
Salinity and Erosion Investigation and Management Plan

**Kogarah Golf Club Redevelopment -
Concept & Early Works SSDA (SSD-
84467726)**

19 & 19A Marsh Street, Arncliffe NSW

**Prepared for Stockland Development Pty
Limited**

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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

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Table of Contents

	Page No
1. Introduction	1
2. Secretary's Environmental Assessment Requirements (SEARs)	1
3. Site Description	2
4. Project Description	4
5. Previous Erosion and Salinity Investigation	7
6. Published data	7
6.1 Geology	7
6.2 Soil Landscape	8
6.3 Acid Sulfate Soils	8
6.4 Salinity	8
7. Field work	9
7.1 Field Work Methods	9
7.2 Field Work Results	9
8. Laboratory Test Results	10
9. Comments on Test Results	14
9.1 Aggressivity	14
9.2 Salinity	15
9.3 Sodidity and Dispersion	16
10. Impacts on the Proposed Development	16
11. Salinity and Erosion Management Plan	17
12. References	19
13. Limitations	20

Appendix A: Notes About This Report

Appendix B: Drawings

Appendix C: Borehole Logs

Appendix D: Laboratory Certificates of Analysis

Salinity and Erosion Investigation and Management Plan

Kogarah Golf Club Redevelopment - Concept & Early Works SSDA (SSD-84467726)

19 & 19A Marsh Street, Arncliffe NSW

1. Introduction

This Salinity and Erosion Investigation and Management Plan has been prepared by Douglas Partners Pty Ltd (Douglas) for the Stockland and John Boyd Properties Joint Venture (JV) to accompany a State Significant Development Application (SSDA) (SSD-84467726) for a Concept Masterplan and Early Works associated with the Kogarah Golf Club Redevelopment located on land identified as 13-19A Marsh Street, Arncliffe NSW (the overall site). It is noted that this investigation and management plan specifically applies to the land at 19 and 19A Marsh Street, Arncliffe NSW (the site).

The vision for the Kogarah Golf Club Redevelopment is to create a world-class precinct that leverages the site's strategic location adjacent to Sydney Airport and strong transport connections by delivering multi-level logistics development, trade-related enterprise and supporting uses with publicly accessible open space. It seeks to deliver state-of-the-art facilities that will redefine the logistics landscape in Australia, setting new benchmarks for scale, efficiency, sustainability and innovation.

The Concept & Early Works SSDA seeks consent for an overarching Concept Masterplan that establishes maximum building envelopes, Gross Floor Area (GFA), land uses, and other parameters through Urban Design Guidelines and technical reporting. It also seeks consent for the carrying out of Early Works to facilitate the initial site preparation and infrastructure works required to support future development and publicly accessible open space

The investigation included the drilling of ten (10) boreholes and laboratory testing of selected samples for aggressivity, salinity, sodicity and dispersion characteristics. This report has been prepared to present the results and interpretation of the salinity and erosion investigation undertaken by Douglas, and to provide a salinity and erosion management plan for the proposed development. This salinity and erosion investigation was carried out in conjunction with geotechnical and acid sulfate soils (ASS) investigations, and the results of these investigations are reported separately. There have been multiple previous geotechnical investigations at the site, and available past information has been used to inform the assessment of the site, where relevant.

This report must be read in conjunction with all appendices including the notes provided in Appendix A.

2. Secretary's Environmental Assessment Requirements (SEARs)

This Salinity and Erosion Investigation and Management Plan addresses the relevant Planning Secretary's Environmental Assessment Requirements (SEARs) for SSD-84467726, as outlined in Table 1 below.

Table 1: SEARs Compliance Table

Relevant Requirement	Response
Soils – an assessment of potential impacts on soil resources and riparian land on and near the site, including: - impacts on soil erosion, salinity and acid sulfate soils - details of earthworks, including cut and fill volumes - description of the proposed erosion and sediment controls during construction.	This Report

3. Site Description

The overall site is identified as 13-19A Marsh Street, Arncliffe NSW within the Bayside Local Government Area (LGA). It is situated to the immediate west of the Cooks River and Sydney Airport, located approximately 6 km west of Port Botany and 10 km south of the Sydney Central Business District (CBD). It includes frontages to Marsh Street, providing direct access to the M5 Motorway, Sydney Airport and St Peter's Interchange (via the Sydney Gateway).

The overall site includes land associated with nine (9) allotments and a total area of approximately 32 hectares. The existing uses include the previous Kogarah Golf Club (vacated in March 2025) accessed via Levey Street and the temporary M6 Motorway Stage 1 construction compound accessed directly from Marsh Street.

The development area represents Lot 31 DP1231486 and Lot 100 DP1231954, excluding land subject to future dedication to Bayside Council. It comprises an area of approximately 16.7 hectares and is zoned SP4 Enterprise and C2 Environmental Conservation under the Bayside LEP 2021.

The overall site is described in Table 2 below and depicted in Figure 1 following.

Table 2: Overall Site Description

Lot & DP	Address	Ownership
Lot 31 DP1231486	19 Marsh Street, Arncliffe	Cook Cove Nominees No 1 Pty Ltd as trustee of Cook Cove Property Trust 1
Lot 100 DP1231954	19A Marsh Street, Arncliffe	Cook Cove Nominees No 2 Pty Ltd as trustee of Cook Cove Property Trust 2
Lot 60 DP1301057	13 Marsh Street, Arncliffe	Bayside Council
Lot 61 DP1301057	19 Marsh Street, Arncliffe	
Lot 62 DP1301057	Marsh Street, Arncliffe	Transport for NSW
Lot 63 DP1301057	Marsh Street, Arncliffe	
Lot 12 DP570900	Marsh Street, Arncliffe	
Lot 102 DP1231954	Marsh Street, Arncliffe	
Lot 103 DP1231954	Marsh Street, Arncliffe	



Figure 1: Overall Site Aerial Map (Source: Nearmap, edited by Ethos Urban)

The site for this investigation and management plan (Items 1 and 2 in Table 2, the Development Area in Figure 1 and shown in Figure 2) is located off Marsh Street at Arncliffe, and has an irregular shape with an approximate area of 18 ha. The site was formerly occupied by Kogarah Golf Club, which has now been vacated and includes low-rise clubhouse and maintenance buildings, on-grade car parking, and extensive grassed areas for the fairways and rough. There are localised excavated areas for bunkers, as well as mounded areas across the site and two water-filled basins in the southern portion of the site. The Sydney Desalination pipeline runs through the central-eastern part of the site in a north-south direction within a shallow trench and mound in the southern portion of the site and within a deeper under-bored alignment in the north. The Moomba to Sydney ethane (gas) pipeline operated by APA Group (APA) also runs through the site in a north-south direction, through the eastern portion of the site. The approximate locations of the pipelines are shown in Figure 2.

The site is bounded by Marsh Street to the north, Cooks River to the east, the M5 motorway to the south and an M6 motorway construction facility to the west with a temporary M6 dive structure

running adjacent to the north-west boundary of the site. Below ground level, the existing M8 motorway tunnels run beneath the M6 motorway construction facility and Marsh Street. The former golf course extends outside of the lot boundary to the west and south.

The site is located on relatively flat terrain with surface levels generally varying between about RL 1 m and RL 3 m relative to Australian height datum (AHD) with elevated areas up to RL 6 m AHD at the clubhouse and small, localised elevated areas, as shown in Figure 2.

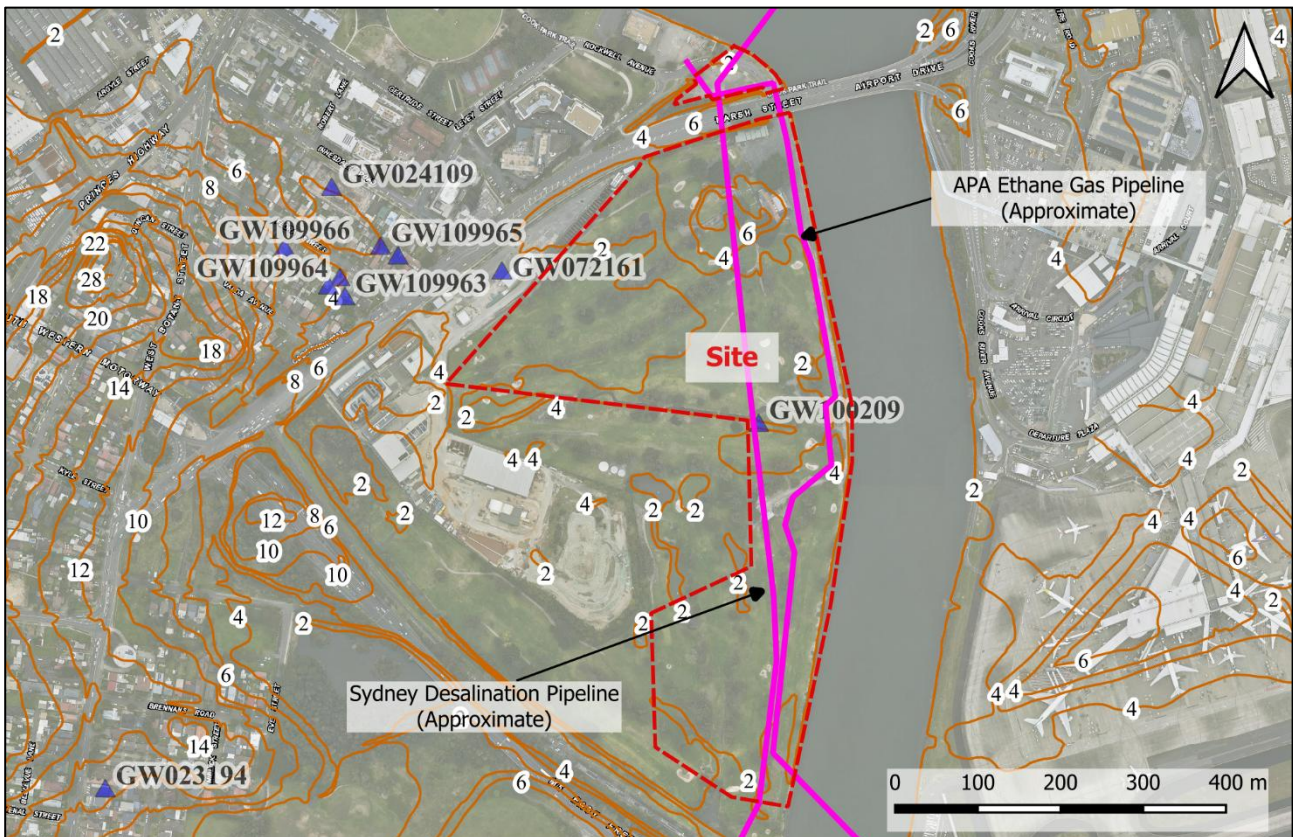


Figure 2: Aerial image of site overlain by 2 m surface contours to AHD

4. Project Description

The Concept & Early Works SSDA seeks consent for the following:

- Concept Masterplan to support the staged delivery of the Kogarah Golf Club Redevelopment, including:
 - o Maximum building envelopes, including maximum building heights and minimum setbacks;
 - o Maximum Gross Floor Area (GFA) up to 343,250 m², comprising up to:
 - 3,250 m² of GFA (FSR of 1.25:1) on Lot 31 DP 1231486; and
 - 340,000 m² of GFA on Lot 100 DP 1231954.
 - o Conceptual primary land uses, including:

- Block 1 – Mixed use and advertising structures;
 - Block 2 – Logistics and mixed-use;
 - Block 3A – Logistics;
 - Block 3B – Logistics; and
 - Block 3C – Logistics and Data centre.
 - o Urban Design Guidelines to guide future development of the built form and public domain; and
 - o Strategies and mitigation measures to manage potential environmental impacts.
- Early Works to support future delivery of built form and publicly accessible open space, including:
 - o Site preparation works, comprising:
 - Demolition of existing structures;
 - Clearing of existing vegetation;
 - Remediation works; and
 - Bulk earthworks, including ground improvement and flood mitigation works.
 - o Site servicing and infrastructure works, including:
 - Construction of the Flora Street East extension consistent with Item 3 of the executed Voluntary Planning Agreement with Bayside Council;
 - Construction of stormwater infrastructure; and
 - Construction and augmentation of service and utility infrastructure as necessary.

For a detailed description, refer to the Environmental Impact Statement prepared by Colliers Urban Planning.

The Concept Masterplan is supported by Indicative Reference Schemes that present as ‘proof of concepts’ within the proposed framework. The schemes demonstrate suitable primary land use, built form and public domain outcomes that align with the vision for a world-class precinct that leverages the site’s strategic location adjacent to Sydney Airport and strong transport connections

The Indicative Reference Schemes consider different potential development outcomes enabled by the Concept Masterplan to support the delivery of the highest and best use at the time of redevelopment. This includes a Logistics scheme and Alternative Uses scheme, which facilitate the potential for four (4) different primary land use outcomes across the Site. The alternative land use outcomes enabled by the Concept Masterplan include an alternative mixed-use outcome on Block 2 and alternative data centre outcome on Block 3C.

The Indicative Reference Schemes are established in Figure 3, with the Logistics scheme and Alternative Uses scheme prepared by Grimshaw depicted in Figure 4 and Figure 5.

It is noted that the Indicative Reference Schemes are indicative only and the development of future built form and publicly accessible open space will be subject to future Development

Applications. The Indicative Reference Schemes demonstrate the ability to support different potential outcomes, consistent with the proposed framework under the Concept Masterplan including Urban Design Guidelines.

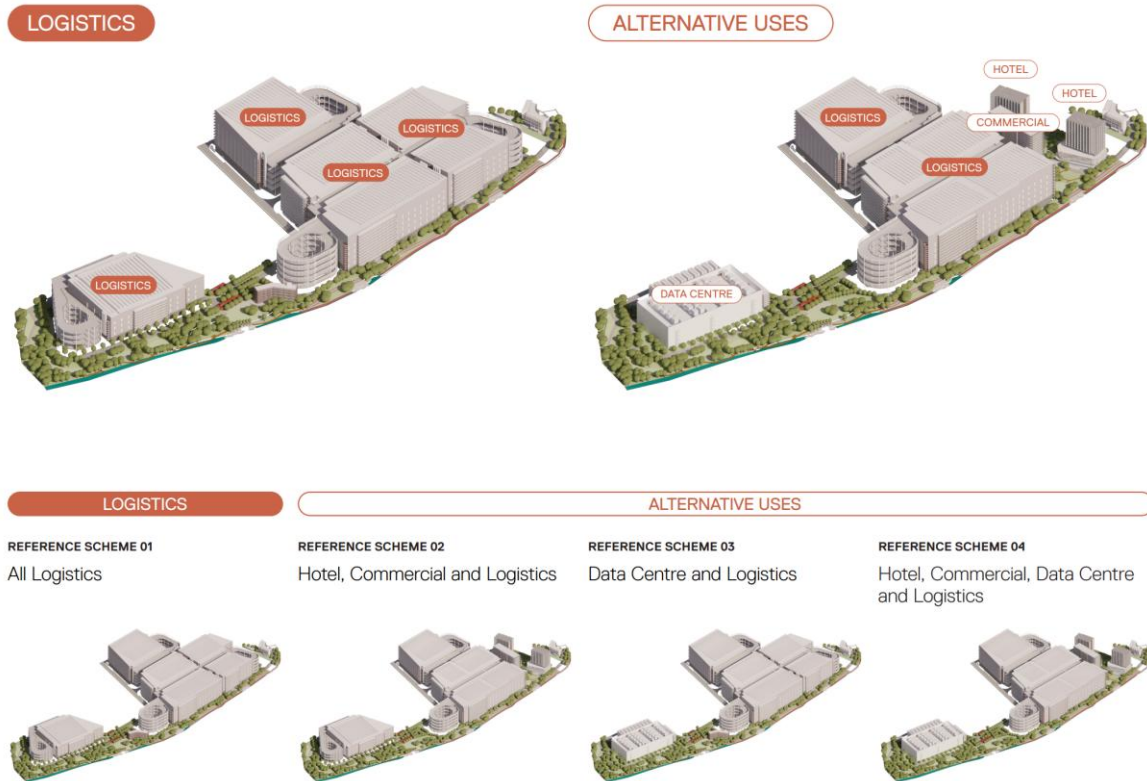


Figure 3: Indicative Reference Schemes (Source: Grimshaw)



Figure 4: Indicative Reference Scheme – Logistics Scheme (Source: Grimshaw)



Figure 5: Indicative Reference Scheme – Alternative Uses Scheme (Source: Grimshaw)

5. Previous Erosion and Salinity Investigation

Consulting Earth Scientists (CES) undertook an Erosion and Salinity Assessment for the site between 2017 and 2023 to assess the suitability of the site for the proposed development in terms of potential erosion and salinity risks. The investigations included the collection of samples from 14 borehole locations and the laboratory testing on samples for salinity, sodicity, and aggressivity. The results of the CES investigation and assessment indicated the site soils to be non-saline to moderately saline, moderate erosion potential, non-sodic, and non-aggressive to concrete and steel.

6. Published data

6.1 Geology

Reference to the Sydney 1:100 000 Geological Series Map and NSW Seamless Geology database indicates that the site is mostly underlain by freshwater swamp material (Clastic sediment) comprising estuarine and marine deposits of the Quaternary period. The deposits are estuarine tidal-delta flat material deposited in a transitional environment (marine to terrestrial), typically comprising fine- to medium-grained lithic-carbonate-quartz sand (marine-deposited), silt, clay, shell material, polymictic gravel.

The geology mapping indicates that the northern portion of the site is underlain by Hawkesbury Sandstone. Hawkesbury Sandstone comprises medium to coarse grained quartz sandstone, with very minor shale and laminite lenses. An extract from the geological map is shown in Figure 6.

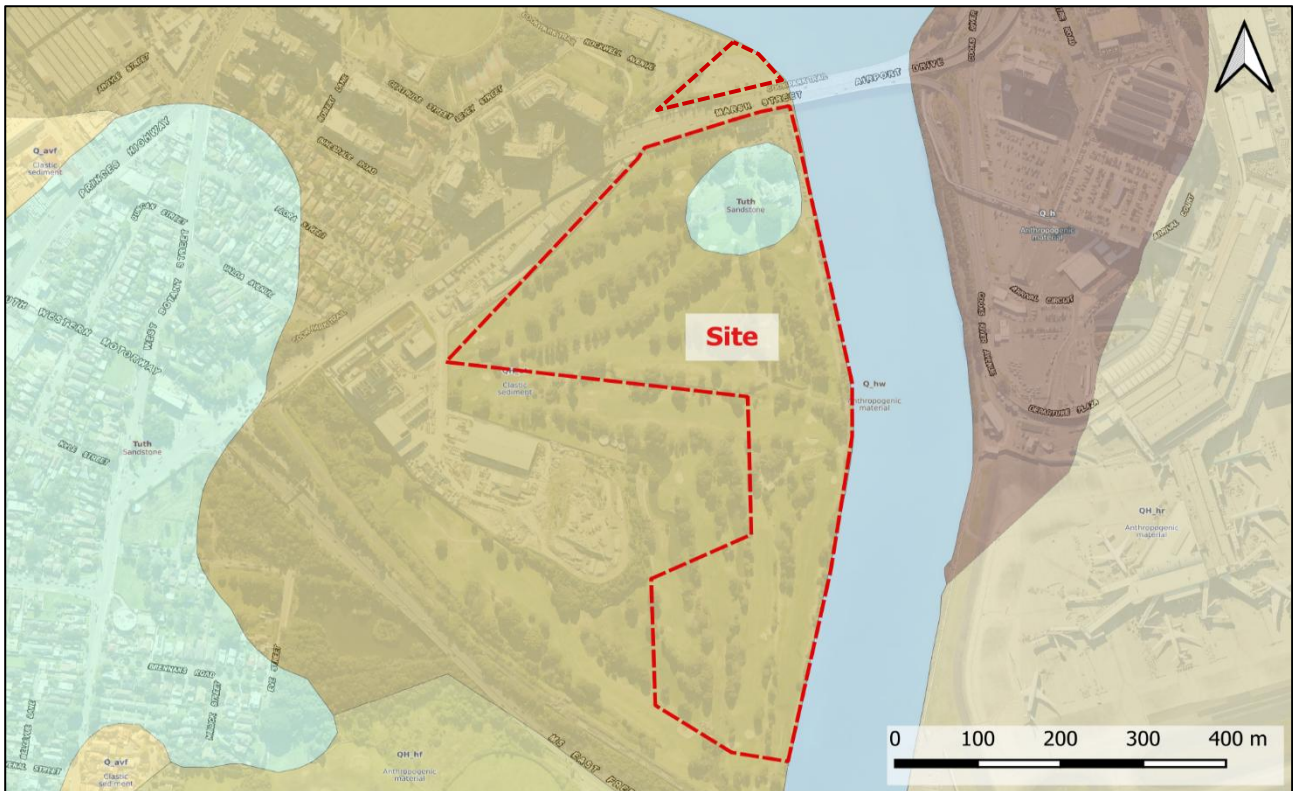


Figure 6: Extract from NSW Seamless Geology Map

6.2 Soil Landscape

Reference to the Sydney 1:100 000 Soil Landscape Series map indicates that the site is underlain by disturbed terrain.

Disturbed terrain sites are characterised by level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Local relief is typically less than 10 m, slopes are less than 30% and the fill material can comprise soil, rock, building and waste material.

6.3 Acid Sulfate Soils

Reference to the 1:25 000 Acid Sulfate Soils (ASS) Risk map indicates that the site is in an area of high probability of occurrence of acid sulfate soils from depths of between 1 m and 3 m below the ground surface.

6.4 Salinity

Dryland salinity risk and hazard mapping was undertaken in 2000 by the former NSW Government Departments of Land and Water Conservation to show the broad distribution of areas considered as having either a high salinity risk or a high salinity hazard.

The site is not located within, or close to, mapped areas with high salinity risk or high salinity hazard. The nearest areas mapped as having high salinity risk/hazard are in Western Sydney.

7. Field work

7.1 Field Work Methods

Field investigations were undertaken between 29 September and 14 October 2025 under the supervision of Douglas personnel. The field work included the drilling of ten (10) boreholes (BH401 to BH410) to depths between 8.0 m and 24.7 m using a track-mounted drilling rig. Boreholes were drilled using solid flight augers and rotary wash boring drilling techniques, followed by NMLC diamond coring, at selected locations. Five groundwater monitoring wells were installed at the completion of drilling at selected locations (BH402, BH404, BH406, BH408 and BH409).

Engineering logs detailing the subsurface profiles encountered within the bores were prepared by the site supervisor, who also collected representative samples for strata identification and subsequent laboratory testing purposes. The groundwater monitoring wells were developed by removing drilling fluid, and then groundwater samples were collected for subsequent laboratory testing.

Coordinates and elevations of borehole locations were recorded by Douglas using a differential GPS. The surface coordinates are presented on the engineering logs and were measured relative to MGA Zone 56 and GDA 2020. The surface elevations were measured relative to AHD. The borehole locations are shown on Drawing 1 in Appendix B.

7.2 Field Work Results

The detailed subsurface conditions encountered at each borehole are presented in the borehole logs in Appendix C, together with notes defining descriptive terms and classification methods.

The general subsurface profile encountered at the borehole locations may be summarised as:

- **FILL:** Fill from the ground surface to depths of between 0.3 m and 3.6 m. At most boreholes locations the upper 0.1 m to 0.4 m of the fill comprised heavily root affected sandy clay similar to a topsoil type material. The test results indicated generally sandy and silty sandy fill with variable consistency. The fill appeared generally consistent with very loose and loose sand material with some denser layers.
- **CLAY and SILT (very soft to firm):** Very soft, soft, soft to firm and firm clay, silty clay, and sandy silt with trace shell fragments and sulphurous odour to depths of between 1.7 m and 7.8 m; overlying
- **SAND (very loose, loose & medium dense):** Very loose, loose and medium dense sand and silty sand to depths between 3.8 m and 8.0 m; and
- **INTERBEDDED CLAY & SAND:** Alternating layers of clay and sand to depths of between 8.0 m and 25.2 m. The clay ranged between stiff and hard, and the sand ranged between loose and very dense; overlying
- **SANDSTONE BEDROCK:** Generally low and medium strength, fresh to moderately weathered, pale grey fine to coarse grained sandstone (Hawkesbury Sandstone) bedrock.

Groundwater was observed in all boreholes during drilling at depths between 0.4 m and 2.5 m, with the exception of BH409 in which groundwater was not observed. Groundwater levels were measured in the monitoring wells, screened in soils, installed during the geotechnical

investigation at depths of between 0.6 m and 1.8 m (between 10 October and 11 November 2025). Note that groundwater levels can fluctuate due to seasonal and rainfall variations.

8. Laboratory Test Results

Laboratory testing at NATA accredited laboratories was undertaken on soil and groundwater samples retrieved during the field work. The detailed test reports are presented in Appendix D and the testing included:

- Testing for aggressivity on 36 soil samples and 5 groundwater samples (pH, chloride, sulphate and electrical conductivity (EC)) to assess the exposure classification to buried steel and concrete elements in accordance with the provisions of AS2159–2009 “Piling – Design and Installation”, which are summarised in Table 3;
- Testing for salinity on 37 soil samples (EC, soil textural class, EC_e and salinity classification) presented in Table 4. It is noted that soil salinity values (EC_e) have been calculated using the methods of the “Site Investigations for Urban Salinity” booklet, prepared by the Department of Land and Water Conservation (DLWC, 2002). The soil samples were classified as per soil textural classification methods to determine the multiplication factors (M) for the samples and resultant calculated soil salinity values ($EC_e = M \times EC_{1:5}$);
- Testing for sodicity and dispersion on 4 disturbed soil samples (exchangeable sodium, cation exchange capacity (CEC), exchangeable sodium percentage (ESP) and Emerson class number) presented in Table 5. The sodicity classification is based on DLWC (2002) and the dispersion testing was carried out in accordance with AS 1289.3.8.1 – 2017.

Table 3: Analytical Results for Aggressivity in Soil and Groundwater

BH	Depth (m)	Material	pH	EC (μS/cm)	Sulphate (mg/kg)	Chloride (mg/kg)	Aggressivity		
							Soil Conditions	To Concrete	To Steel
Soil									
401	0.4-0.5	FILL / SAND	7.3	190	78	20	B ⁽¹⁾	Non-aggressive	Non-aggressive
401	0.9-1	FILL / SAND	7.5	190	NT	NT	A	Non-aggressive	Non-aggressive
401	2-2.2	Sandy SILT	7.6	350	NT	NT	B	Non-aggressive	Non-aggressive
402	0.4-0.5	Silty SAND	6.9	140	NT	NT	B ⁽¹⁾	Non-aggressive	Non-aggressive
402	0.9-1	SAND	7.1	60	20	<10	A	Mild	Non-aggressive
402	2-2.45	SAND	7.0	20	NT	NT	A	Mild	Non-aggressive
403	0.4-0.5	SAND	8.2	330	39	10	B ⁽¹⁾	Non-aggressive	Non-aggressive

BH	Depth (m)	Material	pH	EC (µS/cm)	Sulphate (mg/kg)	Chloride (mg/kg)	Aggressivity		
							Soil Conditions	To Concrete	To Steel
403	0.9-1	SAND	7.9	290	NT	NT	A	Mild	Mild
403	2-2.2	SAND	7.0	270	NT	NT	A	Mild	Mild
403	3.2-3.65	SAND	7.0	190	NT	NT	A	Mild	Non-aggressive
404	0.4-0.5	FILL / SAND	7.8	150	10	10	B ⁽¹⁾	Non-aggressive	Non-aggressive
404	0.9-1	Sandy SILT	7.2	120	NT	NT	B	Non-aggressive	Non-aggressive
404	2-2.45	Sandy SILT	7.1	140	NT	NT	B	Non-aggressive	Non-aggressive
404	3.2-3.65	SAND	8.0	100	NT	NT	A	Mild	Non-aggressive
405	0.4-0.5	FILL / SAND	7.9	120	NT	NT	B ⁽¹⁾	Non-aggressive	Non-aggressive
405	0.9-1	FILL / SAND	8.6	44	NT	NT	A	Mild	Non-aggressive
405	3-3.45	Sandy SILT	8.0	290	330	73	B	Non-aggressive	Non-aggressive
406	0.4-0.5	FILL / SAND	8.8	140	33	56	B ⁽¹⁾	Non-aggressive	Non-aggressive
406	0.9-1	SAND	8.6	210	NT	NT	A	Mild	Mild
406	2.5-2.8	Sandy SILT	7.2	720	NT	NT	B	Non-aggressive	Mild
407	0-0.1	FILL / SAND	7.2	120	<10	<10	B ⁽¹⁾	Non-aggressive	Non-aggressive
407	0.4-0.5	FILL / SAND	8.7	46	NT	NT	B ⁽¹⁾	Non-aggressive	Non-aggressive
407	0.9-1	FILL / SAND	7.9	170	NT	NT	A	Non-aggressive	Non-aggressive
407	2.1-2.55	Sandy SILT	7.5	810	NT	NT	B	Non-aggressive	Mild
408	0.4-0.5	FILL / SAND	8.4	260	NT	NT	B ⁽¹⁾	Non-aggressive	Non-aggressive
408	0.9-1	Silty CLAY	7.7	5500	NT	NT	B	Non-aggressive	Moderate

BH	Depth (m)	Material	pH	EC (µS/cm)	Sulphate (mg/kg)	Chloride (mg/kg)	Aggressivity		
							Soil Conditions	To Concrete	To Steel
408	2-2.45	Silty CLAY	7.8	10000	850	14000	B	Non-aggressive	Moderate
408	3-3.45	Silty CLAY	7.6	12000	NT	NT	B	Non-aggressive	Moderate
409	0.1-0.2	FILL / SAND	5.0	150	NT	NT	B ⁽¹⁾	Mild	Non-aggressive
409	0.4-0.5	FILL / SAND	4.4	200	NT	NT	B ⁽¹⁾	Moderate	Non-aggressive
409	0.9-1	Sandy SILT	5.5	1100	1600	320	B	Mild	Moderate
409	2.5-2.95	Sandy SILT	5.0	660	NT	NT	B	Mild	Mild
410	0.1-0.2	FILL / SAND	7.5	250	NT	NT	B ⁽¹⁾	Non-aggressive	Non-aggressive
410	0.4-0.5	Sandy SILT	6.7	420	280	99	B	Non-aggressive	Non-aggressive
410	0.9-1	Sandy SILT	7.1	730	NT	NT	B	Non-aggressive	Mild
410	2-2.45	Sandy SILT	7.8	5300	78	20	B	Non-aggressive	Moderate
Groundwater									
402	-	Ground-water	6.6	1500	130	190	A ⁽²⁾	Mild	Severe
404	-	Ground-water	4.9	21000	1600	10000	A ⁽²⁾	Moderate	Severe
406	-	Ground-water	7.2	3100	130	370	A ⁽²⁾	Mild	Severe
408	-	Ground-water	6.8	33000	520	16000	A ⁽²⁾	Severe	Severe
409	-	Ground-water	7.0	23000	300	11000	A ⁽²⁾	Moderate	Severe

Notes: EC = electrical conductivity; soil samples mixed with 1:5 soil:water. NT = Not tested

Aggressivity Soil Conditions and Classification per Tables 6.4.2(C) and 6.5.2(C) of AS 2159 – 2009

(1) Samples taken from 0.5 m depth or shallower are considered to be above groundwater and, therefore, soil conditions B apply;

(2) Soil conditions A apply to groundwater samples due to the presence of sandy soils at various depths below groundwater beneath the site.

Table 4: Summary of Test Results for Salinity

Borehole	Depth (m)	Material	Soil Texture	MF	EC (μS/cm)	EC _e (dS/m)	Classification
BH401	0.4-0.5	FILL / SAND	SAND	17	190	3.2	Slightly Saline
BH401	0.9-1	FILL / SAND	Medium CLAY	7	190	< 2	Non-saline
BH401	2-2.2	Sandy SILT	LOAM	10	350	3.5	Slightly Saline
BH402	0.4-0.5	Silty SAND	Sandy LOAM	14	140	2.0	Slightly Saline
BH402	0.9-1	SAND	SAND	17	60	< 2	Non-saline
BH402	2-2.45	SAND	SAND	17	20	< 2	Non-saline
BH403	0.4-0.5	SAND	Light CLAY	8.5	330	2.8	Slightly Saline
BH403	0.9-1	SAND	Sandy LOAM	14	290	4.1	Moderately Saline
BH403	2-2.2	SAND	SAND	17	270	4.6	Moderately Saline
BH403	3.2-3.65	SAND	SAND	17	190	3.2	Slightly Saline
BH404	0.4-0.5	FILL / SAND	SAND	17	150	2.6	Slightly Saline
BH404	0.9-1	Sandy SILT	SAND	17	120	2.0	Slightly Saline
BH404	2-2.45	Sandy SILT	SAND	17	140	2.4	Slightly Saline
BH404	3.2-3.65	SAND	SAND	17	100	< 2	Non-saline
BH405	0.4-0.5	FILL / SAND	SAND	17	120	2.0	Slightly Saline
BH405	0.9-1	FILL / SAND	SAND	17	44	< 2	Non-saline
BH405	3-3.45	Sandy SILT	SAND	17	290	4.9	Moderately Saline
BH406	0.4-0.5	FILL / SAND	SAND	17	140	2.4	Slightly Saline
BH406	0.9-1	SAND	SAND	17	210	3.6	Slightly Saline
BH406	2.5-2.8	Sandy SILT	LOAM	10	720	7.2	Moderately Saline
BH407	0-0.1	FILL / SAND	SAND	17	120	2.0	Slightly Saline
BH407	0.4-0.5	FILL / SAND	SAND	17	46	< 2	Non-saline
BH407	0.9-1	FILL / SAND	SAND	17	170	2.9	Slightly Saline
BH407	2.1-2.55	Sandy SILT	LOAM	10	810	8.1	Very Saline
BH408	0.4-0.5	FILL / SAND	SAND	17	260	4.4	Moderately Saline
BH408	0.9-1	Silty CLAY	Light CLAY	8.5	5500	47	Highly Saline
BH408	2-2.45	Silty CLAY	Clay LOAM	9	10000	90	Highly Saline
BH408	3-3.45	Silty CLAY	Light CLAY	8.5	12000	102	Highly Saline
BH409	0.1-0.2	FILL / SAND	Clay LOAM	9	150	< 2	Non-saline
BH409	0.4-0.5	FILL / SAND	Loam	10	200	2.0	Slightly Saline

Borehole	Depth (m)	Material	Soil Texture	MF	EC (μS/cm)	EC _e (dS/m)	Classification
BH409	0.9-1	Sandy SILT	Sandy LOAM	14	1100	15	Very Saline
BH409	2.5-2.95	Sandy SILT	Sandy LOAM	14	660	9.2	Very Saline
BH410	0.1-0.2	FILL / SAND	SAND	17	250	4.3	Moderately Saline
BH410	0.4-0.5	Sandy SILT	Clay LOAM	9	420	3.8	Slightly Saline
BH410	0.9-1	Sandy SILT	Light CLAY	8.5	730	6.2	Moderately Saline
BH410	2-2.45	Sandy SILT	Clay LOAM	9	5300	48	Highly Saline

Notes: MF = multiplication factor based on textural classification; EC_e = salinity value (calculated value);
Salinity Classification per DLWC (2002), using the criteria of Richards (1954)

Table 5: Summary of Test Results for Sodicity and Dispersion

Borehole	Depth (m)	Material	Exchangeable Sodium (meq/100g)	CEC (meq/100g)	ESP (%)	Emerson Class	Sodicity Class, Dispersion
BH403	0.4-0.5	SAND	0.1	22	<1	4*	Non-sodic, Non-dispersive*
BH404	0.4-0.5	FILL / SAND	<0.1	13	<1	3	Non-sodic, Dispersion after remoulding
BH407	0.4-0.5	FILL / SAND	<0.1	1.8	<1	3	Non-sodic, Dispersion after remoulding
BH410	0.4-0.5	Sandy SILT	0.1	17	<1	6	Non-sodic, Non-dispersive

Notes: Sodicity Classification per DLWC (2002); Dispersion per AS 1289.3.8.1 – 2017. *Carbonate minerals present

9. Comments on Test Results

9.1 Aggressivity

In accordance with AS 2159 – 2009, the laboratory test results for soils indicate typically 'non-aggressive' to 'mildly' aggressive conditions for buried concrete, with a one 'moderately' aggressive result at the southern end of the site (BH409). The laboratory test results for groundwater indicate brackish and saline water with typically 'mild' to 'moderate' conditions for buried concrete, with one occurrence of 'severe' aggressivity, also within the southern end of the site (BH408).

The laboratory test results for soils indicate generally 'non-aggressive' to 'mildly' aggressive conditions for buried steel elements over the majority of the site, with five (5) occurrences of 'moderately' aggressive conditions for buried steel indicated at the southern end of the site (BH408 to BH410). The test results for groundwater indicate 'severely' aggressive conditions for buried steel within all five groundwater monitoring wells, which are spread across the site.

In summary, 'non-aggressive' to 'mildly' aggressive soil conditions are present across the site for both concrete and steel elements, with some localised occurrences of 'moderately' aggressive soils. Based on the groundwater aggressivity results, concrete elements below groundwater level will be exposed to 'mild' to 'moderate' conditions with potentially localised 'severe' aggressivity, and steel elements below groundwater level will be exposed to 'severely' aggressive conditions.

9.2 Salinity

Figure 7 presents the variations of salinity with depth, based on salinity (EC_e) profiles, together with the salinity classifications (Richards, 1954). There does not appear to be a correlation between salinity and depth. The results indicate that the salinity of soils generally increases towards the southern end of the site, within silty and clayey soils.

The test results indicate that:

- 19% (7 out of 36) of tested soil samples were non-saline.
- 42% (15 out of 36) were slightly saline.
- 19% (7 out of 36) were moderately saline.
- 8% (3 out of 36) were very saline; and
- 11% (4 out of 36) were highly saline.

The very saline soils were found in samples from BH409 below 0.9 m depth. The highly saline soils were found in samples from BH408 below 1 m depth, and BH410 at 2 m depth, with all of these boreholes (BH408-BH410) located at the southern end of the site. Based on these results, it is inferred that the clay and silt beneath the southern portion of the site tend to retain salt from the saline/brackish groundwater and adjacent Cooks River and Botany Bay. Note that the shallow soils beneath the southern portion of the site typically comprise clay and silt, whereas the soils beneath the northern portion of the site are mostly sandy.

Based on the results of salinity testing, it is considered necessary to undertake salinity management measures for the proposed development. A Salinity Management Plan is provided in Section 11 of this report.

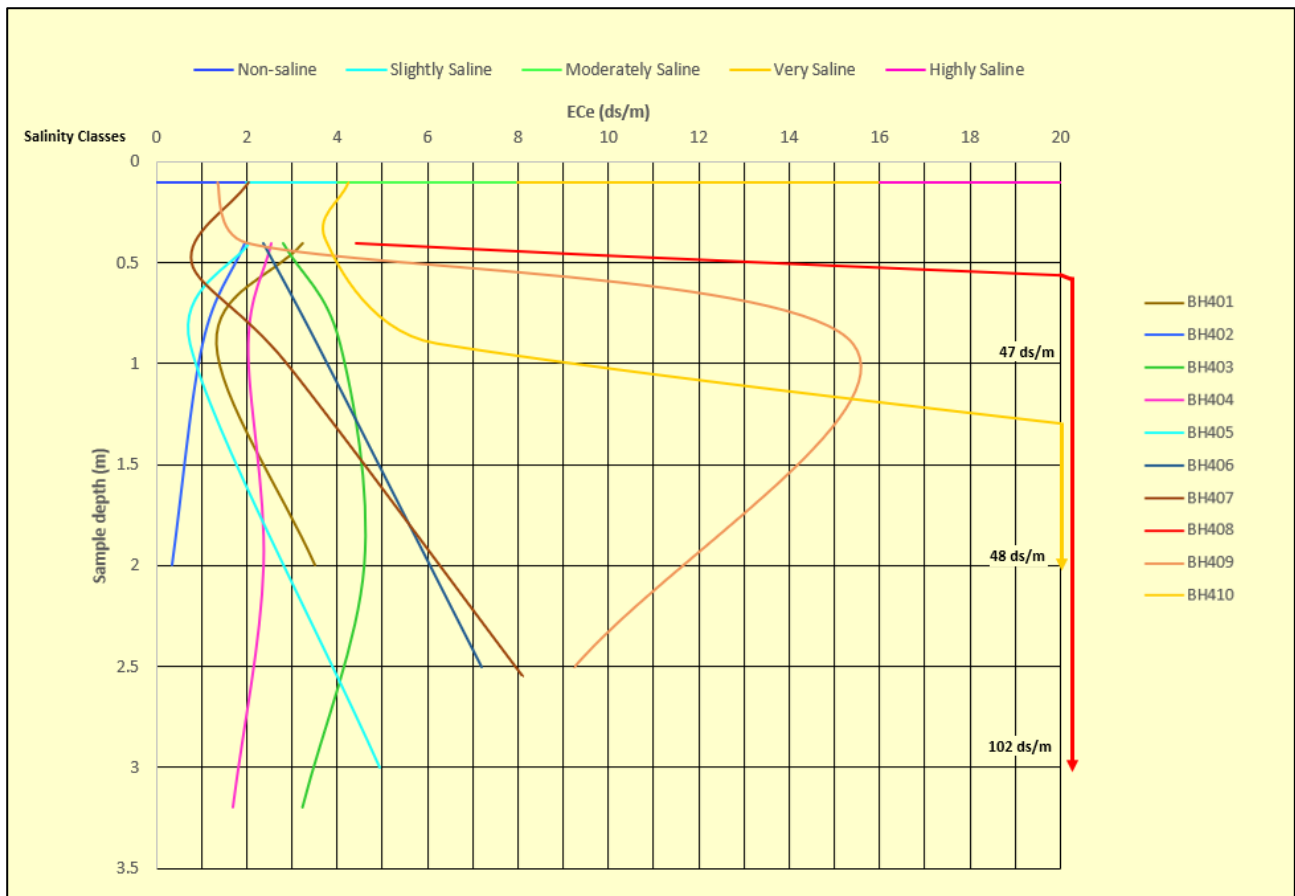


Figure 7: Vertical Salinity Profiles and Salinity Classes

9.3 Sodicty and Dispersion

The sodicty tests indicated that all soil samples tested were non-sodic. Dispersion potential by the Emerson class number test indicated Class 3 material (dispersion after remoulding), Class 4 and Class 6 (both non-dispersive). Given that the clay inclusions within the upper soils are relatively minor, and the test results show Class 3 or higher, management of dispersive soils is not considered necessary for the site. The sandy upper soils are considered to be erodible, which will require management, as discussed Section 11 of this report.

10. Impacts on the Proposed Development

It is understood that the proposed redevelopment will include the demolition of the existing golf course buildings and removal of golf course infrastructure followed by bulk earthworks for raising and levelling of the site, construction of multi-storey warehouse and office buildings, car parking and hardstand areas, as well as landscaping, footpaths and other ancillary works.

The bulk earthworks plans indicate a bulk earthworks level (BEL) of RL 3.1 m for roads, hardstands and pads, and a BEL of RL 1.6 m within building footprints with a finished floor level of RL 3.6 m. Filling will be required across much of the site to a maximum fill height of 3 m and cutting will be required in elevated areas, up to 4.5 m depth.

The 'mildly' to 'severely' aggressive soil and groundwater conditions and the presence of 'moderately' to 'highly' saline soils are not considered significant impediments to the proposed development, provided appropriate management techniques are employed.

Salinity affects the durability of concrete and steel by causing premature breakdown of concrete and corrosion of steel. This has impacts on the longevity of structures in contact with these materials. As a result, management will be required for the 'very' and 'highly' saline soils, which were identified as clayey and silty soils below about 0.9 m depth, within the southern portion of the site, which is discussed further in Section 11.

Testing within the northern portion of the site indicated generally 'non-saline' and 'slightly' saline material. Specific salinity management requirements are generally not considered necessary for the northern portion of the site.

Soil and groundwater aggressivity also have design implication for the durability of concrete and steel. Based on the results of soil testing, it is recommended that at least 'mildly' aggressive soil conditions are considered for buried steel and concrete above groundwater. Based on the results of groundwater testing, it is recommended that at least 'moderately' aggressive conditions are considered for buried concrete below groundwater, and 'severely' aggressive conditions are considered for buried steel below groundwater. It is noted that the test results indicate some instances of higher aggressivity classifications than these recommendations, and the civil/structural designer should make their own assessment on a suitable design aggressivity classification.

Management of the erodible upper sandy soils will be required, which is also discussed in Section 11.

11. Salinity and Erosion Management Plan

The salinity investigation indicates that material across the site is variable and ranges from 'non-saline' to 'highly' saline. Testing of other parameters indicates that the materials range from 'non-aggressive' to 'severely' aggressive to concrete and steel (AS 2159, 2009). The 'very' and 'highly' saline soils, and 'severely' aggressive soils appear to be present within the southern portion of the site, in the vicinity of borehole locations BH407 to BH410, within the silty and clayey soils. This observation is consistent with results of the previous CES testing.

Over the southern portion of the site, it would be prudent to assume that the upper silty and clayey soils below about 0.9 m depth are 'very' or 'highly' saline and 'severely' aggressive to steel. At least 'moderate' aggressivity conditions should be considered for buried concrete, noting one result of 'severely' aggressivity to concrete.

The upper sandy soils across the entire site are considered to be erodible (given their predominantly sandy composition) and will thus require erosion management considerations. An Erosion and Sediment Control Plan should be developed by the civil contractor, which should be implemented during construction.

The following management strategies are recommended, which are confined to the management of those factors with a potential impact on the development.

- With respect to imported fill material, testing should be undertaken prior to importation, to determine the salinity characteristics of the material, which should be 'non-aggressive' and 'non-saline' where possible, but in any case, not more aggressive or more saline than the material on which it is to be placed.
- Erodible soils can be managed by maintaining vegetation where possible and planting salt tolerant species. Erodible soils can also be managed by constructing pavements, slabs and hardstand covering as well as using flatter batter slopes (e.g. flatter than 3H:1V for vegetated slopes or flatter than 5H:1V if not vegetated) to reduce the impacts of stormwater run-off.
- Pavements should be designed to be well drained of surface water with exaggerated cross-falls and camber grades, as appropriate. There should not be excessive concentrations of runoff or ponding that would lead to waterlogging of the pavement. Discharge from such drainage should not be concentrated to avoid the erosion of soils.
- Surface drains should generally be provided along the top of any batter slopes to reduce the potential for concentrated flows of water down slopes possibly causing scour/erosion.
- Salt tolerant grasses and trees should be considered for landscaping, to reduce soil erosion and to maintain the existing evapo-transpiration and groundwater levels. Reference should be made to an experienced landscape planner or agronomist.

The following additional strategies are recommended for the completion of subsurface structures and service installation, including but not limited to, roads, drainage, services, piles, slabs and footings. These strategies should be complementary to standard good building practices recommended within the Building Code of Australia, including cover to reinforcement within concrete.

- With regard to concrete piles:
 - o For soils that are 'mildly' aggressive to concrete, piles should have a minimum concrete strength of 32 MPa and a minimum cover to reinforcement of 60 mm (as per AS 2159) to limit the corrosive effects of the surrounding materials (in accordance with AS 2159).
 - o For soils that are 'moderately' aggressive to concrete, piles should have a minimum concrete strength of 40 MPa and a minimum cover to reinforcement of 65 mm (as per AS 2159) to limit the corrosive effects of the surrounding materials (in accordance with AS 2159).
 - o For soils that are 'severely' aggressive to concrete, piles should have a minimum concrete strength of 50 MPa and a minimum cover to reinforcement of 70 mm (as per AS 2159) to limit the corrosive effects of the surrounding materials (in accordance with AS 2159).
- With regard to other concrete structures:
 - o for 'moderately' saline soils (with salinities of 4 – 8 dS/m) and soils that are 'mildly' aggressive to concrete (AS 3600 – A2), slabs and foundations should have a minimum concrete strength of 25 MPa, a minimum cover of reinforcement of 45 mm from unprotected ground.
 - o for 'very' saline soils (with salinities of 8 – 16 dS/m) and soils that are 'mildly' aggressive to concrete (AS 3600 – B1), slabs and foundations should have a minimum concrete strength of 32 MPa, a minimum cover of reinforcement of 50 mm from unprotected ground.

- o for 'highly' saline soils (with salinities of >16 dS/m) and 'soils that are severely' aggressive to concrete (AS 3600 – B2), slabs and foundations should have a minimum concrete strength of 40 MPa, a minimum cover of reinforcement of 55 mm from unprotected ground.
- o Concrete should be cured continuously for a minimum of three days for moderately saline soils and a minimum of seven days for very and highly saline soils (as per AS 3600) to limit the corrosive effects of the surrounding soils.
- Wet cast concrete pipes and spun concrete pipes are understood to have estimated compressive strengths of 50 MPa and 60 MPa to 70 MPa, respectively, equal to and in excess of the requirements for mass concrete, as above. Reference to the maximum and minimum test results of Table 3 (refer to Section 8 of this report), and to Tables E1 and 3.1 of AS 4058 – 2007 'Precast concrete pipes' indicates that the site generally falls within the 'Medium' (low sulphate) soil type (where chlorides $\leq 20,000$ ppm, pH ≥ 4.5 , and sulphates $\leq 1,000$ ppm) and (in the presence of tidal water flow) falls within the 'Normal' durability environment under AS 4058. Under these conditions, compliant reinforced concrete pipes of General Purpose (GP) Portland cement, with a minimum cover to reinforcement of 10 mm, are expected to have a design life in excess of 100 years.

Hence, any concrete pipes installed within the site should employ steel reinforced pipes of GP Portland cement compliant with AS 4058 (2007), with minimum cover to reinforcement of 10 mm, or should be fibre reinforced.

- For soils that are 'mildly', 'moderately' and 'severely' aggressive to steel, a corrosion allowance (as per AS2159 – 2009) of 0.01 – 0.02 mm/year, 0.02 – 0.04 mm/year and 0.04 – 0.1 mm/year should be taken into account by the designer, respectively. In instances where a corrosion protection coating is applied, if the design life of the structure is greater than the design life of the coating, consideration must be given to corrosion of the structure in accordance with the above allowances.

12. References

AS 2159. (2009). *Piling - Design and Installation*. Standards Australia.

AS 3600. (2018). *Concrete Structures*. including Amendment 1:2018 and Amendment 2:2021: Standard Australia.

AS 4058. (2007). *Precast Concrete Pipe (Pressure and Non-Pressure)*. Australian Standard.

NSW DPI. (2014). *Salinity Training Manual: Salinity Identification, Causes and Management*. JTN 12832 06/14, June 2014: NSW Department of Primary Industries.

Richards, L. A. (1954). *Diagnosis of Saline and Alkaline Soils*. Washington D.C: US Department of Agriculture.

Consulting Earth Scientists. (2023). *Erosion and Salinity Assessment; Cooke Cove Development Zone*. Document No.: CES130608-BP-AU, Revision 1, 15 February 2023.

NSW DLWC. (2002). *Site Investigations for Urban Salinity*. ISBN: 0 7347 5305 5, 2002: NSW Department of Land and Water Conservation.

13. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 19 & 19A Marsh Street, Arncliffe NSW in line with Douglas' proposal dated 11/07/2025 and acceptance received from Stockland Development Pty Limited. The work was carried out under the Standing Offer Deed between Douglas and Stockland Development Pty Ltd, dated February 2025. This report is provided for the exclusive use of Stockland Development Pty Limited 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.

The scope of work for this investigation did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of fill of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such fill may contain contaminants and hazardous building materials.

Appendix A

About this Report

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

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

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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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

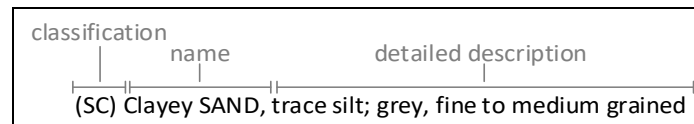
Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has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

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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)	
	Coarse	Fine
Gravel	19 - 63	6.7 - 19
	Medium	2.36 - 6.7
Sand	0.6 - 2.36	0.21 - 0.6
	Medium	0.075 - 0.21
	Fine	

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.

Soil Descriptions

Terminology
Symbols
Abbreviations

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:

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

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

Rock Descriptions

Terminology
Symbols
Abbreviations

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 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:

SAMPLE			DEPTH (m)	TESTING	
SAMPLE REMARKS	TYPE	INTERVAL		TEST TYPE	RESULTS AND REMARKS
	SPT		1.0 1.45	SPT	4,9,11 N=20

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(L)
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

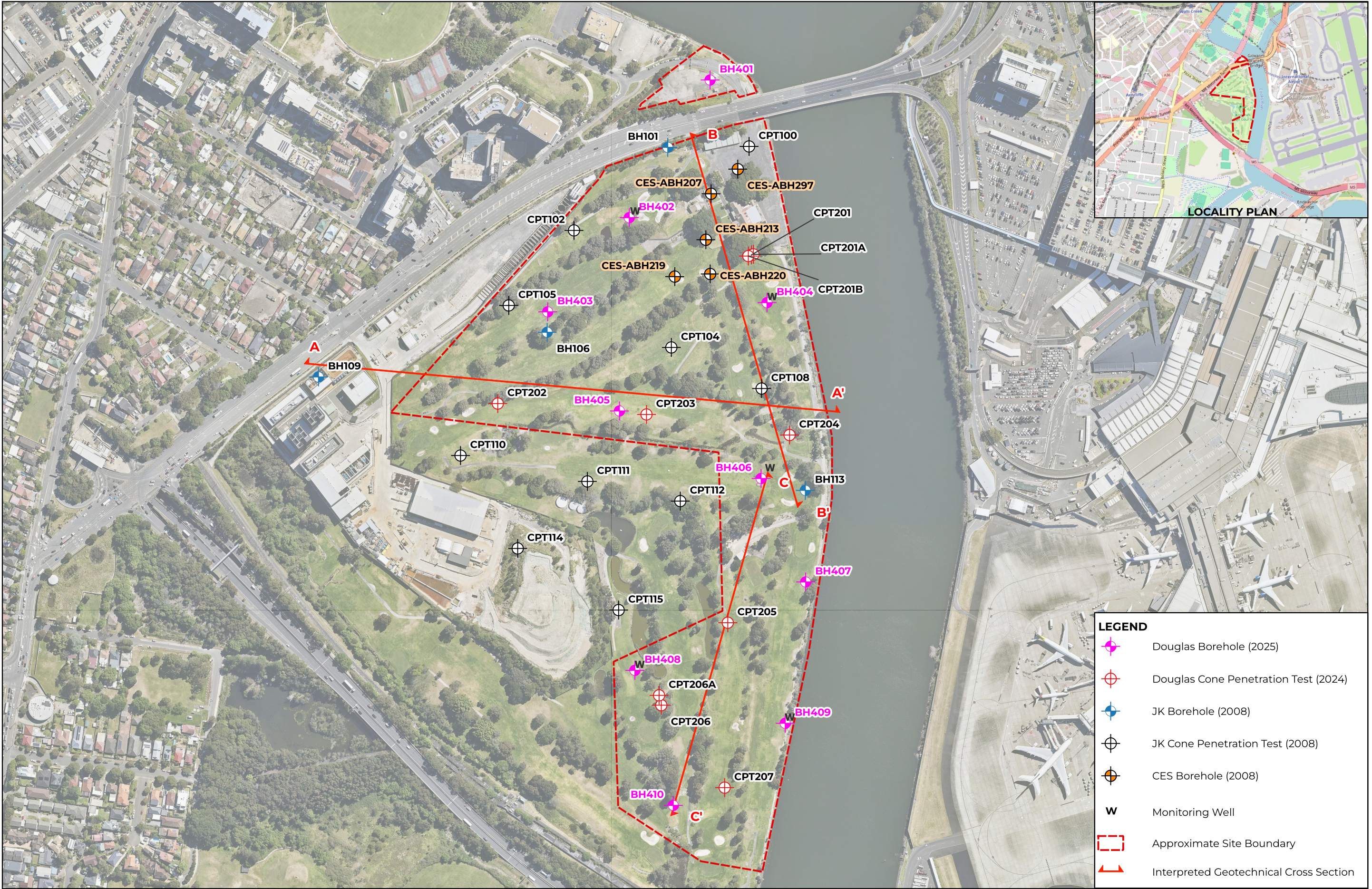
The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

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

Appendix B

Drawings



LEGEND

Douglas Borehole (2025)

Douglas Cone Penetration Test (2024)

JK Borehole (2008)

JK Cone Penetration Test (2008)

CES Borehole (2008)

Monitoring Well

Approximate Site Boundary

Interpreted Geotechnical Cross Section

REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	Issued for Information	06.11.2025	MN
SCALE: 0 50 100 150 200 m			
1:4000 @ A3			

PARTNERS

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

CLIENT:
Stockland Development Pty Limited

NOTE:
1: Basemap from Metromap (Dated 04.09.2025)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
Proposed Commercial-Industrial Development
PROJECT ADDRESS:
Kogarah Golf Course, Cooks Cove, Arncliffe NSW

DRAWING TITLE:
Test Location Plan

PROJECT NO:
223528.01

DRAWING NO:
1

REVISION:
0

Appendix C

Borehole Logs

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:329923.9, N:6243666.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH401
PROJECT No: 223528.01
DATE: 03/10/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED														SAMPLE		TESTING			
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN ^(#)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY	(%)						
		0.10	FILL / Sandy GRAVEL: grey; fine to medium; medium to coarse sand.		FILL	ND									ASS	D	0.10		
		0.20			FILL										x2 ASS	D	0.40		
		0.60	FILL / SAND trace gravel: dark brown; medium; medium gravel.														0.50		
		1	FILL / SAND with silt: dark grey; medium.		FILL	(VL)									ASS	D	0.90		
		1.00													SPT		1.45	SPT	0,1,1 N=2
		1.50	Sandy SILT (ML): dark grey; low plasticity; fine to medium sand; trace shells.														1.45		
		2			EST	VS	w=LL								ASS	D	2.00		
		2.00													no return	SPT	2.20	SPT	0,0,0 N=0 (HW)
		2.45															2.45		
		2.90	SAND (SP) trace silt: grey; medium.												ASS	SPT	3.00	SPT	0,1,1 N=2
		3.00															3.45		
		4				VL									ASS	SPT	4.00	SPT	1,0,1 N=1
		4.00															4.45		
		5	From 4.80m: No silt, pale grey		EST		W										5		
		5.20													ASS	SPT	5.20	SPT	9,16,20 N=36
		5.65															5.65		
		6				D									ASS	SPT	6.00	SPT	8,17,25 N=42
		6.00															6.45		
		6.90	Silty CLAY (CH): grey; high plasticity.												ASS	SPT	7.00	SPT	1,2,1 N=3
		7.00															7.45		
		8			EST	VS	w>PL								ASS	SPT	8.00	SPT	0,1,0 N=1
		8.00															8.45		
		9															9		
		9.70			ALV	VSt													

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.

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

METHOD: AD/T to 4.0 m, WB to 21.1m

REMARKS:

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam

CASING: HWT to 5.1m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:329923.9, N:6243666.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH401
PROJECT No: 223528.01
DATE: 03/10/25
SHEET: 2 of 3

[illegible]

PLANT: Coo 305 OPERATOR: J. H. H. LOGGED: J. H. H.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 5.1m

METHOD: AD/T to 4.0 m, WB to 21.1m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:329923.9, N:6243666.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH401
PROJECT No: 223528.01
DATE: 03/10/25
SHEET: 3 of 3

GROUNDWATER		CONDITIONS ENCOUNTERED													SAMPLE			TESTING	
RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
				ORIGIN ^(#)	CONSIS. ^(*) DENSITY. ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS						
		[CONT] Clayey SAND (SC): grey; medium.		ALV	L	W													
	21	Borehole discontinued at 21.10m depth. WB Refusal on Inferred Sandstone Bedrock.																	
	22																		
	23																		
	24																		
	25																		
	26																		
	27																		
	28																		
	29																		

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: C-305	OPERATOR: J. J. J.	LOGGED: J. J. J.
--------------	--------------------	------------------

PLANT: Geo 305
METHOD: AD/T to 4.0 m, WB to 21.1m
REMARKS:

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 5.1m

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329833.9, N:6243513.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH402
PROJECT No: 223528.01
DATE: 09/10/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING						
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			WEATH.	ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
					ORIGIN ^(#)	CONSIS. ^(*)	DENSITY ^(*)		MOISTURE	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)								
	0.20		FILL / SAND trace silt: brown; fine; heavy roots to 0.06m, trace roots to 0.3m; Topsoil.		EST		ND	D							ASS	D	0.10 0.20					
	0.70		Silty SAND (SM): dark brown; fine.					M							ASS	D	0.40 0.50					
	1		SAND (SP): grey and orange-brown; fine to medium.												ASS	D	0.90 1.00					
							VL								SPT		1.45	SPT	0,0,0 N=0 (HW)			
	2														ASS	SPT	2.00 2.45	SPT	1,1,1 N=2			
	3				EST			W							ASS	SPT	3.20 3.65	SPT	3,5,8 N=13			
	4		From 4.20m-5.00m: Soft clay bed				MD								ASS	SPT	4.00 4.45	SPT	3,1,0 N=1			
	5														ASS	SPT	5.00 5.12	SPT	1,3,7/80m m (HB)			
	5.60		SANDSTONE: pale grey, medium to coarse grained, cross bedded at 10°.														PLT	PL(A)=0.15MPa				
	6							MW														
	7							SW														
	8																					
	9							FR														

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: Geo 305

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 3.2m

METHOD: AD/T to 2.0 m, WB to 5.6 m, NMLC to 11.44 m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329833.9, N:6243513.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH402
PROJECT No: 223528.01
DATE: 09/10/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED														SAMPLE				TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
					ORIGIN (#)	CONSIS. (°)	DENSITY (°)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)								
	9		[CONT] SANDSTONE: pale grey, medium to coarse grained, cross bedded at 10°. Hawkesbury Sandstone.																			
	10		11.27m-11.31m: Siltstone bed						FR													
	11																					
	12		Borehole discontinued at 11.44m depth. Target Depth Reached.																			
	13																					
	14																					
	15																					
	16																					
	17																					
	18																					
	19																					

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.

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: Geo 305
METHOD: AD/T to 2.0 m, WB to 5.6 m, NMLC to 11.44 m
REMARKS:

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam
CASING: HWT to 3.2m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

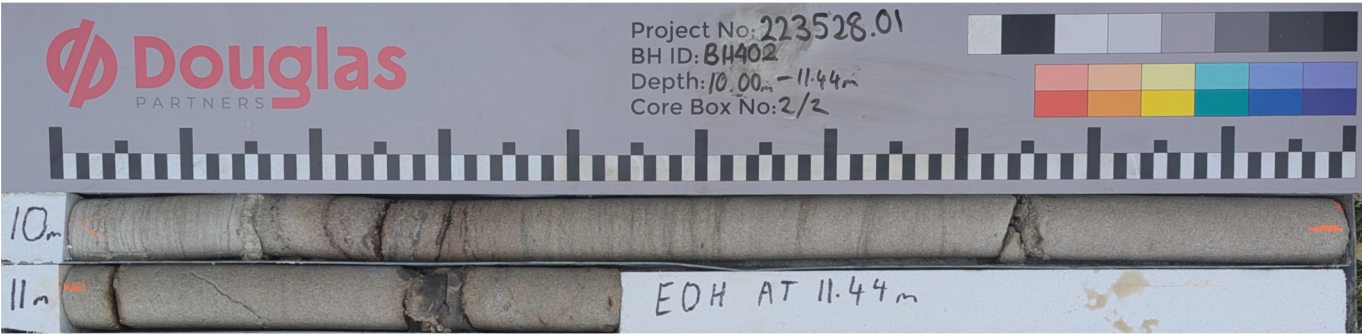
CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329833.9, N:6243513.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH402
PROJECT No: 223528.01
DATE: 09/10/25
SHEET: 1 of 1



5.60-10.00 m depth



10.00-11.44 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329743.2, N:6243408.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH403
PROJECT No: 223528.01
DATE: 08/10/25 - 09/10/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN (#)	CONSIS. (%) DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS						
0.8/0.25	1	0.10	FILL / SAND trace silt: grey; fine to medium; heavy roots to 0.08m, trace roots to 0.15m; Topsoil. SAND (SP) trace silt: brown; fine to medium. From 0.70m: with silt, dark grey-brown		ND	D									ASS	D	0.10 0.20			
	0.40	ASS													D	0.40 0.50				
	0.90	ASS													D	0.90 1.00				
	1.45	SPT																		
	2.00	ASS													D	2.00 2.20				
	2	1		SAND (SP): pale grey and orange-brown; fine to medium.		EST	VL								SPT			SPT	0,0,1 N=1	
	2.50	SPT														2.50 2.95	SPT	0,1,1 N=2		
	3.20	ASS	SPT													3.20 3.65	SPT	1,1,1 N=2		
	4.00	ASS	SPT													4.00 4.45	SPT	3,4,6 N=10		
	5.00	ASS	SPT													5.00 5.45	SPT	7,12,16 N=28		
	3	2		SAND (SP): pale grey and orange-brown; fine to medium.		ALV	MD								ASS	SPT		SPT	6,6,2 N=8	
	3.90	ASS	SPT													3.90 4.00	SPT	0,0,0 N=0 (HW)		
	4.45	ASS	SPT													4.45 5.00	SPT	6,7,13 N=20		
	5.45	ASS	SPT													5.45 6.00	SPT			
	6.00	ASS	SPT													6.00 6.45	SPT			
4	3		CLAY (CH) trace sand: grey; high plasticity; fine to medium sand.		ALV	VS	w>PL							ASS	SPT		SPT			
4.90	ASS	SPT													4.90 5.00	SPT				
5.45	ASS	SPT													5.45 6.00	SPT				
6.00	ASS	SPT													6.00 6.45	SPT				
6.45	ASS	SPT													6.45 7.00	SPT				
5	4		SAND (SW): grey, pale grey and yellow-brown; fine to coarse.		ALV	MD	M							ASS	SPT		SPT			
5.90	ASS	SPT													5.90 6.00	SPT				
6.45	ASS	SPT													6.45 7.00	SPT				
7.00	ASS	SPT													7.00 7.45	SPT				
7.45	ASS	SPT													7.45 8.00	SPT				
6	5		Borehole discontinued at 8.45m depth. Target Depth Reached.											ASS	SPT		SPT			
6.90	ASS	SPT													6.90 7.00	SPT				
7.45	ASS	SPT													7.45 8.00	SPT				
8.00	ASS	SPT													8.00 8.45	SPT				
8.45	ASS	SPT													8.45 9.00	SPT				
7	6																			
8	7																			
9	8																			

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.

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

METHOD: AD/T to 2.5 m, WB to 8.0 m

REMARKS:

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam

CASING: HWT to 3.2m

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 0.7 AHD
COORDINATE: E:329987.2, N:6243418.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH404
PROJECT No: 223528.01
DATE: 02/10/25 - 03/10/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				ORIGIN ^(*)	CONSIS. ^(*)	DENSITY. ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD								
RL (m)																				
02/10/25	0.10	TOPSOIL / SAND with silt: dark grey; fine to medium; Heavy roots to 0.03 m, trace roots to 0.2 m.	TS	TOP	ND	M								ASS	D	0.10				
	0.55	FILL / SAND: grey; fine to medium.	FILL																	
	1	Sandy SILT (ML): grey and dark grey; low plasticity; fine to medium sand; faint sulphurous odour.			W>PL									ASS	D	0.90				
														SPT		1.00	SPT	0,0,0 N=0 (HW)		
			EST	(VS)	W=LL											1.45				
	2															2.00				
	2.60													ASS	SPT	2.45	SPT	0,0,1 N=1		
	3	SAND (SP): pale grey; fine to medium.														3.00				
					EST	(VL)	W							ASS	SPT	3.45	SPT	1,0,1 N=1		
	4.00	SANDSTONE: pale grey and yellow-brown, medium to coarse grained. Hawkesbury Sandstone.														4	PLT	PL(A)=0.46MPa		
	5								100	100			5.04m: B, 5°, PR, INF Clay 10mm, SM 5.17m: B, 0°, PR, INF Clay 5mm, SM			5				
	6												5.91m: B, 10°, PR, CN, SM 6.04m: B, 0°, PR, CN, SM 6.31m: B, 15°, PR, VNR Clay, SM			6	PLT	PL(A)=0.59MPa		
	7												6.59m: B, 10°, ST, CN, RF 6.75m: B, 5°, PR, CN, RF 6.86m: EW, Clay 60mm			7				
	8												7.84m: B, 20°, PR, VNR Clay, SM 8.18m: B, 5°, PR, VNR Clay, RF 8.44m: B, 0°, IR, CN, RF			8	PLT	PL(A)=0.68MPa		
	9												8.86m: B, 10°, ST, CN, SM 9.67m: B, 15°, PR, CN, SM			9	PLT	PL(A)=0.32MPa		

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: Geo 305

OPERATOR: Ground Test (S. Stembridge)

LOGGED: I. Howsam
CASING: HWT to 4m

METHOD: AD/T to 2.0 m, WB to 4.0 m, NMLC to 11.48 m

REMARKS:

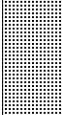
Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 0.7 AHD
COORDINATE: E:329987.2, N:6243418.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH404
PROJECT No: 223528.01
DATE: 02/10/25 - 03/10/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																			SAMPLE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	TESTING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
					ORIGIN(%)	CONSIS. ⁽¹⁾ DENSITY. ⁽²⁾	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS							BACKFILL	WELL PIPE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	-6	11	[CONT] SANDSTONE: pale grey and yellow-brown, medium to coarse grained. Hawkesbury Sandstone. From 10.14m: Pale grey					SW	10.14	 L M H VH																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				</

Generated with CORE-GS by Geroc - Combined Log

PLANT: Geo 305
METHOD: AD/T to 2.0 m, WB to 4.0 m, NMLC to 11.48 m
REMARKS:

OPERATOR: Ground Test (S. Stemberge)

LOGGED: I. Howsam
CASING: HWT to 4m

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 0.7 AHD
COORDINATE: E:329987.2, N:6243418.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH404
PROJECT No: 223528.01
DATE: 02/10/25 - 03/10/25
SHEET: 1 of 1



4.00-8.00 m depth



8.00-11.48 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329823.0, N:6243298.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405
PROJECT No: 223528.01
DATE: 08/10/25
SHEET: 1 of 3

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN(%)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)						
		0.15	TOPSOIL / SAND trace silt: dark brown; fine to medium; heavy roots to 0.04m, trace roots to 0.15m.	TS	TOP	ND		D												
		1	FILL / SAND: brown; fine to medium. From 0.60m: pale grey From 0.80m: grey, trace silt	FILL	PC		M													
		1.60																		
		2	Sandy SILT (ML): grey; low plasticity; fine to medium sand; trace shell fragments; sulphurous odour.			VS														
		2.45		EST			W=LL													
		3				F														
		3.30	SAND (SP): brown; fine to medium; trace shell fragments.																	
		4				VL														
		5		EST		MD		W												
		6				D														
		6.90	CLAY (CI-CH) with sand: grey mottled yellow-brown; medium to high plasticity.		EST	S		W>PL												
		8.00	SAND (SP): grey; fine to medium.																	
		9		EST		D		W												
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.																				

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stembridge)

LOGGED: J. Flynn

METHOD: AD/T to 2.0 m, WB to 16.85 m, NMLC to 24.70 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329823.0, N:6243298.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405
PROJECT No: 223528.01
DATE: 08/10/25
SHEET: 2 of 3

CONDITIONS ENCOUNTERED													SAMPLE		TESTING				
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
				ORIGIN (#)	CONSIS. (°)	DENSITY (t/m³)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)						
	0	[CONT] SAND (SP): grey; fine to medium.		EST	D	W													
	10.60	Sandy CLAY (CI): grey; medium plasticity; fine to medium sand.																	
	11																		
	12																		
	13																		
	14			ALV	(VS)	w>PL													
	15																		
	16																		
	16.85	SANDSTONE: pale grey and orange-brown, fine to medium grained; crossbedded.																	
	17						MW										PLT	PL(A)=0.49MPa	
	17.20						SW										PLT	PL(A)=0.11MPa	
	17.61																		
	17.79																		
	18						SW										PLT	PL(A)=0.11MPa	
	18.70																		
	19						MW										PLT	PL(A)=1.1MPa	
	19																		

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Coo 305 OPERATOR: J. H. H. LOGGED: J. H. H.

PLANT: Geo 305

OPERATOR: Ground Test (S. Stemberge)

LOGGED: J. Flynn

METHOD: AD/T to 2.0 m, WB to 16.85 m, NMLC to 24.70 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329823.0, N:6243298.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405
PROJECT No: 223528.01
DATE: 08/10/25
SHEET: 3 of 3

GROUNDWATER		CONDITIONS ENCOUNTERED												SAMPLE				TESTING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				ORIGIN (#)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)							DEFECTS & REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	20.00	[CONT] SANDSTONE: grey-orange brown, fine to medium grained, siltstone laminations, 0-10°.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305
METHOD: AD/T to 2.0 m, WB to 16.85 m, NMLC to 24.70 m
REMARKS:

OPERATOR: Ground Test (S. Stembridge)

LOGGED: J. Flynn
CASING: HWT to 3.2m

Refer to explanatory notes for symbol and abbreviation definitions

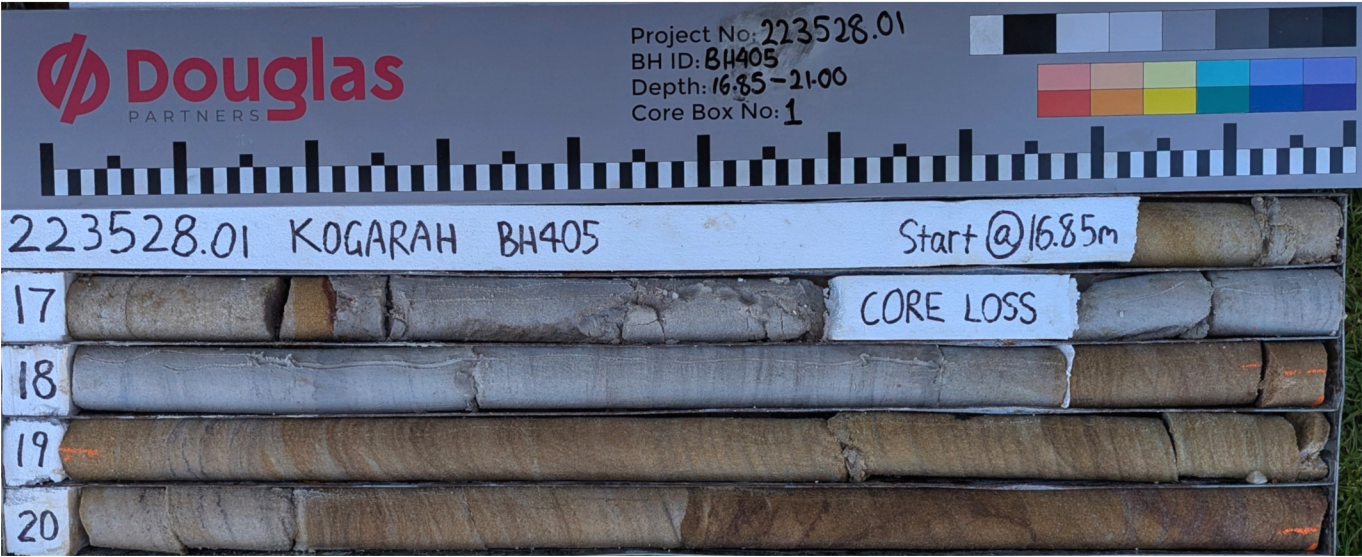


CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.2 AHD
COORDINATE: E:329823.0, N:6243298.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH405
PROJECT No: 223528.01
DATE: 08/10/25
SHEET: 1 of 1



16.85-21.00 m depth



21.00-24.78 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.1 AHD
COORDINATE: E:329980.7, N:6243223.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH406
PROJECT No: 223528.01
DATE: 02/10/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE		TESTING						
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
					ORIGIN (#)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)								
02/10/25		0.10	FILL / SAND with silt: dark grey; fine to medium; Heavy roots to 0.05 m, trace roots to 0.2 m; Topsoil.		FILL	PC	M								ASS	D	0.10					
		0.60	FILL / SAND: grey mottled orange-brown; fine to medium; frequent shells.												x2 ASS	D	0.20					
		1	SAND (SP): grey and dark grey; fine to medium; faint sulphurous odour .		EST. or possibly FILL	VL	W								ASS	D	0.40					
		2	From 0.60m: grey and dark grey, faint sulphur odour												SPT		0.50					
		2.40	Sandy SILT (ML): dark grey and black; low plasticity; fine to medium sand; frequent shells, sulphur odour.		EST	S	w=LL								SPT		0.90					
		3													ASS	D	1.00		0,1,0 N=1			
		3.80	SAND (SP): grey; fine to medium; trace shells.		EST	VL	W								ASS	SPT	1.45					
		4													ASS	SPT	2		1,0,0 N=0 (HW)			
		5			EST	VL	W								ASS	SPT	2.20					
		6													ASS	SPT	2.50					
	7			EST	MD	W								ASS	SPT	2.65						
	7.10	CLAY (CI) with sand: grey; medium plasticity; medium sand.												ASS	SPT	2.80		0,0,0 N=0 (HW)				
	7.60	SAND (SP): pale grey and yellow-grey; medium.		EST	MD + D	W								ASS	SPT	3.00						
	8													ASS	SPT	3.45		0,0,0 N=0				
				EST	MD	W								ASS	SPT	4.00						
														ASS	SPT	4.45		0,0,0 N=0				
				EST	MD	W								ASS	SPT	5.00		1,2,2 N=4				
														ASS	SPT	5.45						
				EST	MD	W								ASS	SPT	6.00		4,10,18 N=28				
														ASS	SPT	6.45						
				EST	MD	W								ASS	D	7.00						
														ASS	SPT	7.10		0,1,2 N=3				
				EST	MD	W								ASS	SPT	7.55						
														ASS	SPT	8.00		7,13,17 N=30				
				EST	MD	W								ASS	SPT	8.45						
				EST	MD	W																
				EST	MD	W																
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BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.7 AHD
COORDINATE: E:330030.2, N:6243107.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH407
PROJECT No: 223528.01
DATE: 29/09/25
SHEET: 1 of 1

CONDITIONS ENCOUNTERED														SAMPLE		TESTING			
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
				ORIGIN (#)	CONSIS. (%)	DENSITY (%)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)						
29/09/25 1 2 3 4 5 6 7 8 9	0.20	FILL / SAND: grey; medium; trace charcoal, heavy roots to 0.01 m, trace roots to 0.2 m.		FILL	ND										D	0.10			
	1	FILL / SAND: pale grey and white; medium. From 0.60m: dark grey, trace silt		FILL			M								D	0.40			
	1.60														SPT	0.90			
	2	Sandy SILT (ML): dark grey and black; fine to medium sand; trace shells, strong sulphur odour.			VL										SPT	1.00		SPT	2,1,0 N=1
	2																1.45		
	2														SPT	2.10		SPT	1,0,0 N=0
	3			EST. possibly FILL													2.55		
	3						W								SPT	3.00		SPT	1,0,0 N=0
	3.60																3.45		
	4	Silty CLAY (OH): dark grey; high plasticity; strong sulphur odour, possibly peat.													SPT	4.00		SPT	1,0,0 N=0
	4																4.45		
	5			EST	VS	W=LL									SPT	5.00		SPT	1,0,0 N=0
	5																5.45		
	6														SPT	6.00		SPT	1,0,0 N=0
	6.40																6.45		
	7	Silty SAND (SM): grey; medium; trace shells, strong sulphur odour.			EST	VL	W								SPT	7.00		SPT	1,0,0 N=0
7																7.45			
8														SPT	8.00		SPT	1,0,0 N=0	
8																8.45			
		Borehole discontinued at 8.45m depth. Target Depth Reached.																	

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.

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 8.0 m

CASING: Uncased

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:329840.2, N:6243009.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH408
PROJECT No: 223528.01
DATE: 01/10/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED										SAMPLE		TESTING								
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK						SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				ORIGIN(##)	CONSIS. (V)	DENSITY. (T)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD								
01/10/25	0.10	FILL / Silty SAND: dark brown; fine to coarse; with rootlets.	TS	FILL	(PC)	M								D	0.10					
	0.70	FILL / SAND trace silt: grey, brown and orange - brown; fine to coarse; trace shell fragments.		FILL	(MC)									D	0.40					
	1	Silty CLAY: dark grey; medium plasticity; trace shells, organic odour.												D	0.90					
	1.45												ASS	SPT	1.45	SPT	1,0,0 N=0			
	2												ASS	SPT	2.00	SPT	0,0,0 N=0 (HW)			
	2.45														2.45					
	3														3.00	SPT	0,0,0 N=0 (HW)			
	3.45			EST	(VS) - (S)	w>PL							no recovery	SPT	3.45					
	4												ASS	SPT	4.00	SPT	0,0,0 N=0 (HW)			
	4.45														4.45					
	5												ASS	SPT	5.00	SPT	0,0,0 N=0 (HW)			
	5.45														5.45					
	6.00	Silty SAND: dark grey; fine to medium; trace shells, organic odour.											ASS	SPT	6.00	SPT	0,0,0 N=0 (HW)			
	6.45														6.45					
	7			EST	VL	W							ASS	SPT	7.00	SPT	0,0,0 N=0 (HW)			
	7.45														7.45					
	7.90	Sandy CLAY (CI-CH): grey; medium to high plasticity; fine to medium sand.											ASS	SPT	8.00	SPT	2,1,1 N=2			
	8.45			ALV	S	w>PL									8.45					
	9														9.00					
	9.30	SAND (SP): grey; fine to medium.		ALV	D	W							ASS	SPT	9.45	SPT	2,4,19 N=23			

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305 **OPERATOR:** Ground Test (L. Cooper) **LOGGED:** L. Straney/R. Taylor
METHOD: AD/T to 2.0 m, WB to 10.5 m, NMLC to 18.78 m **CASING:** HWT to 3.2m, then HQ to 10.45m
REMARKS: grass overlay

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:329840.2, N:6243009.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH408
PROJECT No: 223528.01
DATE: 01/10/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED										SAMPLE		TESTING								
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK													
				ORIGIN(1)	CONSIS.(1) DENSITY.(1)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS							
	10.20	[CONT] SAND (SP): grey; fine to medium.		ALV	D	W														
	10.50	Clayey SAND (SC): grey; fine to medium; low plasticity clay.		XWM																
	11	SANDSTONE: pale grey, medium to coarse grained, cross bedding, 5 to 10°. Hawkesbury sandstone.																		
	11.13																			
	11.19																			
	11.47																			
	11.57																			
	11.75																			
	11.81																			
	12																			
	12.31																			
	13																			
	13.05																			
	13.14																			
	13.70																			
	14																			
	14.00																			
	15																			
	15.58																			
	16																			
	16.66																			
	17																			
	17.36																			
	18																			
	18.35																			
	19	Borehole discontinued at 18.78m depth. Target Depth Reached.																		

NOTES: (1) Soil origin is "probable" unless otherwise stated. (1) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305 **OPERATOR:** Ground Test (L. Cooper) **LOGGED:** L. Straney/R. Taylor
METHOD: AD/T to 2.0 m, WB to 10.5 m, NMLC to 18.78 m **CASING:** HWT to 3.2m, then HQ to 10.45m
REMARKS: grass overlay

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

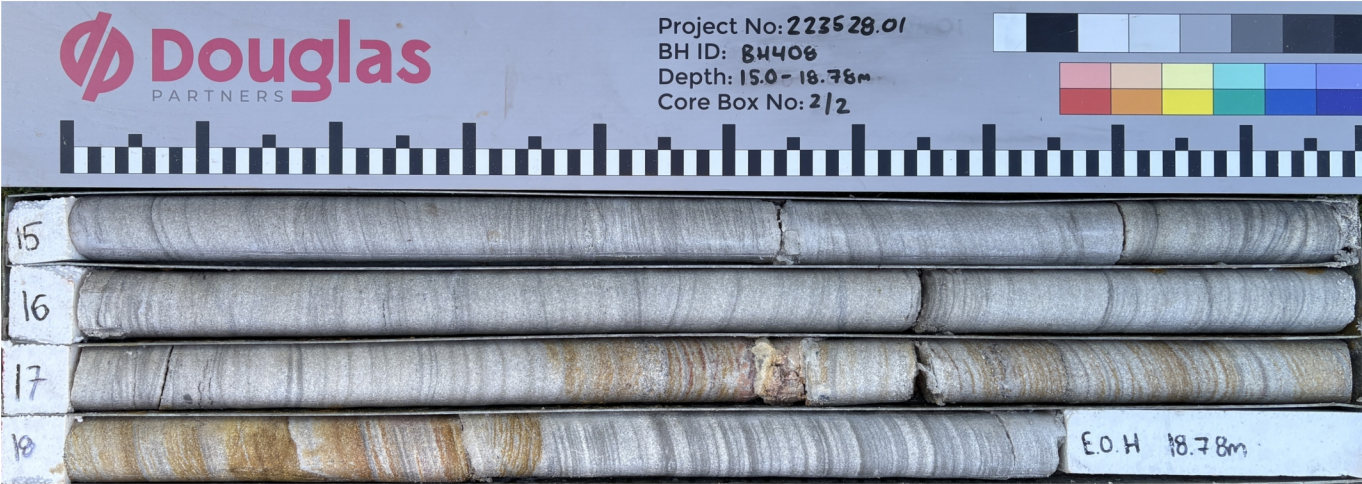
CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:329840.2, N:6243009.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH408
PROJECT No: 223528.01
DATE: 01/10/25
SHEET: 1 of 1



10.50-15.00 m depth



15.00-18.78 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:330007.5, N:6242950.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH409
PROJECT No: 223528.01
DATE: 29/09/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING					
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				ORIGIN(1)	CONSIS. (1) DENSITY. (1)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS								
29/10/25 No Free Groundwater Observed Whilst Augering	0.30	FILL / SAND: brown; medium; trace wood chips, heavy roots to 0.01 m, trace roots to 0.3 m.		FILL		ND	M								ASS	D	0.10 0.20				
	0.80	FILL / SAND: yellow-brown; fine to medium.		FILL											ASS	D	0.40 0.50				
	1	Sandy SILT (ML): dark grey; low plasticity; fine to medium sand.													ASS	D	0.90 1.00				
	2			EST possibly FILL		S	w>PL										1.45	SPT	1,1,1 N=2		
	2.90	Silty CLAY (OH): dark grey; high plasticity; possibly peat, strong sulphur odour.													ASS	SPT	2.50	SPT	1,0,0 N=0		
	3														ASS	SPT	2.95	SPT	1,0,0 N=0		
	4														ASS	SPT	3.45				
	5														ASS	SPT	4.00	SPT	1,0,0 N=0		
	6														no return	SPT	4.45	SPT	1,0,0 N=0		
	7														ASS	SPT	5.00	SPT	1,0,0 N=0		
	8	CLAY (CH): grey and yellow - brown; high plasticity; interbedded with bands of medium grained Sandy CLAY.													ASS	SPT	5.45				
	9														ASS	SPT	6.00	SPT	1,0,0 N=0		
	7.80														ASS	SPT	6.45				
	8														ASS	SPT	7.00	SPT	0,0,0 N=0 (HW)		
	9														ASS	SPT	7.45				
	8.45														ASS	SPT	8.00	SPT	1,4,7 N=11		
	9.45														ASS	SPT	8.45				
	9														ASS	SPT	9.00	SPT	3,3,7 N=10		
	9.45																9.45				

NOTES: (1) Soil origin is "probable" unless otherwise stated. (1) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 1.0 m, WB to 13.94 m, NMLC to 20.0 m

CASING: HWT to 2.6m, then HQ to 13.94m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited

PROJECT: Kogarah Golf Course Redevelopment

LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD

COORDINATE: E:330007.5, N:6242950.6

DATUM/GRID: MGA2020 Zone 56

DIP/AZIMUTH: 90°/---°

LOCATION ID: BH409

PROJECT No: 223528.01

DATE: 29/09/25

SHEET: 2 of 2

CONDITIONS ENCOUNTERED																SAMPLE			TESTING			
GROUNDWATER	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
				ORIGIN(%)	CONSIS. ^(*) DENSITY ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)										
RL (m)																						
-9		[CONT] CLAY (CH): grey and yellow - brown; high plasticity; interbedded with bands of medium grained Sandy CLAY.																				
-11																						
-10																						
-12																						
-11																						
-12.80		SAND (SP): pale grey; medium.																				
-13																						
-12																						
-13.94		SANDSTONE: pale grey - yellow, medium to coarse grained. Hawkesbury Sandstone.																				
-13																						
-15																						
-14																						
-16																						
-15																						
-17																						
-17.23		SANDSTONE: pale grey, medium to coarse grained. Hawkesbury Sandstone.																				
-16																						
-18																						
-17																						
-19																						
-18		Borehole discontinued at 20.00m depth. Target Depth Reached.																				
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: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 1.0 m, WB to 13.94 m, NMLC to 20.0 m

CASING: HWT to 2.6m, then HQ to 13.94m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.5 AHD
COORDINATE: E:330007.5, N:6242950.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH409
PROJECT No: 223528.01
DATE: 29/09/25
SHEET: 1 of 1



13.94-18.00 m depth



18.00-20.00 m depth

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.3 AHD
COORDINATE: E:329882.9, N:6242859.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH410
PROJECT No: 223528.01
DATE: 30/09/25
SHEET: 1 of 2

CONDITIONS ENCOUNTERED														SAMPLE		TESTING				
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK							SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
					ORIGIN ^(#)	CONSIS. ^(*)	DENSITY ^(*)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)						
▼	30/10/25	0.40	FILL / SAND: brown; medium; heavy roots to 0.05 m, trace roots to 0.4 m.		FILL	ND	M													
		1	Sandy SILT (ML): dark grey; low plasticity; fine to medium sand; trace shell fragments, sulphur odour.		EST. possibly FILL	PC														
		2																		
		2.80	Silty CLAY (OH): dark grey; high plasticity; possibly peat, strong sulphur odour.				w=LL													
		3																		
		4			EST	VS														
		5																		
		5.50	Silty SAND (SM): dark grey; fine to medium; occasional shells, sulphur odour.																	
		6			EST	VL	W													
		7																		
		7.80	Sandy CLAY (CL-CI): grey; low to medium plasticity; fine to medium sand.																	
		8			EST	VS														
		9					w>PL													
		9.70	From 9.70m: orange-brown		RS	St														

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.

NOTES: ¹ Soil origin is "probable" unless otherwise stated. ² Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 2.0 m, WB to 10.48 m, NMLC to 17.45 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.3 AHD
COORDINATE: E:329882.9, N:6242859.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH410
PROJECT No: 223528.01
DATE: 30/09/25
SHEET: 2 of 2

CONDITIONS ENCOUNTERED																			SAMPLE				TESTING	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	SOIL			ROCK										SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	
					ORIGIN (#)	CONSIS. (°)	DENSITY (°)	MOISTURE	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS									
					RS	St	w>PL																	
		10.48	SANDSTONE: orange - brown and grey, medium to coarse grained. Hawkesbury sandstone.					HW	10.48	VL									10.05	SPT	4,7,25/110mm (HB)			
		10.46								10.77	SEAM								10.46					
		11						MW				100	65		10.85m: B, 0°, PR, CN, SM				11	PLT	PL(A)=0.29MPa			
		12													11.47m: B, 20°, PR, CN, RF 11.54m: B, 20°, PR, VNR Clay 11.59m: B, 20°, PR, CT Clay, RF				12					
		12						SW							12.07m: B, 25°, PR, CN, SM					PLT	PL(A)=0.62MPa			
		12.85								12.85					12.44m: B, 20°, PR, CN, RF									
		12.95						HW		12.95	L								13					
		13						XW		13.16	SEAM				13.16-13.25m: EW, Clay 90mm					PLT	PL(A)=0.13MPa			
		14						HW		13.25	VL	95	61		13.44m: B, 15°, PR, INF Clay 10mm, RF 13.58m: EW, Clay 40mm 13.83m: B, 10°, PR, CT Clay, SM				14					
		15						HW		13.67					14.40m: EW, Clay 40mm				15	PLT	PL(A)=0.16MPa			
		16								15.10m: B, 0-5°, PR, CN, SM 15.40m: B, 0°, PR, CN, SM 15.59m: IS, Clay 30mm								16	PLT	PL(A)=0.59MPa				
		17						MW		16.07		100	86		16.07m: B, 10°, PR, SN M, SM 16.61m: B, 0-10°, IR, CT Clay, RF				16	PLT	PL(A)=0.33MPa			
		18	Borehole discontinued at 17.45m depth. Target Depth Reached.																					
		19																						

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.

NOTES: ¹Soil origin is "probable" unless otherwise stated. ²Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Geo 305

OPERATOR: Ground Test (L. Cooper)

LOGGED: I. Howsam

METHOD: AD/T to 2.0 m, WB to 10.48 m, NMLC to 17.45 m

CASING: HWT to 3.2m

REMARKS:

Refer to explanatory notes for symbol and abbreviation definitions



CORE PHOTO LOG

CLIENT: Stockland Development Pty Limited
PROJECT: Kogarah Golf Course Redevelopment
LOCATION: Marsh Street, Arncliffe, NSW

SURFACE LEVEL: 1.3 AHD
COORDINATE: E:329882.9, N:6242859.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH410
PROJECT No: 223528.01
DATE: 30/09/25
SHEET: 1 of 1



10.48-15.00 m depth



15.00-17.45 m depth

Appendix D

Laboratory Results

Material Test Report

Report Number: 223528.01-1
Issue Number: 1
Date Issued: 15/10/2025
Client: Stockland Development Pty Limited
Level 29/133 Castlereagh Street, Sydney NSW
Contact: Daniel Lorenzetto
Project Number: 223528.01
Project Name: Kogarah Golf Course Redevelopment
Project Location: Marsh Street, Arncliffe NSW
Work Request: 12647
Sample Number: SY-12647A
Date Sampled: 07/10/2025
Dates Tested: 07/10/2025 - 10/10/2025
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH404 (0.4 - 0.5m)
Material: SAND: yellow brown, trace clay



Douglas Partners Pty Ltd

Sydney Laboratory

96 Hermitage Road West Ryde NSW 2114

Phone: (02) 9809 0666

Email: lujia.wu@douglaspartners.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

A handwritten signature in blue ink, appearing to read 'Lujia Wu'.

Approved Signatory: Lujia Wu

Soil Technician

Laboratory Accreditation Number: 828

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	3		
Soil Description	SAND: yellow brown, trace clay		
Nature of Water	Demineralized		

Material Test Report

Report Number: 223528.01-1
Issue Number: 1
Date Issued: 15/10/2025
Client: Stockland Development Pty Limited
Level 29/133 Castlereagh Street, Sydney NSW
Contact: Daniel Lorenzetto
Project Number: 223528.01
Project Name: Kogarah Golf Course Redevelopment
Project Location: Marsh Street, Arncliffe NSW
Work Request: 12647
Sample Number: SY-12647I
Date Sampled: 07/10/2025
Dates Tested: 07/10/2025 - 10/10/2025
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH407 (0.4 - 0.5m)
Material: SAND: dark browns, trace clay



Douglas Partners Pty Ltd

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Accredited for compliance with ISO/IEC 17025 - Testing

A handwritten signature in blue ink, appearing to read 'Lujia Wu'.

Approved Signatory: Lujia Wu

Soil Technician

Laboratory Accreditation Number: 828

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	3		
Soil Description	SAND: dark browns, trace clay		
Nature of Water	Demineralized		

Material Test Report

Report Number: 223528.01-4
Issue Number: 1
Date Issued: 11/11/2025
Client: Stockland Development Pty Limited
Level 29/133 Castlereagh Street, Sydney NSW
Contact: Daniel Lorenzetto
Project Number: 223528.01
Project Name: Kogarah Golf Course Redevelopment
Project Location: Marsh Street, Arncliffe NSW
Work Request: 12695
Sample Number: SY-12695G
Date Sampled: 02/10/2025
Dates Tested: 24/10/2025 - 30/10/2025
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH410 (0.4-0.5m)
Material: Clayey SAND: dark grey



Douglas Partners Pty Ltd

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Accredited for compliance with ISO/IEC 17025 - Testing

A handwritten signature in black ink, appearing to read 'A. Hutchings'.

Approved Signatory: Andrew Hutchings

Associate / Laboratory Manager

Laboratory Accreditation Number: 828

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	6		
Soil Description	Clayey SAND: dark grey		
Nature of Water	Demineralised		

Material Test Report

Report Number: 223528.01-5
Issue Number: 1
Date Issued: 11/11/2025
Client: Stockland Development Pty Limited
Level 29/133 Castlereagh Street, Sydney NSW
Contact: Daniel Lorenzetto
Project Number: 223528.01
Project Name: Kogarah Golf Course Redevelopment
Project Location: Marsh Street, Arncliffe NSW
Work Request: 12696
Sample Number: SY-12696A
Date Sampled: 03/10/2025
Dates Tested: 24/10/2025 - 30/10/2025
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH403 (0.4-0.5m)
Material: SAND: dark brown, with clay



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A handwritten signature in black ink, appearing to read 'A. Hutchings'.

Approved Signatory: Andrew Hutchings
Associate / Laboratory Manager
Laboratory Accreditation Number: 828

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	4 *		
Soil Description	SAND: dark brown, with clay		
Nature of Water	Demineralised		
* Mineral Present	Carbonate		

Textural Classification

Estimation of Soil Texture by Hand

15 Oct 2025

223528.01 Kogarah Golf Course Redevelopment – Marsh Street, Arncliffe NSW

Sample	Location	Sampling Date	Test Date	Soil Texture Group	Texture Value
12647A	BH404 (0.4-0.5)	07-10-2025	09-10-2025	SAND (Clayey SAND)	17
12647B	BH404 (0.9-1.0)	07-10-2025	09-10-2025	SAND (Loamy SAND)	17
12647C	BH404 (2.0-2.45)	07-10-2025	09-10-2025	SAND (Loamy SAND)	17
12647D	BH404 (3.2-3.65)	07-10-2025	09-10-2025	SAND	17
12647E	BH406 (0.4-0.6)	07-10-2025	09-10-2025	SAND	17
12647F	BH406 (0.9-1.0)	07-10-2025	09-10-2025	SAND	17
12647G	BH406 (3.0-3.45)	07-10-2025	09-10-2025	LOAM	10
12647H	BH407 (0.1-0.2)	07-10-2025	09-10-2025	SAND	17
12647I	BH407 (0.4-0.5)	07-10-2025	09-10-2025	SAND (Clayey SAND)	17
12647J	BH407 (0.9-1.0)	07-10-2025	09-10-2025	SAND (Loamy SAND)	17
12647K	BH407 (2.1-2.55)	07-10-2025	09-10-2025	LOAM	10
12647L	BH408 (0.4-0.5)	07-10-2025	09-10-2025	SAND	17
12647M	BH408 (1.0-1.45)	07-10-2025	09-10-2025	Light CLAY	8.5
12647N	BH408 (2.0-2.45)	07-10-2025	09-10-2025	Clay LOAM	9



Andrew Hutchings
Associate / Laboratory Manager

Textural Classification

Estimation of Soil Texture by Hand

11 November 2025

223528.01 Kogarah Golf Course Redevelopment – Marsh Street, Arncliffe, NSW

Report Number: 223528.01-3
Date Sampled: 02/10/2025
Date Tested: 31/10/2025

Sample	Location	Soil Texture Group	Texture Value
12695A	BH408 (4-4.45m)	Light clay	8.5
12695B	BH409 (0.1-0.2m)	Clay Loam	9
12695C	BH409 (0.4-0.5m)	Loam	10
12695D	BH409 (0.9-1.0m)	Sandy loam	14
12695E	BH409 (2.5-2.95m)	Sandy loam	14
12695F	BH410 (0.1-0.2m)	Sand	17
12695G	BH410 (0.4-0.5m)	Clay loam	9
12695H	BH410 (0.9-1.0m)	Light clay	8.5
12695I	BH410 (2.0-2.45m)	Clay loam	9



Andrew Hutchings
Associate / Laboratory Manager

Textural Classification

Estimation of Soil Texture by Hand

11 November 2025

223528.01 Kogarah Golf Course Redevelopment – Marsh Street, Arncliffe, NSW

Report Number: 223528.01-6
Date Sampled: 03/10/2025
Date Tested: 31/10/2025

Sample	Location	Soil Texture Group	Texture Value
12696A	BH403 (0.4-0.5)	Light Clay	8.5
12696B	BH403 (0.9-1.0)	Sand Loam	14
12696C	BH403 (2.5-2.95)	Sand	17
12696D	BH403 (3.2-3.65)	Sand	17
12696E	BH402 (0.4-0.5)	Sandy Loam	14
12696F	BH402 (0.9-1.0)	Sand	17
12696G	BH402 (2.0-2.45)	Sand	17
12696H	BH401 (0.4-0.5)	Sand	17
12696I	BH401 (0.9-1.0)	Medium Clay	7
12696J	BH401 (2.0-2.2)	Loam	10
12696K	BH405 (0.4-0.5)	Sand	17
12696L	BH405 (0.9-1.0)	Sand	17
12696M	BH405 (3.0-3.45)	Sand	17



Andrew Hutchings
Associate / Laboratory Manager

CERTIFICATE OF ANALYSIS 392291

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01 Arncliffe</u>
Number of Samples	54 Soil
Date samples received	03/10/2025
Date completed instructions received	03/10/2025

Analysis Details

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

Samples were analysed as received from the client unless as indicated below in the method summaries. 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	13/10/2025
Date of Issue	13/10/2025

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Results Approved By

Diego Bigolin, Inorganics Supervisor
Giovanni Agosti, Group Technical Manager

Authorised By

Nancy Zhang, Laboratory Manager

Misc Inorg - Soil

Our Reference		392291-1	392291-2	392291-3	392291-4	392291-5
Your Reference	UNITS	BH404	BH404	BH404	BH404	BH406
Depth		0.4-0.5	0.9-1	2-2.45	3.2-3.65	0.4-0.5
Date Sampled		02/10/2025	02/10/2025	02/10/2025	02/10/2025	02/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	08/10/2025	08/10/2025	08/10/2025	9/10/2025
Date analysed	-	9/10/2025	08/10/2025	08/10/2025	08/10/2025	9/10/2025
pH 1:5 soil:water	pH Units	7.8	7.2	7.1	8.0	8.8
Electrical Conductivity 1:5 soil:water	µS/cm	150	120	140	100	140
Chloride, Cl 1:5 soil:water	mg/kg	10	[NA]	[NA]	[NA]	56
Sulphate, SO4 1:5 soil:water	mg/kg	10	[NA]	[NA]	[NA]	33

Misc Inorg - Soil

Our Reference		392291-6	392291-7	392291-14	392291-15	392291-16
Your Reference	UNITS	BH406	BH406	BH407	BH407	BH407
Depth		0.9-1	2.5-2.8	0-0.1	0.4-0.5	0.9-1
Date Sampled		02/10/2025	02/10/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2025	08/10/2025	9/10/2025	9/10/2025	08/10/2025
Date analysed	-	08/10/2025	08/10/2025	9/10/2025	9/10/2025	08/10/2025
pH 1:5 soil:water	pH Units	8.6	7.2	7.2	8.7	7.9
Electrical Conductivity 1:5 soil:water	µS/cm	210	720	120	46	170
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	<10	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	<10	[NA]	[NA]

Misc Inorg - Soil

Our Reference		392291-17	392291-24	392291-25	392291-26	392291-27
Your Reference	UNITS	BH407	BH408	BH408	BH408	BH408
Depth		2.1-2.55	0.4-0.5	0.9-1	2-2.45	3-3.45
Date Sampled		29/09/2025	01/10/2025	01/10/2025	01/10/2025	01/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2025	9/10/2025	9/10/2025	08/10/2025	08/10/2025
Date analysed	-	08/10/2025	9/10/2025	9/10/2025	08/10/2025	08/10/2025
pH 1:5 soil:water	pH Units	7.5	8.4	7.7	7.8	7.6
Electrical Conductivity 1:5 soil:water	µS/cm	810	260	5,500	10,000	12,000
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	14,000	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	[NA]	850	[NA]

Misc Inorg - Soil						
Our Reference		392291-34	392291-35	392291-36	392291-37	392291-44
Your Reference	UNITS	BH409	BH409	BH409	BH409	BH410
Depth		0.1-0.2	0.4-0.5	0.9-1	2.5-2.95	0.1-0.2
Date Sampled		29/09/2025	29/09/2025	29/09/2025	29/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	9/10/2025	08/10/2025	08/10/2025	9/10/2025
Date analysed	-	9/10/2025	9/10/2025	08/10/2025	08/10/2025	9/10/2025
pH 1:5 soil:water	pH Units	5.0	4.4	5.5	5.0	7.5
Electrical Conductivity 1:5 soil:water	µS/cm	150	200	1,100	660	250
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	320	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	1,600	[NA]	[NA]

Misc Inorg - Soil				
Our Reference		392291-45	392291-46	392291-47
Your Reference	UNITS	BH410	BH410	BH410
Depth		0.4-0.5	0.9-1	2-2.45
Date Sampled		30/09/2025	30/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	9/10/2025	08/10/2025	08/10/2025
Date analysed	-	9/10/2025	08/10/2025	08/10/2025
pH 1:5 soil:water	pH Units	6.7	7.1	7.8
Electrical Conductivity 1:5 soil:water	µS/cm	420	730	5,300
Chloride, Cl 1:5 soil:water	mg/kg	99	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	280	[NA]	[NA]

ESP/CEC				
Our Reference		392291-1	392291-15	392291-45
Your Reference	UNITS	BH404	BH407	BH410
Depth		0.4-0.5	0.4-0.5	0.4-0.5
Date Sampled		02/10/2025	29/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	13/10/2025	13/10/2025	13/10/2025
Date analysed	-	13/10/2025	13/10/2025	13/10/2025
Exchangeable Ca	meq/100g	13	1.7	14
Exchangeable K	meq/100g	<0.1	<0.1	0.5
Exchangeable Mg	meq/100g	0.2	<0.1	1.7
Exchangeable Na	meq/100g	<0.1	<0.1	0.1
Cation Exchange Capacity	meq/100g	13	1.8	17
ESP	%	<1	<1	<1

sPOCAS field test

Our Reference		392291-2	392291-3	392291-4	392291-6	392291-7
Your Reference	UNITS	BH404	BH404	BH404	BH406	BH406
Depth		0.9-1	2-2.45	3.2-3.65	0.9-1	2.5-2.8
Date Sampled		02/10/2025	02/10/2025	02/10/2025	02/10/2025	02/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	9/10/2025	9/10/2025	9/10/2025	9/10/2025
Date analysed	-	9/10/2025	9/10/2025	9/10/2025	9/10/2025	9/10/2025
pH _F (field pH test)	pH Units	7.6	7.4	7.5	8.1	7.8
pH _{FOX} (field peroxide test)	pH Units	5.7	2.8	2.3	6.4	2.3
Reaction Rate*	-	High reaction	Medium reaction	Extreme reaction	Low reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-8	392291-9	392291-10	392291-11	392291-12
Your Reference	UNITS	BH406	BH406	BH406	BH406	BH406
Depth		3-3.45	4-4.45	5-5.45	6-6.45	7-7.1
Date Sampled		02/10/2025	02/10/2025	02/10/2025	02/10/2025	02/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.5	8.1	8.4	8.7	7.4
pH _{FOX} (field peroxide test)	pH Units	5.7	6.1	6.2	6.5	1.8
Reaction Rate*	-	Low reaction	Low reaction	Low reaction	Low reaction	Extreme reaction

sPOCAS field test

Our Reference		392291-13	392291-16	392291-17	392291-18	392291-19
Your Reference	UNITS	BH406	BH407	BH407	BH407	BH407
Depth		8-8.45	0.9-1	2.1-2.55	3-3.45	4-4.45
Date Sampled		02/10/2025	29/09/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	9/10/2025	9/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	9/10/2025	9/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.6	8.3	8.3	8.4	8.2
pH _{FOX} (field peroxide test)	pH Units	6.1	5.7	3.4	2.8	2.6
Reaction Rate*	-	Low reaction	Medium reaction	Medium reaction	High reaction	High reaction

sPOCAS field test

Our Reference		392291-20	392291-21	392291-22	392291-23	392291-26
Your Reference	UNITS	BH407	BH407	BH407	BH407	BH408
Depth		5-5.45	6-6.45	7-7.45	8-8.45	2-2.45
Date Sampled		29/09/2025	29/09/2025	29/09/2025	29/09/2025	01/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025	9/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025	9/10/2025
pH _F (field pH test)	pH Units	8.1	8.4	8.3	8.1	8.3
pH _{FOX} (field peroxide test)	pH Units	3.3	5.5	2.4	2.4	2.9
Reaction Rate*	-	Extreme reaction	Medium reaction	Extreme reaction	Volcanic reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-27	392291-28	392291-29	392291-30	392291-31
Your Reference	UNITS	BH408	BH408	BH408	BH408	BH408
Depth		3-3.45	4-4.45	5-5.45	6-6.45	7-7.45
Date Sampled		01/10/2025	01/10/2025	01/10/2025	01/10/2025	01/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	9/10/2025	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	7.8	7.9	8.2	8.4	8.3
pH _{FOX} (field peroxide test)	pH Units	2.7	3.2	3.2	6.1	1.6
Reaction Rate*	-	Extreme reaction	Volcanic reaction	Volcanic reaction	Low reaction	Extreme reaction

sPOCAS field test

Our Reference		392291-32	392291-33	392291-36	392291-37	392291-38
Your Reference	UNITS	BH408	BH408	BH409	BH409	BH409
Depth		8-8.45	9-9.45	0.9-1	2.5-2.95	3-3.45
Date Sampled		01/10/2025	01/10/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	9/10/2025	9/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	9/10/2025	9/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.3	7.6	5.4	5.9	6.3
pH _{FOX} (field peroxide test)	pH Units	2.4	2.4	2.0	1.8	1.8
Reaction Rate*	-	Extreme reaction	Low reaction	High reaction	Volcanic reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-39	392291-40	392291-41	392291-42	392291-43
Your Reference	UNITS	BH409	BH409	BH409	BH409	BH409
Depth		4-4.45	6-6.45	7-7.45	8-8.45	9-9.45
Date Sampled		29/09/2025	29/09/2025	29/09/2025	29/09/2025	29/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	7.6	8.4	8.2	8.8	8.1
pH _{FOX} (field peroxide test)	pH Units	5.5	4.4	2.5	6.5	6.2
Reaction Rate*	-	Volcanic reaction	Volcanic reaction	Volcanic reaction	Extreme reaction	High reaction

sPOCAS field test

Our Reference		392291-46	392291-47	392291-48	392291-49	392291-50
Your Reference	UNITS	BH410	BH410	BH410	BH410	BH410
Depth		0.9-1	2-2.45	3.2-3.65	4-4.45	5-5.45
Date Sampled		30/09/2025	30/09/2025	30/09/2025	30/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	9/10/2025	9/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	9/10/2025	9/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	7.5	8.4	7.6	7.7	7.9
pH _{FOX} (field peroxide test)	pH Units	4.7	2.0	2.4	3.9	4.8
Reaction Rate*	-	High reaction	Volcanic reaction	Volcanic reaction	Volcanic reaction	Volcanic reaction

sPOCAS field test

Our Reference		392291-51	392291-52	392291-53	392291-54
Your Reference	UNITS	BH410	BH410	BH410	BH410
Depth		6-6.45	7-7.45	8-8.45	9-9.45
Date Sampled		30/09/2025	30/09/2025	30/09/2025	30/09/2025
Type of sample		Soil	Soil	Soil	Soil
Date prepared	-	03/10/2025	03/10/2025	03/10/2025	03/10/2025
Date analysed	-	07/10/2025	07/10/2025	07/10/2025	07/10/2025
pH _F (field pH test)	pH Units	8.3	8.1	8.2	8.4
pH _{FOX} (field peroxide test)	pH Units	6.3	6.2	2.4	5.1
Reaction Rate*	-	Low reaction	Low reaction	Extreme reaction	Medium reaction

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-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.
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.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/10/2025	5	9/10/2025	9/10/2025		08/10/2025	[NT]
Date analysed	-			08/10/2025	5	9/10/2025	9/10/2025		08/10/2025	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	5	8.8	8.7	1	101	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	5	140	120	15	109	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	5	56	49	13	86	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	5	33	31	6	97	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	27	08/10/2025	9/10/2025		[NT]	[NT]
Date analysed	-			[NT]	27	08/10/2025	9/10/2025		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	27	7.6	7.6	0	[NT]	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	27	12000	12000	0	[NT]	[NT]

QUALITY CONTROL: ESP/CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			13/10/2025	[NT]	[NT]	[NT]	[NT]	13/10/2025	[NT]
Date analysed	-			13/10/2025	[NT]	[NT]	[NT]	[NT]	13/10/2025	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	96	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/10/2025	[NT]	[NT]	[NT]	[NT]	03/10/2025	[NT]
Date analysed	-			07/10/2025	[NT]	[NT]	[NT]	[NT]	07/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	03/10/2025	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	07/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-3	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	03/10/2025	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	07/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[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.

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.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

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.

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.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

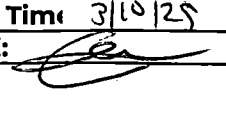
Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Project No:	223528.01	Suburb:	Arncliffe	To:	Envirolab Services
Project Manager:	Matthew Bennett	Order Number:		Sampler:	IH/RT
Email:	Matthew.Bennett@douglaspartners.com.au			Attn:	Sample Receipt
Turnaround time:	☒ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day			(02) 9910 6200 samplereceipt@envirolab.com	

Prior Storage:
☐ Fridge
 ☒ Freezer
 ☐ Esky
 ☐ Shelf
 Do samples contain 'potential' HBM?
☒ No
 ☐ Yes If YES, then handle, transport and store in accordance with FPM HAZID

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl							
1	BH404	0.4	0.5	2/10/25	S	P		x	x	x							
2	BH404	0.9	1	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
3	BH404	2	2.45	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
4	BH404	3.2	3.65	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
5	BH406	0.4	0.5	2/10/25	S	P			x	x							
6	BH406	0.9	1	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
7	BH406	2.5	2.8	2/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
8	BH406	3	3.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
9	BH406	4	4.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
10	BH406	5	5.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
11	BH406	6	6.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
12	BH406	7	7.1	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
13	BH406	8	8.45	2/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
14	BH407	0	0.1	29/09/25	S	P			x	x							

ENVIROLAB
 12 Ashley St
 Chatswood NSW 2067
 Ph: (02) 9910 6200
 Job No: 392291
 Date Received: 3/10/25
 Time Received: 1600
 Received By: C. CHAN
 Temp: Cool/Ambient
 Cooling: Icepack
 Security: Intact/Broken/None

Metals to analyse:		LAB RECEIPT	
Number of samples in container:		Transported to laboratory by:	Lab Ref. No: 392291
Send results to:	Douglas Partners Pty Ltd		Received by: Envirolab C. CHAN
Address:	96 Hermitage Road, West Ryde NSW 2114	Phone: (02) 9809 0666	Date & Time: 3/10/25 1600
Relinquished by: R. TAYLOR	Date: 03/10/25	Signed: 	Signed: 

#392291
3/10/25 1600 CC

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 223528.01				Suburb: Arncliffe				To: Envirolab Services										
Project Manager: Matthew Bennett				Dispatch date: 0/01/1900														
Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements	
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl								
15	BH407	0.4	0.5	29/09/25	S	P		x	x									
16	BH407	0.9	1	29/09/25	S	P	X		x									Keep sample for possible SCr Suite after screening results
17	BH407	2.1	2.55	29/09/25	S	P	X		x									Keep sample for possible SCr Suite after screening results
18	BH407	3	3.45	29/09/25	S	P	X											Keep sample for possible SCr Suite after screening results
19	BH407	4	4.45	29/09/25	S	P	X											Keep sample for possible SCr Suite after screening results
20	BH407	5	5.45	29/09/25	S	P	X											Keep sample for possible SCr Suite after screening results
21	BH407	6	6.45	29/09/25	S	P	X											Keep sample for possible SCr Suite after screening results
22	BH407	7	7.45	29/09/25	S	P	X											Keep sample for possible SCr Suite after screening results
23	BH407	8	8.45	29/09/25	S	P	X											Keep sample for possible SCr Suite after screening results
24	BH408	0.4	0.5	1/10/25	S	P			x									
25	BH408	0.9	1	1/10/25	S	P			x									
26	BH408	2	2.45	1/10/25	S	P	X		x	x								Keep sample for possible SCr Suite after screening results
27	BH408	3	3.45	1/10/25	S	P	X		x									Keep sample for possible SCr Suite after screening results
28	BH408	4	4.45	1/10/25	S	P	X											Keep sample for possible SCr Suite after screening results
29	BH408	5	5.45	1/10/25	S	P	X											Keep sample for possible SCr Suite after screening results
30	BH408	6	6.45	1/10/25	S	P	X											Keep sample for possible SCr Suite after screening results
31	BH408	7	7.45	1/10/25	S	P	X											Keep sample for possible SCr Suite after screening results

#392291
3/10/25 1600 CC

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 223528.01		Suburb: Arncliffe										To: Envirolab Services					
Project Manager: Matthew Bennett												Dispatch date: 0/01/1900					
Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl							
32	BH408	8	8.45	1/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
33	BH408	9	9.45	1/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
34	BH409	0.1	0.2	29/09/25	S	P				x							
35	BH409	0.4	0.5	29/09/25	S	P				x							
36	BH409	0.9	1	29/09/25	S	P	X			x	x						Keep sample for possible SCR Suite after screening results
37	BH409	2.5	2.95	29/09/25	S	P	X			x							Keep sample for possible SCR Suite after screening results
38	BH409	3	3.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
39	BH409	4	4.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
40	BH409	6	6.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
41	BH409	7	7.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
42	BH409	8	8.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
43	BH409	9	9.45	29/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
44	BH410	0.1	0.2	30/09/25	S	P				x							
45	BH410	0.4	0.5	30/09/25	S	P				x	x	x					
46	BH410	0.9	1	30/09/25	S	P	X			x							Keep sample for possible SCR Suite after screening results
47	BH410	2	2.45	30/09/25	S	P	X			x							Keep sample for possible SCR Suite after screening results
48	BH410	3.2	3.65	30/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
49	BH410	4	4.45	30/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
50	BH410	5	5.45	30/09/25	S	P	X										Keep sample for possible SCR Suite after screening results
Project No: 223528.01		Suburb: Arncliffe										To: Envirolab Services					
Project Manager: Matthew Bennett												Dispatch date: 0/01/1900					

#392291
3/10/25 1600 cc

CHAIN OF CUSTODY DESPATCH SHEET

[illegible]

CERTIFICATE OF ANALYSIS 392715

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01, Arncliffe</u>
Number of Samples	31 Soil
Date samples received	10/10/2025
Date completed instructions received	10/10/2025

Analysis Details

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

Samples were analysed as received from the client unless as indicated below in the method summaries. 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	20/10/2025
Date of Issue	20/10/2025

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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
Priya Samarawickrama, Senior Chemist
Tabitha Roberts, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

sPOCAS field test

Our Reference		392715-2	392715-3	392715-4	392715-5	392715-6
Your Reference	UNITS	BH403	BH403	BH403	BH403	BH403
Depth		0.9-1	2-2.2	3.2-3.65	4-4.45	5-5.45
Date Sampled		8/09/2025	8/09/2025	9/09/2025	9/09/2025	9/09/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	8.0	6.3	5.8	6.5	6.8
pH _{FOX} (field peroxide test)	pH Units	6.0	1.6	3.2	2.3	2.2
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction	Medium reaction

sPOCAS field test

Our Reference		392715-7	392715-8	392715-9	392715-11	392715-12
Your Reference	UNITS	BH403	BH403	BH403	BH402	BH402
Depth		6-6.45	7-7.45	8-8.45	0.9-1	2-2.45
Date Sampled		9/09/2025	9/09/2025	9/09/2025	9/10/2025	9/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	6.0	7.5	5.9	6.5	5.3
pH _{FOX} (field peroxide test)	pH Units	2.3	6.0	4.0	4.1	2.9
Reaction Rate*	-	Medium reaction	Volcanic reaction	Medium reaction	Medium reaction	Medium reaction

sPOCAS field test

Our Reference		392715-13	392715-14	392715-15	392715-17	392715-18
Your Reference	UNITS	BH402	BH402	BH402	BH401	BH401
Depth		3.2-3.65	4-4.45	5.12-5.5	0.9-1	2-2.2
Date Sampled		9/10/2025	9/10/2025	9/10/2025	3/10/2025	3/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	4.4	5.0	4.8	7.7	7/5
pH _{FOX} (field peroxide test)	pH Units	2.2	2.6	2.9	6.0	3.1
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction	Extreme reaction

sPOCAS field test

Our Reference		392715-19	392715-20	392715-21	392715-22	392715-23
Your Reference	UNITS	BH401	BH401	BH401	BH401	BH401
Depth		3-3.45	5-5.45	6-6.45	7-7.45	8-8.45
Date Sampled		3/10/2025	3/10/2025	3/10/2025	3/10/2025	3/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	7.0	7.8	7.8	7.1	8.1
pH _{FOX} (field peroxide test)	pH Units	2.7	2.6	2.3	1.8	2.4
Reaction Rate*	-	High reaction	Medium reaction	Medium reaction	High reaction	Volcanic reaction

sPOCAS field test

Our Reference		392715-25	392715-26	392715-27	392715-28	392715-29
Your Reference	UNITS	BH405	BH405	BH405	BH405	BH405
Depth		0.9-1	3-3.45	4-4.45	5-5.45	6-6.45
Date Sampled		8/10/2025	8/10/2025	8/10/2025	8/10/2025	8/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	8.7	7.6	8.3	7.8	7.7
pH _{FOX} (field peroxide test)	pH Units	6.4	2.3	2.4	2.5	2.2
Reaction Rate*	-	Medium reaction	Medium reaction	Medium reaction	Medium reaction	Medium reaction

sPOCAS field test

Our Reference		392715-30	392715-31
Your Reference	UNITS	BH405	BH405
Depth		7-7.45	8-8.45
Date Sampled		8/10/2025	8/10/2025
Type of sample		Soil	Soil
Date prepared	-	10/10/2025	10/10/2025
Date analysed	-	14/10/2025	14/10/2025
pH _F (field pH test)	pH Units	7.8	7.3
pH _{FOX} (field peroxide test)	pH Units	5.6	2.1
Reaction Rate*	-	Medium reaction	Medium reaction

ESP/CEC		
Our Reference		392715-1
Your Reference	UNITS	BH403
Depth		0.4-0.5
Date Sampled		8/09/2025
Type of sample		Soil
Date prepared	-	15/10/2025
Date analysed	-	15/10/2025
Exchangeable Ca	meq/100g	21
Exchangeable K	meq/100g	0.1
Exchangeable Mg	meq/100g	0.4
Exchangeable Na	meq/100g	0.1
Cation Exchange Capacity	meq/100g	22
ESP	%	<1

Misc Inorg - Soil						
Our Reference		392715-1	392715-2	392715-3	392715-4	392715-10
Your Reference	UNITS	BH403	BH403	BH403	BH403	BH402
Depth		0.4-0.5	0.9-1	2-2.2	3.2-3.65	0.4-0.5
Date Sampled		8/09/2025	8/09/2025	8/09/2025	9/09/2025	9/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units	8.2	7.9	7.0	7.0	6.9
Electrical Conductivity 1:5 soil:water	µS/cm	330	290	270	190	140
Chloride, Cl 1:5 soil:water	mg/kg	10	[NA]	[NA]	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	39	[NA]	[NA]	[NA]	[NA]

Misc Inorg - Soil						
Our Reference		392715-11	392715-12	392715-16	392715-17	392715-18
Your Reference	UNITS	BH402	BH402	BH401	BH401	BH401
Depth		0.9-1	2-2.45	0.4-0.5	0.9-1	2-2.2
Date Sampled		9/10/2025	9/10/2025	3/10/2025	3/10/2025	3/10/2025
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	15/10/2025	15/10/2025	15/10/2025	15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units	7.1	7.0	7.3	7.5	7.6
Electrical Conductivity 1:5 soil:water	µS/cm	60	20	190	190	350
Chloride, Cl 1:5 soil:water	mg/kg	<10	[NA]	20	[NA]	[NA]
Sulphate, SO4 1:5 soil:water	mg/kg	20	[NA]	78	[NA]	[NA]

Misc Inorg - Soil				
Our Reference		392715-24	392715-25	392715-26
Your Reference	UNITS	BH405	BH405	BH405
Depth		0.4-0.5	0.9-1	3-3.45
Date Sampled		8/10/2025	8/10/2025	8/10/2025
Type of sample		Soil	Soil	Soil
Date prepared	-	15/10/2025	15/10/2025	15/10/2025
Date analysed	-	15/10/2025	15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units	7.9	8.6	8.0
Electrical Conductivity 1:5 soil:water	µS/cm	120	44	290
Chloride, Cl 1:5 soil:water	mg/kg	[NA]	[NA]	73
Sulphate, SO4 1:5 soil:water	mg/kg	[NA]	[NA]	330

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-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.
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.
Metals-020	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			10/10/2025	[NT]	[NT]	[NT]	[NT]	10/10/2025	[NT]
Date analysed	-			14/10/2025	[NT]	[NT]	[NT]	[NT]	14/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: sPOCAS field test					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-2	[NT]
Date prepared	-			[NT]	[NT]	[NT]	[NT]	[NT]	10/10/2025	[NT]
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	14/10/2025	[NT]
pH _F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
pH _{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]

QUALITY CONTROL: ESP/CEC					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			15/10/2025	[NT]	[NT]	[NT]	[NT]	15/10/2025	[NT]
Date analysed	-			15/10/2025	[NT]	[NT]	[NT]	[NT]	15/10/2025	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Exchangeable K	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	95	[NT]
Exchangeable Na	meq/100g	0.1	Metals-020	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	392715-11
Date prepared	-			15/10/2025	1	15/10/2025	15/10/2025		15/10/2025	15/10/2025
Date analysed	-			15/10/2025	1	15/10/2025	15/10/2025		15/10/2025	15/10/2025
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	1	8.2	8.1	1	99	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	1	330	300	10	110	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	10	20	67	103	86
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	1	39	37	5	114	99

QUALITY CONTROL: Misc Inorg - Soil					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	24	15/10/2025	15/10/2025		[NT]	[NT]
Date analysed	-			[NT]	24	15/10/2025	15/10/2025		[NT]	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	24	7.9	8.0	1	[NT]	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	[NT]	24	120	100	18	[NT]	[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.
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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.

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.

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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.

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.

For Dust Deposit Gauge (DDG) analysis the sampling, sampling period and funnel exposure area do not fall under Envirolab's NATA accreditation (unless the Newcastle laboratory where responsible for the sampling), hence the annotation on the DDG units of reporting.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Project No: 223528.01	Suburb: Arncliffe	To: Envirolab Services
Project Manager: Matthew Bennett	Order Number:	12 Ashley St, Chatswood NSW 2067
Email: Matthew.Bennett@douglaspartners.com.au		Attn: Sample Receipt
Turnaround time: ☒ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day		(02) 9910 6200 samplereceipt@envirolab.com

Prior storage: ☒ Fridge ☒ Freezer ☐ Esky ☐ Shelf **Do samples contain 'potential' HBM?** ☒ No ☐ Yes If YES, then handle, transport and store in accordance with FPM HAZID)

Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO4, Cl							
1	 BH403	0.4	0.5	8/09/25	S	P		x	x	x							
2	 BH403	0.9	1	8/09/25	S	P	X		x								Keep sample for possible SCR
3	 BH403	2	2.2	8/09/25	S	P	X		x								Suite after screening results Keep sample for possible SCR
4	 BH403	3.2	3.65	9/09/25	S	P	X		x								Suite after screening results Keep sample for possible SCR
5	 BH403	4	4.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
6	 BH403	5	5.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
7	 BH403	6	6.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
8	 BH403	7	7.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
9	 BH403	8	8.45	9/09/25	S	P	X										Suite after screening results Keep sample for possible SCR
10	 BH402	0.4	0.5	9/10/25	S	P			x								Suite after screening results Keep sample for possible SCR
11	 BH402	0.9	1	9/10/25	S	P	X		x	x							Suite after screening results Keep sample for possible SCR
12	 BH402	2	2.45	9/10/25	S	P	X		x								Suite after screening results Keep sample for possible SCR
13	 BH402	3.2	3.65	9/10/25	S	P	X										Suite after screening results Keep sample for possible SCR
14	 BH402	4	4.45	9/10/25	S	P	X										Suite after screening results

Metals to analyse:		LAB RECEIPT	
Number of samples in container:		Transported to laboratory by:	
Send results to: Douglas Partners Pty Ltd		Lab Ref. No: 392715	
Address: 96 Hermitage Road, West Ryde NSW 2114		Received by: Sharon Tok	
Relinquished by:		Date & Time: 10/10/25 1630	
Phone: (02) 9809 0666		Signed: [Signature]	
Date: 10/10/25		Signed: [Signature]	

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 223528.01		Suburb: Arncliffe										To: EnviroLab Services					
Project Manager: Matthew Bennett												Dispatch date: 07/07/2020					
Lab ID	Sample ID			Date Sampled	Sample Type	Container Type	Analytes										Notes/ Preservation/ Additional Requirements
	Location / Other ID	Depth From	Depth To		S - soil W - water M - Material	G - glass P - plastic	ASS Screening	CEC/ESP	pH, EC	SO ₄ , Cl							
15	BH402	5.12	5.5	9/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
16	BH401	0.4	0.5	3/10/25	S	P			x	x							Keep sample for possible SCR Suite after screening results
17	BH401	0.9	1	3/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
18	BH401	2	2.2	3/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
19	BH401	3	3.45	3/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
NR	BH401	4	4.45	3/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
20	BH401	5	5.45	3/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
21	BH401	6	6.45	3/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
22	BH401	7	7.45	3/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
23	BH401	8	8.45	3/10/25	S	P	x										Keep sample for possible SCR Suite after screening results
24	BH405	0.4	0.5	8/10/25	S	P			x								Keep sample for possible SCR Suite after screening results
25	BH405	0.9	1	8/10/25	S	P	X		x								Keep sample for possible SCR Suite after screening results
26	BH405	3	3.45	8/10/25	S	P	X		x	x							Keep sample for possible SCR Suite after screening results
27	BH405	4	4.45	8/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
28	BH405	5	5.45	8/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
29	BH405	6	6.45	8/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
30	BH405	7	7.45	8/10/25	S	P	X										Keep sample for possible SCR Suite after screening results
31	BH405	8	8.45	8/10/25	S	P	X										Keep sample for possible SCR Suite after screening results

#392715
10/10/25
57

CERTIFICATE OF ANALYSIS 392786

Client Details

Client	Douglas Partners Pty Ltd
Attention	Matthew Bennett
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	<u>223528.01, Arncliffe</u>
Number of Samples	5 Water
Date samples received	13/10/2025
Date completed instructions received	13/10/2025

Analysis Details

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

Samples were analysed as received from the client unless as indicated below in the method summaries. 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	20/10/2025
Date of Issue	20/10/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

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

Miscellaneous Inorganics						
Our Reference		392786-1	392786-2	392786-3	392786-4	392786-5
Your Reference	UNITS	BH402	BH404	BH406	BH408	BH409
Date Sampled		10/10/2025	10/10/2025	10/10/2025	10/10/2025	10/10/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
Date analysed	-	14/10/2025	14/10/2025	14/10/2025	14/10/2025	14/10/2025
pH	pH Units	6.6	4.9	7.2	6.8	7.0
Electrical Conductivity	µS/cm	1,500	21,000	3,100	33,000	23,000
Sulphate, SO4	mg/L	130	1,600	130	520	300
Chloride, Cl	mg/L	190	10,000	370	16,000	11,000

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: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			14/10/2025	1	14/10/2025	14/10/2025		14/10/2025	[NT]
Date analysed	-			14/10/2025	1	14/10/2025	14/10/2025		14/10/2025	[NT]
pH	pH Units		Inorg-001	[NT]	1	6.6	6.5	2	99	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	1500	1500	0	106	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	1	130	[NT]		110	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	1	190	[NT]		117	[NT]

Result Definitions

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[illegible]