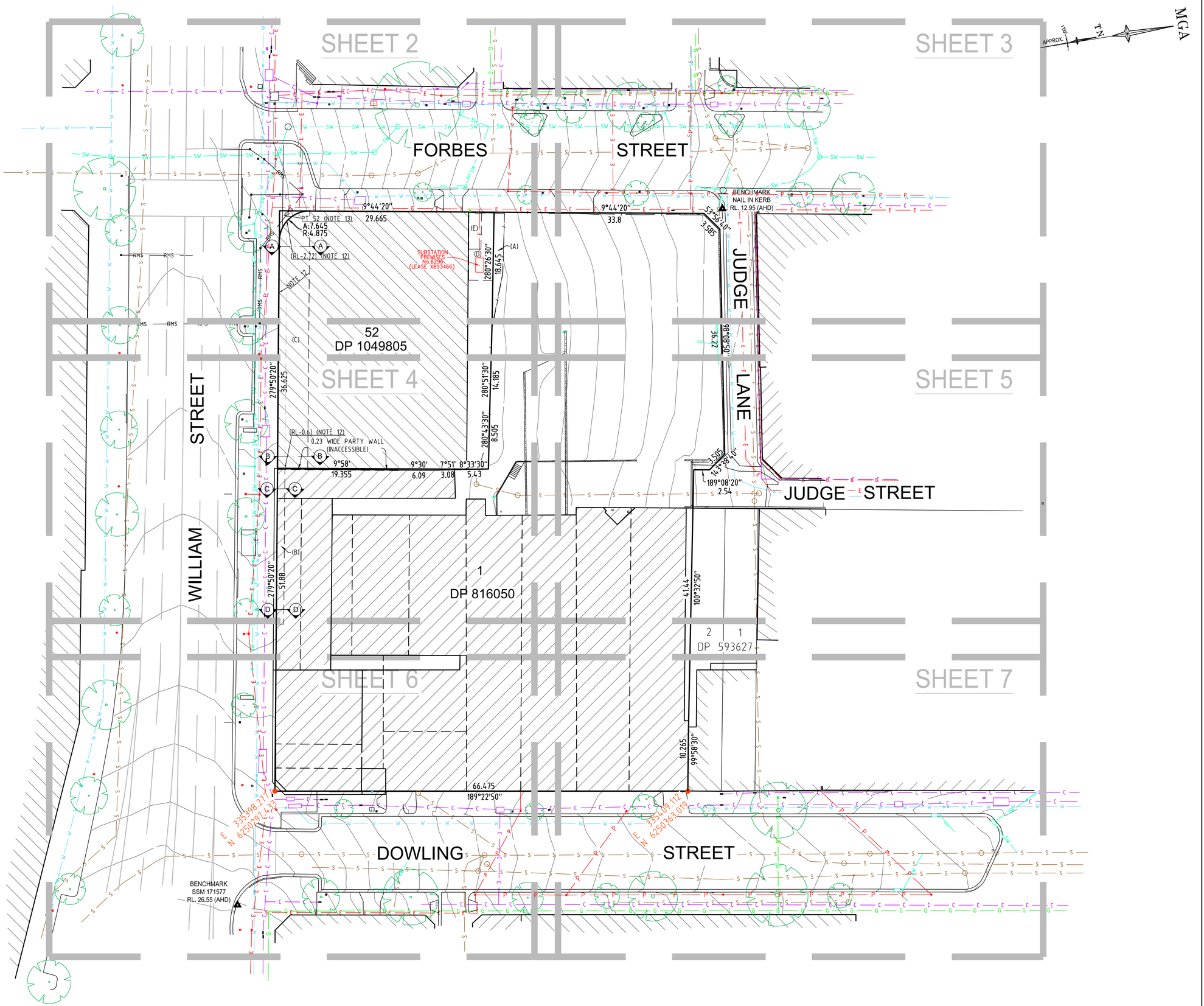
BENCH MARK	▲
OPTUS PIT	OP
TELSTRA PILLAR	TP
COMMS PIT	COM
TELSTRA PIT	TEL
ELECTRIC LIGHT POLE	ELP
ELECTRICITY PIT	EPIT
ELECTRICITY BOX	EL
POWER POLE	PP
PIT WITH CONCRETE LID	CLID
PIT WITH METAL LID	MLID
TRAFFIC LIGHT	TL
STREET SIGN	SS
PARKING METER	PM
ROADS & MARITIME SERVICES	RMS
GRATED INLET PIT	GIP
SEWER INSPECTION POINT	SIP
SEWER MANHOLE	SMH
STOP VALVE	SV
HYDRANT	HYD
GAS VALVE	GAS
VEHICLE CROSSING	(VC)
PRAM CRAMP	(PC)
GAS (DBYD)	G
COMMUNICATIONS (DBYD)	C
WATER (DBYD)	W
SEWER (DBYD)	S
ROADS & MARITIME (DBYD)	RMS
ELECTRICITY (U'GROUND) (DBYD)	E
ELECTRICITY (OVERHEAD)	P
STORMWATER (DBYD)	SW

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED ON GROUND
2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY NSW LAND REGISTRY SERVICES AND ARE SUBJECT TO FINAL SURVEY
3. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM **PM 53290** R.L. **17.373** (A.H.D.) IN DOWLING STREET
4. CONTOUR INTERVAL **0.5 m**
5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
6. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
7. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
8. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. SERVICES HAVE BEEN PLOTTED FROM RELEVANT AUTHORITIES INFORMATION AND HAVE NOT BEEN SURVEYED. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
9. 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
10. SHOWS APPROXIMATE POSITION OF ROAD LINEMARKING AND IS INDICATIVE ONLY
11. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

EASEMENTS

(A) RIGHT OF CARRIAGEWAY VARIABLE WIDTH (I281774)
(B) EASEMENT FOR ROCK ANCHORS 1.2 WIDE (9597264) LIMITED IN STRATUM (DP 1072859)
(C) EASEMENT FOR ROCK ANCHORS 4.865 WIDE LIMITED IN STRATUM (9597264)
(D) EASEMENT FOR ELECTRICITY AND OTHER PURPOSES (X893466)
(E) RIGHT OF WAY (X839466)



Revision	Date	Description	Reference
H	00/00/00	-	00
G	00/00/00	-	00
F	00/00/00	-	00
E	00/00/00	-	00

Revision	Date	Description	Reference
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B	16/11/21	TRANSLATED TO GDA94 COORDINATES	002
A	31/08/20	ELEVATIONS ADDED	001

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GDA94

0 6 12 18 24 30

SCALE 1: 300 @ A1

LTS CONFIDENCE TOGETHER
www.ltsi.com.au | P 1300 587 000

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

.....
Registered Surveyor NSW

Client WILLIAM STREET NOMINEE PTY LTD

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 1 IN DP 816050 AND LOT 52 IN DP 1049805 KNOWN AS No.166-194 WILLIAM STREET, WOOLLOOMOOLOO

datum	AHD	reference number	51095 001DT
site Area	6398m² (CALC)	scale	1:300 @A1
LGA	SYDNEY	date of survey	14/08/2020
		SHEET OF	1 15

MGA

APPROX. TRUE N

WILLIAM STREET

LANE

FORBES STREET

WILLIAM STREET

PAVED

KERB

TOP OF KERB

BITUMEN

FOOTPATH

PEDESTRIAN CROSSING

ISLAND

CONCRETE

GATE

FENCE

MESH

WIRE

POST

STEEL

BLOCKED

GLASS & BRICK BUILDING

SUBSTATION PREMISES No.6296 (LEASE X893466)

1
DP 816050

52
DP 1049805

9°44'20"
29.665
A=7.645
R=4.875

280°26'30"
18.645

PT 52 (NOTE 13)

(RL-2.72) (NOTE 12)

NOTE 12

SHEET 3

ADJOINS

ADJOINS SHEET 4

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GDA2020

0 2 4 6 8 10

SCALE 1:100 @ A1

Revision	Date	Description	Reference
H	00/00/00	-	00
G	00/00/00	-	00
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datum AHD
site Area 6398m² (CALC)
LGA SYDNEY

reference number 51095 001DT
scale 1:100 @A1
date of survey 14/08/2020
SHEET 2
OF 15

MGA

APPROX. TRUE N

CORFU STREET

FORBES STREET

JUDGE LANE

SHEET 2

ADJOINS

BITUMEN

FOOTPATH

TOP OF KERB

ISLAND

CONCRETE

BENCHMARK
NAIL IN KERB
RL. 12.95 (AHD)

9°44'20"
33.8

53°56'40"
3.585

98°08'50"
36.22

1
DP 816050

RENDERED
TERRACE

101
DP 606980

BLOCK WALL

RETAINING WALL

ADJOINS SHEET 5

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GDA2020

0 2 4 6 8 10

SCALE 1:100 @ A1

Revision	Date	Description	Reference
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datum AHD
site Area 6398m² (CALC)
LGA SYDNEY

reference number 51095 001DT
scale 1:100 @A1
date of survey 14/08/2020
SHEET 3 OF 15

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GDA2020

SCALE 1:100 @ A1

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site Area 6398m² (CALC)

LGA SYDNEY

reference number 51095 001DT

scale 1:100 @A1

date of survey 14/08/2020

SHEET 4 OF 15

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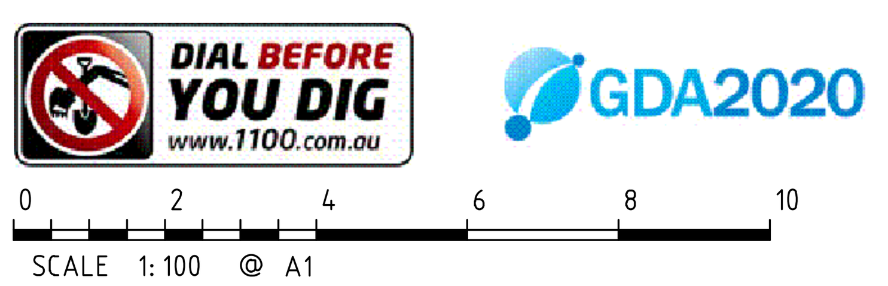
site Area 6398m² (CALC)
LGA SYDNEY
reference number 51095 001DT
scale 1:100 @A1
date of survey 14/08/2020
SHEET 5 OF 15



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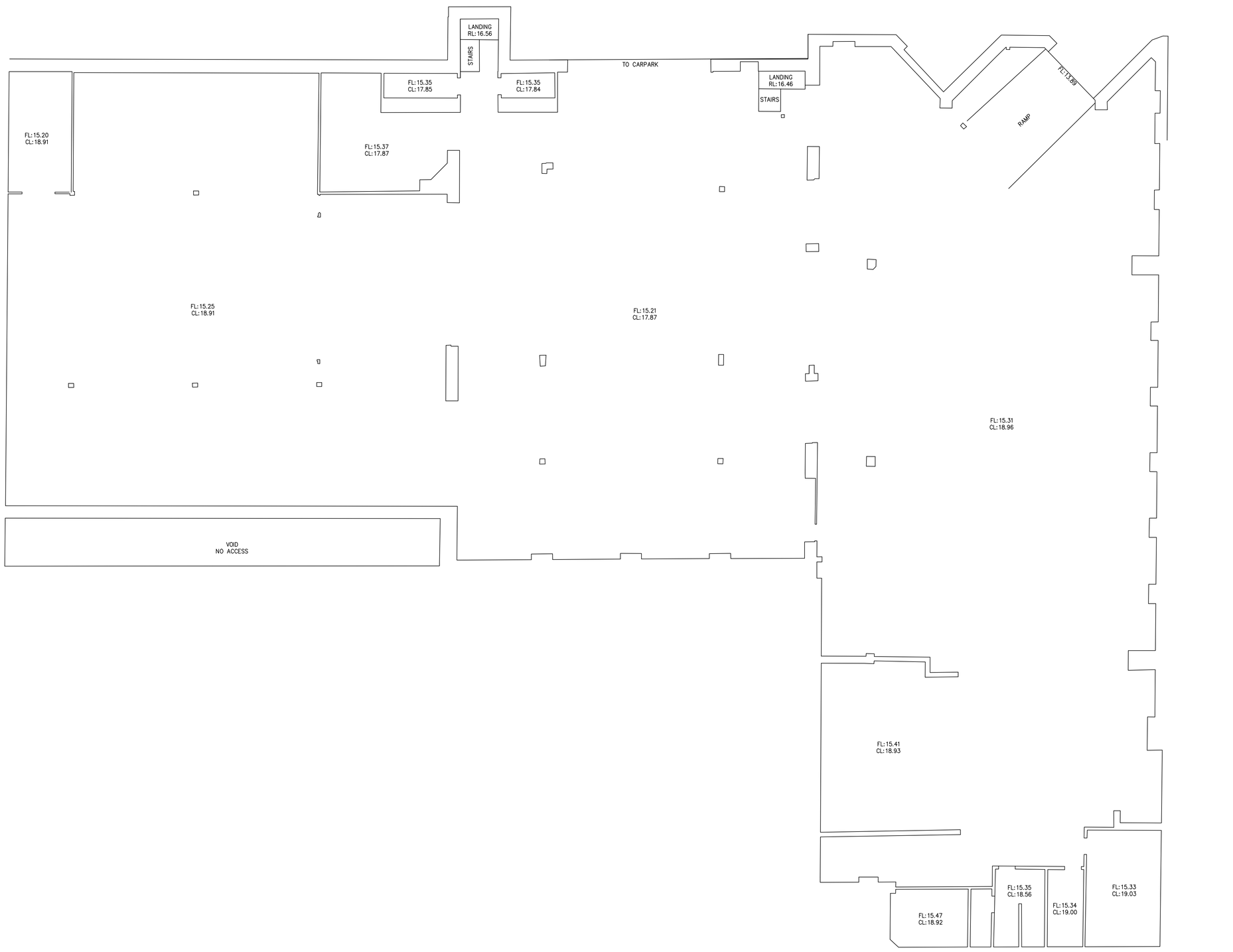
SHEET 7 OF 15

LOWER GROUND



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MGA

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0 2 4 6 8 10

SCALE 1:100 @ A1

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datum AHD

site Area 6398m² (CALC)

LGA SYDNEY

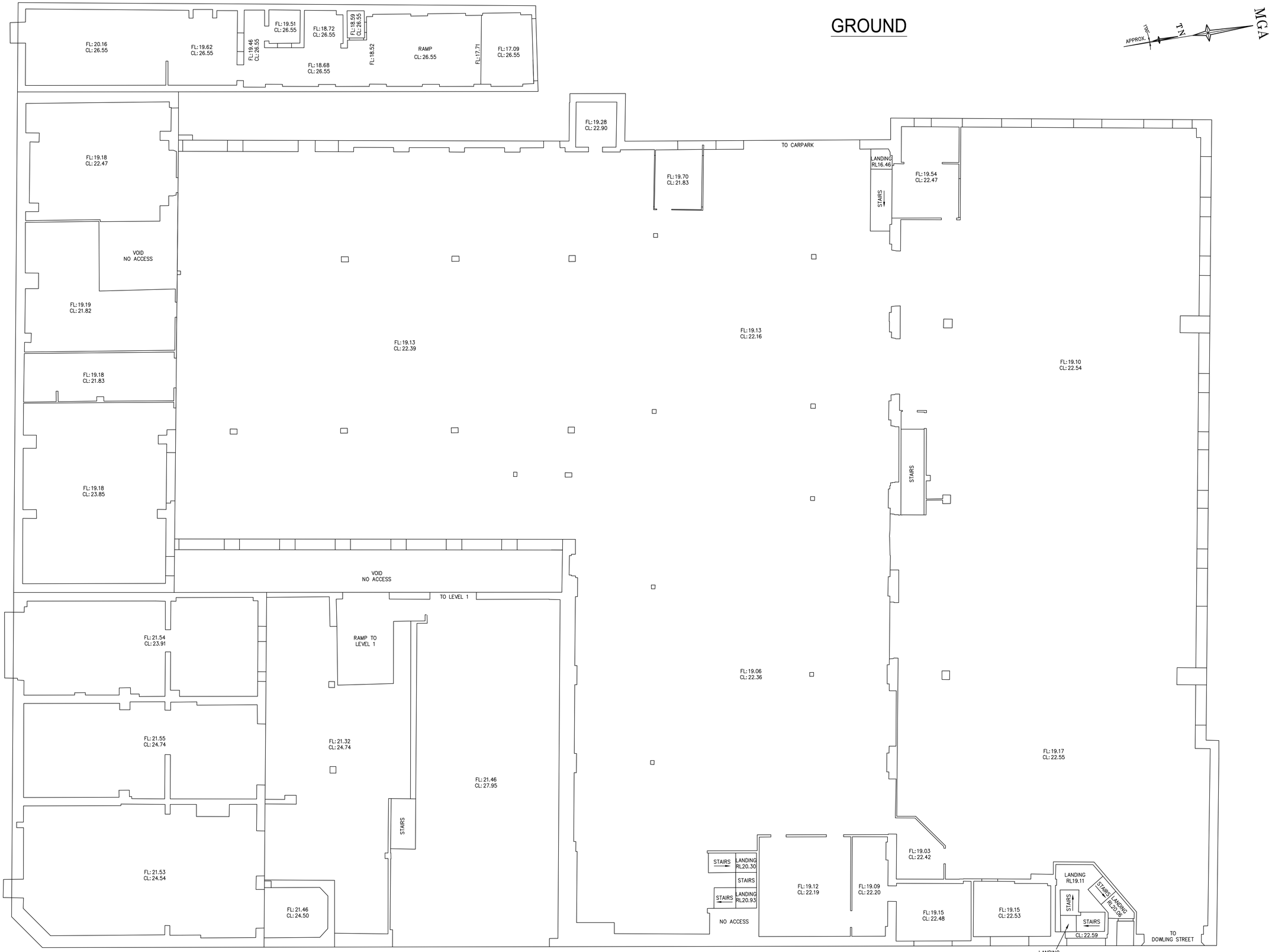
reference number 51095 001DT

scale 1:100 @A1

date of survey 14/08/2020

SHEET 8 OF 15

GROUND



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SCALE 1:100 @ A1

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datum AHD

site Area 6398m² (CALC)

LGA SYDNEY

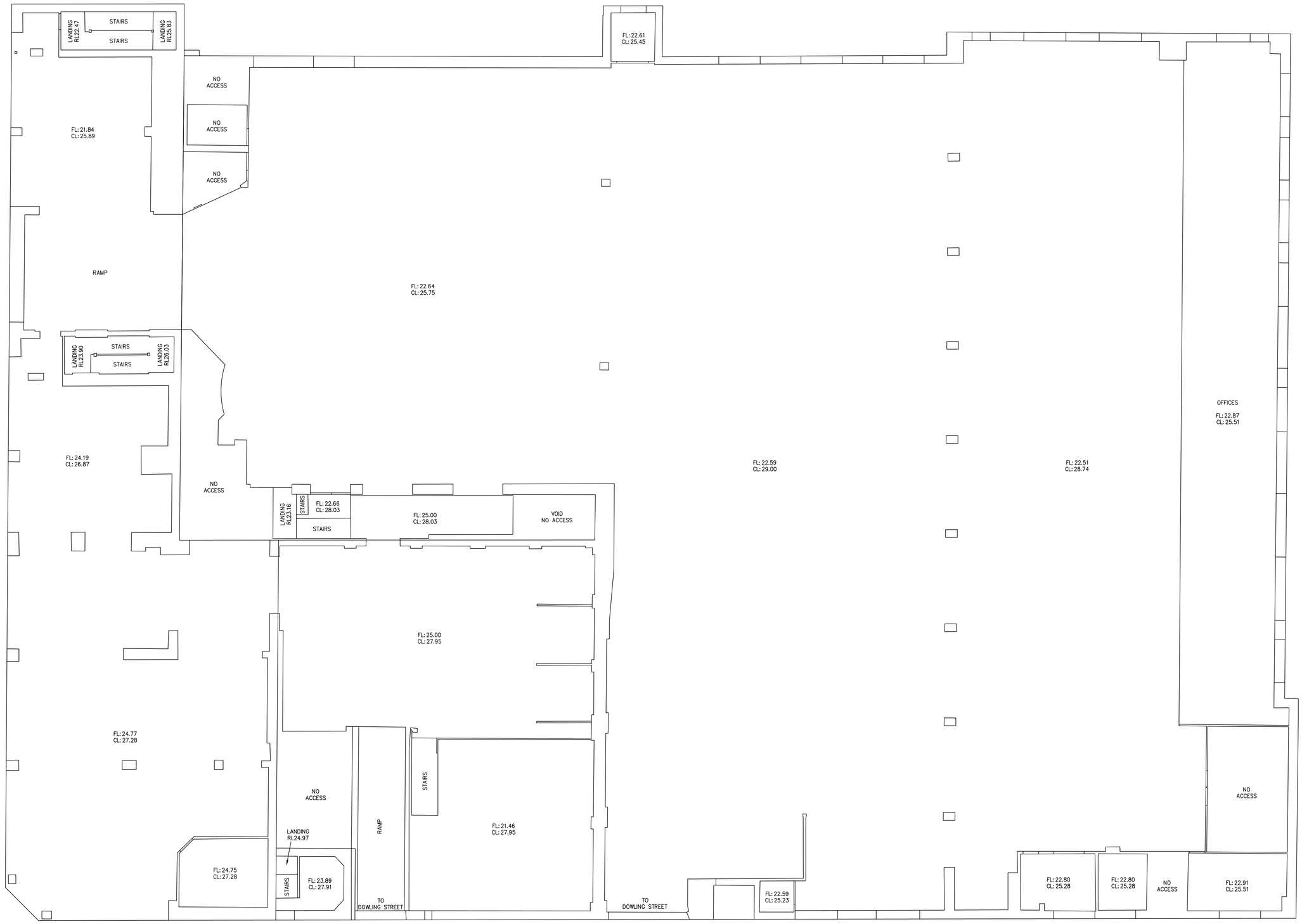
scale 1:100 @A1

date of survey 14/08/2020

reference number 51095 001DT

SHEET 9 OF 15

LEVEL 1



APPROX. 70° TN MGA

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GDA2020

0 2 4 6 8 10

SCALE 1:100 @ A1

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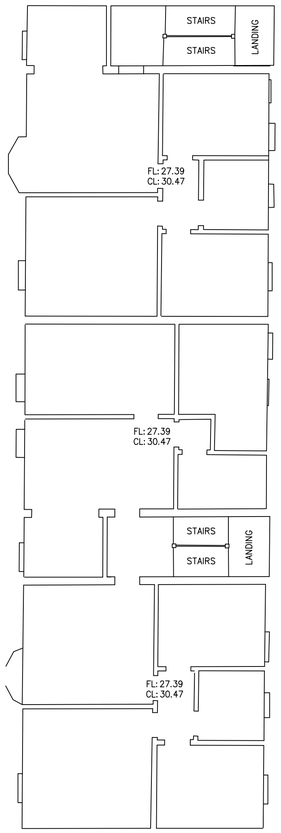
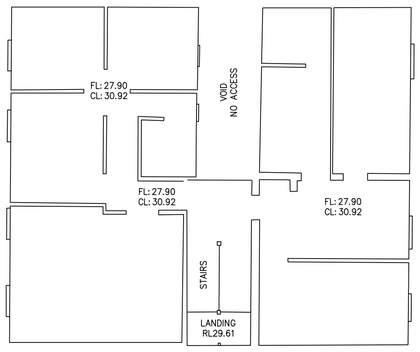
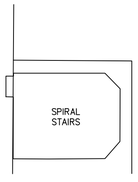
datum	AHD
site Area	6398m² (CALC)
LGA	SYDNEY
reference number	51095 001DT
scale	1:100 @A1
date of survey	14/08/2020
SHEET	10
OF	15

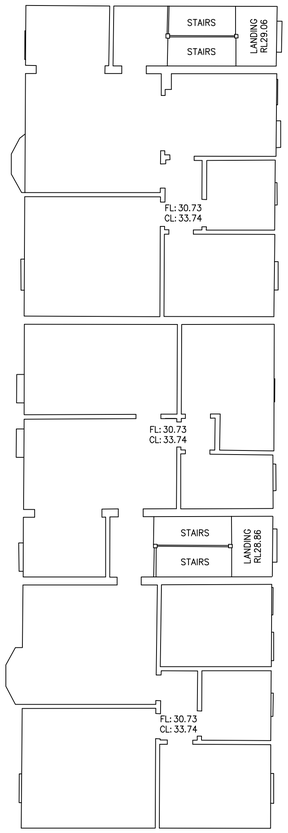
LEVEL 2

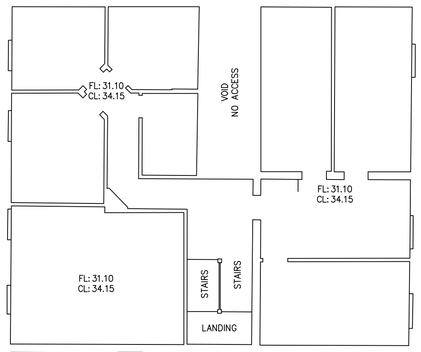






LEVEL 3





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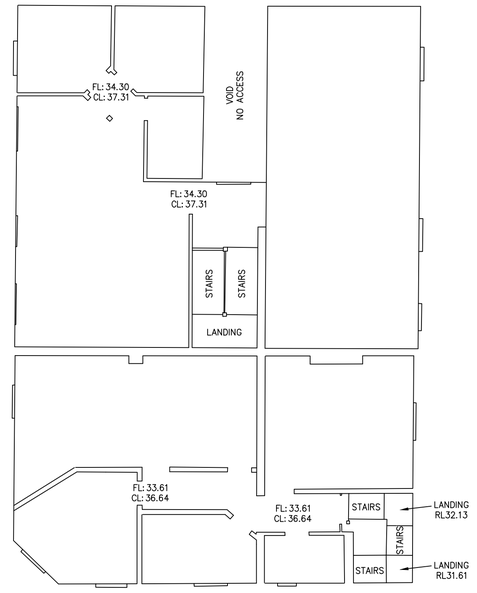

GDA2020

0 2 4 6 8 10

SCALE 1:100 @ A1

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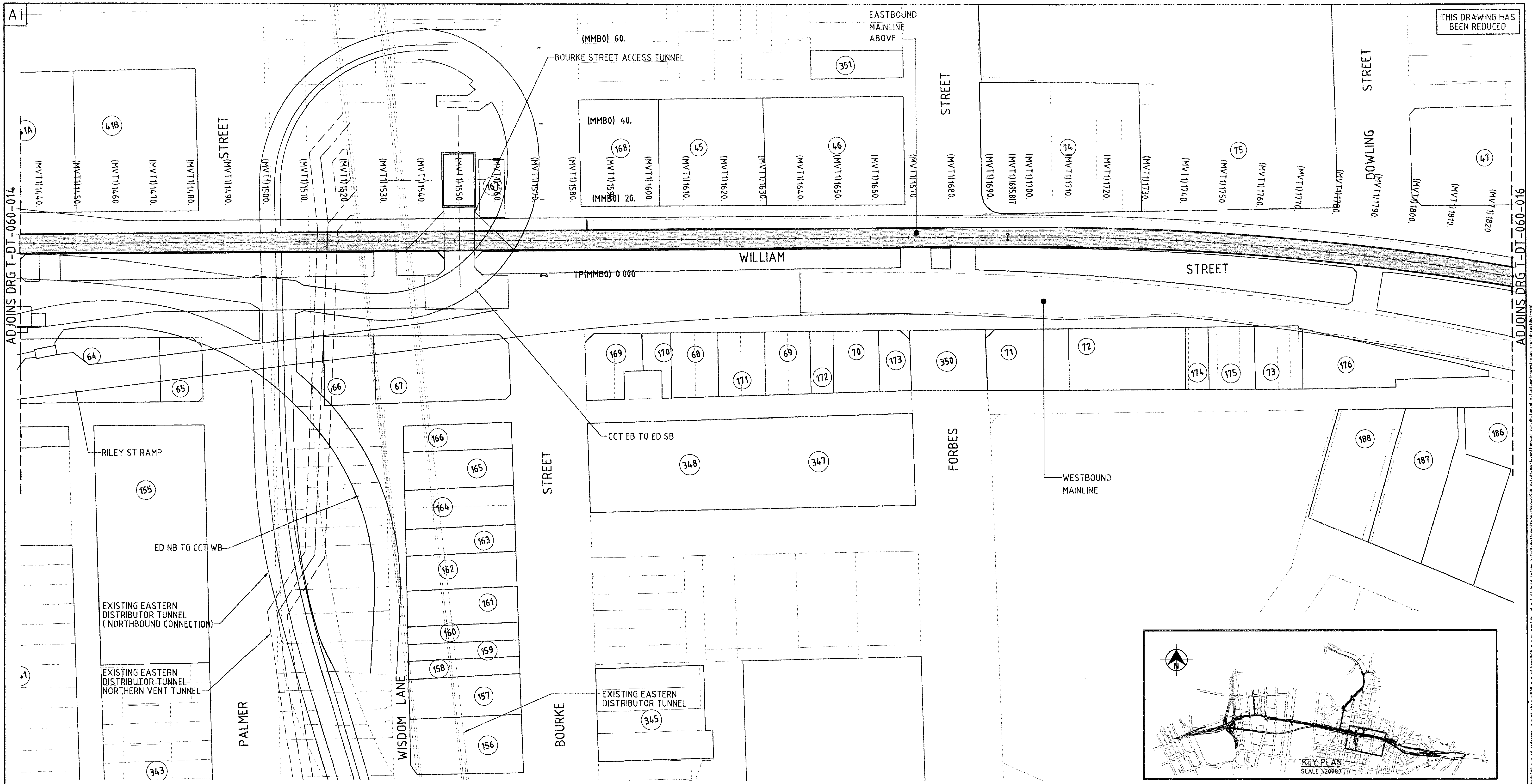
datum AHD
site Area 6398m² (CALC)
LGA SYDNEY

reference number 51095 001DT
scale 1:100 @A1
date of survey 14/08/2020
SHEET 11 OF 15

A1

THIS DRAWING HAS BEEN REDUCED



PLAN

SCALE 1:500

NOTES

1 FOR NOTES & LEGEND REFER DRG T-DT-060-011

SCALE 1:500

AS BUILT

Rev.	Date	Revision Details	By	Ver.	App.
B	07.12.05	AS BUILT ISSUE	EG		
A	18.11.03	ISSUED FOR CONSTRUCTION	AB	HRB	WAC

CW-DC Pty Ltd
CW-DC Pty Ltd ABN 66 009 310 169
116 Military Road (PO Box 1475) Neutral Bay
New South Wales 2089 Australia
Telephone: +61 2 9465 5500
Facsimile: +61 2 9465 5775
Email: cwsyd@cw-dc.com.au

A person using CW-DC Pty Ltd drawings and other data accepts the risk of:
1. using the drawings and other data in electronic form without requesting and checking them for accuracy against the original hard copy versions;
2. using the drawings or other data for any purpose not agreed to in writing by CW-DC Pty Ltd.

Project: Cross City Tunnel

Client: BAULDERSTONE HORNIBROOK BILFINGER BERGER

Sign:

		Signed	Date
Drawn	CJG	CJG	18.11.03
Designed	JF	JF	14.11.03
Verified	ALB	HRB	14.11.03
Approved	WAC	WAC	14.11.03

Drawing Title:

BYPASS VENT TUNNEL-MAINLINE
GENERAL ARRANGEMENT
PLAN SHT 5 OF 6

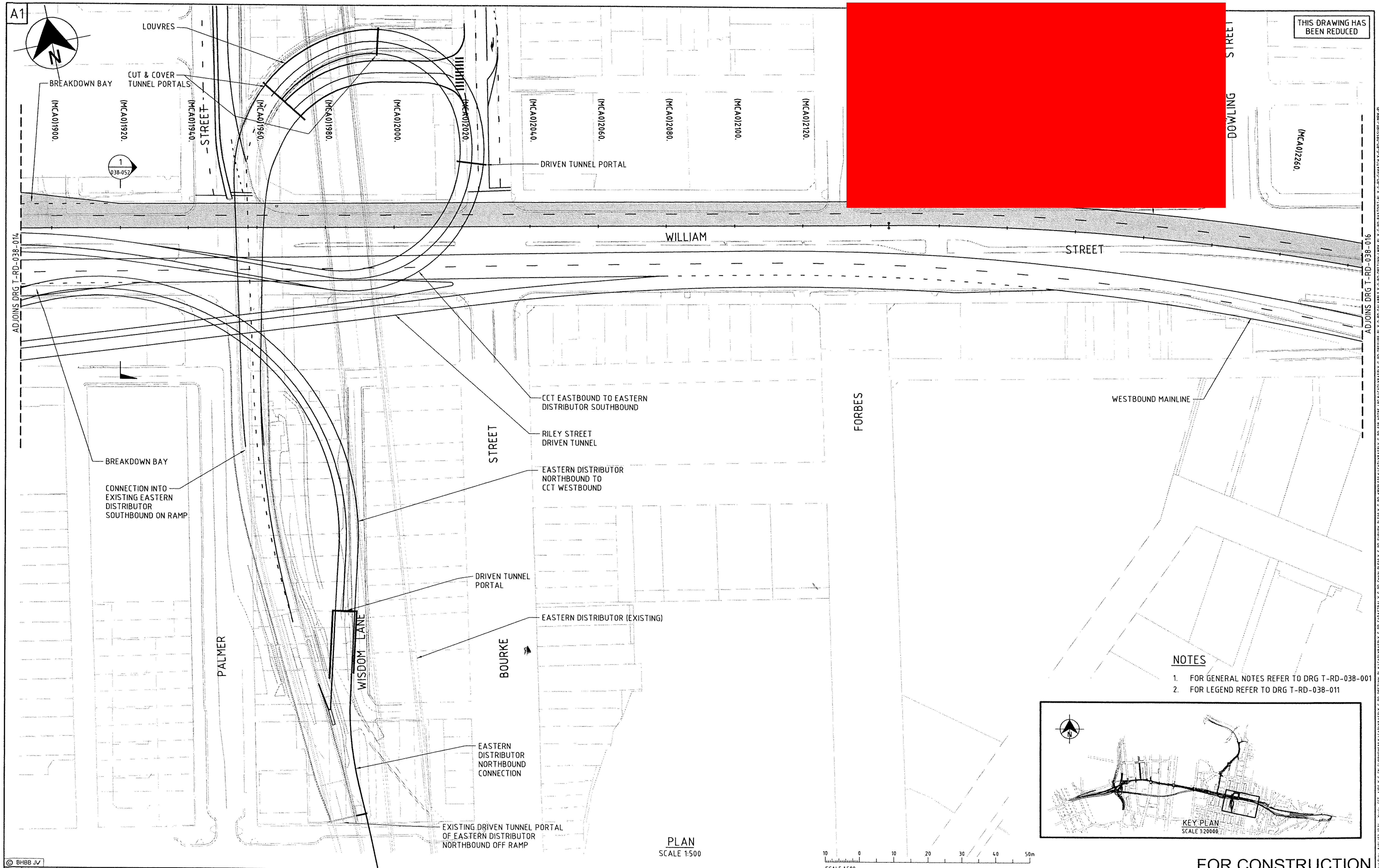
CW-DC Project No. 584C

Scale 1:500

Drawing No. T-DT-060-015

Rev. B

A1



PLAN
SCALE 1:500

NOTES

1. FOR GENERAL NOTES REFER TO DRG T-RD-038-001
2. FOR LEGEND REFER TO DRG T-RD-038-011

FOR CONSTRUCTION

© BHBB JV

Rev.	Date	Revision Details	By	Ver.	App.
A	08.04.03	ISSUED FOR CONSTRUCTION (IFC)	ST		

CW-DC Pty Ltd
CW-DC Pty Ltd ABN 66 009 310 169
118 Military Road (PO Box 1475) Neutral Bay
New South Wales 2089 Australia
Telephone: +61 2 9465 5500
Facsimile: +61 2 9465 5775
Email: cwsyd@cw-dc.com.au

Project: Cross City Tunnel
Client:
BAULDERSTONE HORNIBROOK
BILFINGER BERGER
Sign:

Drawn	ST	Date
Designed	AWC	Date
Verified	KAO	Date
Approved	WAC	Date

Drawing Title:
ROADWORKS AND ROAD GEOMETRY
EASTBOUND MAINLINE
GENERAL ARRANGEMENT
SHEET 5 OF 7

CW-DC Project No. 584C
Scale 1:500
Drawing No. T-RD-038-015
Rev. A

Appendix C

Borehole Location Plan and Sections

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	06.09.2024	EC

SCALE: 0 5 10 15 20 25 m
1:500 @ A3

Douglas PARTNERS
OFFICE: SYDNEY
96-98 Hermitage Rd, West Ryde NSW 2114
(02)9809 0666

CLIENT:
William Street Nominee Pty Ltd

NOTE:
1: Basemap from Metromap (Dated 26.06.2024)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Mixed-Use Development

PROJECT ADDRESS:
164-194 William Street, Woolloomooloo

DRAWING TITLE:
Test Location Plan

PROJECT NO: **208700.01**

DRAWING NO: **1**

REVISION: **0**

A

A'

APPROXIMATE SITE BOUNDARY

APPROXIMATE SITE BOUNDARY

FORBES STREET

DOWLING STREET

PROPOSED BASEMENT RL 3m

BH201

BH204

UNIT 1A

UNIT 2

UNIT 1A

UNIT 3

UNIT 4

UNIT 5

ELEVATION (AHD)

30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
-10.0

0 10 20 30 40 50 60 70 80 90 100 110 120

DISTANCE ALONG PROFILE (m)

LEGEND

- CONCRETE
- NO CORE
- GP - Poorly Graded GRAVEL
- Laminite
- SANDSTONE
- SILTSTONE

TESTS / OTHER

— ? — — - Standard penetration test value

ROCK STRENGTH

VL- Very Low
L - Low
M - Medium
H - High

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	06.09.2024	EC
1	PROPOSED BASEMENT RL UPDATES	05.06.2025	MN

SCALE: 0 2 4 6 8 10 15 20

1:400 @ A3
Vertical Exaggeration = 2.0

Douglas PARTNERS
OFFICE: SYDNEY
96-98 Hermitage Rd, West Ryde NSW 2114
(02) 9809 0666

CLIENT:
William Street Nominee Pty Ltd

NOTES
1. Subsurface conditions are accurate at the borehole locations only. Variations in subsurface conditions may occur between borehole locations. Interpreted strata boundaries are approximate and should be used as a guide only.
2. Summary logs only and should be read in conjunction with detailed logs.
3. Horizontal and vertical scales are not equal.

PROJECT NAME:
Proposed Mixed-Use Development

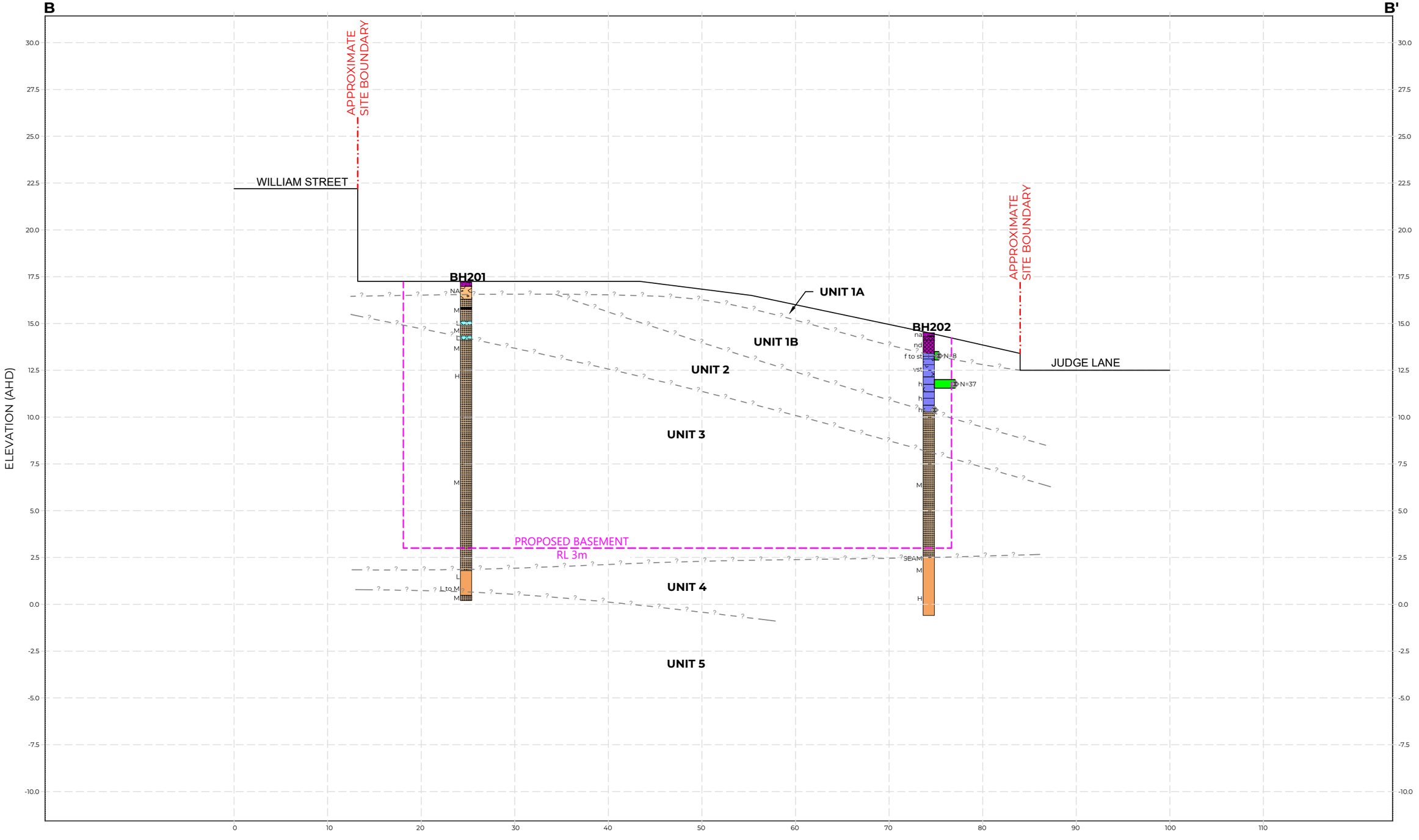
PROJECT ADDRESS:
164-194 William Street, Woolloomooloo

DRAWING TITLE:
INTERPRETED GEOTECHNICAL CROSS SECTION A-A'

PROJECT No: **208700.01**

DRAWING No: **2**

REVISION: **1**



DISTANCE ALONG PROFILE (m)

LEGEND

- ASPHALTIC CONCRETE
- Sandy CLAY
- CLAY
- Silty CLAY
- CONCRETE
- NO CORE
- FILL
- GP - Poorly Graded GRAVEL
- Laminite
- SANDSTONE
- SILTSTONE
- SPT
- SPT - Symbol

TESTS / OTHER

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

ROCK STRENGTH

- VL- Very Low
- L - Low
- M - Medium
- H - High

SOIL CONSISTENCY

- vs - Very Soft
- s - Soft
- f - Firm
- st - Stiff
- vst - Very Stiff
- h - Hard

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	06.09.2024	EC
1	PROPOSED BASEMENT RL UPDATES	05.06.2025	MN

SCALE: 0 2 4 6 8 10 15 20
1:400 @ A3
Vertical Exaggeration = 2.0

Douglas PARTNERS
OFFICE: SYDNEY
96-98 Hermitage Rd, West Ryde NSW 2114
(02) 9809 0666

CLIENT:
William Street Nominee Pty Ltd

NOTES
1. Subsurface conditions are accurate at the borehole locations only. Variations in subsurface conditions may occur between borehole locations. Interpreted strata boundaries are approximate and should be used as a guide only.
2. Summary logs only and should be read in conjunction with detailed logs.
3. Horizontal and vertical scales are not equal.

PROJECT NAME:
Proposed Mixed-Use Development
PROJECT ADDRESS:
164-194 William Street, Woolloomooloo

DRAWING TITLE:
INTERPRETED GEOTECHNICAL CROSS SECTION B-B'

PROJECT No: **208700.01**
DRAWING No: **3**
REVISION: **1**

C

C'

ELEVATION (AHD)

APPROXIMATE SITE BOUNDARY

WILLIAM STREET

APPROXIMATE SITE BOUNDARY

BH204

BH203

UNIT 1A

UNIT 3

UNIT 4

UNIT 5

PROPOSED BASEMENT
RL 3m

BH204: NA, M to H, M, L, H, M, SEAM, M, SEAM, M to H, M to H, SEAM, H

BH203: NA, M, SEAM, M, SEAM, M, SEAM, M, M to H, M, M to H

DISTANCE ALONG PROFILE (m)

LEGEND

- CONCRETE
- NO CORE
- FILL
- Laminite
- SANDSTONE
- SILTSTONE

TESTS / OTHER

— ? — — - Standard penetration test value

ROCK STRENGTH

VL- Very Low
L - Low
M - Medium
H - High

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	06.09.2024	EC
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SCALE: 0 2 4 6 8 10 15 20

1:400 @ A3
Vertical Exaggeration = 2.0

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NOTES
1. Subsurface conditions are accurate at the borehole locations only. Variations in subsurface conditions may occur between borehole locations. Interpreted strata boundaries are approximate and should be used as a guide only.
2. Summary logs only and should be read in conjunction with detailed logs.
3. Horizontal and vertical scales are not equal.

PROJECT NAME:
Proposed Mixed-Use Development

PROJECT ADDRESS:
164-194 William Street, Woolloomooloo

DRAWING TITLE:
INTERPRETED GEOTECHNICAL CROSS SECTION C-C'

PROJECT No: **208700.01**

DRAWING No: **4**

REVISION: **1**

Appendix D

Borehole Logs, Core Photos and Explanatory Notes

Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style `XW`. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	`KL`
Unknown	Information was not available to allow classification of the property. For example, when auguring in loose, saturated sand auger cuttings may not be returned.	`UK`
No data	Information required to allow classification of the property was not available. For example, if drilling is commenced from the base of a hole predrilled by others	`ND`
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example, providing a description of the strength of a concrete pavement	`NA`

Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Soil Descriptions

Terminology
Symbols
Abbreviations

November 2023

Introduction

All materials which are not considered to be "in-situ rock" are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:

The "classification" comprises a two character "group symbol" providing a general summary of dominant soil characteristics. The "name" summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either "fine grained" (also known as "cohesive" behaviour) or "coarse grained" ("non cohesive" behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as "oversize"	
Cobble	63 - 200		
Gravel[1]	2.36 - 63	Coarse	>65%
Sand[1]	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

[1] – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer "component proportions" below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a "Sandy CLAY", this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a "primary", "secondary", or "minor" component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition[1]	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor[2]	Present in the soil, but not significant to its engineering properties	All other components	All other components

[1] As defined in AS1726-2017 6.1.4.4

[2] In the detailed material description, minor components are split into two further sub-categories. Refer "identification of minor components" below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, "INTERBEDDED Silty CLAY AND SAND".

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component [1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code NDF, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example (VS).

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as "extremely weathered material" in reports and by the abbreviation code XWM on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than 'very low' as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

The presence of particles considered to be "oversize" may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with "MIXTURE OF".

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Rock Strength

Rock strength is defined by the unconfined compressive strength, and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $I_{s(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Unconfined Compressive Strength (MPa)	Point Load Index[1] $I_{s(50)}$ MPa	Abbreviation Code
Very low	0.6 - 2	0.03 - 0.1	VL
Low	2 - 6	0.1 - 0.3	L
Medium	6 - 20	0.3 - 1.0	M
High	20 - 60	1 - 3	H
Very high	60 - 200	3 - 10	VH
Extremely high	>200	>10	EH

[1] Rock strength classification is based on UCS. The UCS to $I_{s(50)}$ ratio varies significantly for different rock types and specific ratios may be required for each site. The point load Index ranges shown above are as suggested in AS1726 and should not be relied upon without supporting evidence.

The following abbreviation codes are used for soil layers or seams of material "within rock" but for which the equivalent UCS strength is less than 0.6 MPa.

Scenario	Abbreviation Code
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The properties of the material encountered over this interval are described in the "Description of Strata" and soil properties columns.	SOIL
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The prominence of the material is such that it can be considered to be a seam (as defined in Table 22 of AS1726-2017) and the properties of the material are described in the defect column.	SEAM

Degree of Weathering

The degree of weathering of rock is classified as follows:

Weathering Term	Description	Abbreviation Code
Residual Soil[1]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.	RS
Extremely weathered[1]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible	XW
Highly weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.	HW
Moderately weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MW
Slightly weathered	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.	SW
Fresh	No signs of decomposition or staining.	FR
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.	DW

[1] The parent rock type, of which the residual/extremely weathered material is a derivative, will be stated in the description (where discernible).

Degree of Alteration

The degree of alteration of the rock material (physical or chemical changes caused by hot gasses or liquids at depth) is classified as follows:

Term	Description	Abbreviation Code
Extremely altered	Material is altered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.	XA
Highly altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is changed by alteration. Some primary minerals are altered to clay minerals. Porosity may be increased by leaching or may be decreased due to precipitation of secondary materials in pores.	HA
Moderately altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MA
Slightly altered	Rock is slightly discoloured but shows little or no change of strength from fresh rock	SA
Note: If HA and MA cannot be differentiated use DA (see below)		
Distinctly altered	Rock strength usually changed by alteration. The rock may be highly discoloured, usually by staining or bleaching. Porosity may be increased by leaching or may be decreased due to precipitation of secondary minerals in pores.	DA

Degree of Fracturing

The following descriptive classification apply to the spacing of natural occurring fractures in the rock mass. It includes bedding plane partings, joints and other defects, but excludes drilling breaks. These terms are generally not required on investigation logs where fracture spacing is presented as a histogram, and where used are presented in an unabbreviated format.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e., drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

These terms may be used to describe the spacing of bedding partings in sedimentary rocks. Where used, these terms are generally presented in an unabbreviated format

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Defect Descriptions

Defect Type

Term	Abbreviation Code
Bedding plane	B
Infilled seam	IS
Cleavage	CV
Crushed zone	CZ
Decomposed seam	DS
Fault	F
Joint	JT
Lamination	LAM
Parting	P
Shear zone	SZ
Vein	VN
Drilling/handling break	DB , HB
Fracture	FC

Rock Defect Orientation

Term	Abbreviation Code
Horizontal	H
Vertical	V
Sub-horizontal	SH
Sub-vertical	SV

Rock Defect Coating

Term	Abbreviation Code
Clean	CN
Coating	CT
Healed	HE
Infilled	INF
Stained	SN
Tight	TI
Veneer	VNR

Rock Defect Infill

Term	Abbreviation Code
Calcite	CA
Carbonaceous	CBS
Clay	CLAY
Iron oxide	FE
Manganese	MN

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Rock Defect Shape/Planarity

Term	Abbreviation Code
Curved	CU
Irregular	IR
Planar	PR
Stepped	ST
Undulating	UN

Rock Defect Roughness

Term	Abbreviation Code
Polished	PO
Rough	RF
Slickensided	SL
Smooth	SM
Very rough	VR

Defect Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

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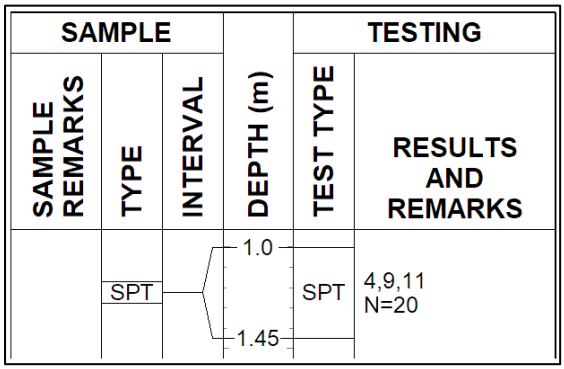
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

November 2023

Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Bulk sample	B
Core sample	C
Disturbed sample	D
Sample from SPT test	SPT
Environmental sample	ES
Gas sample	G
Undisturbed tube sample	U[1]
Water sample	W
Piston sample	P
Core sample for unconfined compressive strength testing	UCS
Material Sample	MT

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y =x blows for y mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS

Field and laboratory testing (continued)

Test Type	Code
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(_)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150

Groundwater Observations

▷	seepage/inflow
▽	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Toothed bucket	TB[1]
Mud/blade bucket	MB[1]
Ripping tyne/ripper	R
Rock breaker/hydraulic hammer	RB
Hand auger	HA[1]
NMLC series coring	NMLC
HMLC series coring	HMLC
NQ coring	NQ3
HQ coring	HQ3
PQ coring	PQ3
Push tube	PT[1]
Rock roller	RR[1]
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD[1]
Sonic drilling	SON[1]
Vibrocore	VC[1]
Wash bore (unspecified bit type)	WB[1]
Existing exposure	X
Hand tools (unspecified)	HAND
Predrilled	PD
Diatube	DT[1]
Hollow flight auger	HSA[1]
Vacuum excavation	VE

[1] – numeric suffixes indicate tool diameter/width in mm

Douglas PARTNERS

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 17.2 AHD
COORDINATE: E:335315.5, N:6250324.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH201
PROJECT No: 208700.01
DATE: 16/07/24 - 17/07/24
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	17	0.23	CONCRETE: 230mm thick, reinforced (7mm) at 0.08m and 0.21m; 10mm asphalt layer at 0.12m		NA	0.00	NA												
			FILL / GRAVEL; medium to coarse, blue metal gravel.			0.90					0.93m: B, 20°, PR, CN, RF				1	PLT	PL(D)=0.60MPa PL(A)=0.60MPa	Backfill	
	16	1.35	SANDSTONE: red, yellow and orange and purple, fine to medium grained; slightly fractured. Hawkesbury Sandstone.		MW		M	81	54		1.12m: B, 20°, PR, VNR, RF, sandy clay 1.19m: B, 20°, PR, SN Fe, RF 1.24m: B, 20°, PR, CN, RF 1.30m: JT, 80°, PR, HE MU 1.35m: , 100 mm Core Loss								
		1.45	Below 1.45m: yellow and pale red		SW	1.45													
	15	2.07	SILTSTONE: dark grey, with sandstone laminations			2.07	L	100	98		2.07-2.09m: DS, 20mm 2.20m: B, 0°, PR, CN, SM				2	PLT	PL(D)=0.20MPa PL(A)=0.10MPa		
		2.29	SANDSTONE: grey, fine to medium grained, with siltstone laminations; Hawkesbury Sandstone.			2.29	M				2.69m: B, 0°, PR, CN, RF								
		2.86	SILTSTONE: see 2.07m to 2.29m			2.86	L				2.86-2.90m: B x3, 0°, HE Fe 3.00-3.10m: B x4, 0°, PR, CN, SM				3	PLT	PL(D)=0.90MPa PL(A)=0.70MPa		
	14	3.08	SANDSTONE: pale grey, medium to coarse grained, bedding dipping at 0 to 20°; fractured to slightly fractured. Hawkesbury Sandstone.			3.08	M	100	83		3.39m: B, 20°, PR, CN, RF 3.47m: B, 0°, PR, VNR Clay, RF 3.48m: JT, 40°, PR, VNR CBS, RF 3.51m: B, 0°, PR, VNR Clay, RF 3.84m: B, 20°, PR, CN, RF								
	13	4				4.00									4	PLT	PL(D)=1.0MPa PL(A)=1.5MPa		
	12	5					H	100	100		4.95m: B, 20°, PR, CN, RF 5.06m: B, 20°, PR, CN, RF 5.32m: B, 10°, PR, CT Clay, RF 5.54m: B, 10°, PR, CT Clay, RF				5	PLT	PL(A)=1.4MPa PL(D)=1.1MPa	Bentonite	
	11	6	From 5.83m: slightly fractured to unbroken		FR	6.00					5.83m: B, 20°, PR, CN, RF				6	PLT	PL(D)=0.90MPa PL(A)=1.0MPa		
	10	7						100	100						7	PLT	PL(D)=0.60MPa PL(A)=1.0MPa		
	9	8						100	100		8.19m: B, 30°, PR, SN Fe, RF				8	PLT	PL(D)=0.90MPa PL(A)=0.90MPa		
	8	9						100	100		9.68m: B, 0°, PR, VNR CBS, RF				9	PLT PLT	PL(A)=0.70MPa PL(D)=0.80MPa		
																PLT	PL(A)=0.70MPa		

NOTES: [a] Soil origin is "probable" unless otherwise stated.

Generated with CORE-GS by Geroc - Rock Log

PLANT: Comacchio Geo205
OPERATOR: Groundtest (JJ)
LOGGED: ECB
METHOD: Diatube (140mm) to 0.23m, auger (v-bit) to 0.9m, NMLC to 17.0m
CASING: Uncased
REMARKS: Steady water loss throughout drilling, 100% water loss during final run.

Douglas PARTNERS

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 17.2 AHD
COORDINATE: E:335315.5, N:6250324.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH201
PROJECT No: 208700.01
DATE: 16/07/24 - 17/07/24
SHEET: 2 of 2

CONDITIONS ENCOUNTERED | **SAMPLE** | **TESTING**

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	7	11	[CONT] SANDSTONE: pale grey, medium to coarse grained, bedding dipping at 0 to 20°; fractured to slightly fractured. Hawkesbury Sandstone.		FR		M	100	100		10.14m: B, 0°, PR, VNR CBS, RF				11	PLT	PL(D)=0.70MPa		
	6							100	100		10.91m: JT, 10°, PR, CN, RF				11	PLT	PL(A)=0.80MPa		
																PLT	PL(D)=0.90MPa		
	5	12						100	100						12	PLT	PL(A)=1.0MPa	Sand	
																PLT	PL(D)=0.80MPa		
											12.67m: B, 5°, PR, CN, RF								
	4	13													13	PLT	PL(A)=1.1MPa		
																PLT	PL(D)=1.0MPa		
								100	100										
	3	14									14.05m: B, 5°, PR, VNR CBS, RF				14	PLT	PL(A)=0.70MPa		
																PLT	PL(D)=0.90MPa		
	2	15									15.12m: B, 20°, PR, CN, RF				15	PLT	PL(A)=1.4MPa		
											15.18m: JT, 15°, PR, CN, RF					PLT	PL(D)=1.2MPa		
		15.40				15.41		100	82		15.32-15.34m: B x2, 4°, PR, CN, SM					PLT	PL(A)=0.10MPa		
			LAMINITE: dark grey and grey, interlaminated siltstone (60%) and fine grained sandstone (40%); fractured. Hawkesbury Sandstone.				L				15.39-15.41m: EW, 0°, Clay 20mm					PLT	PL(D)=0.10MPa		
	1	16									15.63m: B, 10°, PR, CN, SM				16				
											15.75m: B, 0°, PR, CN, SM								
											15.90m: B, 0°, PR, CN, SM								
											16.00-16.03m: EW, 0°, Clay 30mm					PLT	PL(A)=0.10MPa		
						16.03	L to M				16.03-16.13m: JT, 90°, PR, CN, SM					PLT	PL(D)=0.30MPa	Backfill	
								100	46		16.26m: B, 0°, PR, CN, RF								
		16.72				16.72	M				16.35m: B, 0°, PR, CN, RF								
	0	17	SANDSTONE: pale grey, fine to medium grained; fractured. Hawkesbury Sandstone								16.46-16.66m: B x3, 0°, PR, CN, RF								
			Borehole discontinued at 17.00m depth. target depth reached.								16.78m: B, 0°, PR, CT Clay, RF								
											16.82m: JT, 40°, PR, HE								
											16.84-16.86m: JT x2, 20°, PR, HE								
											16.86m: JT, 10°, PR, CT Clay, RF								
	-1	18									16.92m: JT, 10°, PR, CT Clay, RF								
	-2	19																	

Generated with CORE-GS by Geroc - Rock Log

NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Comacchio Geo205
OPERATOR: Groundtest (JJ)
LOGGED: ECB
METHOD: Diatube (140mm) to 0.23m, auger (v-bit) to 0.9m, NMLC to 17.0m
CASING: Uncased
REMARKS: Steady water loss throughout drilling, 100% water loss during final run.

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 17.2 AHD
COORDINATE: E:335315.5, N:6250324.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH201
PROJECT No: 208700.01
DATE: 16/07/24 - 17/07/24
SHEET: 1 of 2

0.90-5.00 m depth

5.00-9.00 m depth

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 17.2 AHD
COORDINATE: E:335315.5, N:6250324.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH201
PROJECT No: 208700.01
DATE: 16/07/24 - 17/07/24
SHEET: 2 of 2

9.00-13.00 m depth

13.00-17.00 m depth

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 14.5 AHD
COORDINATE: E:335325.9, N:6250373.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH202
PROJECT No: 208700.01
DATE: 17/07/24
SHEET: 1 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	14	0.20	FILL / ASPHALTIC CONCRETE; 200mm thick.		FILL	NA	NA				1	SPT	1,3,5 N=8	Bentonite	
		0.40	FILL / Sandy GRAVEL: orange brown; fine to coarse; fine to medium sand.		FILL		M								
	1		FILL / Sandy CLAY, with gravel: brown; fine gravel.		FILL	ND					2	SPT	11,20,17 N=37		
		1.10	Sandy CLAY (SC): grey brown and yellow brown; fine sand.		COL	F to St									
	13	1.40	CLAY (CI-CH): yellow-brown; medium to high plasticity.		RS	(VSt)					3	SPT	20,18/80 (HB)		
		2.00	Silty CLAY (CL), with gravel: brown and grey; medium plasticity; fine, ironstone gravel.		RS	H	w=PL								
	12										4				
		3.50	Silty CLAY (CL): dark grey and red; with ironstone bands; extremely weathered siltstone.		XWM	H									
	11	4.23	Continued as rock												
	10														
	9														
	8														
	7														
	6														
	5														

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Scout 4
METHOD: Auger to 4.0m, rockroll to 4.23m, NMLC to 15.10m
REMARKS: No free groundwater observed during augering.

OPERATOR: Groundtest (GM)

LOGGED: ECB
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 14.5 AHD
COORDINATE: E:335325.9, N:6250373.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH202
PROJECT No: 208700.01
DATE: 17/07/24
SHEET: 2 of 3

CONDITIONS ENCOUNTERED														SAMPLE				TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH. (DW, PS, XW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	14	0													0				
	13	1													1				
	12	2													2				
	11	3													3				
	10	4	Continued from soil												4				
	9	5	SANDSTONE: red, pale grey and orange, distinct laminations dipping at 0 to 20°; slightly fractured. Hawkesbury Sandstone.		MW	4.25 4.28					4.52m: B, 0°, PR, CT Clay, RF 4.56m: B, 30°, PR, CN, RF				5	PLT	PL(A)=0.40MPa	Bentonite	
	8	6			SW	5.00		100	90		5.49m: B, 10°, PR, VNR Clay, RF 5.52m: B, 10°, PR, VNR Clay, RF				6	PLT	PL(A)=0.60MPa		
	7	7					M				6.30m: B, 20°, PR, SN Fe, RF				7	PLT	PL(A)=0.60MPa		
	6	8			FR	6.54		100	100		6.52-6.54m: EW, 20mm, sandy clay 6.56m: B, 15°, PR, CN, RF 6.63m: B, 10°, PR, CN, RF				8	PLT	PL(A)=0.70MPa		
	5	9									8.80m: B, 10°, PR, CN, RF				9	PLT	PL(A)=0.80MPa		
											9.40m: B, 20°, PR, VNR CBS, RF					PLT	PL(A)=0.80MPa		

NOTES: [a] Soil origin is "probable" unless otherwise stated.

Generated with CORE-GS by Geroc - Split Soil-Rock Log

PLANT: Scout 4
METHOD: Auger to 4.0m, rockroll to 4.23m, NMLC to 15.10m
REMARKS: No free groundwater observed during augering.

OPERATOR: Groundtest (GM)

LOGGED: ECB
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 14.5 AHD
COORDINATE: E:335325.9, N:6250373.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH202
PROJECT No: 208700.01
DATE: 17/07/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	4	11	[CONT] SANDSTONE: red, pale grey and orange, distinct laminations dipping at 0 to 20°; slightly fractured. Hawkesbury Sandstone.				M	100	95		10.57m: B, 10°, PR, VNR CBS, RF 10.66m: B, 10°, PR, CN, RF				11	PLT	PL(A)=0.80MPa	Sand	
	3		From 11.77m: coarse grained								11.78m: B, 20°, PR, CN, RF					PLT	PL(A)=0.70MPa		
		12.00	LAMINITE: dark grey and grey, interbedded siltstone (60%) and fine grained sandstone (40%); fractured. Hawkesbury Sandstone.		FR	12.02 12.07					12.00-12.41m: JT, 80°, PR, HE 12.02-12.07m: EW, Clay 50mm				12	PP	270kPa		
	2	13					M				12.70-13.00m: JT, 85°, PR, HE 13.09m: B, 0°, PR, CN, SM				13	PLT	PL(A)=0.30MPa		
	1					13.30					13.30m: JT, 40°, PR, HE 13.35m: B, 0°, PR, CN, RF 13.54-13.90m: JT, 85°, PR, HE								
	0	14					H	100	99		14.12-14.38m: JT, 80°, PR, HE 14.30m: B, 0°, UN, CN, RF 14.44-14.46m: B x2, 5°, UN, CN, RF				14	PLT	PL(A)=1.2MPa		
	-1	15	Borehole discontinued at 15.10m depth. target depth reached.												15	PLT	PL(A)=1.6MPa	Backfill	
	-2	16																	
	-3	17																	
	-4	18																	
	-5	19																	

NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Scout 4
METHOD: Auger to 4.0m, rockroll to 4.23m, NMLC to 15.10m
REMARKS: No free groundwater observed during augering.

OPERATOR: Groundtest (GM)

LOGGED: ECB
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Split Soil-Rock Log

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 14.5 AHD
COORDINATE: E:335325.9, N:6250373.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH202
PROJECT No: 208700.01
DATE: 17/07/24
SHEET: 1 of 2

4.28-8.00 m depth

8.00-12.00 m depth

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 14.5 AHD
COORDINATE: E:335325.9, N:6250373.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH202
PROJECT No: 208700.01
DATE: 17/07/24
SHEET: 2 of 2

12.00-15.10 m depth

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335391.3, N:6250360.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH203
PROJECT No: 208700.01
DATE: 17/07/24 - 19/07/24
SHEET: 1 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	15	0.18	CONCRETE; 180mm thick.		NA	0.18	NA												
			SANDSTONE: pale grey and orange, medium grained; slightly fractured to unbroken. Hawkesbury Sandstone.		SW			100	79		0.59m: B, 20°, PR, VNR MU, RF 0.82-1.08m: B x4, 20°, PR, VNR MU, RF				1	PLT	PL(A)=1.0MPa		
	14	1	1.28m: pale grey			1.28	M				1.27m: B, 20°, PR, VNR MU, RF 1.45m: B, 10°, PR, CT Clay, RF 1.47m: B, 10°, PR, VNR Clay, RF 1.49m: B, 20°, PR, VNR Clay, RF 2.01m: B, 10°, PR, VNR CBS, RF					PLT	PL(A)=0.80MPa		
	13	2						100	94						2	PLT	PL(A)=0.70MPa	Bentonite	
						2.84					2.84-2.89m: DS, 50mm					PP	150kPa		
	12	3				2.89					3.00m: B, 10°, PR, VNR, RF 3.31m: B, 20°, PR, CN 20mm, RF				3	PLT	PL(A)=0.50MPa		
	11	4			FR			100	98		4.05m: B, 20°, PR, CN, RF 4.30-4.32m: DS, 20mm				4	PLT	PL(A)=0.70MPa		
	10	5					M	100	106		5.32m: B, 0°, PR, VNR CBS, RF				5	PLT	PL(A)=0.70MPa		
	9	6						100	91		6.58m: JT, 20°, PR, VNR Clay, RF 6.59m: B, 5°, PR, VNR Clay, RF 6.60m: B, 10°, PR, VNR Clay, RF 6.72-6.82m: B x2, 20°, PR, CN, RF 6.93m: JT, 20°, CU, CN, RF				6	PLT	PL(A)=0.40MPa		
	8	7	7.23m: orange, pale orange and grey			7.23									7	PLT	PL(A)=0.50MPa		
					SW to MW	7.52					7.45m: JT, 20°, CU, VNR Clay, RF 7.52-7.57m: DS, 50mm					PLT	PL(A)=1.0MPa		
						7.57										PP	190kPa		
	7	8					M	100	81		7.61m: JT, 20°, PR, HE 7.94-7.97m: B x2, 10°, PR, SN Fe, RF 8.28m: B, 0°, PR, VNR CBS, RF				8	PLT	PL(A)=0.60MPa		
	8.44					8.28													
						8.44					8.33m: B, 5°, PR, CN, RF					PP	210kPa		
	8.63		SILTSTONE: dark grey			8.63	VL				8.44-8.49m: DS, 50mm 8.57-8.63m: JT x3, 20-40°, PR, HE					PLT PP	.03MPa 310kPa		
			SANDSTONE: pale grey, medium grained, trace fine siltstone rip up clasts; slightly fractured to unbroken. Hawkesbury Sandstone.				M				8.70-8.79m: JT, 85°, UN, SN Fe, RF 8.86m: B, 5°, PR, SN Fe, RF								
	6	9	9.00m-10.81m: thickly bedded		FR	9.00	M to H	100	100		9.00m: B, 20°, PR, CT Clay, RF				9	PLT	PL(A)=1.2MPa		
																PLT	PL(A)=0.80MPa		

NOTES: [a] Soil origin is "probable" unless otherwise stated.

Generated with CORE-GS by Geroc - Rock Log

PLANT: Comacchio 205
METHOD: Diatube (140mm) to 0.18m, NMLC to 15.05m
REMARKS:

OPERATOR: Groundtest (JJ)

LOGGED: ECB
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335391.3, N:6250360.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH203
PROJECT No: 208700.01
DATE: 17/07/24 - 19/07/24
SHEET: 2 of 2

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	5		[CONT] SANDSTONE: pale grey, medium grained, trace fine siltstone rip up clasts; slightly fractured to unbroken. Hawkesbury Sandstone.				M to H	100	100									Sand	
		10.82				10.82					10.82-10.89m: B x4, 0°, PR, CT Clay, RF								
	4	11	LAMINITE: dark grey and grey, interlaminated siltstone (60%) and fine grained sandstone (40%); slightly fractured. Hawkesbury Sandstone.				M	100	95						11	PLT	PL(A)=0.40MPa		
	3	12				12.00					12.12m: B, 0-5°, UN, CN, RF 12.26m: B, 0°, PR, CN, SM 12.32m: B, 0°, PR, VNR CA, SM 12.58m B, 0°, PR, CN, SM 12.74-12.77m: B x2, 0°, PR, CN, SM				12	PLT	PL(A)=1.3MPa		
	2	13			FR		M to H	100	74		13.14-13.21m: B x7, 0-5°, UN, CN, RF				13	PLT	PL(A)=0.70MPa		
	1	14						100	92		13.77m: B, 0°, PR, CN, SM 13.90-14.11m: B x2, 0°, PR, CN, RF 14.29-14.83m: B x3, 5°, PR, CN, RF				14	PLT	PL(A)=1.3MPa		
	0	15	Borehole discontinued at 15.05m depth. target depth reached.								14.96m: B, 5°, PR, CN, RF				15	PLT	PL(A)=1.0MPa		
	-1	16																	
	-2	17																	
	-3	18																	
	-4	19																	

NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Comacchio 205
METHOD: Diatube (140mm) to 0.18m, NMLC to 15.05m
REMARKS:

OPERATOR: Groundtest (JJ)

LOGGED: ECB
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Rock Log

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335391.3, N:6250360.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH203
PROJECT No: 208700.01
DATE: 17/07/24 - 19/07/24
SHEET: 1 of 2

0.18-4.00 m depth

4.00-8.00 m depth

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335391.3, N:6250360.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH203
PROJECT No: 208700.01
DATE: 17/07/24 - 19/07/24
SHEET: 2 of 2

8.00-12.00 m depth

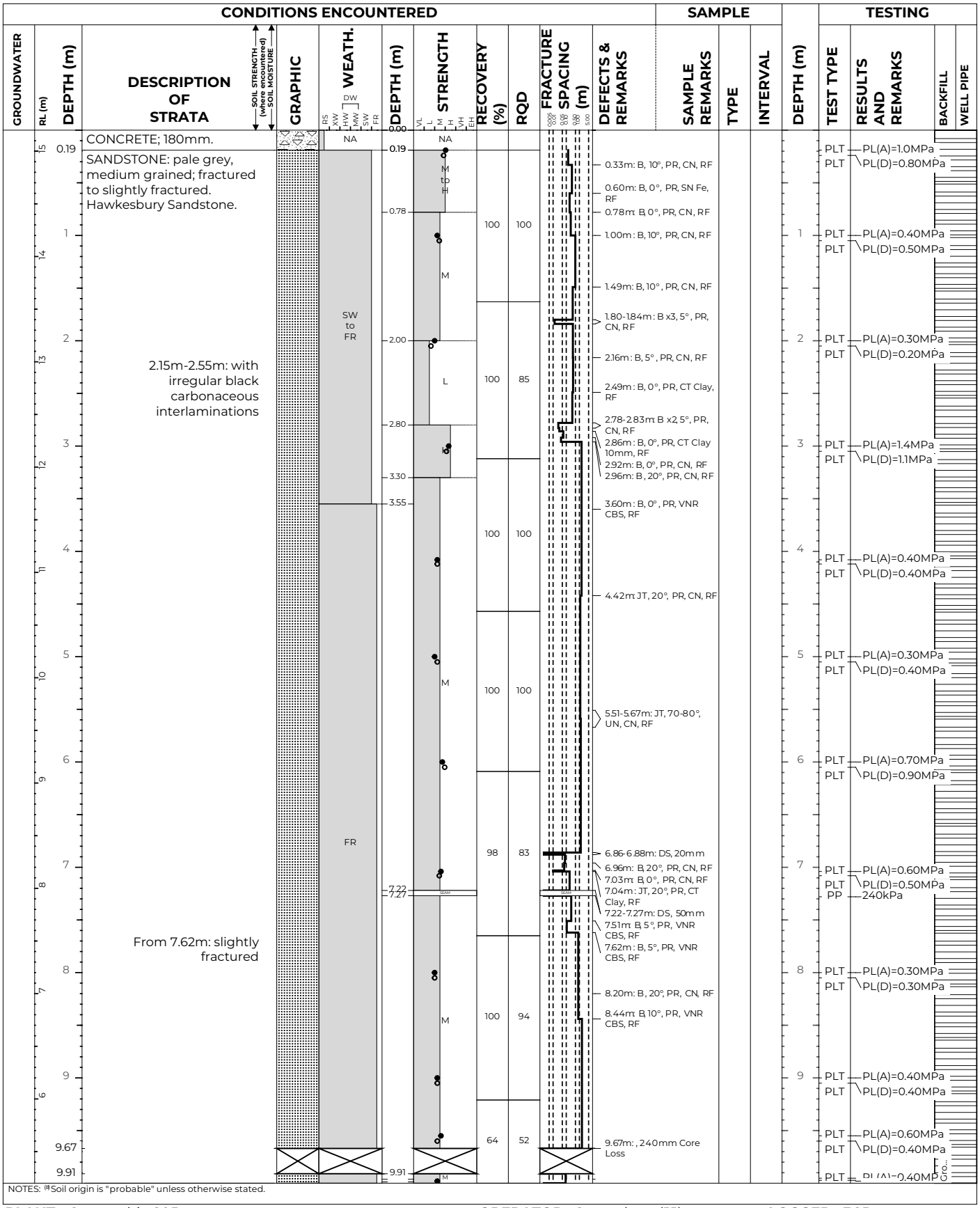
12.00-15.05 m depth

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335374.1, N:6250319.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH204
PROJECT No: 208700.01
DATE: 19/07/24 - 22/07/24
SHEET: 1 of 2



NOTES: [#] Soil origin is "probable" unless otherwise stated.

Generated with CORE-GS by Geroc - Rock Log

PLANT: Comacchio 205
METHOD: Diatube (140mm) to 0.19m, NMLC to 19.8m
REMARKS: 100% water loss at approximately 18.2m.

OPERATOR: Groundtest (JJ)

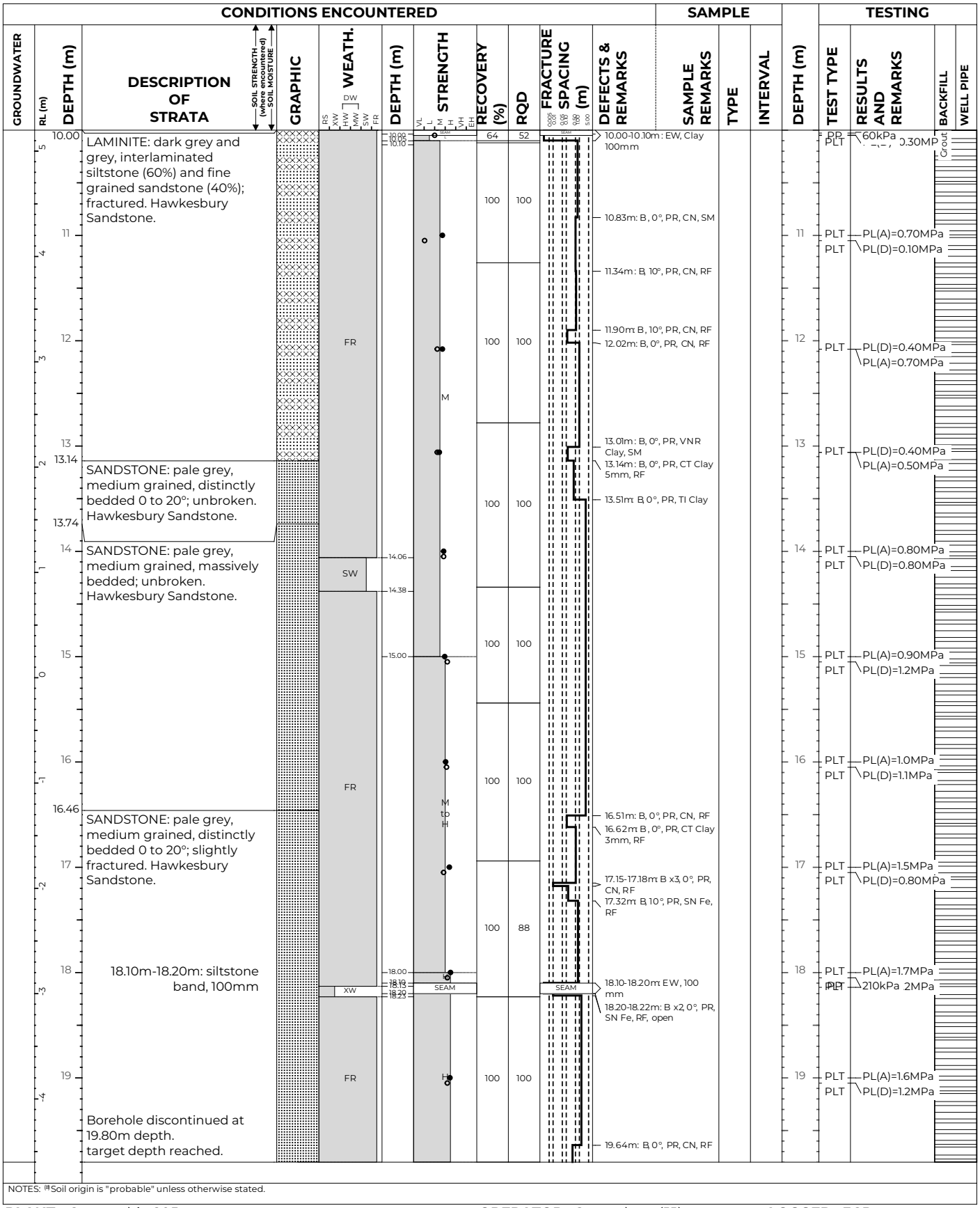
LOGGED: ECB
CASING: Uncased

BOREHOLE LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335374.1, N:6250319.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH204
PROJECT No: 208700.01
DATE: 19/07/24 - 22/07/24
SHEET: 2 of 2



NOTES: [a] Soil origin is "probable" unless otherwise stated.

PLANT: Comacchio 205
METHOD: Diatube (140mm) to 0.19m, NMLC to 19.8m
REMARKS: 100% water loss at approximately 18.2m.

OPERATOR: Groundtest (JJ)

LOGGED: ECB
CASING: Uncased

Generated with CORE-GS by Geroc - Rock Log

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335374.1, N:6250319.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH204
PROJECT No: 208700.01
DATE: 19/07/24 - 22/07/24
SHEET: 1 of 3

0.19-4.00 m depth

4.00-8.00 m depth

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335374.1, N:6250319.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH204
PROJECT No: 208700.01
DATE: 19/07/24 - 22/07/24
SHEET: 2 of 3

8.00-12.00 m depth

12.00-16.00 m depth

CORE PHOTO LOG

CLIENT: William Street Nominee Pty Ltd
PROJECT: Proposed Mixed-Use Development
LOCATION: 164-194 William Street, Woolloomooloo, NSW

SURFACE LEVEL: 15.2 AHD
COORDINATE: E:335374.1, N:6250319.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH204
PROJECT No: 208700.01
DATE: 19/07/24 - 22/07/24
SHEET: 3 of 3

16.00-19.80 m depth

Appendix E

Laboratory Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 357586

Client Details

Client	Douglas Partners Pty Ltd
Attention	Peter Hunt
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**208700.01 Woolloomooloo**
Number of Samples	2 Soil
Date samples received	26/07/2024
Date completed instructions received	26/07/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	02/08/2024
Date of Issue	30/07/2024

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Diego Bigolin, Inorganics Supervisor

Authorised By
Nancy Zhang, Laboratory Manager

Soil Aggressivity			
Our Reference		357586-1	357586-2
Your Reference	UNITS	BH202	BH202
Depth		1-1.45	2.5-2.95
Type of sample		Soil	Soil
Date prepared	-	29/07/2024	29/07/2024
Date analysed	-	29/07/2024	29/07/2024
pH 1:5 soil:water	pH Units	4.3	4.7
Electrical Conductivity 1:5 soil:water	µS/cm	450	91
Chloride, Cl 1:5 soil:water	mg/kg	98	10
Sulphate, SO4 1:5 soil:water	mg/kg	490	110

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

QUALITY CONTROL: Soil Aggressivity						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			29/07/2024	1	29/07/2024	29/07/2024		29/07/2024	[NT]
Date analysed	-			29/07/2024	1	29/07/2024	29/07/2024		29/07/2024	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	4.3	4.2	2	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	450	490	9	103	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	98	99	1	104	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	490	510	4	106	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Uniaxial Compressive Strength

Report Number:	208700.01_11933
Issue Number:	1
Date Issued:	01.08.2024
Client:	William Street Nominee Pty Ltd
Project Number:	208700.01
Project Name:	Stage 2 Development Application
Project Location:	Woolloomooloo, NSW
Work Request:	11933
Date Sampled:	-
Sampling Method:	Sampled by Douglas Partners

The results apply to the sample as received

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
peter.gorseski@douglaspartners.com.au
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2.2 < 50MPa

Sample Number	NC-11933A
Sample Location	BH201
Depth (m)	13.08 - 13.38
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Failure Mode	Shear
Compression Machine	Automax Multitest
Date of Testing	31.07.2024
Duration of Test (seconds)	439
Average Diameter (mm)	51.8
Average Height (mm)	147.7
Height to Diameter Ratio	2.9 : 1
Rate of Displacement	0.07
Moisture Content (%)	5.7
Wet Mass / Unit Volume (t/m^3)	2.46
Dry Mass / Unit Volume (t/m^3)	2.33
Uniaxial Compressive Strength (MPa)	**15.5**
Comments	

Before

After

Uniaxial Compressive Strength

Report Number:	208700.01_11933
Issue Number:	1
Date Issued:	01.08.2024
Client:	William Street Nominee Pty Ltd
Project Number:	208700.01
Project Name:	Stage 2 Development Application
Project Location:	Woolloomooloo, NSW
Work Request:	11933
Date Sampled:	-
Sampling Method:	Sampled by Douglas Partners

The results apply to the sample as received

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
peter.gorseski@douglaspartners.com.au
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2.2 < 50MPa

Sample Number	NC-11933B
Sample Location	BH202
Depth (m)	9.00 - 9.34
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Failure Mode	Shear
Compression Machine	Automax Multitest
Date of Testing	31.07.2024
Duration of Test (seconds)	359
Average Diameter (mm)	51.7
Average Height (mm)	147.7
Height to Diameter Ratio	2.9 : 1
Rate of Displacement	0.07
Moisture Content (%)	6.8
Wet Mass / Unit Volume (t/m^3)	2.42
Dry Mass / Unit Volume (t/m^3)	2.27
Uniaxial Compressive Strength (MPa)	**12.6**
Comments	

Before

After

Uniaxial Compressive Strength

Report Number:	208700.01_11933
Issue Number:	1
Date Issued:	01.08.2024
Client:	William Street Nominee Pty Ltd
Project Number:	208700.01
Project Name:	Stage 2 Development Application
Project Location:	Woolloomooloo, NSW
Work Request:	11933
Date Sampled:	-
Sampling Method:	Sampled by Douglas Partners

The results apply to the sample as received

Douglas Partners Pty Ltd
Newcastle Laboratory
15 Callistemon Close Warabrook Newcastle NSW 2310
Phone: (02) 4960 9600
Email: peter.gorseski@douglaspartners.com.au

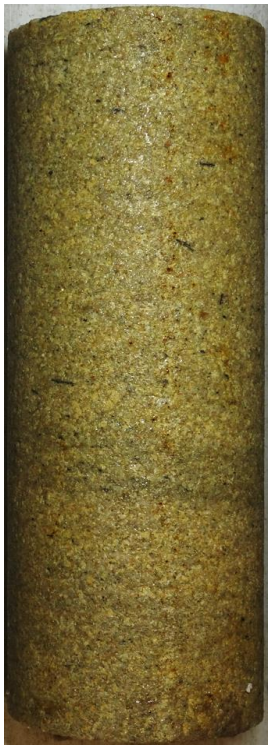
Accredited for Compliance with ISOIEC 17025 - Testing

Approved Signatory: Peter Gorseski
peter.gorseski@douglaspartners.com.au
NATA Accredited Laboratory Number: 828

Uniaxial Compressive Strength of Rock Core AS 4133.4.2.2 < 50MPa

Sample Number	NC-11933C
Sample Location	BH204
Depth (m)	15.04 - 15.34
Rock Description	Sandstone
Storage History and Environment	Tested as Received
Failure Mode	Tensile
Compression Machine	Automax Multitest
Date of Testing	31.07.2024
Duration of Test (seconds)	348
Average Diameter (mm)	51.7
Average Height (mm)	145.7
Height to Diameter Ratio	2.9 : 1
Rate of Displacement	0.07
Moisture Content (%)	6.7
Wet Mass / Unit Volume (t/m^3)	2.41
Dry Mass / Unit Volume (t/m^3)	2.26
Uniaxial Compressive Strength (MPa)	**12.2**
Comments	

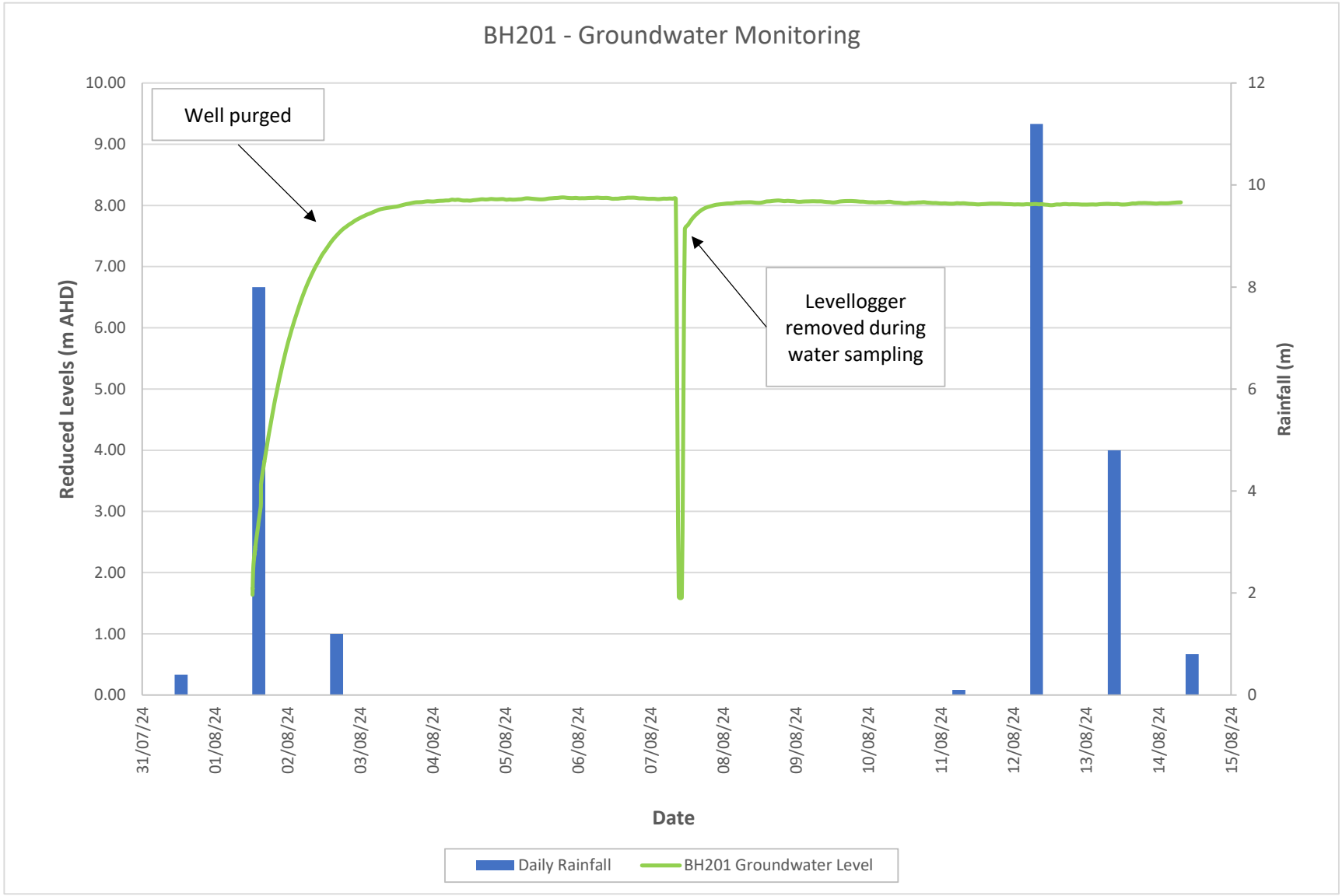
Before

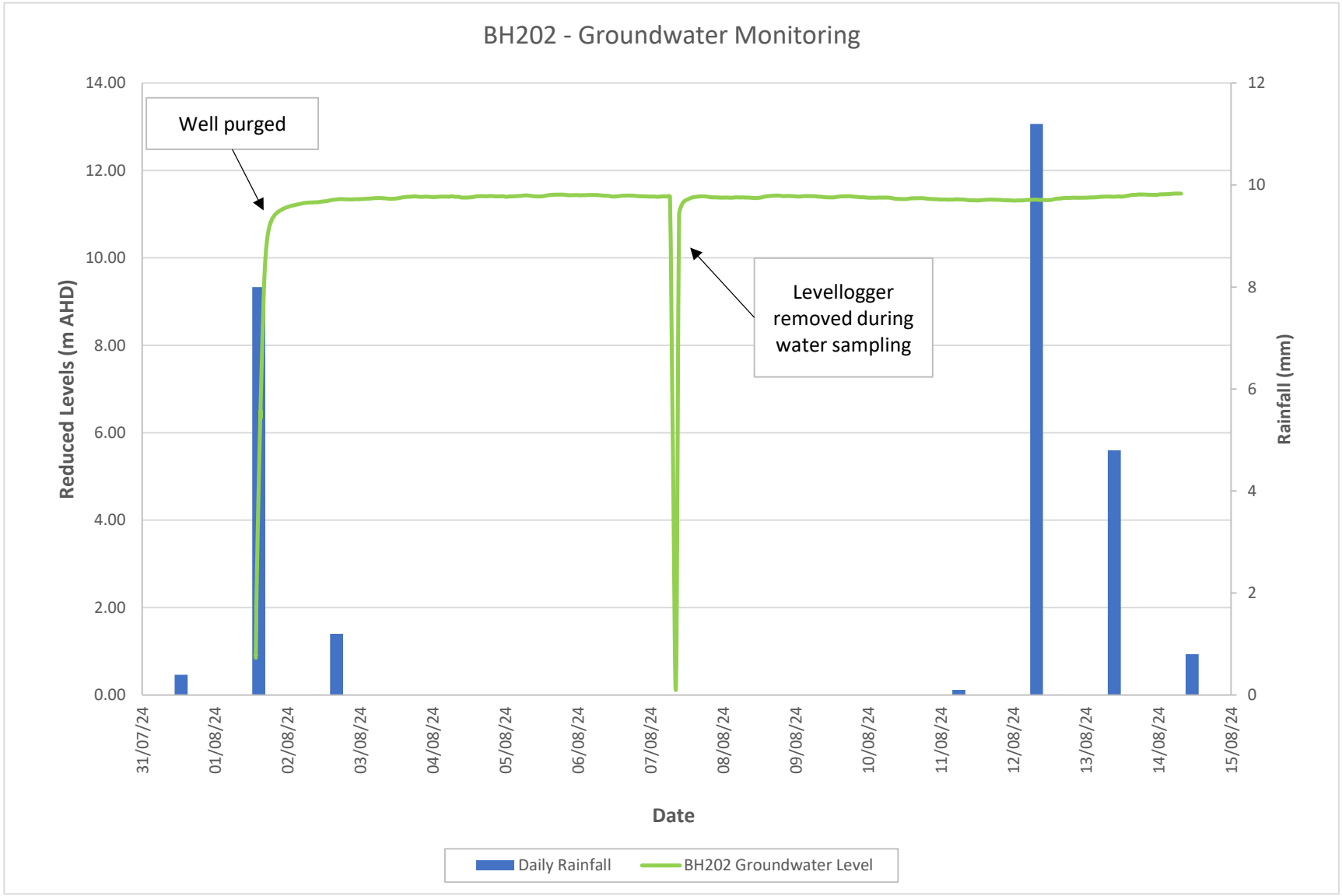


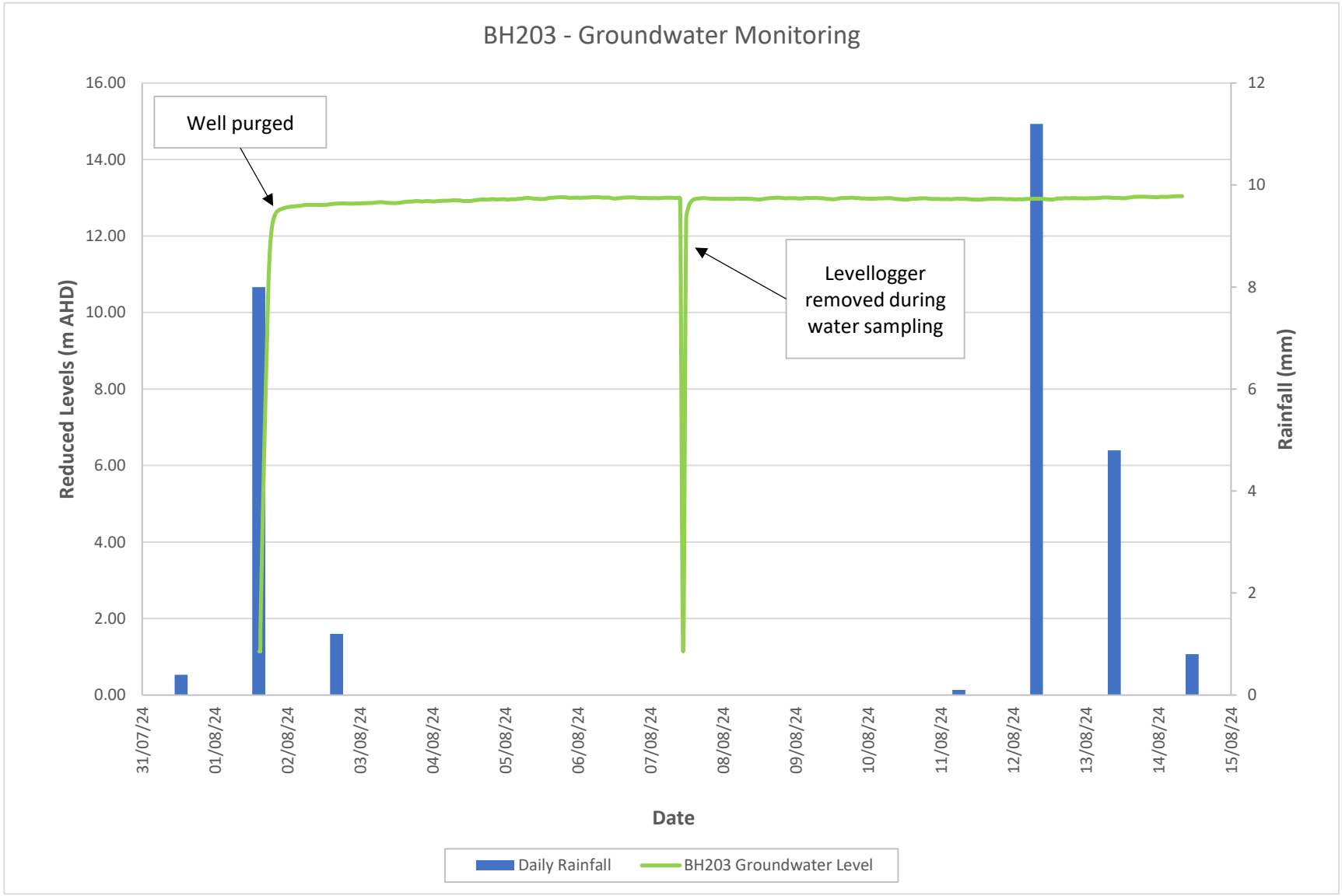
After

Appendix F

Water Monitoring Results


BH201 - Groundwater Monitoring
Well purged
Levellogger removed during water sampling
Reduced Levels (m AHD)
Rainfall (m)
Date
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
12
10
8
6
4
2
0
31/07/24
01/08/24
02/08/24
03/08/24
04/08/24
05/08/24
06/08/24
07/08/24
08/08/24
09/08/24
10/08/24
11/08/24
12/08/24
13/08/24
14/08/24
15/08/24
Daily Rainfall
BH201 Groundwater Level


BH202 - Groundwater Monitoring
Well purged
Levellogger removed during water sampling
Reduced Levels (m AHD)
Rainfall (mm)
Date
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
12
10
8
6
4
2
0
31/07/24
01/08/24
02/08/24
03/08/24
04/08/24
05/08/24
06/08/24
07/08/24
08/08/24
09/08/24
10/08/24
11/08/24
12/08/24
13/08/24
14/08/24
15/08/24
Daily Rainfall
BH202 Groundwater Level


BH203 - Groundwater Monitoring
Well purged
Levellogger removed during water sampling
Reduced Levels (m AHD)
Rainfall (mm)
Date
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
12
10
8
6
4
2
0
31/07/24
01/08/24
02/08/24
03/08/24
04/08/24
05/08/24
06/08/24
07/08/24
08/08/24
09/08/24
10/08/24
11/08/24
12/08/24
13/08/24
14/08/24
15/08/24
Daily Rainfall
BH203 Groundwater Level