Stantec Australia Pty Ltd
Level 9, The Forum, 203 Pacific Highway
St. Leonards NSW 2065
AUSTRALIA
ABN 17 007 820 322

26 August 2025

Project/File: 305001322 / 301351072

LOFTEX
Nick Brien
Level 18,
141 Walker Street,
PO Box 454,
North Sydney
NSW 2059
Australia

Dear Nick Brien,

Reference: 3-5 Help Street, Chatwood, NSW - SSDA application

It is noted during the exhibition period of SSDA, a query from **NSW Department of Climate Change, Energy, the Environment and Water (DPHI)** was received as follows:

NSW Department of Climate Change, Energy, the Environment and Water		
DCCEEW-1	NSW DCCEW Water group has reviewed the EIS and has a recommendation regarding water supply, take and licensing post approval: The Department of Planning, Housing and Infrastructure (DPHI) requests the proponent to ensure a water access licence (WAL) is obtained to account for the maximum predicted water take for construction and operation activities unless an exemption applies under the *Water Management (General) Regulation 2018.*	Input from geotechnical consultant – confirm the development doesn't go into threshold for a WAL.
NSW Environment Protection Authority		

Stantec Response is as follows:

- In accordance with Report: Ref: 301351072, entitled: Groundwater inflow estimates and drainage advice for the proposed residential building, at 3-5 Help Street, Chatwood, NSW, dated: 11/02/2025, by Stantec; if pile walls were slightly permeable, a transient flow of 0.07 ML (first 6 months) and Steady State condition of 0.105 ML per year is anticipated, which is well below the WaterNSW threshold of 3 ML/ year, therefore the proposed development can be granted the Groundwater Access License Exemption, (Refer Attachment A)

Regards,

Stantec Australia Pty Ltd

Deven Date
Group Leader - Geotechnical
Phone: +61 2 9493 9798
Mobile: 0410 096 916
deven.date@stantec.com

stantec.com/au
Attachment: A – Stantec Groundwater Assessment

Technical Memorandum

To	Loftex Chatswood Pty Ltd	**From**	Namal Yapage (Stantec) Senior Principal Geotechnical Engineer Yasmin Chen (Stantec) Geotechnical Engineer
CC		**Date**	11/02/2025
Project	301351072	**Location**	3-5 Help Street, Chatswood
Subject	Groundwater inflow estimates and drainage advice for the proposed residential building		
Report Status	Final Rev4	**Attachments**	Calculation sheet and groundwater measured records

1 Introduction

This report presents an assessment and recommendations by Stantec Australia Pty Ltd (formerly Cardno) for Loftex Chatswood (the Client) regarding the groundwater inflow estimates and drainage advice for the proposed residential building at 3-5 Help Street, Chatswood (the Site).

Based on the provided architectural drawings prepared by EMBECE Architects, Rev B, dated 5th December 2024, it is understood that construction activities associated with the proposed development include:

- Demolition of the existing dwellings at 3 and 5 Help Street, Chatswood.
- The construction of one mixed-use high-rise tower. The proposed tower will be on the 3-5 Help Street with 5 levels of basement and up to 34 stories. Ground floor to level 1 will consist of commercial and retail spaces, from level 2 to 33 will be residential apartments.
- It is estimated that the proposed five level basement excavation will reach the Basement 05 (B5) level of 77.040 m AHD.
- A bulk excavation level (BEL) of RL 76.44 m is adopted in the analysis considering allowance for basement slab construction and over-excavation. Hence, total depth of excavation varies approximately between 16.2 m -19 m.

A geotechnical investigation has previously been undertaken and reported in the Stantec Geotechnical Investigation Report, dated 19 May 2023 (Report No. Cardno_RPT02_GIR_3-5 Help St_Chatswood Rev2, Project No:301351072). The scope of geotechnical investigations such as depth of boreholes was determined based on three basement level, however, building plans has been changed to five basement levels after geotechnical investigations were completed. This geotechnical investigation forms the basis of the subsurface conditions adopted in this assessment and should be read in conjunction with this report. In addition, shoring design and foundation design may be carried out based on this existing geotechnical information. However, the additional geotechnical investigations as required shall be carried out by the by the builder/contractor before construction commences as well as geotechnical inspections during the construction shall be carried out to verify the design assumptions.

At the time of this assessment report, the excavation shoring wall design has not been available. However, solider pile walls with drained basement was initially proposed to support the basement excavation. Hence, the outcome of the groundwater seepage analysis based on that assumption was presented in Revision 3 of this memorandum dated 29 May 2024. Based on this assessment, the estimated seepage flow to the drained basement is less than 3ML per year hence proposed development is eligible for the Groundwater Access License exemptions. Nevertheless, based the conditions

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mentioned in WaterNSW general terms of approval (Condition No. GT0115-00001 and Document Reference No. IDAS1155220 dated 25 July 2024), dewatering is only allowed during the construction but not once construction is completed. Hence, this assessment was revised using cut-off wall with tank basement. The cut-off wall is assumed to be constructed using secant pile wall and piles are assumed to be socketed into rock and socket length is 2m below the BEL. Secant pile walls can effectively resist water flow through the wall due to the overlapping pile design which creates a continuous barrier against groundwater ingress. Hence, secant pile walls are suitable for watertight cut-off walls for deep excavations.

2 Hydrogeological Model

2.1 Subsurface Conditions

Based on the information provided in Stantec (formerly Cardno) geotechnical investigation report, the subsurface conditions are summarized in Table 1. The groundwater condition has been summarized as follows:

- Groundwater table or seepage was not encountered in any of the boreholes during auger drilling up to 7.08m depth below ground level.
- Groundwater monitoring well was installed on 24th November 2022 at BH1, BH2 and BH3 to the bottom of boreholes. Drilling water was purged out on the same day.
- Site revisit was carried out on 5th December 2022. Standing water was measured at 8.5m in depth for BH1, 8.2m for BH2 and 14.1m for BH3. All wells were then purged out again to determine the seepage rates. No groundwater seepage and recharge were observed on BH1 and BH2 for first 2 hours. Permanent ground water was not encountered by the installed groundwater well to the depth of 18m for BH1 and BH2. Recharged standing water was measured at 21.89m depth (RL70.71m) below ground level at BH3.
- Groundwater level data loggers were installed on 25 Jan 2024. Three months hourly monitoring period was then carried out between 25/01/2024 to 01/05/2024. Groundwater seepage rates are considered as consistent, and the recorded levels are considered in the seepage estimate analysis.

Table 1 Subsurface Condition

Geotechnical Unit	BH1	BH2	BH3
Surface RL (m)	94.4m AHD	92.9m AHD	92.6m AHD
Asphalt & Topsoil (Unit 1)	0 – 0.2m	0 – 0.2m	0 – 0.2m
Residual Soils (Unit 2)	0.2 – 4.0m	0.2 – 4.0m	0.2 – 4.0m
Class V/IV Shale (Unit 3a)	4.0 – 7.28m	4.0 – 7.43m	4.0 – 7.43m
Class III/II Shale (Unit 3b)	7.28 – 15m Termination Depth	7.43 – 15.74m	7.43 -19.51m
Class II Sandstone (Unit 4a)	-	15.74 – 18.00m Termination Depth	19.51 – 33.96m Termination Depth

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Table 2 Design Parameter

Geotechnical Unit	Unit Weight (kN/m^3)	Effective Cohesion c' (kPa)	Angle of Effective Internal Friction ϕ' (degree)	Modulus of Elasticity $E_{s\,(h)}$ (MPa)	Poisson Ratio v
Asphalt & Topsoil (Unit 1)	17	2	27	8	0.35
Residual Soils (Unit 2)	18	5	28	20	0.35
Class V/IV Shale (Unit 3a)	24	100	30	300	0.3
Class III/II Shale (Unit 3b)	24	200	32	1200	0.2
Class II Sandstone (Unit 4a)	24	500	36	2000	0.2

2.2 Hydraulic Conductivity Parameters

Additional raising head permeability and lab permeability field tests were carried out at the subject site on 25th Jan 2024, including:

- One additional borehole BH101, taken to 2m, allowing for an undisturbed clay sample collection at 2.5-2.8m for the undisturbed sample permeability soil test.
- One additional borehole BH102, taken to 7m, allowing for an undisturbed clay sample collection at 0.8-1m for the undisturbed sample permeability soil test; also, well installation with screen at 4-7m depth bgl, allowing a field permeability test at the weathered shale (Unit 3a) layer.

Three tests were carried out on each subsurface units. Results and the model adopted permeability parameters are summarised in Table 3 below.

Table 3 Soil Hydraulic Conductivity

BH ID	Test Depth (m)	Lithological Unit	Hydraulic Conductivity Soil Permeability
BH101 BH102 Lab Permeability Test	BH101 2.5-2.8m BH102 0.8-1.0m	Residual Silty Clay	BH101 – 2.5-2.8m: 8E-11 m/sec BH102 – 0.8-1.0m: 4E-10 m/sec (adopted)
BH102 – Well Field Test	BH102 4-7m Field Test	Fractured Shale (Unit 3a)	Field tests completed on 25/01/2024 Test 1: 2.44E-03 m/day (adopted) Test 2: 1.81E-03 m/day Test 3: 1.92E-03 m/day
BH1 – Well Field Test	9 to 15	Shale Bedrock (Unit 3b)	Field test completed on 5/12/2023: 2.9E-3 m/day (3.4E-08 m/sec) Field tests completed on 25/01/2024 Test 2: 5.6E-5 m/day Test 3: 4.9E-5 m/day

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BH ID	Test Depth (m)	Lithological Unit	Hydraulic Conductivity Soil Permeability
BH3 – Well Field Test	21.96 to 33.96	Sandstone Bedrock (Unit 4a)	Field tests completed on 25/01/2024 Test 1: 5.22E-5 m/day (Adopted) Test 2: 4.12E-6 m/day Test 3: 4.82E-6 m/day

2.3 Groundwater Monitoring

Standpipe piezometer wells were installed within three boreholes as part of the Stantec (formerly Cardno) geotechnical investigations 2022 on BH1, BH2 and BH3. Each standpipe was developed by the drilling contractor upon the completion of borehole drilling. The standpipes were installed in accordance with ASTM D5092. A machine slotted 50mm diameter PVC pipe, with the annulus backfilled with a sand filter screen, was installed at the target response depth. Data loggers were installed on 25/01/2024. Installed standpipes and findings are summarised as follows:

Table 4 Summary of Standpipe Response Zone and Measurement

BH ID	Standpipe Installation Depth (mBGL)	Surface RL (m)	Response Zone Material	Screened Interval Depth (m bgl)	Groundwater Measurement Depths (m bgl)	Measurement Date
BH1	15	94.4	Shale Bedrock (Unit 3b)	9 to 15m	12.16m bgl RL 82.24m	30/10/23
					13.82m bgl RL 80.58m	25/01/24
BH2	18	92.9	Shale Bedrock (Unit 3b)	9 to 18m	12.16m bgl RL 80.74m	30/10/23
					12.49m bgl RL 80.41m	25/01/24
BH3	33.96	92.6	Sandstone Bedrock (Unit 4a)	21.96 to 33.96m	18.64m bgl RL 73.98m	30/10/23
					19.34m bgl RL 73.26m	25/01/24
BH102	8	93.0	Fractured Shale (Unit 3a)	4 to 7m	Dry	25/01/24
					Dry	01/05/24

Diver ® and Baro ® Data loggers were installed on BH1, BH2 and BH3 by Stantec for long term groundwater monitoring. Data loggers were hung inside the standpipe by suspending the logger on a 2mm stainless steel wire rope that is fixed to the well cap. The data loggers have been factory calibrated prior to installation and are set to record absolute water levels every hour.

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Table 5 Recorded Groundwater Level (between 25/01/2024 to 01/05/2024)

BH ID	Standpipe Installation Depth (mBGL)	Surface RL (m)	Recorded Groundwater Level	Monitoring Period (in this report submission)
BH1	15	94.4	13.99 m to 13.68 m depth bgl RL 80.41 m to 80.72 m Average: RL 80.55m	25/01/2024 to 01/05/2024
BH2	18	92.9	12.80 m to 12.31m depth bgl RL 80.1 m to 80.59 m Average: RL 80.41m	25/01/2024 to 01/05/2024
BH3	33.96	92.6	19.52 m to 19.23m depth bgl RL 77.08 m to 73.37 m Average: RL 73.21m	25/01/2024 to 01/05/2024

Groundwater level records with bara pressure compensation against rainfall data are summarised as follows and presented in Appendix B.

2.4 Adopted Model

Steady-state groundwater inflows into the basement have been modelled using the commercially available software Seep/W by Geostudio which is a 2D finite element water seepage analysis tool.

The basement excavation has been modelled using two selected representative cross-section as shown in Figure 1. The proposed basement comprising a trapezoidal shape with a length of about 62 m and maximum width of 44m.

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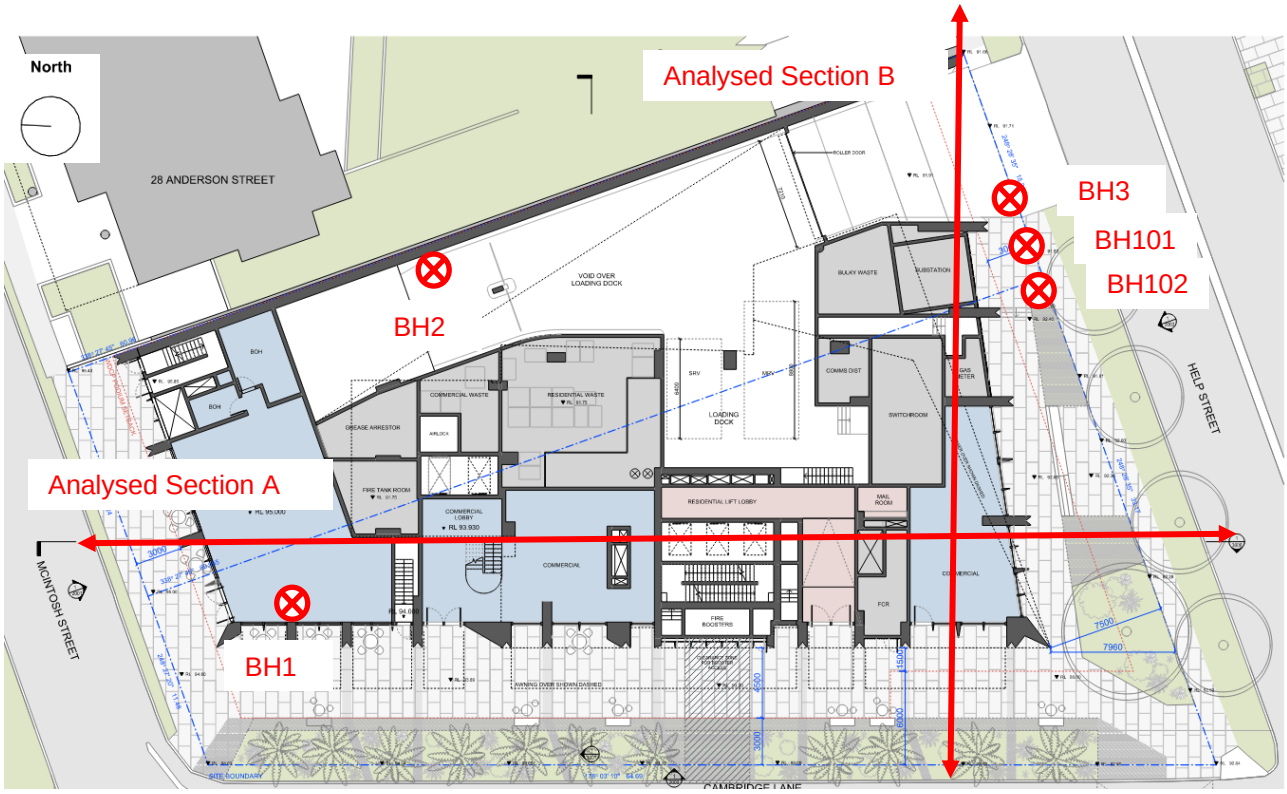
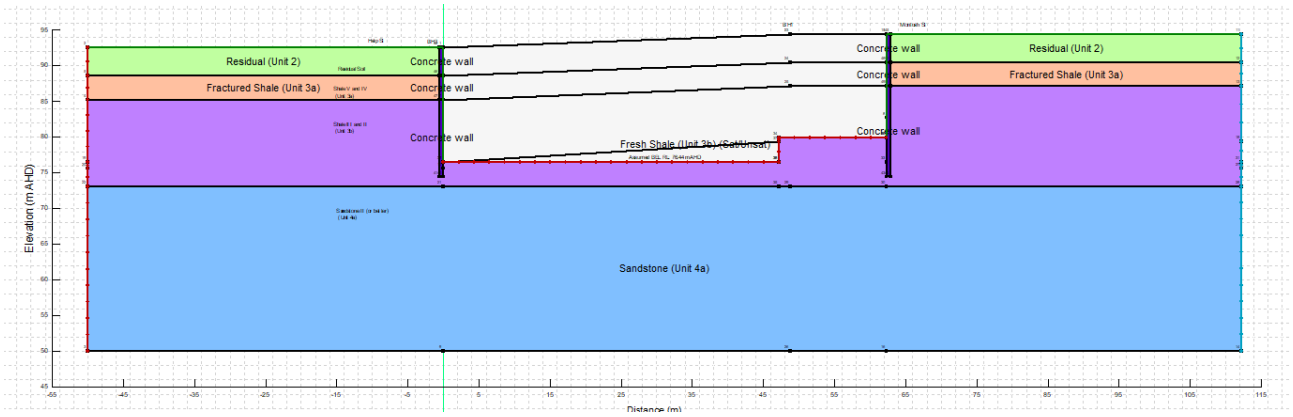


Figure 1 – Site Plan

The ground surrounding the proposed development was simulated as being a multi-layered numerical model to represent the subsurface conditions surrounding the site and to allow the vertical flow components to be simulated more accurately. Details of the layering for analysed Sections is provided in Figure 2. The model boundaries were extended approximately 50 m from each excavation boundaries.



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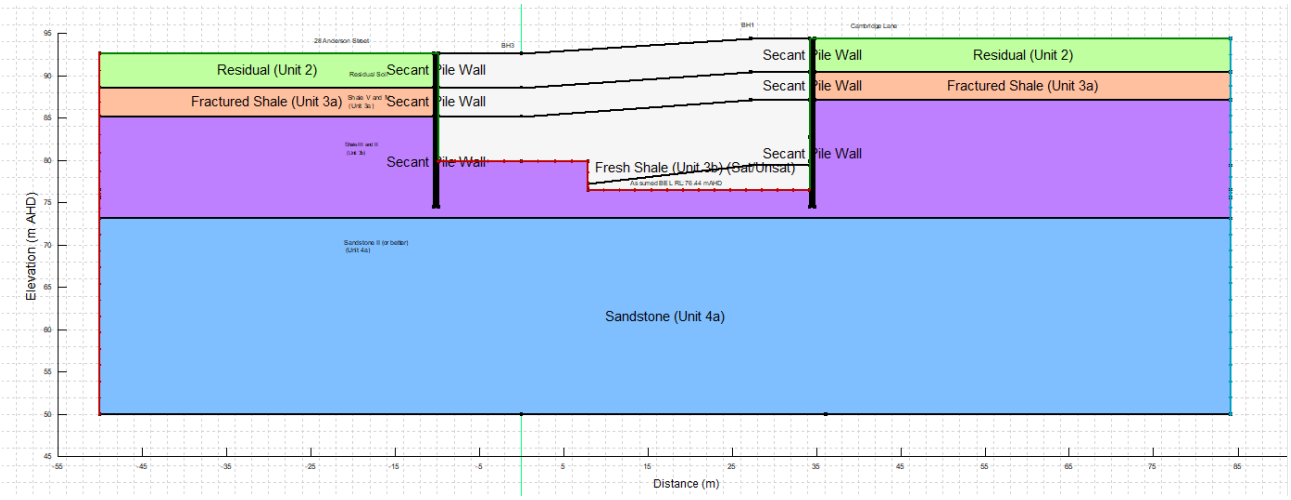

Figure 2 – Model Geometry of Analysed Section A (Top) and B (Bottom)

On the basis that groundwater monitoring data, for Section A and Section B, the design ground water is conservatively adopted at RL 84.5m across the whole site, approximately 2.0 m higher than the recorded highest groundwater standing level. Groundwater also runs from north-western corner towards south-eastern corner.

Considering the very low permeability clay layer on the upper zone and monitoring records, the groundwater seepage impacted by the direct site surface runoff is very low. Seepage will be governed by the bedrock discontinuities and defects and subject to regional intense and prolonged rainfall.

2.5 Results

The analysis was run under transient and steady-state conditions for analysed Section and comprised the following:

- **Transient condition:** A transient scenario to estimate the volume of water removed by sump-and-pump in phases of dewatering (i.e. 6-month construction period) in the 'Tank' basement during basement excavation construction.
- **Steady-state condition:** Tank basement using secant pile cut-off wall was adopted to estimate the inflows for a long-term condition.

Two sections with different site area and ground profiles are modelled to capture the flow rates considering soil variability over the project area. The modelling results for analysed section are summarised in tables below. Even though the secant pile walls are typically used to support the ground around deep excavations and as a cut-off wall, it provides relatively impermeable barrier to groundwater but it is not completely impermeable. Low permeability of secant pile wall minimises the seepage of the groundwater through either the piles or wall as a whole significantly and generally permeability of secant pile wall is less than 1 x 10^{-10} m/s. Hence, two cases was simulated considering wall is completely impermeable and slightly permeable. The results are summasied in tables below.

The Seep/W outputs are attached in Appendix C.

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Table 6 Modelling Results by Seep/W – Section A (Secant pile wall is slightly permeable)

Elapsed Time	Flow rate (m3 / sec / m run)	Dewatering Flow Rate – Side Walls			Dewatering Flow Rate – Base		
		L / sec	m^3 / day	Average ML	L / sec	m^3 / day	Average ML
1 days	2.94E-07	1.83E-03	0.16	0.01 (First 6 months)	1.20E-02	1.04	0.05 (First 6 months)
3 days	9.04E-08	8.64E-05	0.01		3.93E-03	0.34	
7 days	8.20E-08	6.59E-04	0.06		3.28E-03	0.28	
14 days	7.76E-08	6.40E-04	0.06		3.09E-03	0.27	
30 days	7.45E-08	6.21E-04	0.05		2.97E-03	0.26	
60 days	7.21E-08	6.08E-04	0.05		2.87E-03	0.25	
90 days	7.07E-08	5.98E-04	0.05		2.81E-03	0.24	
120 days	6.96E-08	5.83E-04	0.05		2.77E-03	0.24	
180 days	6.84E-08	5.83E-04	0.05		2.72E-03	0.23	
Long-term	5.51E-08	3.04E-04	0.03	0.010 Per year	2.27E-03	0.20	0.072 Per year

Table 7 Modelling Results by Seep/W – Section A (Secant pile wall is completely impermeable)

Elapsed Time	Flow rate (m3 / sec / m run)	Dewatering Flow Rate – Side Walls			Dewatering Flow Rate – Base		
		L / sec	m^3 / day	Average ML	L / sec	m^3 / day	Average ML
1 days	0.00E+00	0.00E+00	0.00	0.00 (First 6 months)	8.58E-03	0.74	0.04 (First 6 months)
3 days	0.00E+00	0.00E+00	0.00		2.99E-03	0.26	
7 days	0.00E+00	0.00E+00	0.00		2.57E-03	0.22	
14 days	0.00E+00	0.00E+00	0.00		2.44E-03	0.21	
30 days	0.00E+00	0.00E+00	0.00		2.35E-03	0.20	
60 days	0.00E+00	0.00E+00	0.00		2.28E-03	0.20	
90 days	0.00E+00	0.00E+00	0.00		2.25E-03	0.19	
120 days	0.00E+00	0.00E+00	0.00		2.22E-03	0.19	
180 days	0.00E+00	0.00E+00	0.00		2.19E-03	0.19	
Long-term	0.00E+00	0.00E+00	0.00	0.000 Per year	1.70E-03	0.15	0.05 Per year

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Table 8 Modelling Results by Seep/W – Section B (Secant pile wall is slightly permeable)

Elapsed Time	Flow rate (m3 / sec / m run)	Dewatering Flow Rate – Side Walls			Dewatering Flow Rate – Base		
		L / sec	m^3 / day	Average ML	L / sec	m^3 / day	Average ML
1 days	2.05E-07	8.72E-05	0.01	0.00 (First 6 months)	1.27E-02	1.10	0.06 (First 6 months)
3 days	8.14E-08	5.02E-05	0.00		5.05E-03	0.44	
7 days	7.09E-08	4.91E-05	0.00		4.39E-03	0.38	
14 days	6.80E-08	4.83E-05	0.00		4.21E-03	0.36	
30 days	6.59E-08	4.76E-05	0.00		4.08E-03	0.35	
60 days	6.43E-08	4.67E-05	0.00		3.98E-03	0.34	
90 days	6.33E-08	4.61E-05	0.00		3.92E-03	0.34	
120 days	6.26E-08	4.56E-05	0.00		3.88E-03	0.33	
180 days	6.17E-08	4.50E-05	0.00		3.82E-03	0.33	
Long-term	5.35E-08	3.96E-05	0.00	0.001 Per year	3.31E-03	0.29	0.105 Per year

Table 9 Modelling Results by Seep/W – Section B (Secant pile wall is completely impermeable)

Elapsed Time	Flow rate (m3 / sec / m run)	Dewatering Flow Rate – Side Walls			Dewatering Flow Rate – Base		
		L / sec	m^3 / day	Average ML	L / sec	m^3 / day	Average ML
1 days	0.00E+00	0.00E+00	0.00	0.00 (First 6 months)	1.25E-02	1.08	0.06 (First 6 months)
3 days	0.00E+00	0.00E+00	0.00		4.85E-03	0.42	
7 days	0.00E+00	0.00E+00	0.00		4.20E-03	0.36	
14 days	0.00E+00	0.00E+00	0.00		4.02E-03	0.35	
30 days	0.00E+00	0.00E+00	0.00		3.90E-03	0.34	
60 days	0.00E+00	0.00E+00	0.00		3.84E-03	0.33	
90 days	0.00E+00	0.00E+00	0.00		3.75E-03	0.32	
120 days	0.00E+00	0.00E+00	0.00		3.71E-03	0.32	
180 days	0.00E+00	0.00E+00	0.00		3.65E-03	0.32	
Long-term	0.00E+00	0.00E+00	0.00	0.000 Per year	3.19E-03	0.28	0.101 Per year

Based on the above seepage rates and the size of the proposed excavation, the expected seepage to a tank basement is modelled to be:

- **If the walls are slightly permeable;**
    - Short term flows for temporary dewatering during construction will be 0.07 ML over the first 6 months (i.e. 0.01 ML + 0.00 ML + 0.06 ML (max. base flow out of all two models).

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- Long term flows during service life of structure will be 0.12 ML/year (i.e. 0.01 ML + 0.001 ML + 0.105 ML (max. base flow out of all two models)

- **If the walls are completely permeable;**
  - Short term flows for temporary dewatering during construction will be 0.06 ML over the first 6 months (i.e. 0.00 ML + 0.00 ML + 0.06 ML (max. base flow out of all two models).
  - Long term flows during service life of structure will be 0.10 ML/year (i.e. 0.00 ML + 0.00 ML + 0.101 ML (max. base flow out of all two models)

Projected seepage inflows for a tank basement are below the WaterNSW threshold of 3 ML/year. It is confirmed that this proposed development can be granted the Groundwater Access License exemptions.

During the early stages of the excavation, initial inflow rates will be higher due to the absorbed water within the cohesive soil and fractured rock layers. The water flow will then gradually decrease as the hydraulic gradient around the excavation decreases.

The actual flow rate will only be known once the excavation is completed, and the inflow can be observed and measured. Appropriate planning should be in place to compensate for possible variations and increases in the actual inflow rate. This may include grouting the overlaps of soft and hard piles and also floor of the excavation if locally fractured rock and high inflows through these fractured zones are observed at the basement excavation floor.

In addition, the maximum long term ground water seepage is expected to be 0.12 ML/year for the worst case, which can be considered as negligible. However, if the long term seepage is required to be further reduced, the secant pile wall can be extended more than 2m below the bulk excavation level during the detailed design stage to ensure the effectiveness of water barrier and to reduce the amount of seepage more than estimated in this assessment. In addition, the estimated seepage can be significantly reduced by using effective waterproofing measures at the bulk excavation level which along with basement slabs have not been considered in this assessment.

3 Assessments

It is assessed that the proposed earthwork will intersect with the underground groundwater table. Groundwater will be limited to minor seepage only during tank basement excavation.

The topography and measured standing groundwater levels indicate that there is a hydraulic gradient, and groundwater inflows (if any) may be predominately from the northern and western basement excavation wall.

Conservative groundwater modelling has been undertaken and it is predicted that maximum groundwater inflow of near 0.07 ML and 0.12 ML may be expected (nominated 6 and 12 months period).

It is evident from the results of Stantec's seepage analysis that a tank basement is adopted, the volume of water entering the basement is minimal. Basement slab or any water proofing has not been considered in this assessment. The contractor should make sure that the basement is fully watertight for the design life of the building. The waterproofing of basement should be carefully designed and constructed to avoid any water seepage for unforeseen highwater table elevations such as flood events. In addition, a surface drainage plan should also be prepared to ensure any surface water will drain either away from the building, or to dedicated sumps for pumping off-site for long term conditions.

In the long term, sufficient drainage should be provided around the perimeter of the basement and below the basement slab.

It is noted that this report is prepared by DA submission only. No builder is yet to be awarded for this project. Dewatering management plan should be prepared by the future builder in order to discharge the seepage water during basement excavation.

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Given that the predicted inflow is less than 3 ML/year during construction and long term usage, the proposed excavation is considered as an exemption from a Water Access License from Water NSW but will require a Water Supply Works Approval for construction dewatering.

All observed groundwater seepage has been limited to bedrock units, where groundwater flows are dictated by joints, beddings, and contacts. Hence the effects of groundwater drawdown on adjacent properties and structures are considered to be negligible. Considering the negligible draw-down impact within 50m distance around the shoring wall, the surrounding structures impacts are considered be negligible. It is expected that there will be no harmful impact to the surround receptors during the basement construction and dewatering.

Based on both the groundwater modelling assessment and Stantec's previous experience at the Chatswood region (upper north shore), the expected groundwater inflows will be manageable during temporary construction with a typical sump and pump setup which has the capacity to handle the inflows calculated in this assessment.

4 NSW Aquifer Interference Policy Impact Assessment

The Water Management Act 2000 includes the concept of ensuring "no more than minimal harm" for the granting of approvals.

For the purposes of this assessment and based on the regional hydrogeological profile, the groundwater source at the site is a "less productive" source as it does not contain water supply works that can yield water at a rate greater than 5 L/sec. The Groundwater Source is assessed as a "Porous or Fractured Rock Water Source".

The impact assessment has been based on the following three assessment criteria:

4.1 Water Table

Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any:

(a) high priority groundwater dependent ecosystem; or

(b) high priority culturally significant site;

listed in the schedule of the relevant water sharing plan.

A maximum of a 2 m decline cumulatively at any water supply work.

Analysis presented within this report shows that all drawdown effects of the proposed works are considered negligible to all nearby receivers, therefore Stantec confirms that the proposed works will have "minimal impact" on the Water Table.

4.2 Water Pressure

A cumulative pressure head decline of not more than a 2m decline, at any water supply work.

As discussed, no registered water supply works are present within 50 m of the proposed excavation. Analysis presented within this report shows that all drawdown effects of the proposed works are considered negligible to all nearby receivers, therefore Stantec confirms that the proposed works will have "minimal impact" on the Water Pressure.

4.3 Water Quality

Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity.

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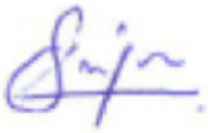
Dewatering Management Plan (DMP) for the site will be prepared and submitted by the future awarded builder. General Term of Approval with condition shall be granted with Water quality monitoring will be carried out throughout the works as part of the DMP requirements.

It is expected that the works are not projected to cause any detrimental effect to the water quality beyond 40 m from the activity. Based on the assessment of the proposed works achieving the requirements of Level 1 minimal impact considerations, Stantec confirms that the proposed works will do no more than minimal harm.

To	Prepared by	Reviewed by	Date
Loftex Chatswood Pty Ltd	 Yasmin Chen Geotechnical Engineer Yasmin.chen@stantec.com	 Namal Yapage Senior Principal Geotechnical Engineer Namal.yapage@stantec.com	11/02/2025

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203 Pacific Highway , St Leonards
NSW,2065
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Appendix A – Site Plan

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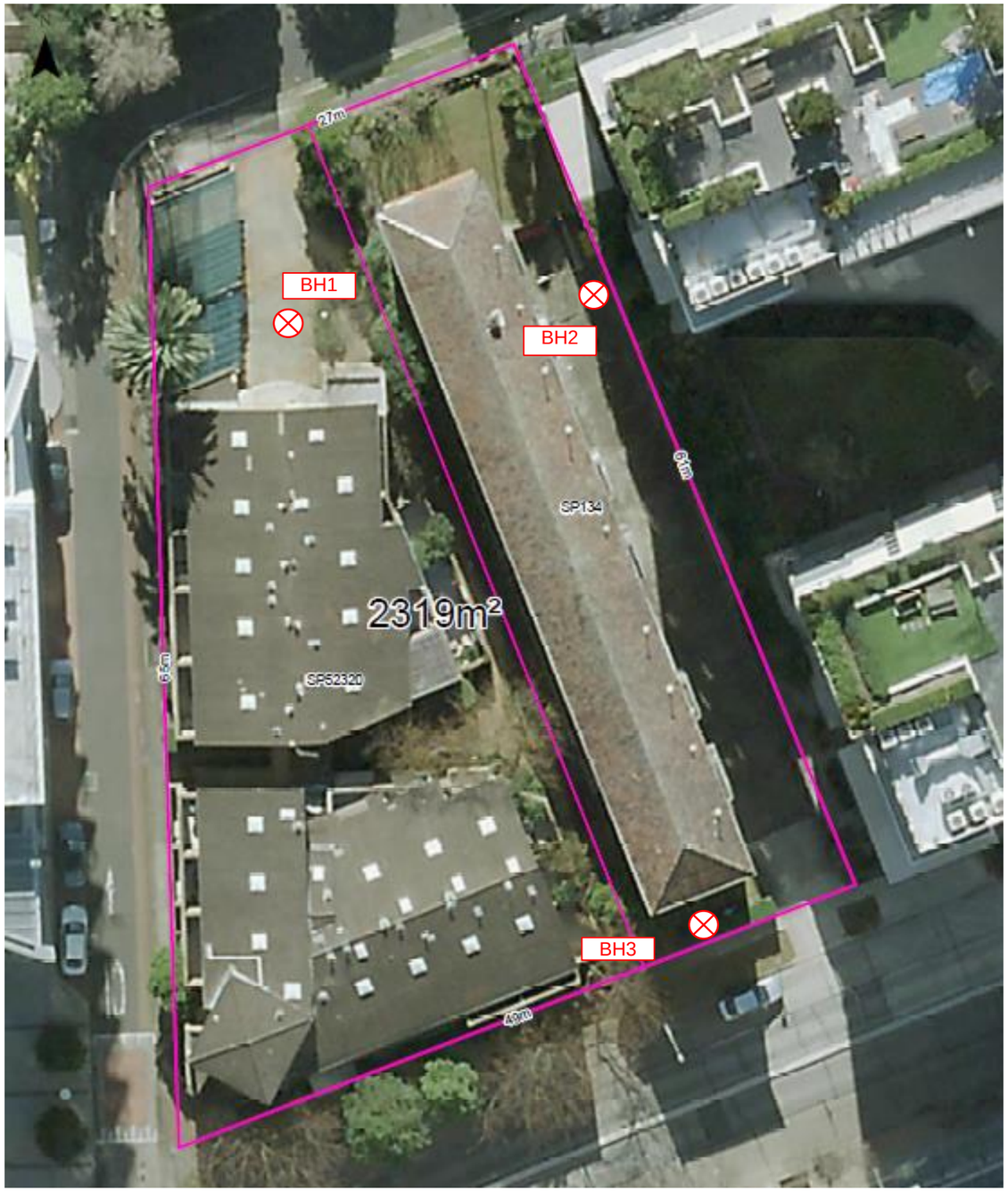
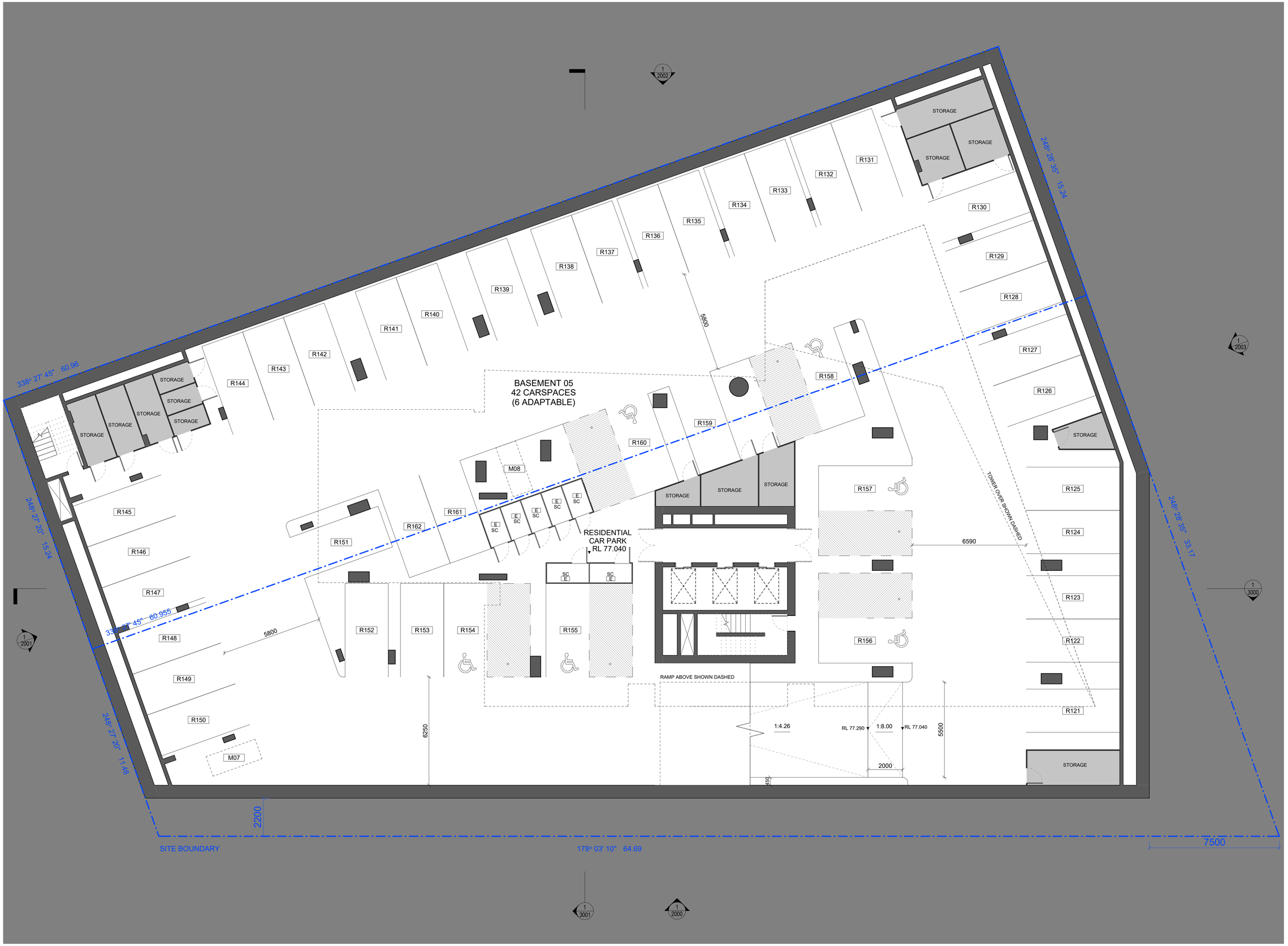


⊗ BOREHOLE AND TEST LOCATION

Cardno Shaping the Future	TITLE: **Site Plan** **3-5 Help St Chatswood Geotechnical Investigation**		
	PROJECT NO: **301351072**	TEST DATE: **21/12/2022**	PREPARED BY: **TH**



Iss.	Date	For
A	06.08.2024	Scoping Meeting

Legend

SC Storage cage

General Notes

Verify dimensions on site prior to commencement of work. Check existing RL's on site. Advise Architect of any discrepancies before commencement. Allow for adjustments to suit discrepancies. Comply with relevant authorities requirements. Comply with Building Code of Australia requirements. Comply with relevant Australian Standards for materials and construction practice. Comply with Basix Certificate. Do not scale from drawings.

Acknowledgement of Country

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Loftex Chatswood Pty. Ltd.
02 8920 0516

Mecone | Planner
Jordan Faeghi
0437 898 661

BG&E | Structure
Vince Betro
0414 814 862

Neuron | Services
Steve Cassells
0401 222 862

Common Grounds | Landscape
Alex Georgouras
0404 626 520

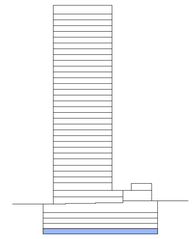
Walkerbai | ESD
Stewart Mann
0407 545 647

Stantec | Civil
Jackson Bramley
0421 193 028

PDC Consultants | Traffic
Ben Midgley
0413 167 797

Design Confidence | BCA / Access
Lindsay Beard
0407 870 612

Key Section



Project
Help Street Apartments

Project No.
22023

Address
3-5 Help Street Chatswood

Status
FOR INFORMATION

Drawn	Authorised	Date Issued
MD	MP	06.08.2024

Drawing
B05 Plan

Drawing No.
1000

Scale
1 : 100 @ A1

Issue
A

North

0 1000 2000 3000 4000 5000
Scale 1:100 mm

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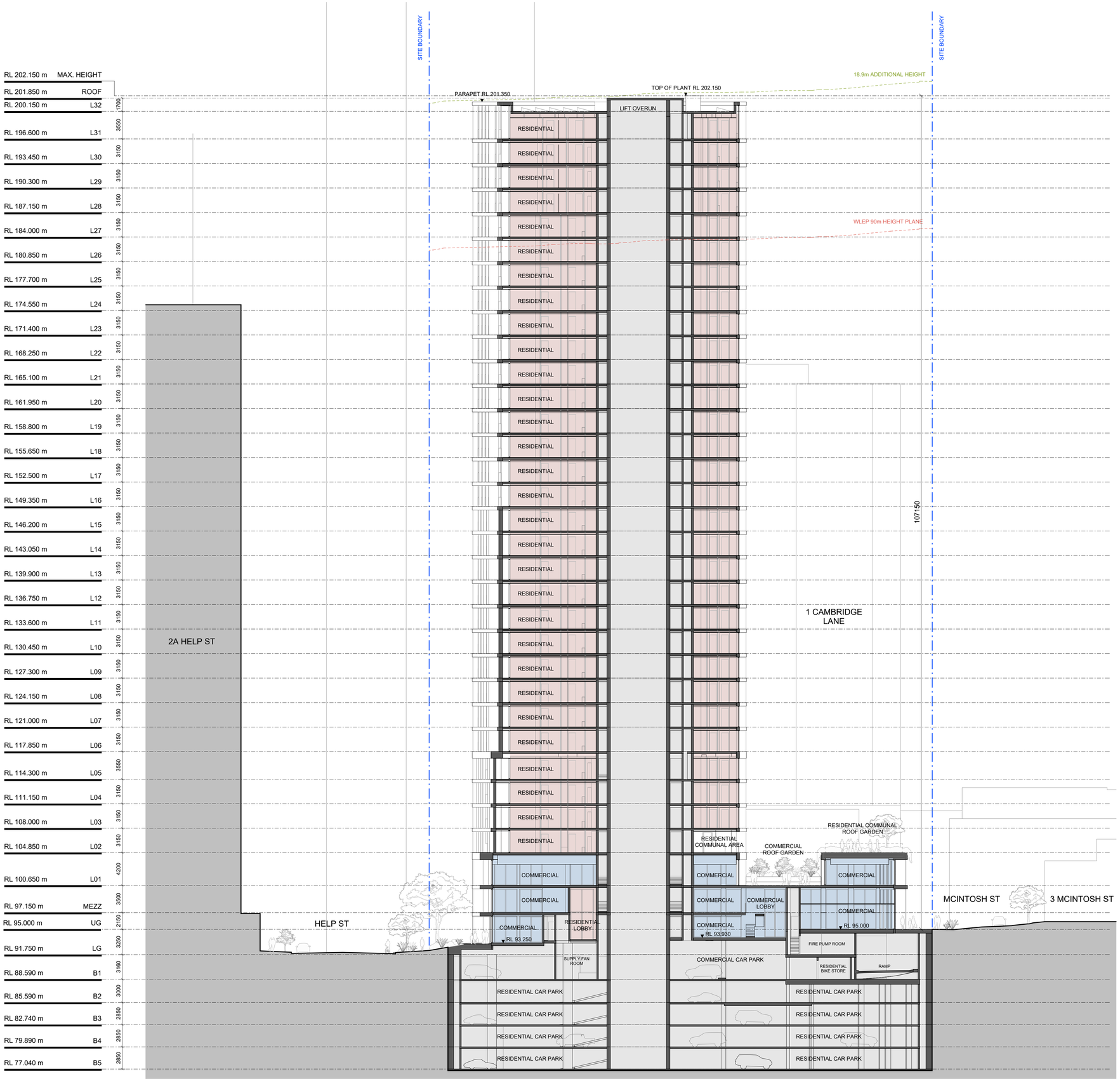
EMBECE.com.au
+612 9125 0569
Suite 3, 414 Bourke Street
Surry Hills, NSW 2010 Australia

Nominated Architects
Mladen Prnjatovic 7468
Ben Green 7066
Chi Melhem 7754



Iss.	Date	For
A	06.08.2024	Scoping Meeting

General Notes
Verify dimensions on site prior to commencement of work. Check existing RL's on site. Advise Architect of any discrepancies before commencement. Allow for adjustments to suit discrepancies. Comply with relevant authorities requirements. Comply with Building Code of Australia requirements. Comply with relevant Australian Standards for materials and construction practice. Comply with Basix Certificate. Do not scale from drawings.

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02 8920 0516

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Jordan Faeghi
0437 898 661

BG&E | Structure
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PDC Consultants | Traffic
Ben Midgley
0413 167 797

Design Confidence | BCA / Access
Lindsay Beard
0407 870 612

Project
Help Street Apartments

Project No.
22023

Address
3-5 Help Street Chatswood

Status
FOR INFORMATION

Drawn	Authorised	Date Issued
SY	MP	06.08.2024

Drawing
Section North-South

Drawing No.
3000

Scale
1 : 250 @ A1

Issue
A

0 2500 5000 7500 10000 12500
mm

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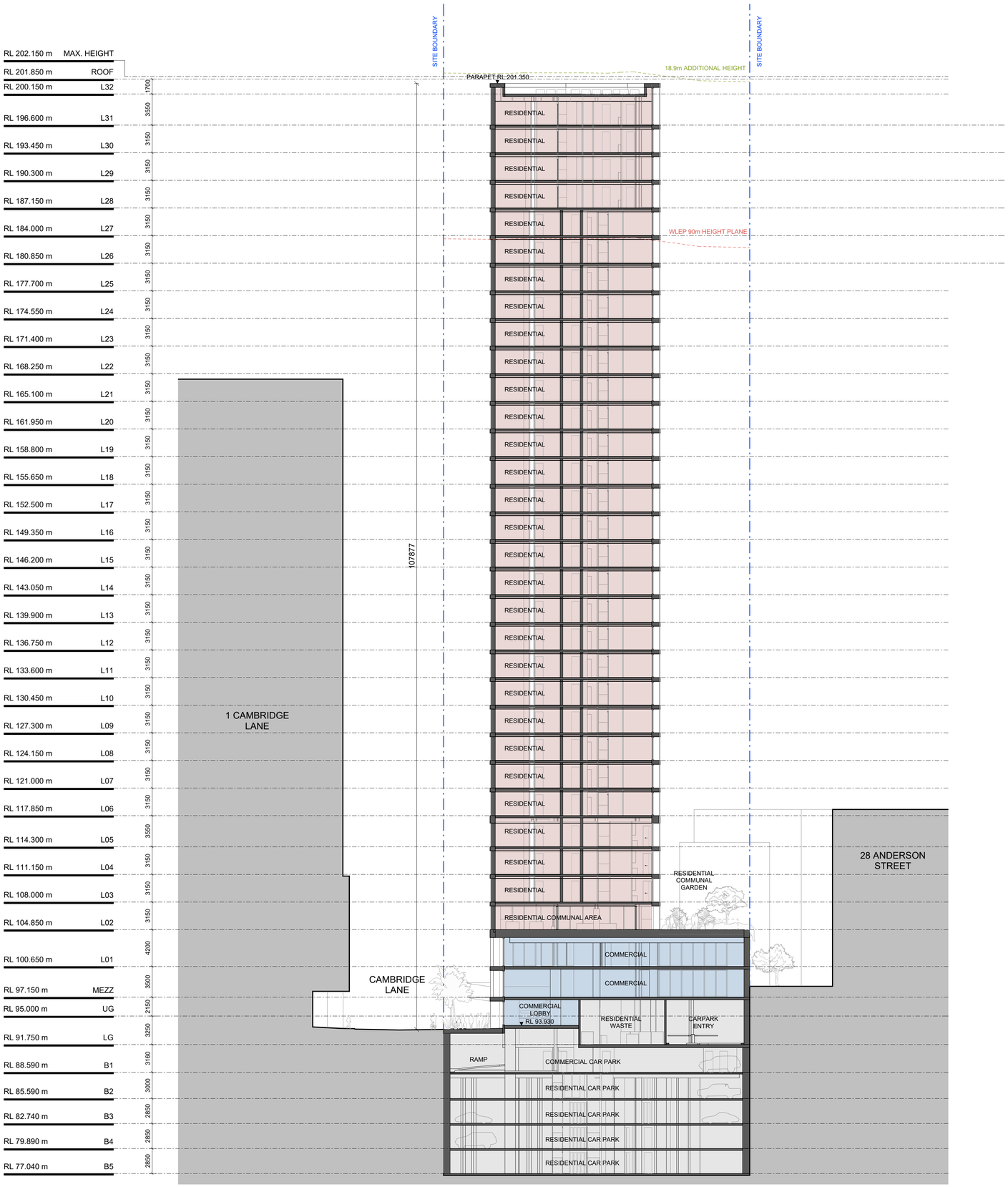
Suite 3, 414 Bourke Street
Surry Hills, NSW 2010 Australia

Nominated Architects
Mladen Prnjatovic 7468
Ben Green 7066
Chi Melhem 7754

Iss.	Date	For
A	06.08.2024	Scoping Meeting



General Notes
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02 8920 0516

Mecone | Planner
Jordan Faeghi
0437 898 661

BG&E | Structure
Vince Betro
0414 814 862

Neuron | Services
Steve Cassells
0401 222 862

Common Grounds | Landscape
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0404 626 520

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Stantec | Civil
Jackson Bramley
0421 193 028

PDC Consultants | Traffic
Ben Midgley
0413 167 797

Design Confidence | BCA / Access
Lindsay Beard
0407 870 612

Project
Help Street Apartments

Project No.
22023

Address
3-5 Help Street Chatswood

Status
FOR INFORMATION

Drawn	Authorised	Date Issued
SY	MP	06.08.2024

Drawing
Section East-West

Drawing No.
3001

Scale
1 : 250 @ A1

Issue
A

0 2500 5000 7500 10000 12500 mm

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+612 9125 0569
Suite 3, 414 Bourke Street
Surry Hills, NSW 2010 Australia

Nominated Architects
Mladen Prnjatovic 7468
Ben Green 7066
Chi Melhem 7754

Appendix B – Borehole and Groundwater Measurement Records

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NSW,2065
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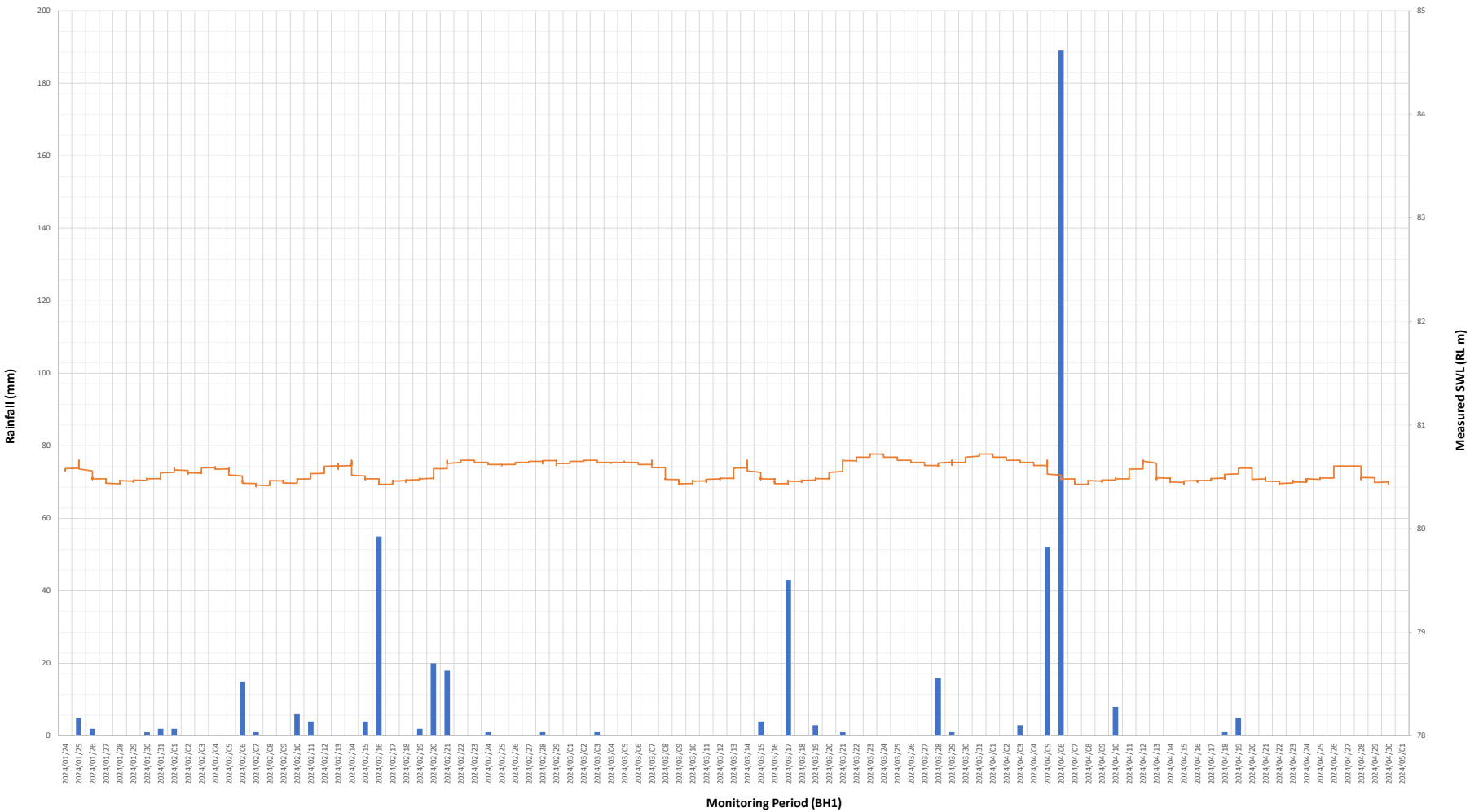
Rainfall (mm)
Measured SWL (RL m)
Monitoring Period (BH1)
200
180
160
140
120
100
80
60
40
20
0
85
84
83
82
81
80
79
78
2024/01/24
2024/01/25
2024/01/26
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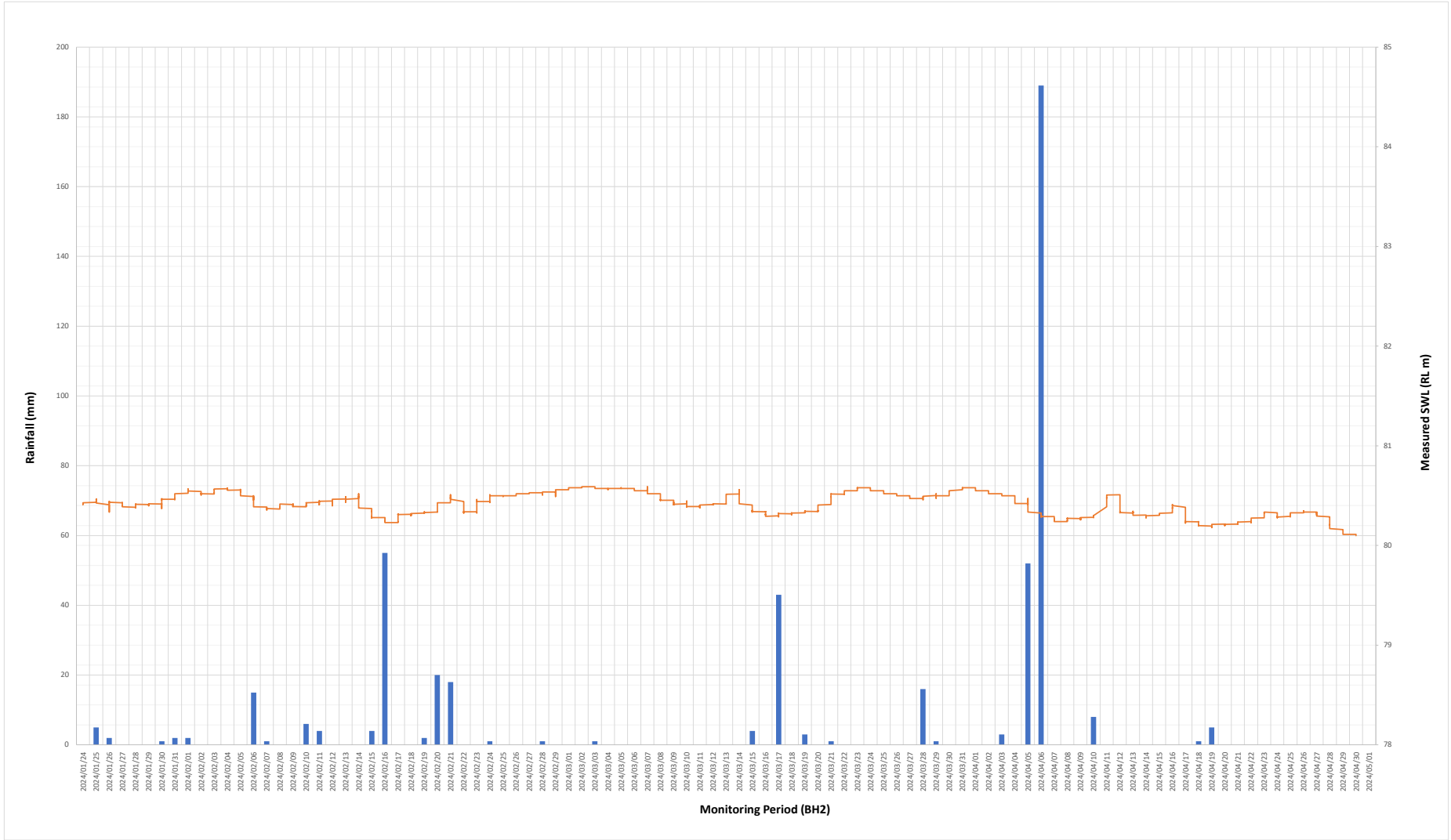
Rainfall (mm)
Measured SWL (RL m)
Monitoring Period (BH2)
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180
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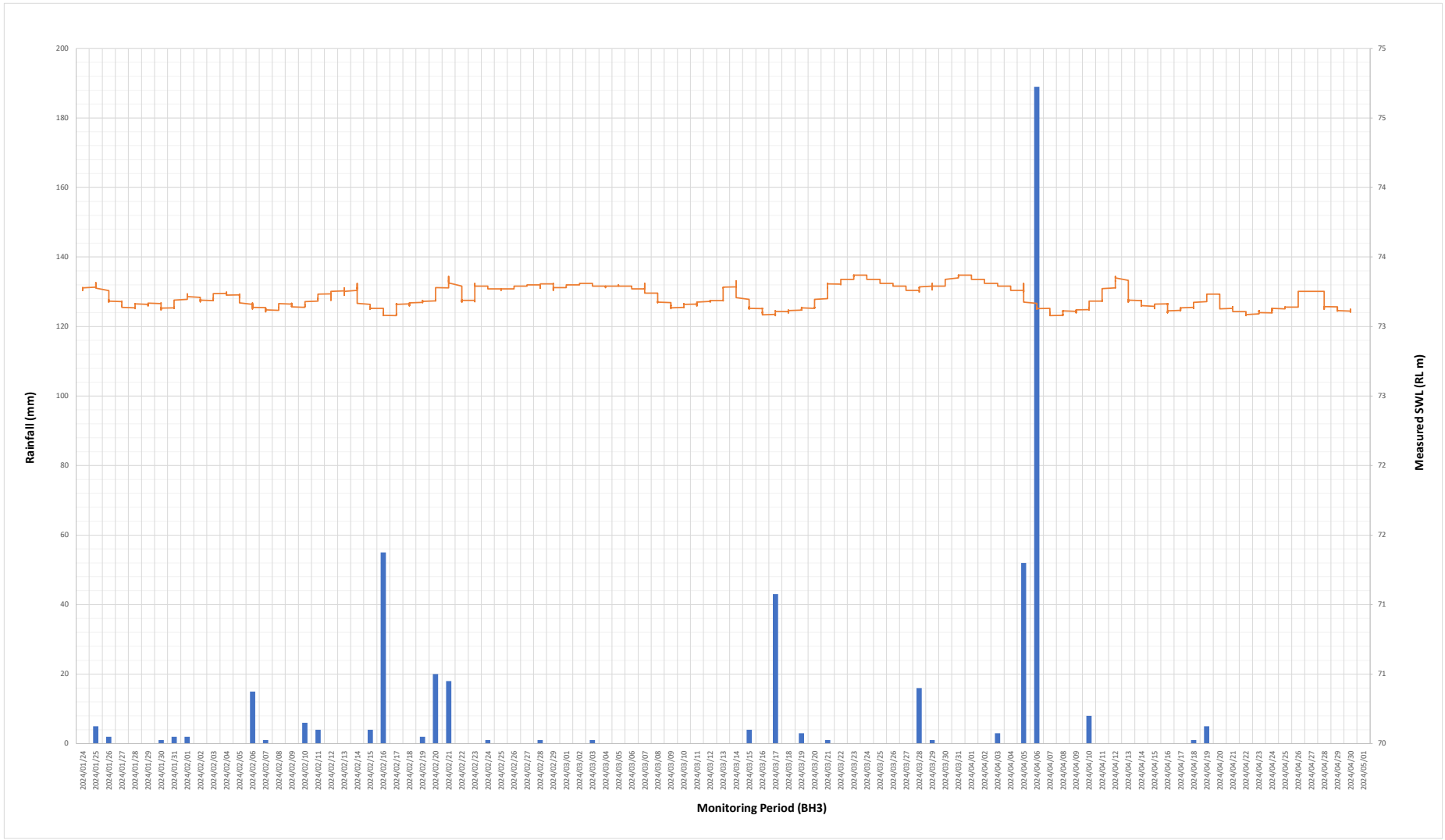
Rainfall (mm)
Measured SWL (RL m)
Monitoring Period (BH3)
200
180
160
140
120
100
80
60
40
20
0
75
74
73
72
71
70

Permeability of Soil - Constant Head Method Using a Flexible Wall Permeameter Report

Client	Stantec	**Source**	3-5H-BH101 2.5-2.8m
Address	Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065	**Sample Description**	Silty CLAY
Project	3-5 Help St Street Chatswood	**Report No**	S93918-TP
Job No	S24039-3	**Lab No**	S93918

Test Procedure	AS 1289 6.7.3 Determination of permeability of soil-Constant head method using a flexible wall permeameter		
Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	25/01/2024
Preparation	Prepared in accordance with the test method	**Date Tested**	06-02-24

Test Details	
Specimen Type	Undisturbed
Remoulding Details	-
Tested Portion	-
Permeant Type	Sydney Tap Water

Specimen Details	
Percent Retained on 37.5 mm Sieve (%)	-
Maximum Dry Density (t/m^3)	-
Optimum Moisture Content (%)	-
Test Moisture Content (%)	20.5
Moisture Ratio (%)	-
Test Dry Density (t/m^3)	1.78
Density Ratio (%)	-
Specimen Length (mm)	49.9
Specimen Diameter (mm)	49.9
Length to Diameter Ratio	1.0

Test Data	
Confining Pressure (kPa)	550
Back Pressure (kPa)	500
Mean Effective Stress (kPa)	50
Coefficient of Permeability k(20) (m/second)	**8E-11**

Notes

NATA

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NATA Accredited Laboratory Number: 14874

Authorised Signatory: Date:

06-02-24

Chris Lloyd

MACQUARIE GEOTECH

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

Permeability of Soil - Constant Head Method Using a Flexible Wall Permeameter Report

Client	Stantec	**Source**	3-5H-BH102 0.8-1.0m
Address	Level 9 - The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065	**Sample Description**	Silty CLAY
Project	3-5 Help Street Chatswood	**Report No**	S93919-TP
Job No	S24039-3	**Lab No**	S93919

Test Procedure	AS 1289 6.7.3 Determination of permeability of soil-Constant head method using a flexible wall permeameter		
Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	25/01/2024
Preparation	Prepared in accordance with the test method	**Date Tested**	06-02-24

Test Details	
Specimen Type	Undisturbed
Remoulding Details	-
Tested Portion	-
Permeant Type	Sydney Tap Water

Specimen Details	
Percent Retained on 37.5 mm Sieve (%)	-
Maximum Dry Density (t/m^3)	-
Optimum Moisture Content (%)	-
Test Moisture Content (%)	19.4
Moisture Ratio (%)	-
Test Dry Density (t/m^3)	1.72
Density Ratio (%)	-
Specimen Length (mm)	50.3
Specimen Diameter (mm)	50.3
Length to Diameter Ratio	1.0

Test Data	
Confining Pressure (kPa)	550
Back Pressure (kPa)	500
Mean Effective Stress (kPa)	50
Coefficient of Permeability k(20) (m/second)	**4E-10**

Notes

NATA

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Results relate only to the samples tested.

NATA Accredited Laboratory Number: 14874

Authorised Signatory: Date:

06-02-24

Chris Lloyd

MACQUARIE GEOTECH

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH01
FILE / JOB NO : 301351072
SHEET : 1 OF 3

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331647.190, N: 6259120.800 (56 MGA94) SURFACE ELEVATION : 94.400 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 23/11/22 DATE COMPLETED : 23/11/22 DATE LOGGED : 23/11/22 LOGGED BY : RKC CHECKED BY : TH

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T		H E F	Not Encountered	0.50m D 1.00m 1.50m SPT 3, 5, 5 N=10 1.95m 2.00m D 2.50m 3.00m SPT 6, 8, 9 N=17 3.45m 4.50m SPT 8, 25, 25 N=50 4.95m 6.00m SPT 16, 20, 23 N=42 6.45m	0.0 94.4 1.0 93.4 2.0 92.4 3.0 91.4 4.0 90.4 5.0 89.4 6.0 88.4 7.0 87.4 8.0 86.4		CI-CH CI-CH CI-CH	0.10m CONCRETE 0.20m FILL: SAND: grey, fine to coarse grained sand SILTY CLAY: grey, medium to high plasticity, trace sub-rounded to angular gravel, trace rootlets 0.80m SILTY CLAY: brown, grey, medium to high plasticity, trace rootlets 2.00m SILTY CLAY: grey, medium to high plasticity, with ironstone gravel 4.00m SILTY CLAY: dark grey, medium to high plasticity, with inferred siltstone, extremely weathered to highly weathered gravel 7.08m Continued as Cored Drill Hole	M D M	F St	FILL RESIDUAL SOIL WEATHERED ROCK

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

Cardno

CORED DRILL HOLE LOG

HOLE NO : BH01
FILE / JOB NO : 301351072
SHEET : 2 OF 3

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331647.190, N: 6259120.800 (56 MGA94) SURFACE ELEVATION : 94.400 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 23/11/22 DATE COMPLETED : 23/11/22 DATE LOGGED : 23/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : good

DRILLING					MATERIAL				FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral VL (-0.1) L (-0.3) M (-1.0) H (-3.0) VH (-10.0) EH	NATURAL FRACTURE (mm) 20 40 100 300 1000	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					0.0 *94.4*						
					1.0 *93.4*						
					2.0 *92.4*						
					3.0 *91.4*						
					4.0 *90.4*						
					5.0 *89.4*						
					6.0 *88.4*						
					7.0 *87.4*		7.08m START CORING AT 7.08m				
HQ	20% Water LOSS	0% LOSS	90	7.65m UCS =14 MPa 7.90m	8.0 *86.4*		7.26m SILTY CLAY (CI-CH): grey, medium to high plasticity, with inferred siltstone, extremely weathered to highly weathered gravel (WEATHERED ROCK) SILTSTONE: dark grey, 5% sandstone laminated at 0-5 degrees, grey, fine grained	SW			7.33: BP 0° CN PR S 7.41: DB 7.53: DB 7.60: DB 7.62: DB 7.66: DB 7.91: DB

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

Cardno

CORED DRILL HOLE LOG

HOLE NO : BH01
FILE / JOB NO : 301351072
SHEET : 3 OF 3

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331647.190, N: 6259120.800 (56 MGA94) SURFACE ELEVATION : 94.400 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 23/11/22 DATE COMPLETED : 23/11/22 DATE LOGGED : 23/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : good

DRILLING						MATERIAL				FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral (VL -0.1, L -0.3, M -1.0, H -3.0, VH -10.0, EH)	NATURAL FRACTURE (mm) (20, 40, 100, 300, 1000)	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ	20% Water LOSS	0% LOSS 9.00	90	Is(50) d=0.87 a=1.06 MPa	8.0 86.4		SILTSTONE: dark grey, 5% sandstone laminated at 0-5 degrees, grey, fine grained *(continued)*	SW			8.08: DB 8.13: DB 8.18: DB 8.21: DB 8.26: DB 8.32: BP 0° Clay CT PR S 8.35: DB 8.38-8.41: JT 70° CN PR S 8.44: DB 8.46: BP 0° Fe SN PR S 8.48: DB 8.51: DB 8.53: DB 8.56: DB 8.58: DB 8.61: DB 8.63: BP 0° CN PR S 8.68: DB 8.74: DB 8.77: DB 8.80-8.83: JT 40° CN PR S 8.83-8.87: JT 50° CN IR S 8.87: BP 0° CN PR S 8.92: BP 0° CN PR S 8.95: DB 8.97: DB 9.05: DB 9.10: DB 9.16: DB 9.21: BP 10° CN PR S 9.28-9.33: JT 30 - 90° CN IR S 9.39: DB 9.43: DB 9.49: DB 9.51-9.52: JT 90° CN PR S 9.56: DB 9.58: DB 9.66: DB 9.71: DB 9.74: DB 9.78-9.93: JT 70° CN PR S 10.06: SZ 10.11: SZ 10.23: HB 10.32: HB 10.37: DB 10.39: DB 10.42: DB 10.43-10.51: JT 40 - 90° CN IR S 10.57: DB 10.69: DB 10.75: DB 10.76-10.86: JT 75° CN IR S 10.86-10.89: JT 55° CN PR S 10.95: DB 11.10-11.13: JT 20 - 50° CN UN S 11.22-11.26: JT 30° CN PR S 11.29: DB 11.33: DB 11.41: EWS 11.75-11.79: JT 40° CN PR S 11.85-11.89: JT 50° CN PR S 11.90: BP 0° CN PR S 12.10: BP 10° CN PR S 12.14-12.17: JT 30° Clay FLD IR S 12.20-12.24: JT 30° CN IR S 12.27: DB 12.30: DB 12.32: DB 12.44-12.52: JT 85 - 90° CN IR S 12.56: DB 12.59: DB 12.86: BP 15° CN PR S 12.89-12.95: JT 20 - 50° CN IR S 13.25: DB 13.61: DB 14.09: DB 14.38: DB 14.88: DB
	100% Water LOSS	0% LOSS 11.40	85	Is(50) d=1.11 a=1.03 MPa	9.0 85.4						
				10.55m UCS =12 MPa 10.67m	10.0 84.4						
	100% Water LOSS	0% LOSS 12.00	85	Is(50) d=0.44 a=1.75 MPa	11.0 83.4						
	100% Water LOSS	0% LOSS 15.00	80	Is(50) d=0.86 a=0.7 MPa	12.0 82.4			HW SW F			
				14.52m UCS =16 MPa 14.77m	13.0 81.4						
				Is(50) d=0.38 a=0.89 MPa	14.0 80.4		15.00m				
					15.0 79.4		BOREHOLE BH01 TERMINATED AT 15.00 m Target depth				
					16.0 78.4						

See Explanatory Notes for details of abbreviations & basis of descriptions.

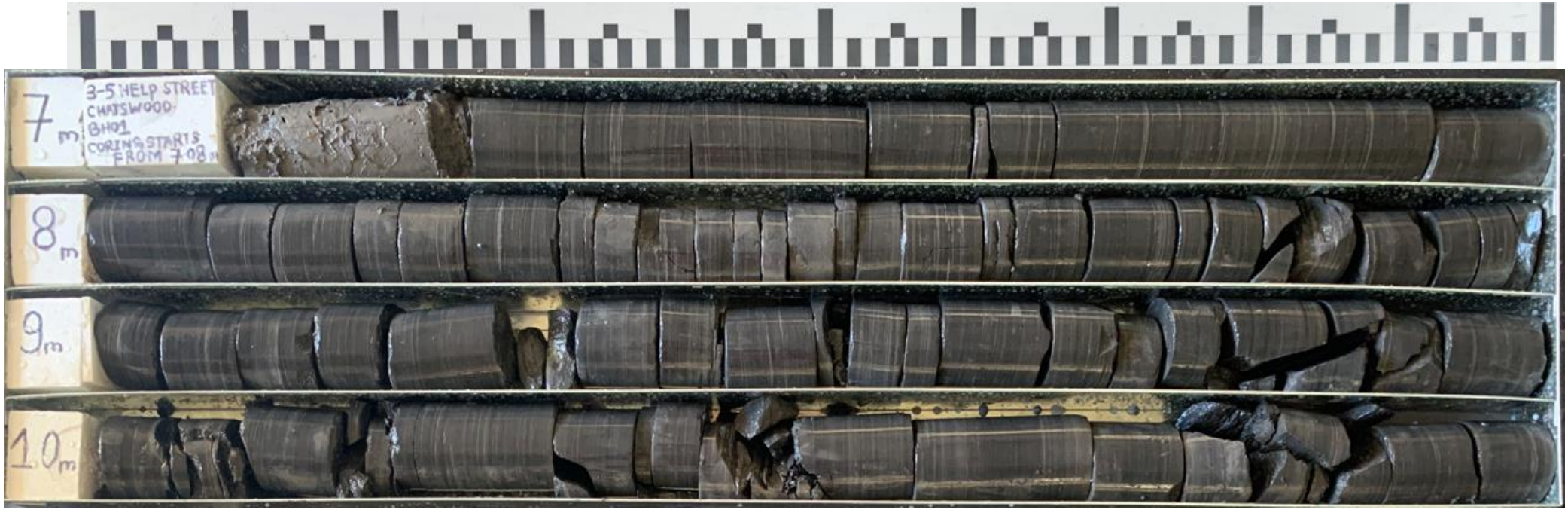
CARDNO NSW/ACT PTY LTD

Cardno

File: 301351072 BH01 3 OF 3

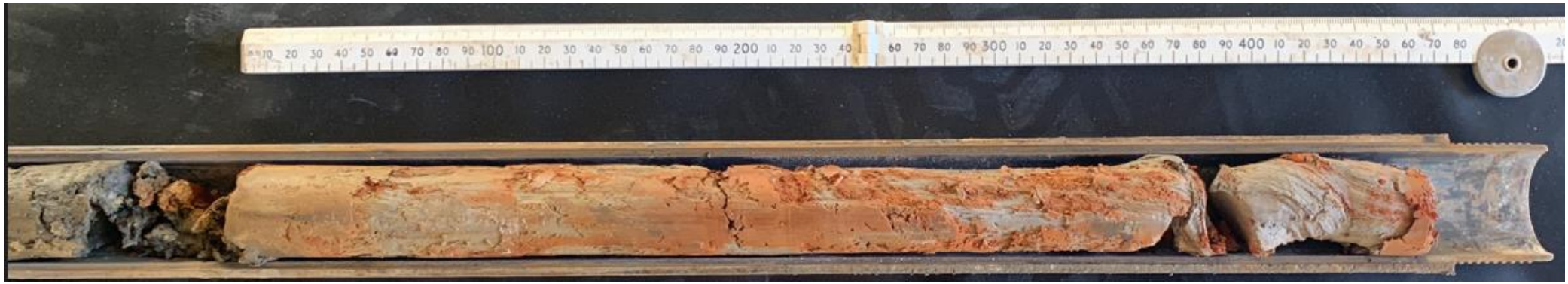
RMS LIB 40.3 EXTERNAL REV1.3.GLB Log RTA CORED DRILL HOLE 5 301351072 3-5 HELP ST. CHATWOOD.GPJ <<DrawingFile>> 22/Dec/2022 15:01 10.03.00.09 Cardno M6E

Cardno now Stantec	TITLE: **Borehole Core Photographs – BH01** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **23/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 1 OF 2** **7.08 – 11m (3.92 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



Cardno now Stantec	TITLE: **Borehole Core Photographs – BH01** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **23/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 2 OF 2** **11.0 – 15.0m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**

Cardno now Stantec	TITLE: **Borehole SPT Photographs – BH01** **3-5 Help ST, Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **23/12/2022**	INCLINATION: **-90 degree**	SPT PHOTO: **1.5-1.95**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH02
FILE / JOB NO : 301351072
SHEET : 1 OF 4

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331675.964, N: 6259082.994 (56 MGA94) SURFACE ELEVATION : 92.900 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 22/11/22 DATE COMPLETED : 22/11/22 DATE LOGGED : 22/11/22 LOGGED BY : RKC CHECKED BY : TH

DRILLING						MATERIAL					
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
AD/T		H F	Not Encountered	0.50m D 1.00m SPT 8, 30/150mm HB N=R 1.30m	0.0 92.9			0.10m CONCRETE	D		
							CI-CH	0.20m SILTY CLAY: grey, medium to high plasticity SILTY CLAY: grey, medium to high plasticity, with ironstone gravel			RESIDUAL SOIL
					1.0 91.9					St	
					2.0 90.9		CI-CH		M		
		H		3.00m SPT 6, 12,16 N=28 3.45m	3.0 89.9					VSt	
					4.0 88.9			4.00m CLAYEY GRAVEL: pale grey to grey, brown, fine to medium gravel, medium to high plasticity clay, inferred as siltstone bedrock			WEATHERED ROCK
				4.50m SPT 14, 25, 26 N=51 4.95m	5.0 87.9				D		
								5.55m Continued as Cored Drill Hole			
					6.0 86.9						
					7.0 85.9						
					8.0 84.9						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

Cardno

CORED DRILL HOLE LOG

HOLE NO : BH02
FILE / JOB NO : 301351072
SHEET : 2 OF 4

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331675.964, N: 6259082.994 (56 MGA94) SURFACE ELEVATION : 92.900 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 22/11/22 DATE COMPLETED : 22/11/22 DATE LOGGED : 22/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : good

DRILLING						MATERIAL				FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral VL -0.1 L -0.3 M -1.0 H -3.0 VH -10.0 EH	NATURAL FRACTURE (mm) 20 40 100 300 1000	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					0.0 92.9						
					1.0 91.9						
					2.0 90.9						
					3.0 89.9						
					4.0 88.9						
					5.0 87.9						
							5.55m START CORING AT 5.55m				
HQ		0% LOSS 6.00	100		6.0 86.9		SILTY CLAY (CI-CH): grey, medium to high plasticity, with fine to coarse grained gravel, with fine to coarse grained sand (WEATHERED ROCK) 5.85m	EW			
		5% LOSS	63				SILTSTONE: grey, fine grained, bedded at 20 degrees, with 10% sandstone laminated at 20 degrees, fine grained, grey	HW			5.94: HB 6.03: DB 6.06: DB 6.15: DB 6.23: BP 10° CN PR S 6.23-6.26: SM
							6.43m	EW HW			
							CORE LOSS 0.15m (6.43-6.58) 6.58m				
				Is(50) d=0.62 a=0.9 MPa	7.0 85.9		SILTSTONE: grey, fine grained, bedded at 20 degrees, with 10% sandstone laminated at 20 degrees, fine grained, grey 7.10m	EW HW EW HW EW			6.57-6.64: SM 6.67-6.68: SM 6.71-6.72: SM 6.77: BP 5° CN PR S 6.81: BP 5° CN PR S 6.83-6.85: SM 6.90: HB 7.08: BP 10° CN PR S 7.11: DB 7.15: BP 10 - 15° CN PR S 7.18: BP 15° CN IR S 7.20: DB 7.23: BP 10° CN PR S 7.31: BP 10° CN PR S 7.37-7.42: JT 40° CN PR S 7.52: DB 7.59: DB 7.60-7.66: JT 60° CN PR S
							SILTSTONE: grey, fine grained, 5% sandstone laminated at 35 degrees, fine grained, grey 7.43m	HW EW			
							SILTSTONE: grey, fine grained, less than 5% sandstone laminated at 0-5 degrees, fine grained, grey	SW F			
					8.0 84.9						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

CORED DRILL HOLE LOG

HOLE NO : BH02
FILE / JOB NO : 301351072
SHEET : 3 OF 4

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331675.964, N: 6259082.994 (56 MGA94) SURFACE ELEVATION : 92.900 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 22/11/22 DATE COMPLETED : 22/11/22 DATE LOGGED : 22/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : good

DRILLING

PROGRESS: DRILLING & CASING; WATER

(CORE LOSS RUN %) / DRILL DEPTH

RQD (%)

SAMPLES & FIELD TESTS

DEPTH (m) / RL (m AHD)

(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)
			8.0 / 84.9
5% LOSS	63		
		Is(50) d=0.38 a=1.08 MPa	
9.00			9.0 / 83.9
0% LOSS	86	Is(50) d=0.15 a=0.32 MPa	
		Is(50) d=0.66 a=1.32 MPa	
			10.0 / 82.9
		10.55m UCS =22 MPa	
		10.84m Is(50) d=0.95 a=1.17 MPa	11.0 / 81.9
12.00			
0% LOSS	85		12.0 / 80.9
		Is(50) d=0.54 a=0.88 MPa	13.0 / 79.9
			14.0 / 78.9
		Is(50) d=0.45 a=1.54 MPa	
15.10			15.0 / 77.9
0% LOSS	100	15.22m UCS =25 MPa 15.41m Is(50) d=0.76 a=1.83 MPa	
			16.0 / 76.9

HQ

MATERIAL

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

Weathering

ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral
VL -0.1 L -0.3 M -1.0 H -3.0 VH -10.0 EH

SILTSTONE: grey, fine grained, less than 5% sandstone laminated at 0-5 degrees, fine grained, grey *(continued)* — F

14.25m

SILTSTONE: grey to dark grey, fine grained, with 30% sand in matrix, fine grained

14.95m

15.10m SANDSTONE: grey, fine grained

SILTSTONE: grey, fine grained, with 5% of sandstone laminated at 0 degree, fine grained, grey

15.74m

SANDSTONE: grey, fine to medium grained, with 10% carbonaceous lamination at 0-10 degrees

FRACTURES

NATURAL FRACTURE (mm)
20 40 100 300 1000

ADDITIONAL DATA
(joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

- 7.71: DB
- 7.73: DB
- 7.81: DB
- 7.88: BP 5 - 10° CN PR S
- 7.92: BP 5 - 10° CN PR S
- 8.05: DB
- 8.16: DB
- 8.20: DB
- 8.31: BP 15 - 20° CN PR S
- 8.35: BP 15 - 20° CN PR S
- 8.40: DB
- 8.43: DB
- 8.74: DB
- 8.85: BP 5° CN PR S
- 9.15: BP 0 - 5° CN PR S
- 9.17: BP 0 - 5° CN PR S
- 9.19: BP 0 - 5° CN PR S
- 9.33: BP 0 - 30° CN PR S
- 9.35: BP 0 - 30° CN PR S
- 9.37: BP 0 - 30° CN PR S
- 9.39: BP 0 - 30° CN PR S
- 9.53: DB
- 9.78-9.82: JT 50° CN PR S
- 9.91: HB
- 9.93: HB
- 10.00-10.32: JT 80° CN PR S
- 10.32: DB
- 10.37: DB
- 10.57: DB
- 10.86: BP 5 - 30° Clay UN S
- 11.13-11.16: JT 10 - 60° CN IR S
- 11.29-11.34: JT 20 - 50° CN PR S
- 11.34-11.50: 50° CN UN S
- 11.64: DB
- 11.82: DB
- 11.92: DB
- 11.95: HB
- 12.01: BP 5° CN PR S
- 12.15-12.21: JT 45° CN PR S
- 12.25-12.34: JT 50° CN PR S
- 12.36-12.41: JT 50° CN PR S
- 12.39-12.46: JT 60° CN PR S
- 12.46-12.49: JT 45° CN PR S
- 12.62: DB
- 12.81: DB
- 13.27: DB
- 13.57: DB
- 13.62: DB
- 13.66: DB
- 13.69: DB
- 13.72: DB
- 13.77: DB
- 13.79: DB
- 13.85: DB
- 13.92: BP 0° CN PR S
- 14.11: DB
- 14.20: DB
- 14.40: DB
- 14.59: DB
- 14.67: DB
- 14.73: DB
- 14.91: DB
- 15.03: DB
- 15.10: DB
- 15.22: DB
- 15.61: DB
- 15.70: DB
- 15.78: BP 0 - 5° CN PR S
- 15.80: BP 0 - 5° CN PR S
- 15.92: DB

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

Cardno

CORED DRILL HOLE LOG

HOLE NO : BH02
FILE / JOB NO : 301351072
SHEET : 4 OF 4

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331675.964, N: 6259082.994 (56 MGA94) SURFACE ELEVATION : 92.900 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 22/11/22 DATE COMPLETED : 22/11/22 DATE LOGGED : 22/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : good

DRILLING						MATERIAL			FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	NATURAL FRACTURE (mm)	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					16.0 76.9		SANDSTONE: grey, fine to medium grained, with 10% carbonaceous lamination at 0-10 degrees *(continued)*	F		
HQ		0% LOSS	100	Is(50) d=0.99 a=4.72 MPa			16.70m			16.66: DB
					17.0 75.9		INTERLAMINATED SANDSTONE AND SILTSTONE: pale grey to grey, sandstone 50% and siltstone 50% at 0-10 degrees, fine to medium grained sandstone, pale grey and grey siltstone			16.89: DB
							17.15m INTERLAMINATED SANDSTONE AND SILTSTONE: sandstone 70% and siltstone 30% at 0-10 degrees, fine to medium grained sandstone, pale grey and grey siltstone			
		18.00					18.00m			
					18.0 74.9		BOREHOLE BH02 TERMINATED AT 18.00 m Target depth			
					19.0 73.9					
					20.0 72.9					
					21.0 71.9					
					22.0 70.9					
					23.0 69.9					
					24.0 68.9					

ESTIMATED STRENGTH Is(50) — ● - Axial ○ - Diametral
VL -0.1 L -0.3 M -1.0 H -3.0 VH -10.0 EH
NATURAL FRACTURE (mm): 20 40 100 300 1000

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

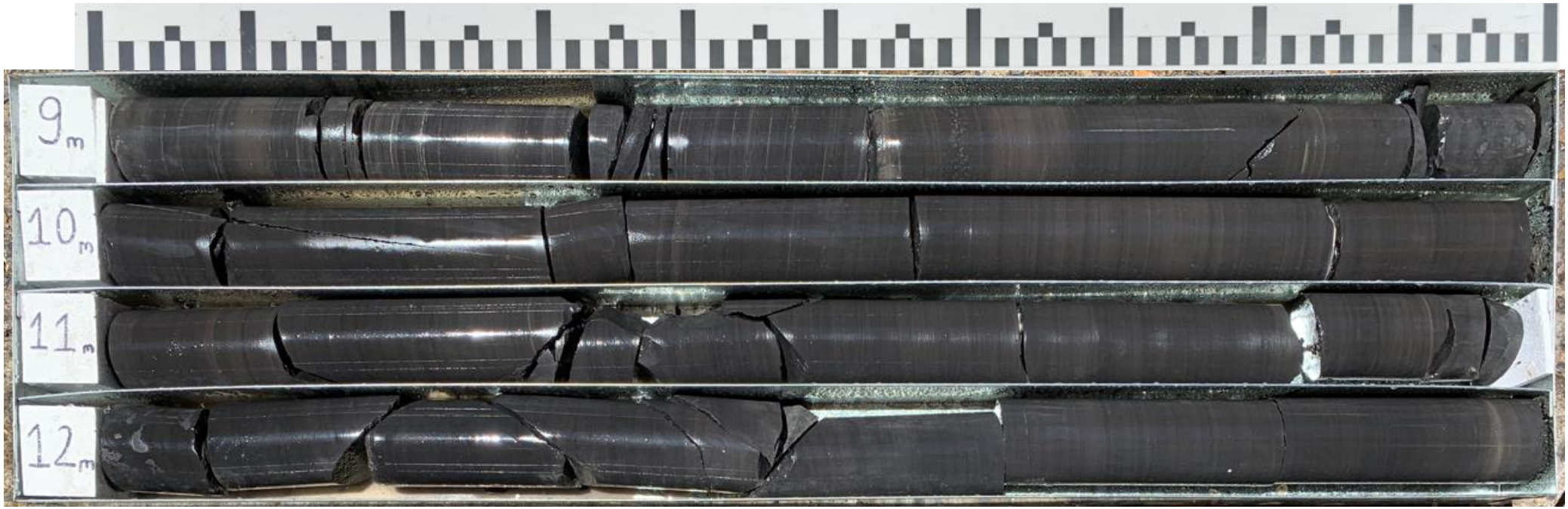
Cardno

File: 301351072 BH02 4 OF 4

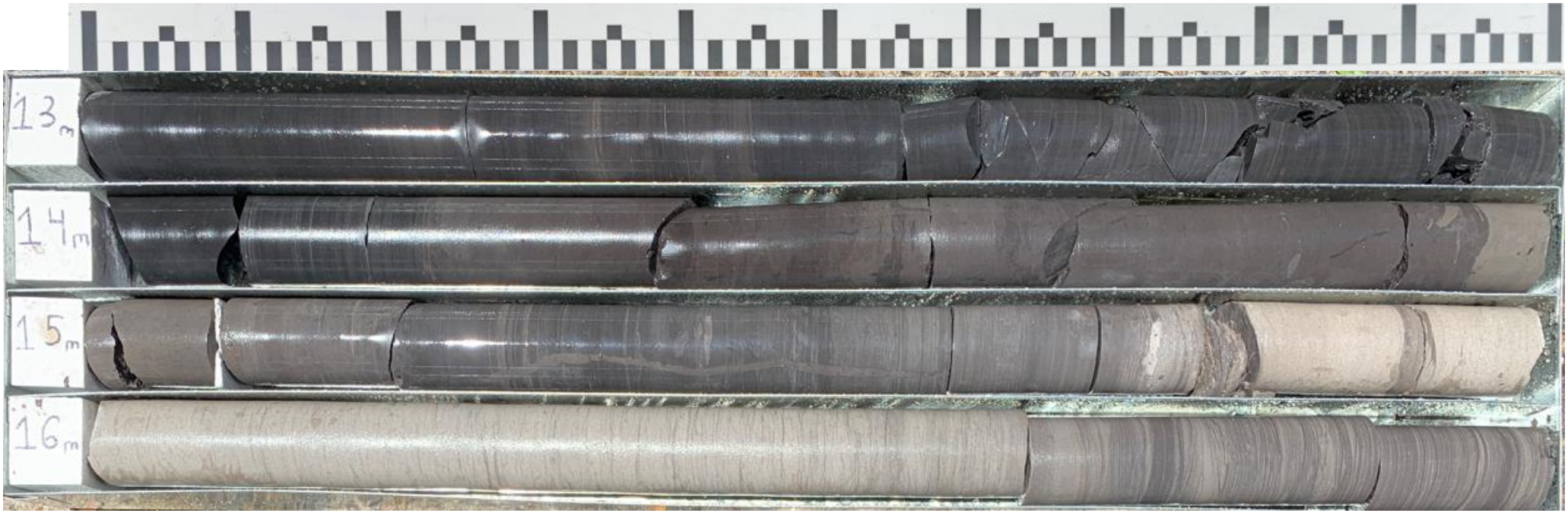
RMS LIB 40.3 EXTERNAL REV1.3.GLB Log RTA CORED DRILL HOLE 5 301351072 3-5 HELP ST. CHATWOOD.GPJ <<DrawingFile>> 22/Dec/2022 15:01 10.03.00.09 Cardno M6E

Cardno now Stantec	TITLE: **Borehole Core Photographs – BH02** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **22/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 1 OF 4** **5.60 – 9m (3.4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**

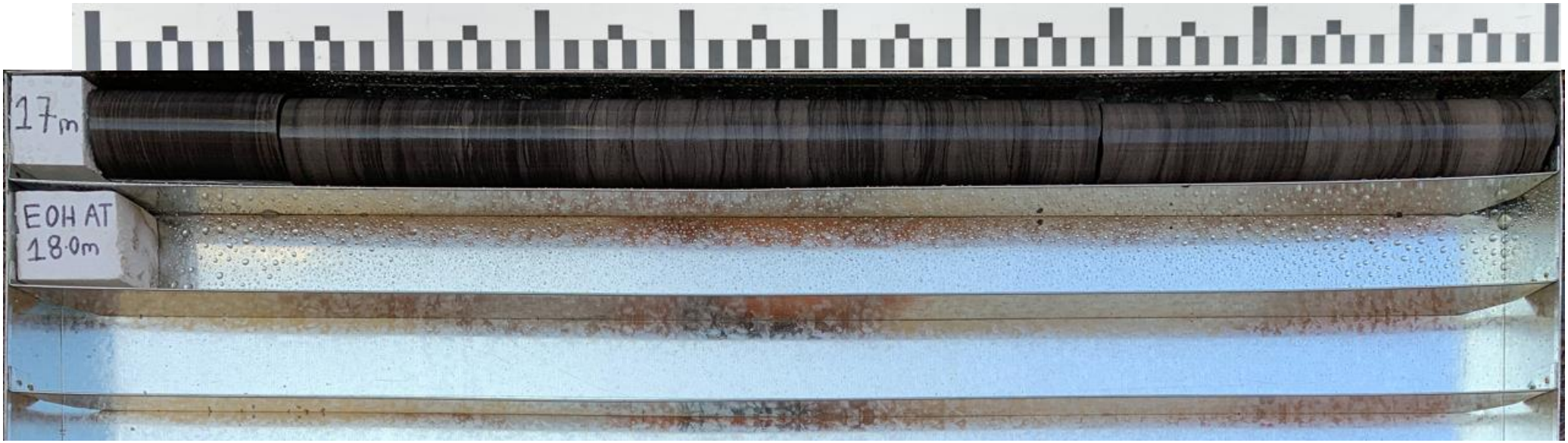
Cardno now Stantec	TITLE: **Borehole Core Photographs – BH02** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **22/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 2 OF 4** **9 – 13m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



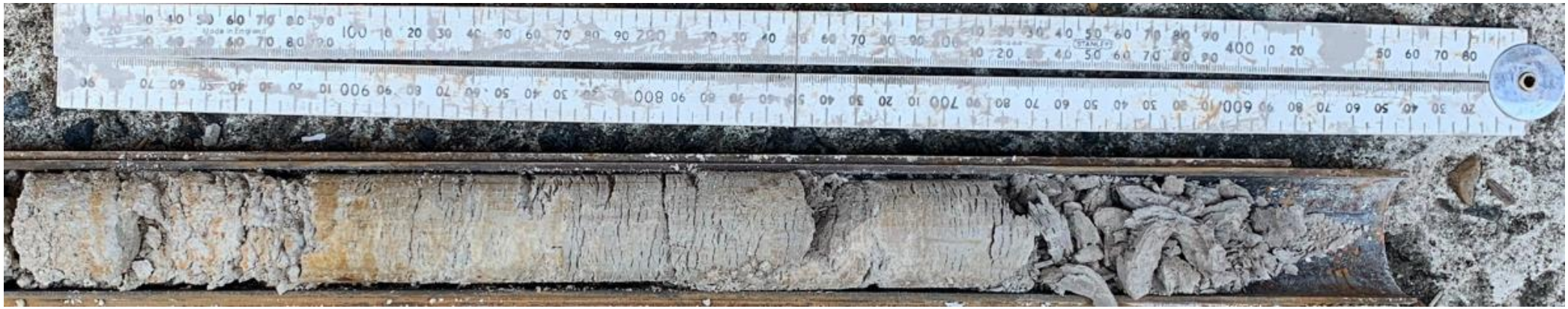
Cardno now Stantec	TITLE: **Borehole Core Photographs – BH02** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **22/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 3 OF 4 13– 17m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



Cardno now Stantec	TITLE: **Borehole Core Photographs – BH02** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **22/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 4 OF 4 17– 18m (1 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



Cardno now Stantec	TITLE: **Borehole SPT Photographs – BH02** **3-5 Help ST, Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **22/12/2022**	INCLINATION: **-90 degree**	SPT PHOTO: **1.0-1.45**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



NON-CORE DRILL HOLE - GEOLOGICAL LOG

HOLE NO : BH03
FILE / JOB NO : 301351072
SHEET : 1 OF 6

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331670.308, N: 6259125.514 (56 MGA94) SURFACE ELEVATION : 92.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 21/11/22 DATE COMPLETED : 21/11/22 DATE LOGGED : 21/11/22 LOGGED BY : RKC CHECKED BY : TH

DRILLING						MATERIAL				
PROGRESS: DRILLING & CASING	PROGRESS: WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
					0.0 92.6			FILL: SILTY SAND: dark brown, fine to medium grained sand, grass covered	M		TOPSOIL
								0.20m SILTY CLAY: pale brown to pale grey, medium to high plasticity			RESIDUAL SOIL
							CI-CH	0.50m SILTY CLAY: pale grey, brown and pale brown, medium to high plasticity, trace gravel			
				1.00m SPT 3, 6, 6 N=12	1.0 91.6						
				1.45m						St	
		F			2.0 90.6		CI-CH				
				3.00m SPT 6, 8, 8 N=16	3.0 89.6						
				3.45m						VSt	
AD/T			Not Encountered						D		
	Water				4.0 88.6			4.00m CLAYEY GRAVEL: pale grey and grey, fine to medium gravel, inferred weathered siltstone, very low strength			WEATHERED ROCK
				4.50m SPT 8, 12, 16 N=28							
		H		4.95m	5.0 87.6					H	
				5.50m SPT 16, 20, 25 N=45							
				5.95m	6.0 86.6						
								6.50m SILTSTONE: grey, fine grained, named as clayet silt, low to medium plasticity			BEDROCK
	Water	VH			7.0 85.6			7.10m Continued as Cored Drill Hole			
					8.0 84.6						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

Cardno

CORED DRILL HOLE LOG

HOLE NO : BH03
FILE / JOB NO : 301351072
SHEET : 2 OF 6

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331670.308, N: 6259125.514 (56 MGA94) SURFACE ELEVATION : 92.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 21/11/22 DATE COMPLETED : 21/11/22 DATE LOGGED : 21/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : Good

DRILLING					MATERIAL				FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral VL -0.1 L -0.3 M -1.0 H -3.0 VH -10.0 EH	NATURAL FRACTURE (mm) 20 40 100 300 1000	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
					0.0 92.6						
					1.0 91.6						
					2.0 90.6						
					3.0 89.6						
					4.0 88.6						
					5.0 87.6						
					6.0 86.6						
					7.0 85.6		7.10m START CORING AT 7.10m				
HQ	Water	0% LOSS	91	Is(50) d=0.48 a=1.44 MPa	8.0 84.6		SANDSTONE: grey, fine to medium grained, massive	MW			7.27: DB
							7.43m				7.43: BP 0° PR S
							SILTSTONE: grey, bedded at 5-15 degrees, thinly laminated	SW			7.55: JT 10° PR RF 7.65: BP 0° PR S 7.86: BP 5° PR S

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

CORED DRILL HOLE LOG

HOLE NO : BH03
FILE / JOB NO : 301351072
SHEET : 3 OF 6

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331670.308, N: 6259125.514 (56 MGA94) SURFACE ELEVATION : 92.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 21/11/22 DATE COMPLETED : 21/11/22 DATE LOGGED : 21/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : Good

DRILLING

PROGRESS: DRILLING & CASING; WATER

(CORE LOSS RUN %) / DRILL DEPTH

RQD (%)

SAMPLES & FIELD TESTS

DEPTH (m) / RL (m AHD)

MATERIAL

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

Weathering

ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral
VL -0.1 L -0.3 M -1.0 H -3.0 VH -10.0 EH

FRACTURES

NATURAL FRACTURE (mm)
20 40 100 300 1000

ADDITIONAL DATA
(joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

DRILL DEPTH	(CORE LOSS RUN %)	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	DESCRIPTION	Weathering	ADDITIONAL DATA
				8.0 / 84.6	SILTSTONE: grey, bedded at 5-15 degrees, thinly laminated *(continued)*	F	8.16: JT 45° PR S 8.23: BP 10° PR S 8.33: BP 10° PR S 8.35: BP 10° PR S 8.42: BP 10° PR S 8.45: BP 10° PR S 8.53: JT 45° IR RF 8.58: JT 15° IR RF 8.60: HB 8.65: JT 10° IR RF 8.68: JT 10° IR RF
				9.0 / 83.6			9.16: JT 15° IR RF 9.20: JT 15° IR RF 9.22: HB 9.25: DB 9.32: DB 9.37: BP 0° PR S 9.44: BP 0° PR S 9.65: JT 20° PR RF 9.75: BP 5° PR S 9.84: BP 5° PR S 9.90: JT 30° PR S
9.32	0% LOSS	91					
	0% LOSS	90	Is(50) d=0.35 a=1.27 MPa				
			10.00m UCS =12 MPa 10.24m	10.0 / 82.6			10.23: JT 45° PR RF 10.38: JT 45° IR RF 10.45: DB 10.57: JT 60° PR RF 10.68: JT 30° IR RF 10.88: DB
			Is(50) d=0.6 a=1.72 MPa	11.0 / 81.6			11.15: JT 45° PR RF 11.20: DB 11.38: BP 5° PR S 11.45: JT 5° PR RF 11.50: HB 11.70: DB 11.84: HB
12.27	0% LOSS	93		12.0 / 80.6			12.06: BP 5° PR S 12.28: JT 5° PR RF 12.30: JT 5° PR RF 12.43: BP 0° PR S 12.44: BP 0° PR S
			Is(50) d=0.25 a=1.19 MPa				12.81: JT 45° PR S
				13.0 / 79.6			13.18: BP 0° PR S
				14.0 / 78.6			13.80: JT 45° PR RF 13.95: CS 14.06: JT 15° IR RF
					14.27m SILTSTONE: pale grey, massive		14.21: HB 14.26: BP 40° PR RF
			Is(50) d=0.62 a=3.47 MPa				
				15.0 / 77.6			14.90: HB 15.10: BP 30° PR RF
15.24	0% LOSS	95			15.24m SILTSTONE: pale grey to grey, bedded at 0-15 degrees, thinly laminated		15.24: DB 15.26: DB
			15.61m UCS =50 MPa 15.81m				15.60: HB
				16.0 / 76.6			15.96: HB

HQ

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

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CORED DRILL HOLE LOG

HOLE NO : BH03
FILE / JOB NO : 301351072
SHEET : 4 OF 6

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331670.308, N: 6259125.514 (56 MGA94) SURFACE ELEVATION : 92.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 21/11/22 DATE COMPLETED : 21/11/22 DATE LOGGED : 21/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : Good

DRILLING					MATERIAL			FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION: ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral (VL -0.1, L -0.3, M -1.0, H -3.0, VH -10.0, EH)	NATURAL FRACTURE (mm) (20, 40, 100, 300, 1000)	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ		0% LOSS 18.46	95	Is(50) d=0.81 a=2.39 MPa	16.0 76.6		16.15m	F			16.05: BP 0° PR S
							SANDSTONE: pale grey, fine to medium grained, massive				16.29: JT 5° PR RF 16.31: JT 10° PR RF 16.34: JT 10° IR RF
				Is(50) d=1.31 a=4.83 MPa	17.0 75.6		17.00m				16.88: DB
							SILTSTONE: pale grey to grey, bedded at 0-15 degrees, thinly laminated				17.50: HB
					18.0 74.6						18.10: HB 18.21: BP 10° PR RF
		0% LOSS	96	Is(50) d=0.89 a=4.35 MPa							18.46: DB 18.53: HB
				UCS =74.8 MPa							
					19.0 73.6						18.89: HB 19.07: HB 19.22: HB
							19.51m				19.49: JT 5° PR RF 19.51: BP 0° PR S
				Is(50) d=0.97 a=1.57 MPa			SANDSTONE: pale grey, medium to coarse grained, bedded at 10-20 degrees				19.65: HB
					20.0 72.6						19.90: HB 20.06: HB
		21.57 0% LOSS	98	Is(50) d=1.17 a=1.48 MPa	21.0 71.6						21.08: HB 21.33: HB 21.57: BP 15° PR RF
					22.0 70.6						21.86: BP 10° PR RF 22.12: DB
					23.0 69.6						
				Is(50) d=1.51 a=1.77 MPa							23.63: HB 23.66: HB
					24.0 68.6						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

CORED DRILL HOLE LOG

HOLE NO : BH03
FILE / JOB NO : 301351072
SHEET : 5 OF 6

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331670.308, N: 6259125.514 (56 MGA94) SURFACE ELEVATION : 92.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 21/11/22 DATE COMPLETED : 21/11/22 DATE LOGGED : 21/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : Good

DRILLING					MATERIAL			FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral VL -0.1 L -0.3 M -1.0 H -3.0 VH -10.0 EH	NATURAL FRACTURE (mm) 20 40 100 300 1000	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ		0% LOSS	98		24.0 68.6		SANDSTONE: pale grey, medium to coarse grained, bedded at 10-20 degrees *(continued)*	F			24.53: HB 24.63: HB 24.64: DB 24.80: end of run
		24.77 0% LOSS	100	Is(50) d=1.06 a=1.88 MPa	25.0 67.6						25.11: BP 0 - 5° SN PR RF 25.17: BP 0 - 5° CN PR RF
					26.0 66.6						26.07: BP 0 - 5° CN PR RF 26.11: HB
				Is(50) d=1.11 a=1.64 MPa			26.52m INTERLAMINATED SANDSTONE AND SILTSTONE: sandstone 50% and siltstone 50% at 0-10 degrees, fine to coarse grained sandstone, pale grey and grey siltstone 26.90m				26.56: BP 0 - 5° CN PR S 26.59: BP 0 - 5° CN PR S 26.82: DB
					27.0 65.6		SANDSTONE: pale grey, medium to coarse grained, bedded at 10-20 degrees				
		27.82 0% LOSS	100	Is(50) d=1.13 a=1.94 MPa							27.82: end of run
					28.0 64.6						28.71: HB
				Is(50) d=1.77 a=1.37 MPa	29.0 63.6						
					30.0 62.6						30.05: HB
		30.85 0% LOSS	100	Is(50) d=2.14 a=2.17 MPa							30.85: end of run
					31.0 61.6						
				Is(50) d=2 a=2.07 MPa							31.79: HB
					32.0 60.6						

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO NSW/ACT PTY LTD

CORED DRILL HOLE LOG

HOLE NO : BH03
FILE / JOB NO : 301351072
SHEET : 6 OF 6

PROJECT : Proposed Mixed Use Redevelopment GI
LOCATION : 3-5 Help St Chatswood

POSITION : E: 331670.308, N: 6259125.514 (56 MGA94) SURFACE ELEVATION : 92.600 (AHD) ANGLE FROM HORIZONTAL : 90°

RIG TYPE : TI3 MOUNTING : Track CONTRACTOR : Stratacore DRILLER : JS

DATE STARTED : 21/11/22 DATE COMPLETED : 21/11/22 DATE LOGGED : 21/11/22 LOGGED BY : RKC CHECKED BY : TH

CASING DIAMETER : BARREL (Length) : 3.00 m BIT : Stepped BIT CONDITION : Good

DRILLING					MATERIAL				FRACTURES	
PROGRESS: DRILLING & CASING	PROGRESS: WATER	(CORE LOSS RUN %) / DRILL DEPTH	RQD (%)	SAMPLES & FIELD TESTS	DEPTH (m) / RL (m AHD)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral VL -0.1 L -0.3 M -1.0 H -3.0 VH -10.0 EH	NATURAL FRACTURE (mm) 20 40 100 300 1000	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ		0% LOSS 33.96	100	Is(50) d=2.06 a=2.11 MPa	32.0 60.6		SANDSTONE: pale grey, medium to coarse grained, bedded at 10-20 degrees *(continued)*	F			32.11: DB 32.54: DB 32.65: DB 32.70: DB 32.75: DB 32.86: DB 32.91: DB 33.00: DB 33.23: DB 33.54: DB 33.68: DB
					33.0 59.6						
					33.96m		BOREHOLE BH03 TERMINATED AT 33.96 m Target depth				
					34.0 58.6						
					35.0 57.6						
					36.0 56.6						
					37.0 55.6						
					38.0 54.6						
					39.0 53.6						
					40.0 52.6						

See Explanatory Notes for details of abbreviations & basis of descriptions.

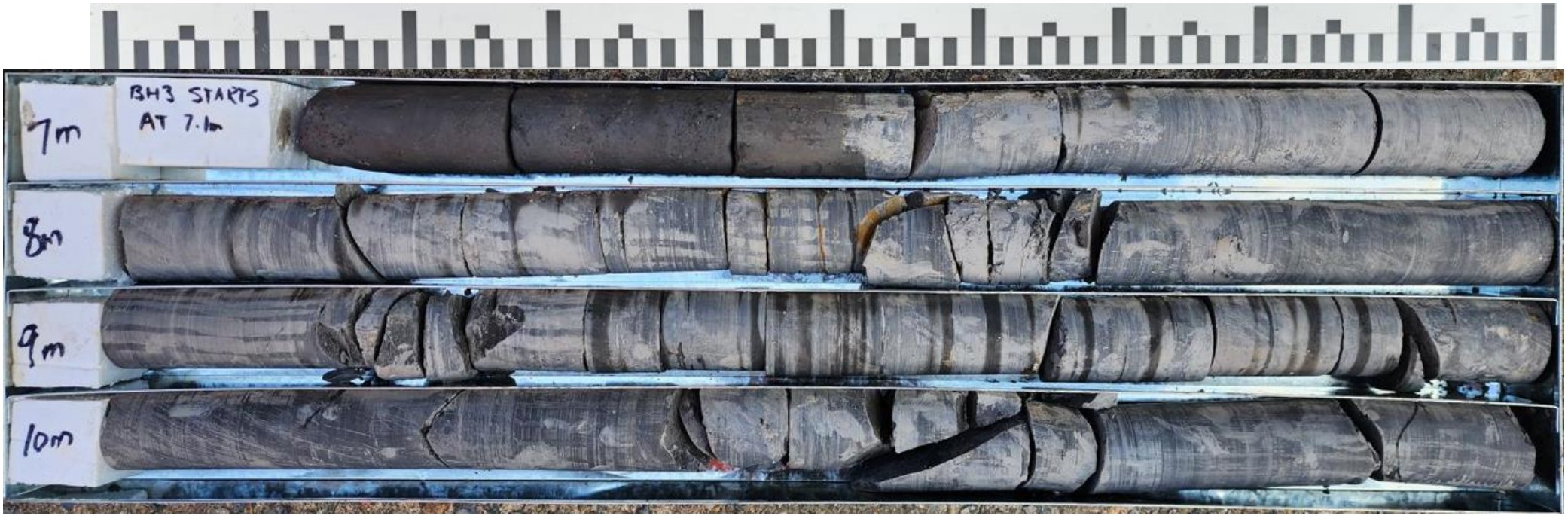
CARDNO NSW/ACT PTY LTD

Cardno

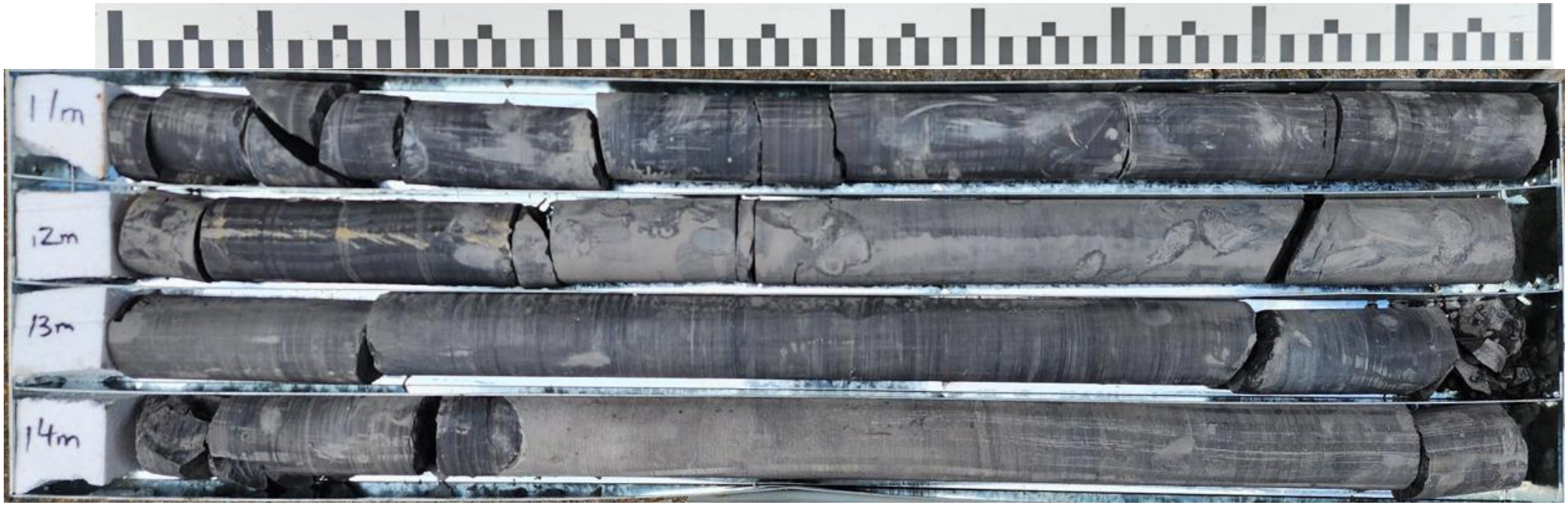
File: 301351072 BH03 6 OF 6

RMS LIB 40.3 EXTERNAL REV1.3.GLB Log RTA CORED DRILL HOLE 5 301351072 3-5 HELP ST. CHATWOOD.GPJ <<DrawingFile>> 22/Dec/2022 15:01 10.03.00.09 Cardno M6E

Cardno now Stantec	TITLE: **Borehole Core Photographs – BH03** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **21/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 1 OF 7 7.1– 11m (3.9 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**

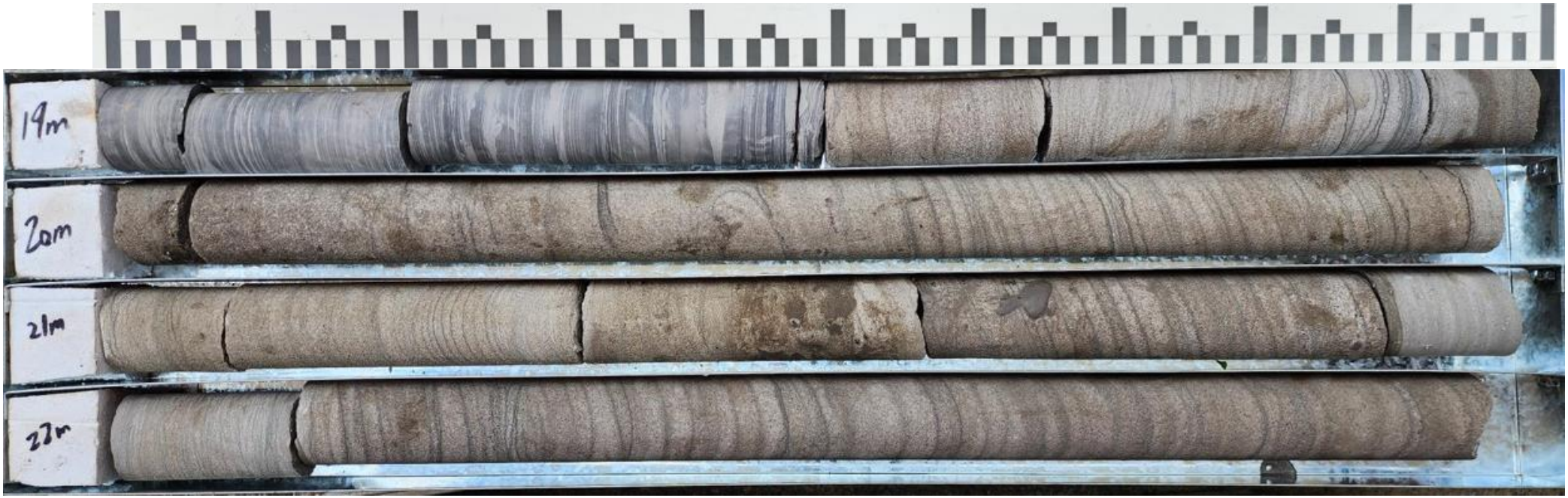


Cardno now Stantec	TITLE: **Borehole Core Photographs – BH03** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **21/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 2 OF 7 11– 15m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**

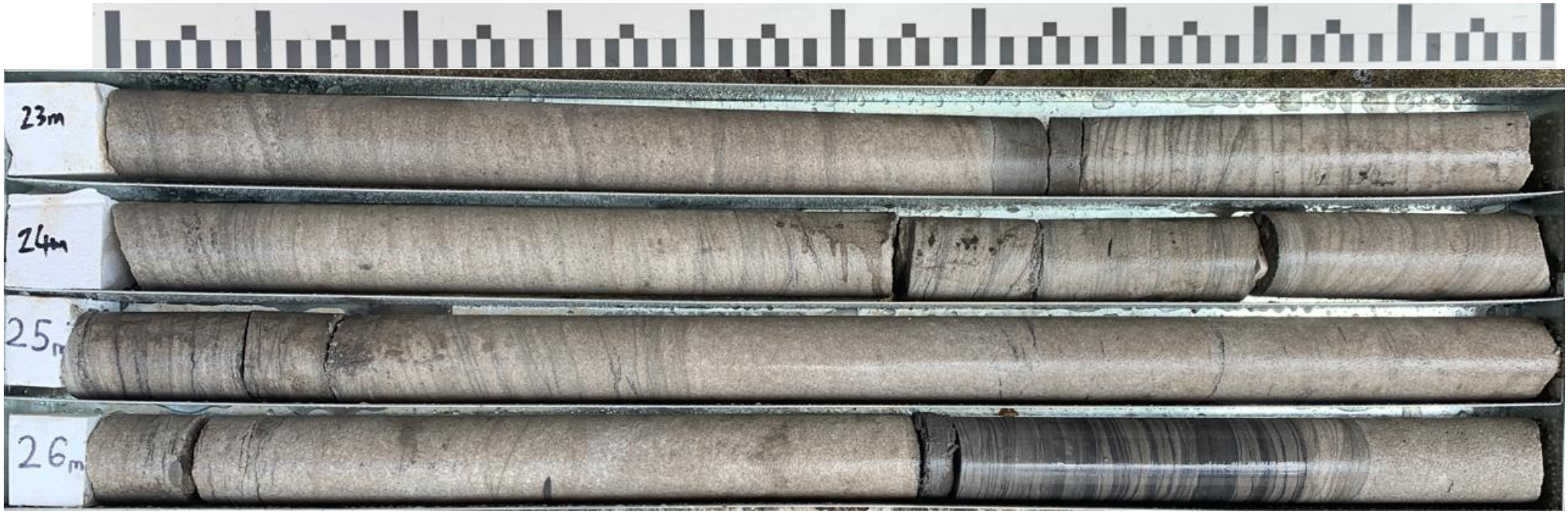


Cardno now Stantec	TITLE: **Borehole Core Photographs – BH03** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **21/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 3 OF 7** **15– 19m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**

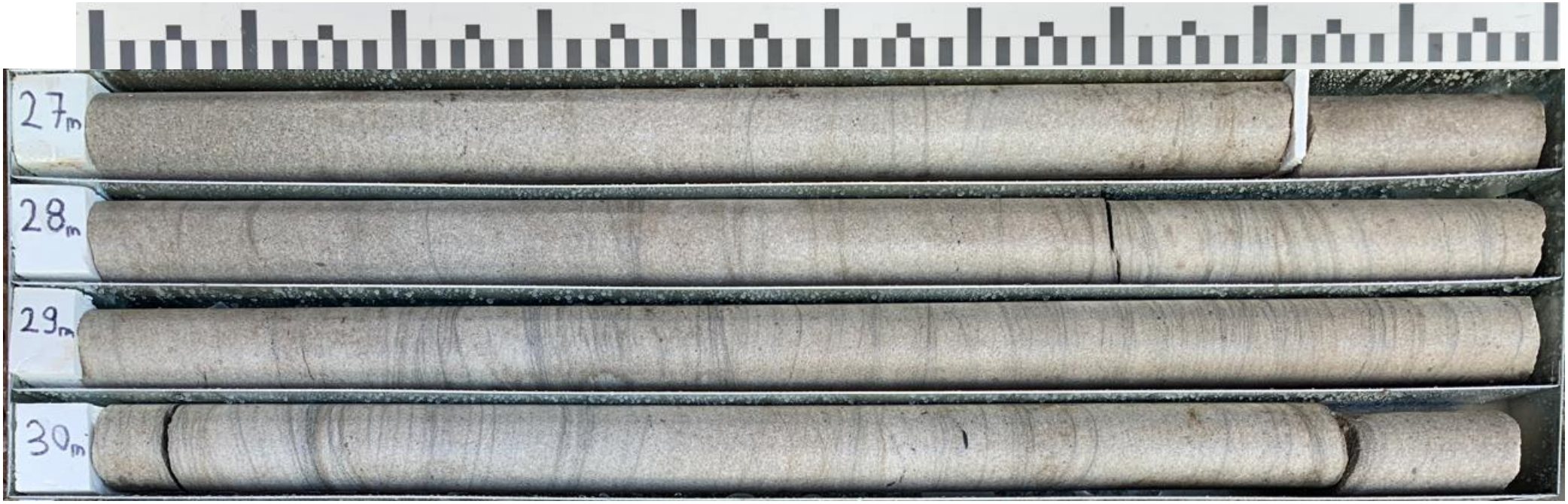
Cardno now Stantec	TITLE: **Borehole Core Photographs – BH03** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **21/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 4 OF 7** **19– 23m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



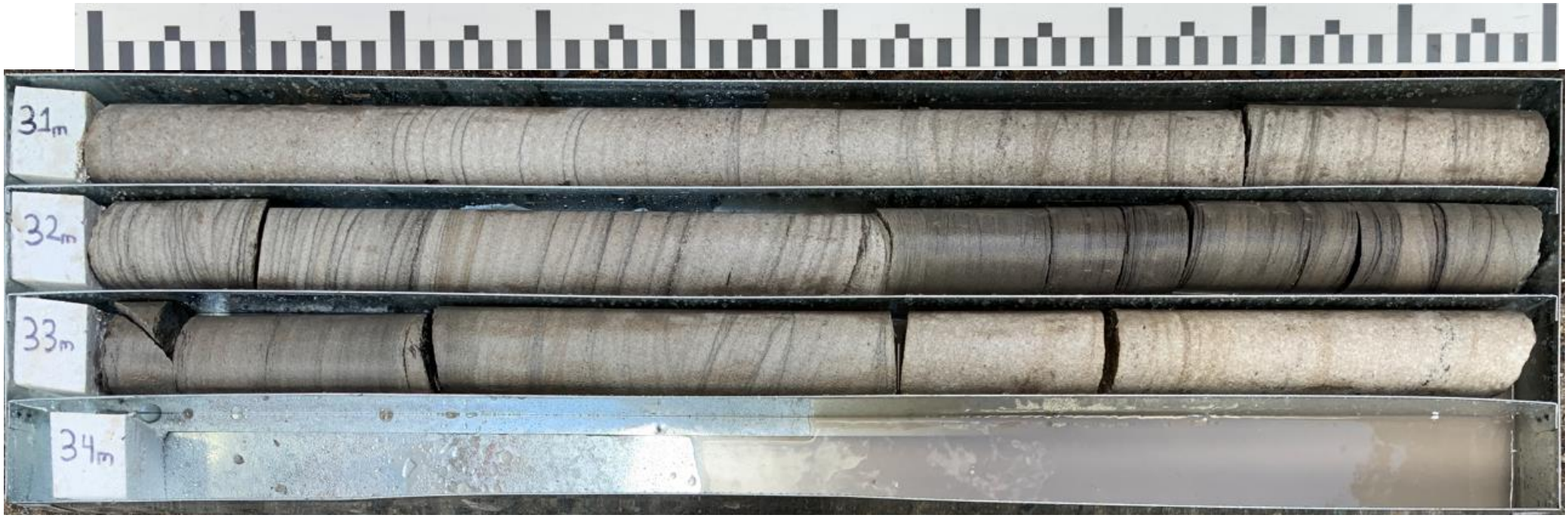
Cardno now Stantec	TITLE: **Borehole Core Photographs – BH03** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **21/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 5 OF 7** **23– 27m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



Cardno now Stantec	TITLE: **Borehole Core Photographs – BH03** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **21/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 6 OF 7** **27– 31m (4 m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



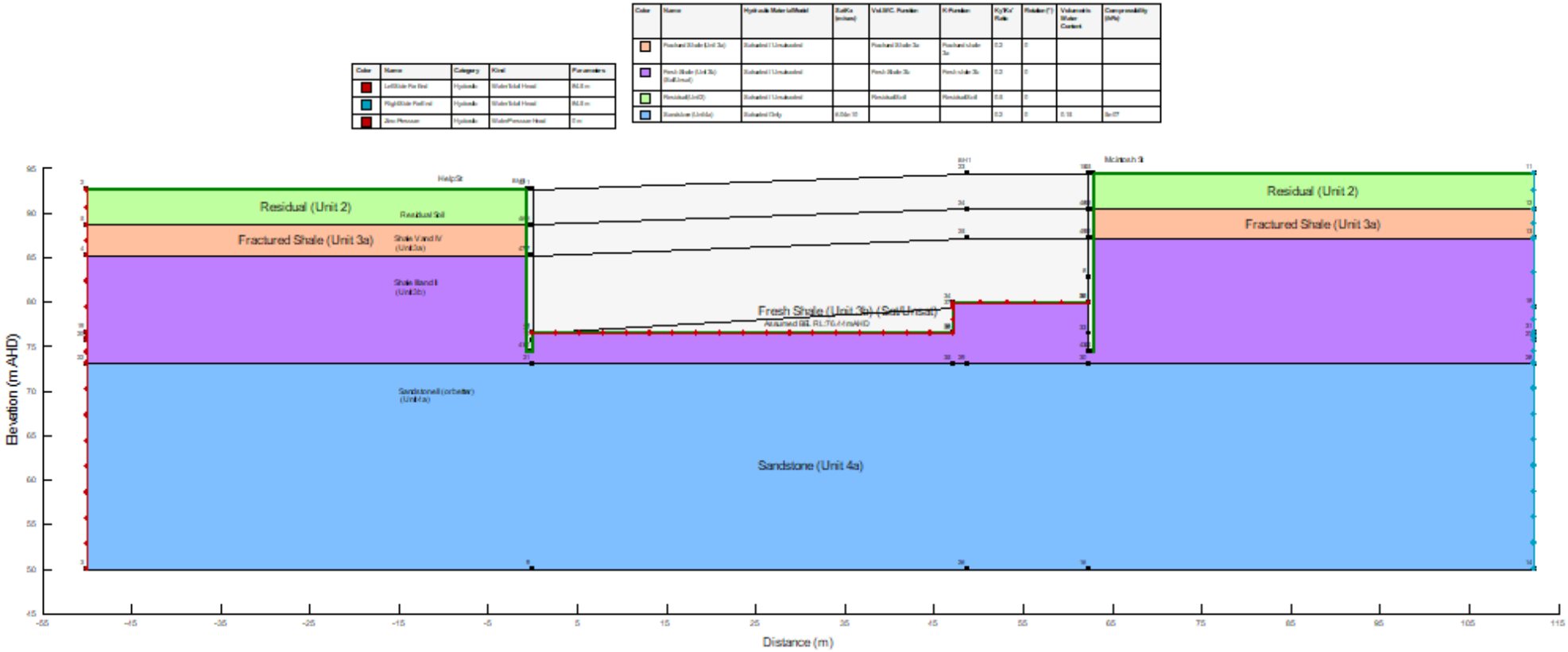
Cardno now Stantec	TITLE: **Borehole Core Photographs – BH03** **3-5 Help St Chatswood**			
	PROJECT NO: **301351072**	TEST DATE: **21/11/2022**	INCLINATION: **-90 degree**	CORED LENGTH: **BOX 7 OF 7 31– 33.96m (2.96m Length)**
	DRILL RIG: **TI3**	CONTRACTOR: **Stratacore**	LOGGED BY: **RKC**	CHECKED BY: **TH**



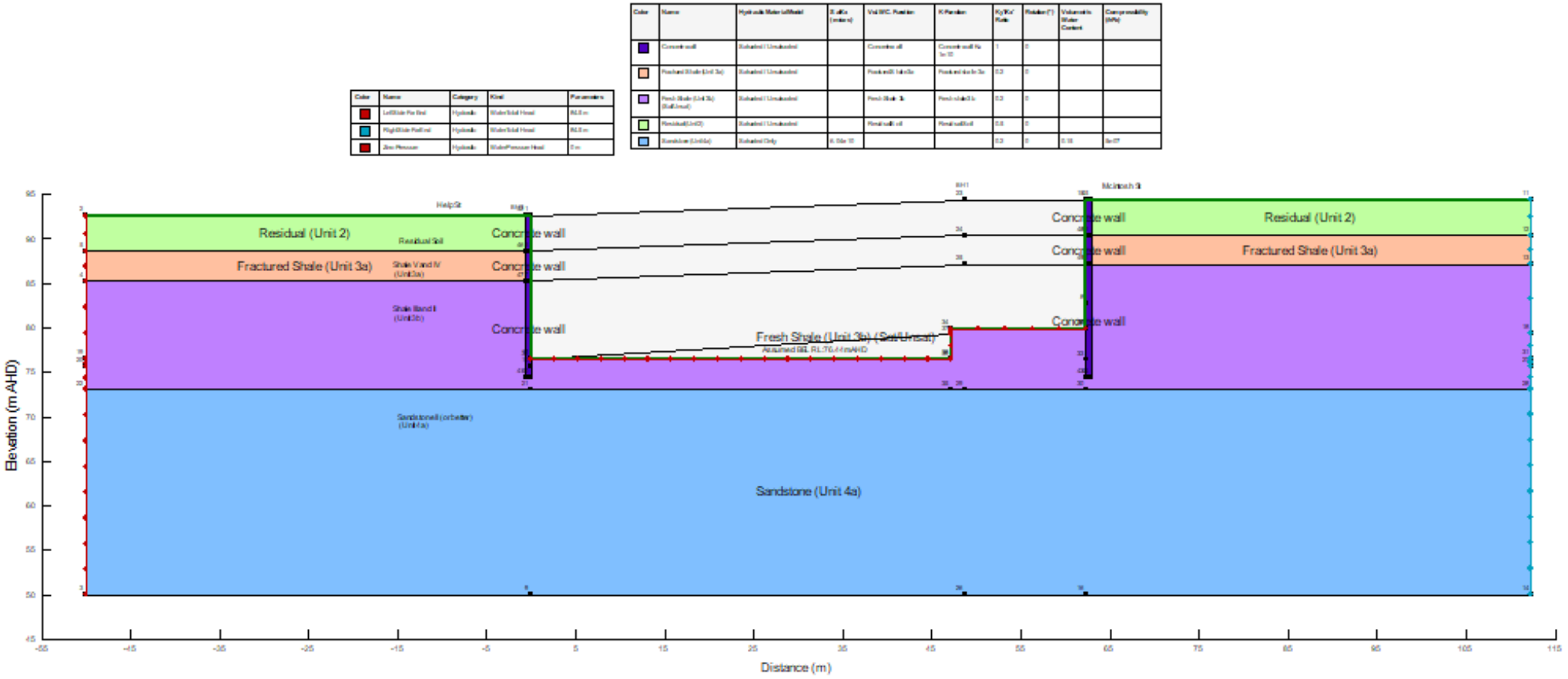
Appendix C – Seep/W Model

Stantec Australia Pty Ltd | ABN 17 007 820 322
Level 9 - The Forum
203 Pacific Highway , St Leonards
NSW,2065
+61 2 9496 7700 | www.cardno.com | www.stantec.com

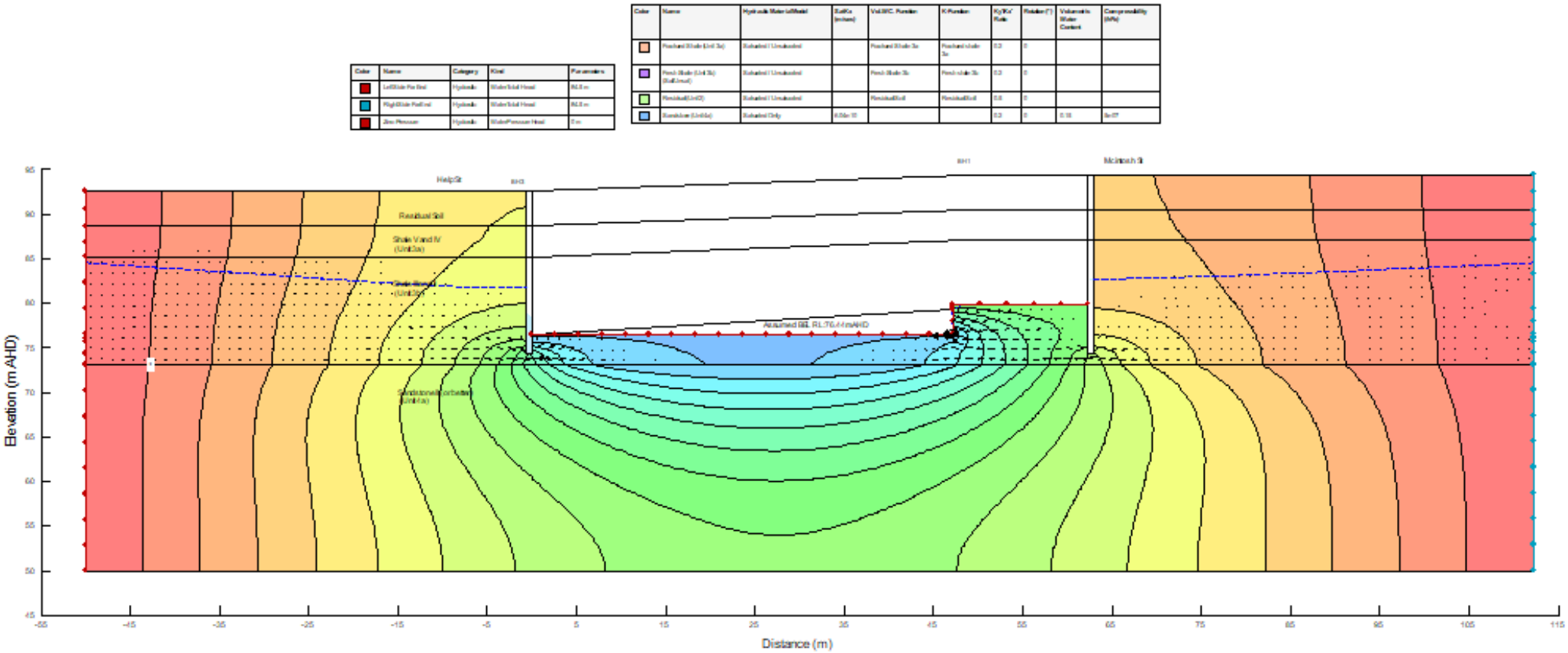
Section A - Model - When the secant pile wall is impermeable



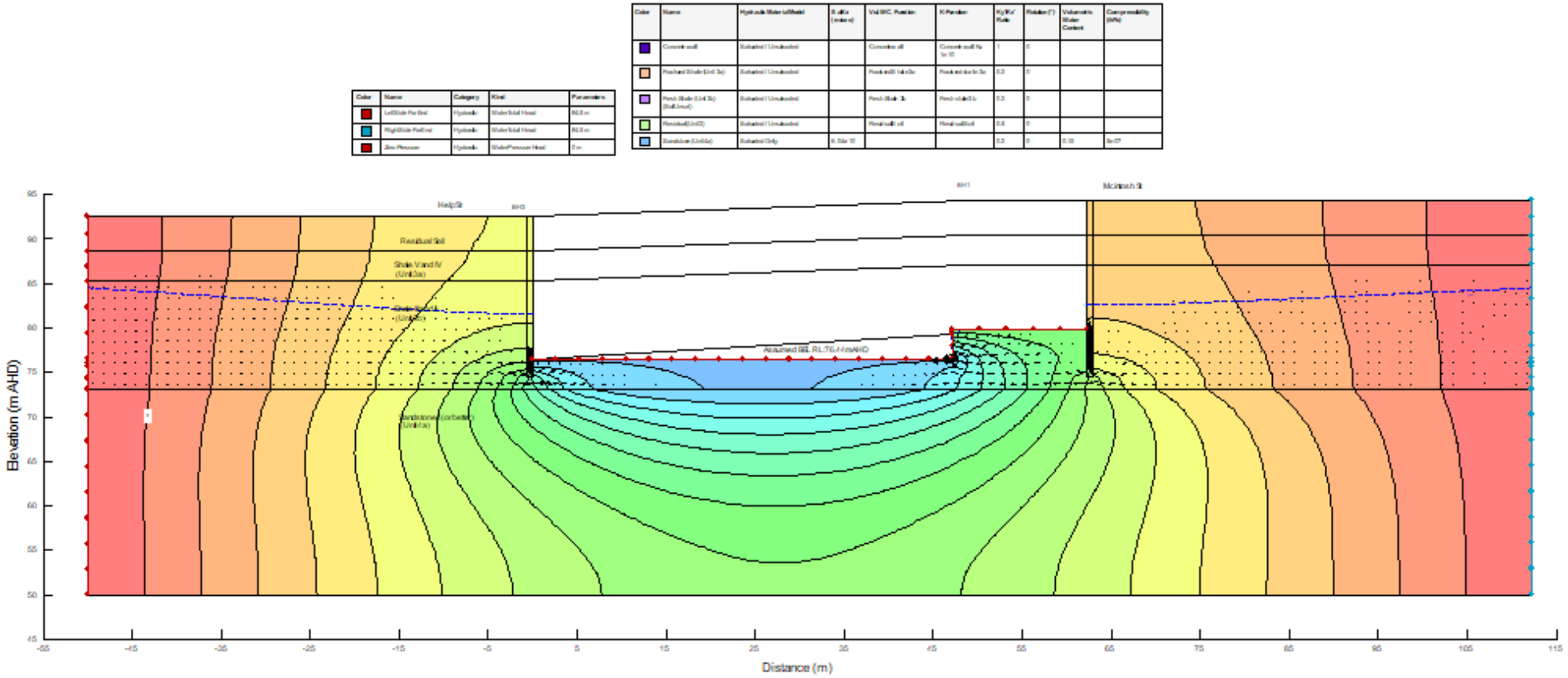
Section A - Model - When the secant pile wall is slightly permeable



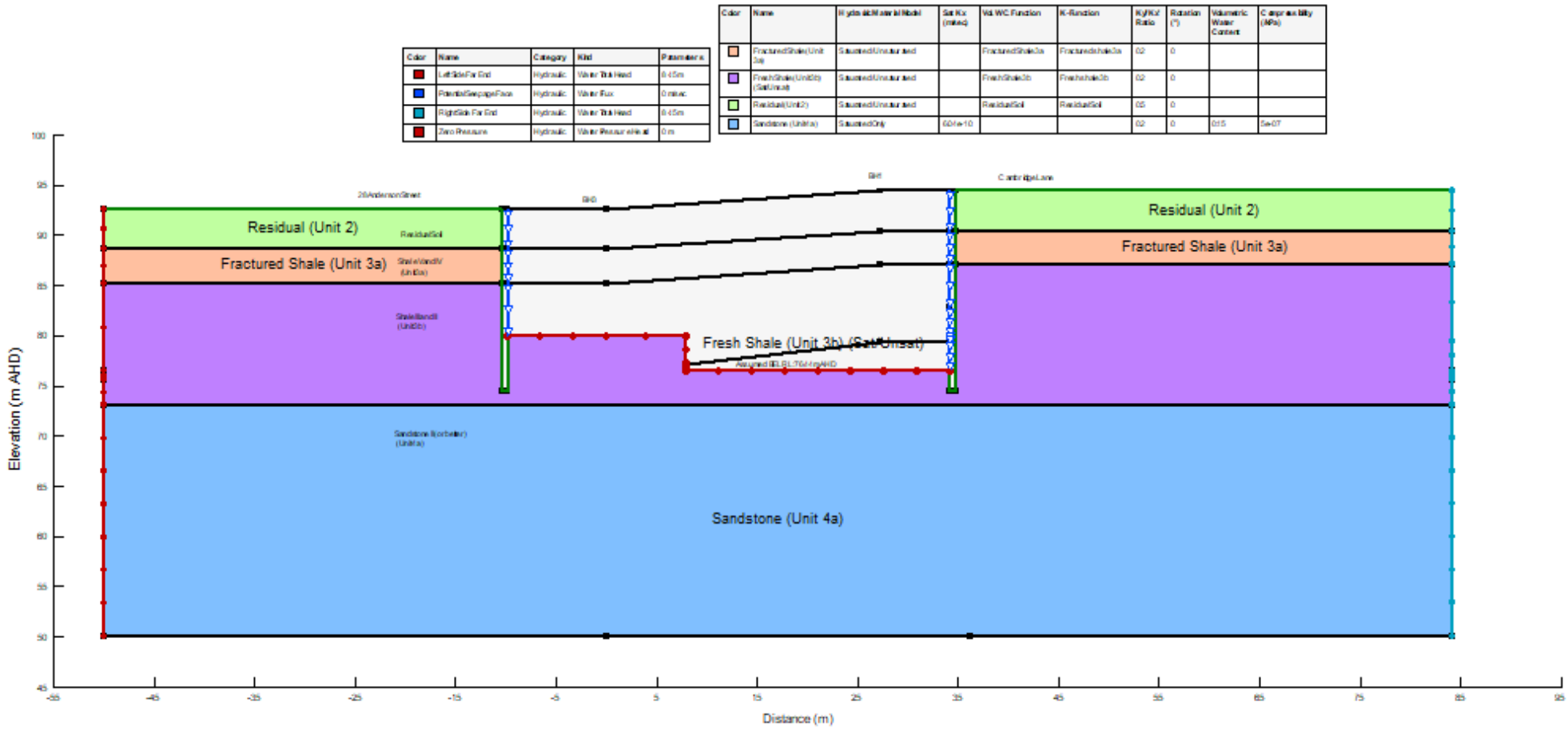
Section A - When the secant pile wall is impermeable



Section A - When the secant pile wall is slightly permeable



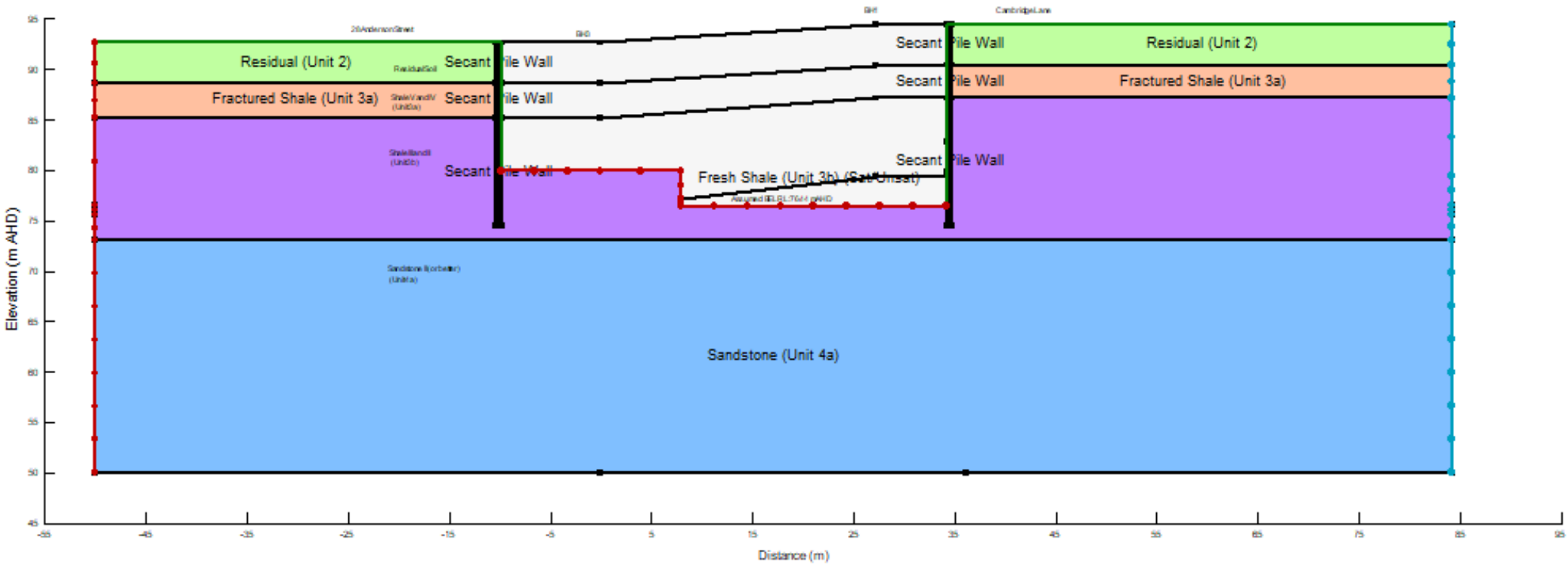
Section B - Model - When the secant pile wall is impermeable



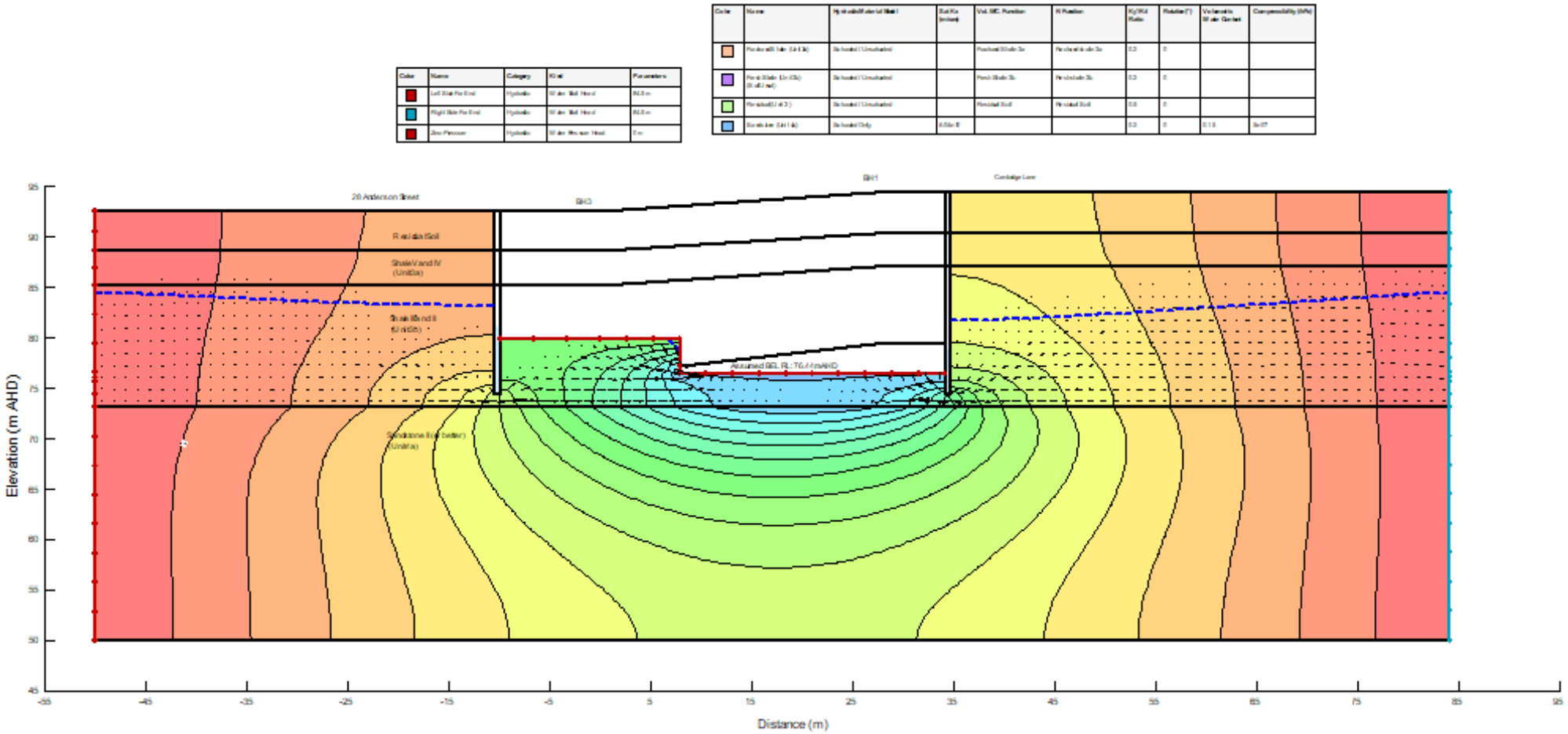
Section B - Model - When the secant pile wall is slightly permeable

Color	Name	Category	Kind	Parameters
	LeftSideFar End	Hydraulic	Water Total Head	845 m
	RightSideFar End	Hydraulic	Water Total Head	845 m
	Zero Pressure	Hydraulic	Water Pressure Head	0m

Color	Name	HydraulicMaterialModel	Sat Kx (m/s)	Vd WC Function	K-Function	Ky/Kx Ratio	Rotation (°)	Volumetric Water Content	Compressibility (MPa)
	FracturedShale (Unit 3a)	Saturated Unsaturated		FracturedShale 3a	Fracturedshale 3a	0.2	0		
	FreshShale (Unit3b) (SatUnsat)	Saturated Unsaturated		FreshShale 3b	Fresha haleSb	0.2	0		
	Residual(Unit2)	Saturated Unsaturated		ResidualSoil	Residual Soil	0.5	0		
	Sandstone (Unit4a)	SaturatedOnly	6.04e-10			0.2	0	0.15	5e-07
	SecantPileWall	Saturated Unsaturated		Concrete wall	Concretewall Kx 1e10	1	0		



Section B - When the secant pile wall is impermeable



Section B - When the secant pile wall is slightly permeable