Douglas PARTNERS

GROUNDED EXPERTISE

Report on Acid Sulfate Soil Assessment

Proposed Mixed Use Development

79-81 Queens Road & 2-8 Spencer Street, Five Dock NSW

Prepared for DPG Project 37 Pty Ltd

Project 224583.01

18 February 2026

Douglas Partners Pty Ltd
ABN 75 053 980 117
douglaspartners.com.au
96 Hermitage Road, West Ryde, NSW 2114
(02) 9809 0666

Document History

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Revision 0	Alexander Lekovski
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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
Author		18 February 2026
Reviewer		18 February 2026

FS604853

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

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Report on Acid Sulfate Soil Assessment
Proposed Mixed Use Development

79-81 Queens Road & 2-8 Spencer Street, Five Dock NSW

1. Introduction

Douglas Partners Pty Ltd (Douglas) has been engaged by DPG Project 37 Pty Ltd to prepare this Acid Sulfate Soil Assessment for a Proposed Mixed-Use Development at 79-81 Queens Road & 2-8 Spencer Street, Five Dock NSW (the site). The site is shown on Drawing 1, Appendix A.

The investigation was prepared with reference to Douglas' proposal 224583.01.P.001.Rev2, dated 5 April 2024.

A geotechnical investigation and contamination assessment were also carried out and reports prepared in sperate documents.

The purpose of this investigation was to confirm the presence / absence of acid sulfate soils (ASS) which may be disturbed during construction of the proposed development. It is understood that the report will be used to support a development application for the proposed development.

The following key guidelines were consulted in the preparation of this report:

- Acid Sulfate Soil Management Advisory Committee (ASSMAC), *Acid Sulfate Soil Manual* (Stone, Ahern, & Blunden, 1998)
- QLD Department of Resources, QLD Department of Environment and Science, A*cid Sulfate Soil Technical Manual: Soil Management Guidelines, Version 5* (Dear, et al., 2023);
- Department of Agriculture and Water Resources (DAWR), *National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual* (Sullivan, et al, 2018a); and
- DAWR, *National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual* (Sullivan, et al, 2018b).

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

2. Scope of Work

The scope of work for the investigation comprised:

- Underground service clearance at proposed test locations by a services locator;
- Drilling of eleven boreholes for the geotechnical and contamination investigation (BH101 – BH107 and BH109 – BH112) using a track-mounted drilling rig and hand auger to depths of between 1.5 m and 30 m;
- Collection of soil samples for ASS testing at regular intervals to the top of bedrock;

- Laboratory testing at an NATA accredited laboratory for screening (testing) of samples for pH_F and pH_{FOX} with reference to the method outlined in Dear, et al. (2023). Based on the screening results, testing of three samples for the sPOCAS and chromium reducible sulfur (S_{Cr}) suite of tests;
- Recording of boreholes BH101 to BH103 coordinates and surface levels determined using a differential Global Positioning System (dGPS) receiver. Coordinates of the remaining locations were determined by measuring the distance of the bores from site features and estimated using GIS software. Reference to the supplied survey drawings was made to infer the levels of internal boreholes (BH104 – BH107). Coordinates are reported in GDA2020/MGA Zone 56 format (Geocentric Datum of Australia 2020 base with Map Grid of Australia projection) and levels are relative to AHD; and
- Preparation of the investigation report.

3. Site Information and Environmental Setting

Site address	79-81 Queens Road & 2-8 Spencer Street, Five Dock NSW, Drawing 1, Appendix A
Legal description	Lots 17, 20, 21, and 22 of DP1117, Lot 18 DP651570 and Lot 1 DP540151
Area	3,158.5 m^2
Zoning	Zone IN1 General Industrial
Local Council area	City of Canada Bay Council
Current use	Industrial
Surrounding uses	North – Open Space and Commercial Leisure Centre) East – Industrial South – Industrial West – Industrial
Regional and site topography	Based on the supplied detailed survey plans prepared by C&A Surveyors NSW Pty Ltd (Ref.: 30163-23 DET, Rev1, dated 24 August 2023), ground surface levels across the site range between RL 1.9 m AHD and RL 2.3 m AHD.
Geology	Reference to the Sydney 1:100 000 Series Geological Sheet indicates that the site is underlain by Quaternary deposits described as silty to peaty quartz sand, silt, and clay; overlying Ashfield Shale of the Wianamatta Group described as black to dark-grey shale and laminite.
Soil landscape	Reference to the Sydney 1: 100,000 Soil Landscape Sheet indicates the site is underlain by the Blacktown (residual) soil landscape characterised by gently undulating rises on Wianamatta Group shales and Hawkesbury shale. Local relief to 30 m, slopes are usually <5%. Broad rounded crests and ridges with gently inclined slopes. Cleared eucalypt woodland and tall open-forest. shallow to moderately deep (<100 cm) red and

	brown podzolic soils on crests, upper slopes and well-drained areas; deep (150-300 cm) yellow podzolic soils and soloths on lower slopes and in areas of poor drainage.
Surface water	The closest body of water to the site is Kings Bay located approximately 500 m to the north, which is fed by an open unnamed culvert approximately 200 m north of the site.
Groundwater	Groundwater levels were measured in wells on site at RL - 1.4 m AHD within the shallow monitoring wells screened in the silty sand soil, and RL -8.0 m AHD and RL -8.2 m AHD within the deeper monitoring wells screened within bedrock.
Acid sulfate soil risk	Reference to the NSW Acid Sulfate Soil Risk map indicates the site is mapped as disturbed terrain, soil investigations required to assess the area for ASS. ASS are typically encountered in coastal areas of elevation RL 5 (AHD) or lower with estuarine deposits, therefore the likelihood that ASS will be disturbed during the proposed development is considered to be high and soil investigations are required to assess the area for ASS.

The site boundary is shown on in Drawing 1, in Appendix A.

4. Proposed Development

It is understood that the proposed development of the site includes the demolition of the existing structures and the construction of two shop top housing buildings, including a 5-storey building along Queens Road, and a 26-storey building along William Street, comprising a shared single storey non-residential podium, with 134 dwellings above. In addition, the proposed development will include the construction of a shared basement carpark accessed from Spencer Street with five levels of basement, anticipated to require excavations of up to 16.3 m depth, or to RL – 13.3 m AHD. It is understood the development will also public domain and landscaping upgrades, including landscaped street setbacks to all boundaries, provision of part of a shared through site link connecting Queens Road to Spencer Street, and associated infrastructure upgrades and diversions.

Therefore, given the depth of bedrock to be up to 7.1 m, the anticipated disturbance of possible ASS is approximately 29,678 m^3 (anticipated to be greater than 1000 tonnes).

5. Sampling Plan

5.1 Rationale

Sullivan, et al. (2018b) recommends for the anticipated disturbance of ASS, a minimum of four boreholes to be drilled within the proposed disturbance area to a depth 1 m beyond proposed disturbance depth. Accordingly, the sampling rationale that was adopted is ten boreholes to 7.0 m within the area of the proposed disturbance.

5.2 Field work methodology

Field work was undertaken between 29 April 2024 and 23 May 2024, and comprised:

- Drilling of eleven boreholes for the geotechnical and contamination investigation (BH101 – BH107 and BH109 – BH112) using a track-mounted drilling rig and hand auger to depths of between 1.5 m and 30 m;
- Collection of soil samples at regular depth intervals and at least one sample for every change in strata observed; and
- Place immediately into zip-lock plastic bags after minimising air content and potential for moisture loss and immediately place on ice in a cooled, insulated and sealed container for transport to the laboratory.

Borehole locations are shown on Drawing 1, in Appendix A.

5.3 Field and laboratory testing

Based on the field screen results, S_{Cr} suite tests was undertaken on representative (including 'worst case' – low pH_F / pH_{Fox} or high pH drop between pH_F and pH_{Fox}) samples. Laboratory testing was undertaken by a NATA accredited laboratory. The number of samples tested, was generally in accordance with Sullivan, et al (2018b), is summarised in the table below.

Table 1: Summary of testing frequency

Test method	Number of tests
Field screen (test): pH_F and pH_{Fox}	16
sPOCAS testing	3

6. Assessment Criteria

The ASS pH_F and pH_{Fox} screening test results were assessed for the possible presence of ASS conditions. It should be noted that ASS screening tests are a qualitative screening test which provides a preliminary indication of the presence of ASS conditions. The results of which were used to guide the selection of samples for laboratory analysis.

Acid base accounting (ABA) via the S_{Cr} test, is a quantitative measurement and takes precedence over the screening test results when evaluating the presence or absence of ASS. The S_{Cr} results can also be used to correlate with the pH_F and pH_{Fox} screening test results.

The relevant assessment criteria from Sullivan, et al. (2018a), are summarised in Table 2 below (and the summary results table in Appendix D). The anticipated disturbance of ASS is greater than 1000 tonnes and this volume was considered in the derivation of the action criterion.

Table 2: Assessment criteria

Assessment criteria and associated test	Units	Threshold
Screening test assessment criteria pH_F and pH_{Fox}	pH_F	<4[1]
	pH_{FOX}	<3[2]
	ΔpH_F	>1
Action criterion: S_{Sr} net acidity / sulphur trail (%) >1000 tonnes	$\%S_{Oxidisable}$	≥0.03

Notes: pH_F = non-oxidised pH
pH_{FOX} = oxidised pH
ΔpH_F = pH_F minus pH_{FOX}
[1] Indicative value only for actual acid sulfate soil (AASS)
[2] Indicative value only for potential acid sulfate soil (PASS)

7. Results

7.1 Field work results

The borehole for this assessment are included in Appendix C. The logs recorded the following general sub-surface profile:

CONCRETE	–	Concrete slab at the start of BH101 and BH104 to BH112. The concrete was measured to be between 150 mm and 160 mm at all locations.
FILL	–	Typically sandy clay with various proportions of gravel within the shallow depths of the boreholes, with variable thickness in a range of 0.6 m to 1.0 m.
RESIDUAL SOIL	–	Medium to high plasticity clay to depths ranging from 5.6 m to 7.1 m. The consistency of the soil was assessed to be typically firm to hard.
SHALE and LAMINITE BEDROCK	–	Dark grey and grey shale and laminite encountered in boreholes BH105, BH106, and BH107 to depths between 7.4 m and 7.7 m.
SANDSTONE BEDROCK	–	Pale grey to grey, medium to coarse grained sandstone to the termination depth of boreholes.

It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time. Groundwater seepage was observed at depths of between 1.2 m and 1.5 m below the existing ground surface, or RL 0.2 m AHD and RL 0.4 m AHD, during augering of the boreholes.

7.2 Analytical Results

The results of screening tests and laboratory analysis are summarised in Table 3 and Table 4.

Table 3 – Results of Acid Sulfate Soil Screening Tests

Sample/Depth (m)	Material Description	Screening Tests			
		Natural pH_F	Oxidised pH_{FOX}	Change in pH	Reaction
BH101/0.9-1	Peaty CLAY	7.8	3.3	4.5	Extreme reaction
BH101/2.9-3	CLAY	8.0	3.5	4.5	Medium reaction
BH102/0.5-0.6	FILL	8.2	6.8	1.4	Medium reaction
BH102/3-3.1	CLAY	5.2	3.3	1.9	High reaction
BH103/0.5-0.6	FILL	7.8	5.6	2.2	High reaction
BH103/1.5-1.6	Clayey SAND	6.5	2.5	4	Medium reaction
BH111/1-1.1	Clayey SAND	7.3	4.0	3.3	High reaction
BH111/2.5-2.6	CLAY	8.1	5.1	3	Medium reaction
BH104/1.5-1.6	Peaty CLAY	6.3	3.2	3.1	Medium reaction
BH105/0.9-1	FILL	7.3	3.7	3.6	Medium reaction
BH105/4.4-4.5	CLAY	7.6	8.3	-0.7	Volcanic reaction
BH106/0.9-1	Peaty CLAY	7.2	4.0	3.2	Medium reaction
BH106/2.9-3	CLAY	6.8	4.5	2.3	Medium reaction
BH107/1.5-1.6	Peaty CLAY	7.3	3.3	4	Medium reaction
BH107/4.4-4.5	CLAY	7.0	5.0	2	Medium reaction
BH104/2.9-3	CLAY	6.0	4.5	1.5	Medium reaction
Action Criteria		<4	<3	1	

Table 4 – Acid Sulfate Soil Test Results (sPOCAS) and Chromium Reducible Sulphur)

Sample/ Depth (m)	Material Description	pH_{KCl} (1)	sPOCAS net acidity / sulphur trail (%)	Scrnet acidity / sulphur trail (%)	Liming rate (kg $CaCO_3$ / t) (2)
BH102/ 3-3.1	CLAY	4.8	0.09	0.04	4.3
BH103/ 1.5-1.6	Clayey SAND	6.5	0.05	0.02	2.4
BH107/ 1.5-1.6	Peaty CLAY	5.8	0.07	0.01	3.4

Sample/ Depth (m)	Material Description	pH_{KCl} (1)	sPOCAS net acidity / sulphur trail (%)	Scrnet acidity / sulphur trail (%)	Liming rate (kg $CaCO_3$ / t) (2)
Action Criteria			0.03	0.03	

Notes: (1) pH_{KCl} = Non-oxidised pH.
(2) Liming rate, as reported by the analytical laboratory
Shading – Exceeds Action Criteria

The laboratory certificates of analysis together with the chain of custody and sample receipt information are provided in Appendix F.

8. Discussion of Results

Based on the testing and the lithology observed at the site, the following is noted for the field screening results:

- pH_F was within the threshold criterion (<4 pH units, indicative of actual ASS) in all samples, ranging from 5.2 to 8.2 pH units;
- pH_{FOX} was within the threshold criterion (<3 pH units, indicative of potential ASS) in all samples, ranging from 3.2 to 8.3 pH units, with the exception of BH103/1.5-1.6 (2.5 pH units); and
- Most samples exceeded the threshold criterion for the drop in pH_F (>1 pH units), ranging from 0.7 to 4.5 pH units.

The SPOCAS test results indicated that both of the samples tested exceeded the action criterion for net acidity of >0.03% S. The exceedances ranged from 0.05% S to 0.09% S. In addition the Scr net acidity also exceeded the action criteria in one of the three samples tested.

Taking into consideration the ASS results and cross-referencing of borehole logs, the SPOCAS results suggest that PASS is likely present at the site from depths of between 0.5 and 3.0 m bgl to depths up to and 4.5 m bgl (depth of testing) and is likely to be associated with the alluvial deposits across the site. It is considered likely that ASS extend below 4.5 m, potentially to the top of bedrock encountered up to a depth of up to 7.1 m bgl. Given the proposed development requires the excavation of soils, ASS will be encountered (excavated) during the proposed works. The exceedance of the relevant criterion in some fill samples indicates that the fill at the may include a component of re-worked natural ASS.

9. Conclusions And Recommendations

The results of the ASS screening and S_{Cr} / ABA testing indicate the presence of ASS conditions (i.e. net acidity exceeding the action criterion) within the natural and fill soils sampled and tested. On this basis, management of ASS for the proposed development is required under a site-specific ASS management plan (ASSMP). The ASSMP will outline the necessary protocols to treat (e.g. lime-dose) and manage the ASS upon excavation to mitigate the acid generating potential of the soils.

Post-treatment verification testing requirements will be outlined in the ASSMP and successfully treated soils can typically be re-used on site. Any off-site disposal of treated ASS is subject to the requirements of NSW EPA *Waste Classification Guidelines, Part 1: Classifying Waste* (NSW EPA, 2014a) and NSW EPA *Waste Classification Guidelines, Part 4: Acid Sulfate Soils* (NSW EPA, 2014b).

Consideration could also given to the application of Resource Recovery Order under Section 286A of the Protection of the Environment Operations Act 1997 The acid sulfate soil (ASS) order 2025 or a 'specific exemption' for treated PASS be sought from NSW EPA under relevant waste regulations for beneficial reuse on a defined receiving site willing to accept the material. The ASS order has specific requirements including the review and endorsement of ae ASSMP by someone that holds certification from Soil Science Australia (SSA) Registered Soils Practitioner in Acid Sulfate Soils (ASS) (RSP-ASS) and proof of performance trials (during construction phase).

10. References

Dear, S. E., Williams, K. M., McElnea, A. E., Ahern, C. R., Dobos, S. K., Moore, N. G., & O'Brien, L. E. (2023). *Queensland acid sulfate soil technical manual : soil management guidelines version 5.* Department of Resources and the Department of Environment and Science.

NSW EPA. (2014a). *Waste Classification Guidelines, Part 1: Classifying Waste.* NSW Environment Protection Authority.

NSW EPA. (2014b). *Waste Classification Guidelines, Part 4: Acid Sulfate Soils.* NSW Environment Protection Authority.

Stone, Y., Ahern, C. R., & Blunden, B. (1998). *Acid Sulfate Soil Manual.* Acid Sulfate Soil Management Committee (ASSMAC).

Sullivan, et al. (2018a). *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Identification and Laboratory Methods Manual.* Canberra ACT CC BY 4.0: Sullivan, L; Ward, N; Toppler, N; Lancaster, G, Department of Agriculture and Water Resources.

Sullivan, et al. (2018b). *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification Methods Manual.* Canberra ACT CC BY 4.0: Sullivan, L; Ward, N; Toppler, N; Lancaster, G, Department of Agriculture and Water Resources.

11. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report for this project at 79-81 Queens Road & 2-8 Spencer Street, Five Dock NSW in accordance with Douglas' proposal 224583.01.P.001.Rev1 dated 5 April 2024 and acceptance received from Alexander Lekovski dated 16 April 2024. The work was carried out under Douglas' Engagement Terms. This report is provided for the exclusive use of DPG Project 37 Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk

and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and/or their agents.

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

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental 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.

Appendix A

Drawings



REV	DESCRIPTION/COMMENT	DATE	DRAWN BY
0	INITIAL ISSUE	19.06.2024	EC

SCALE: 0 5 10 15 20 m
1:400 @ A3

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

CLIENT:
Proposed Mixed Use Development

NOTE:
1: Basemap from Metromap (Dated 25.03.2024)

COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 56

PROJECT NAME:
DPG Project 37 Pty Ltd

PROJECT ADRESS:
79-81 Queens Road & 2-8 Spencer Street, Five Dock

DRAWING TITLE:
TEST LOCATION PLAN

PROJECT NO: **224583.01**
DRAWING NO: **1**
REVISION: **0**

Appendix B

About this Report

About this Report

November 2023

Introduction

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

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

Copyright

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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Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

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

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

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

Abbreviation Codes

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

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

Data Integrity Codes

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

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

Graphic Symbols

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

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Soil Descriptions

Terminology
Symbols
Abbreviations

November 2023

Introduction

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



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

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

Particle size designation and Behaviour Model

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

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

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

[1] – refer grain size subdivision descriptions below

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

Component proportions

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

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

[1] As defined in AS1726-2017 6.1.4.4

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

Composite Materials

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

Classification

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

Soil Name

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

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

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

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

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

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

Identification of minor components

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

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

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

Soil Composition

Plasticity

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

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

Grain Size

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

Grading

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

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

Soil Condition

Moisture

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

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

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

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

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

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

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

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

Consistency (fine grained soils)

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

Relative Density (coarse grained soils)

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

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

Compaction (anthropogenically modified soil)

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

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

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

Soil Origin

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

Cobbles and Boulders

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

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

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Rock Strength

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

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

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

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

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

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

Degree of Weathering

The degree of weathering of rock is classified as follows:

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

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

Degree of Alteration

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

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

Degree of Fracturing

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

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

Rock Quality Designation

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

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

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

Stratification Spacing

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

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

Defect Descriptions

Defect Type

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

Rock Defect Orientation

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

Rock Defect Coating

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

Rock Defect Infill

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

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Rock Defect Shape/Planarity

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

Rock Defect Roughness

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

Defect Orientation

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

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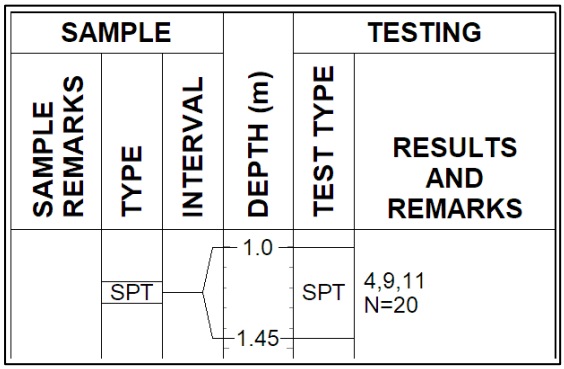
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

November 2023

Sampling and Testing

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



Sampling

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

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

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

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

Field and Laboratory Testing

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

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

Field and laboratory testing (continued)

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

Groundwater Observations

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

Drilling or Excavation Methods/Tools

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

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

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

Douglas PARTNERS

Cone Penetration Testing

November 2023

Introduction

The Cone Penetration Test (CPT) is a sophisticated soil profiling test carried out in-situ. A special cone shaped probe is used which is connected to a digital data acquisition system. The cone and adjoining sleeve section contain a series of strain gauges and other transducers which continuously monitor and record various soil parameters as the cone penetrates the soils.

The soil parameters measured depend on the type of cone being used, however they always include the following basic measurements

- Cone tip resistance q_c
- Sleeve friction f_s
- Inclination (from vertical) i
- Depth below ground z

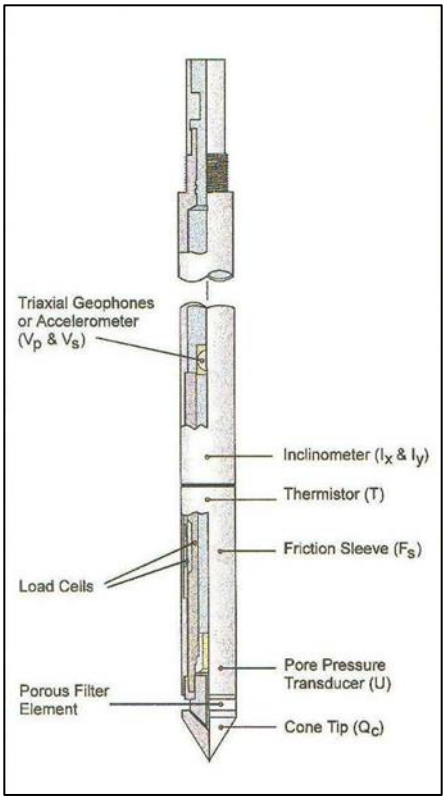


Figure 1: Cone Diagram

The inclinometer in the cone enables the verticality of the test to be confirmed and, if required, the vertical depth can be corrected.

The cone is thrust into the ground at a steady rate of about 20 mm/sec, usually using the hydraulic rams of a purpose built CPT rig, or a drilling rig. The testing is carried out in accordance with the Australian Standard AS1289 Test 6.5.1.



Figure 2: Purpose built CPT rig

The CPT can penetrate most soil types and is particularly suited to alluvial soils, being able to detect fine layering and strength variations. With sufficient thrust the cone can often penetrate a short distance into weathered rock. The cone will usually reach refusal in coarse filling, medium to coarse gravel and on very low strength or better rock. Tests have been successfully completed to more than 60 m.

Types of CPTs

Douglas Partners (and its subsidiary GroundTest) owns and operates the following types of CPT cones:

Type	Measures
Standard	Basic parameters (qc, fs, i & z)
Piezocone	Dynamic pore pressure (u) plus basic parameters. Dissipation tests estimate consolidation parameters
Conductivity	Bulk soil electrical conductivity (□) plus basic parameters
Seismic	Shear wave velocity (Vs), compression wave velocity (Vp), plus basic parameters

Strata Interpretation

The CPT parameters can be used to infer the Soil Behaviour Type (SBT), based on normalised values of cone resistance (Qt) and friction ratio (Fr). These are used in conjunction with soil classification charts, such as the one below (after Robertson 1990)

Cone Penetration testing

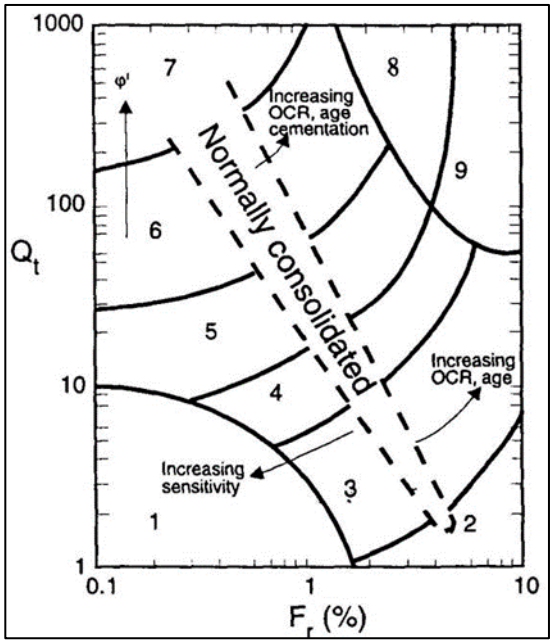


Figure 3: Soil Classification Chart

DP's in-house CPT software provides computer aided interpretation of soil strata, generating soil descriptions and strengths for each layer. The software can also produce plots of estimated soil parameters, including modulus, friction angle, relative density, shear strength and over consolidation ratio.

DP's CPT software helps our engineers quickly evaluate the critical soil layers and then focus on developing practical solutions for the client's project.

Engineering Applications

There are many uses for CPT data. The main applications are briefly introduced below:

Settlement

CPT provides a continuous profile of soil type and strength, providing an excellent basis for settlement analysis. Soil compressibility can be estimated from cone derived moduli, or known consolidation parameters for the critical layers (eg. from laboratory testing). Further, if pore pressure dissipation tests are undertaken using a piezocone, in-situ consolidation coefficients can be estimated to aid analysis.

Pile Capacity

The cone is, in effect, a small scale pile and, therefore, ideal for direct estimation of pile capacity. DP's in-house program ConePile can analyse most pile types and produces pile capacity versus depth plots. The analysis methods are based on proven static theory and empirical studies, taking account of scale effects, pile materials and method of installation.

The results are expressed in limit state format, consistent with the Piling Code AS2159.

Dynamic or Earthquake Analysis

CPT and, in particular, Seismic CPT are suitable for dynamic foundation studies and earthquake response analyses, by profiling the low strain shear modulus G0. Techniques have also been developed relating CPT results to the risk of soil liquefaction.

Other Applications

Other applications of CPT include ground improvement monitoring (testing before and after works), salinity and contaminant plume mapping (conductivity cone), preloading studies and verification of strength gain.

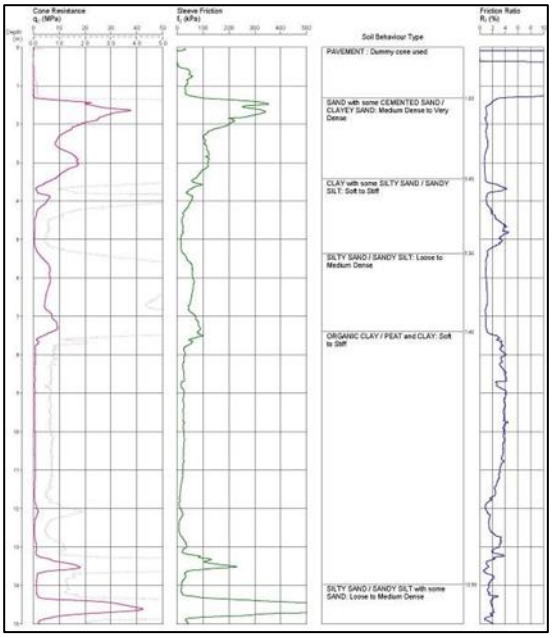


Figure 4: Sample Cone Plot

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Appendix C

Borehole Logs, Notes and Descriptive Terms

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325978.4, N:6250752.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 224583.01
DATE: 01/05/24 - 02/05/24
SHEET: 1 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] DENSITY.[*]	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	TESTING AND REMARKS: RESULTS AND REMARKS
seepage 01/05/24		0.15	CONCRETE 150MM THICK			ND	ND						
			FILL / Sandy CLAY: orange and brown; medium to high plasticity; fine to medium sand.		FILL	(S)	w>PL		A/ES		0.20		
									A/ES		0.50		
		0.90	Peaty CLAY (OH): dark grey and grey; medium plasticity.		ALV	VS to S		PFAS	A/ES		0.90		
seepage 01/05/24		1.40	Clayey SAND (SC): red orange brown; fine to medium.		ALV	L	M		ES		1.40	SPT	1,0,0 N=0
		2.00	CLAY (CI-CH): orange yellow brown mottled red; medium to high plasticity.			F to St							
			From 3.00m: pale grey orange mottled red; with ironstone bands		RS	VSt	w<PL		ES		2.90	SPT	3,4,6 N=10
			From 5.00m: orange-yellow; extremely weathered material						ES		4.40	SPT	5,12,14 N=26
		5.70							ES		5.65	SPT	24,25/100
		5.90	SANDSTONE: orange-brown, pale grey; inferred medium strength Continued as rock			ND							

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: Comacchio 305
METHOD: AD/T to 2.5m, WB to 5.9m, NMLC to 20.5m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 2.5m, then HQ to 6m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

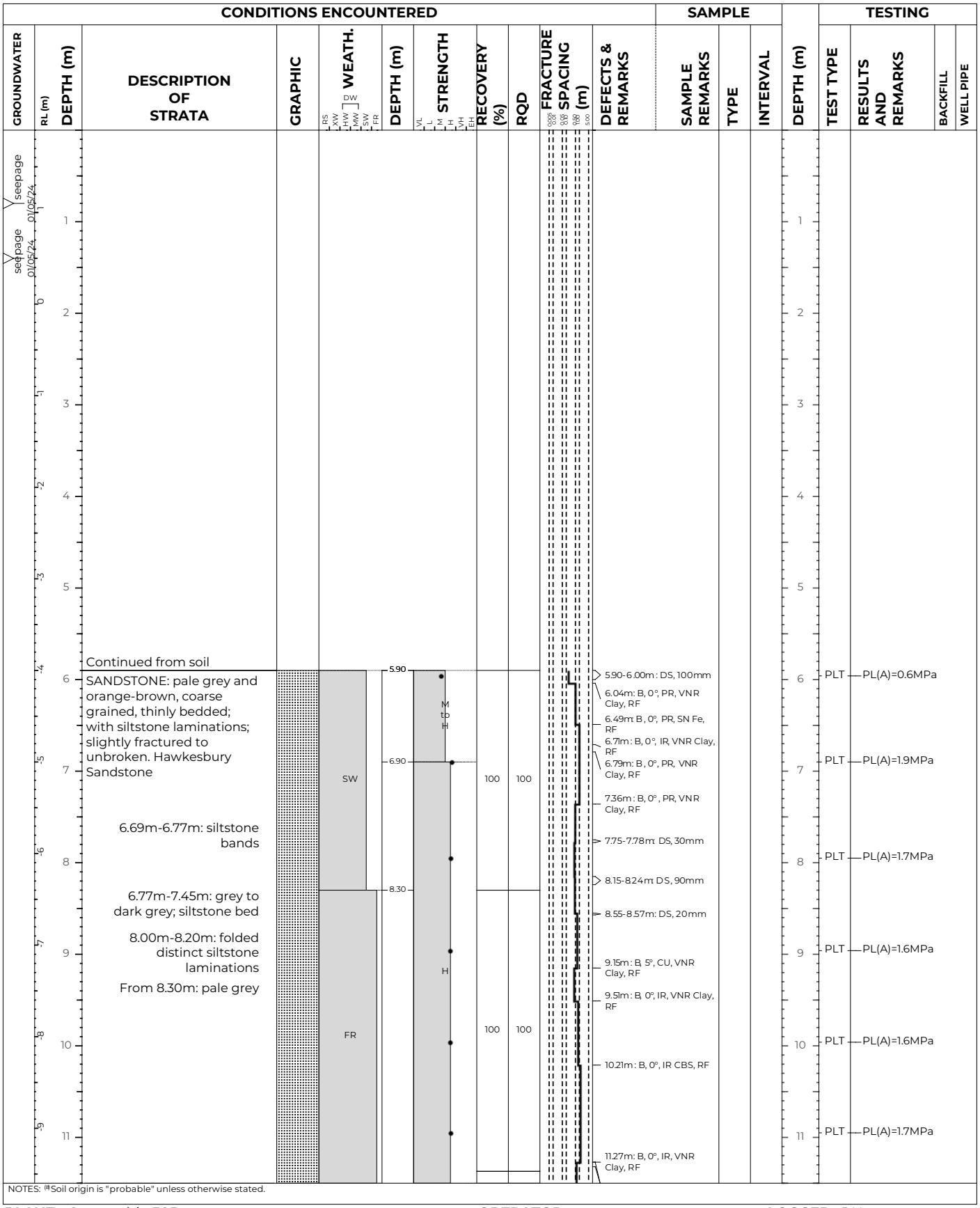
Generated with CORE-GS by Geroc - Split Soil-Rock Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325978.4, N:6250752.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 224583.01
DATE: 01/05/24 - 02/05/24
SHEET: 2 of 3



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

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

PLANT: Comacchio 305
METHOD: AD/T to 2.5m, WB to 5.9m, NMLC to 20.5m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 2.5m, then HQ to 6m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325978.4, N:6250752.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 224583.01
DATE: 01/05/24 - 02/05/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	-10	12	[CONT] SANDSTONE: pale grey and orange-brown, coarse grained, thinly bedded; with siltstone laminations; slightly fractured to unbroken. Hawkesbury Sandstone								11.27-11.32m: JT, 80°, UN, CN, RF				12	PLT	PL(A)=2MPa		
	-11	13	11.71m-11.84m: siltstone bands				H	100	100		11.80m: B, 0°, PR, VNR Clay, RF 12.43m: B, 5°, IR, VNR Clay, RF 13.04m: B, 5°, IR, VNR Clay, RF				13	PLT	PL(A)=1.8MPa		
	-12	14													14	PLT	PL(A)=2.4MPa		
	-13	15													15				
	-14	16			FR	15.95	H to VH	100	100						16	PLT	PL(A)=3.3MPa		
	-15	17				16.95					17.20m: B, 5°, PR, VNR Clay, RF				17	PLT	PL(A)=2.6MPa		
	-16	18													18	PLT	PL(A)=2.9MPa		
	-17	19	19.48m-19.50m: siltstone bands From 19.55m: 30% siltstone laminations				H	100	100		18.68m: B, 0°, PR, VNR Clay, RF 18.87m: B, 5°, CU, VNR Clay, RF 19.47m: B, 0°, PR, VNR Clay, RF				19	PLT	PL(A)=2.7MPa		
	-18	20									20.23m: B, 0°, PR, SN Fe, RF				20	PLT	PL(A)=2MPa		
	-19	21	Borehole discontinued at 20.50m depth. Target depth reached.													PLT	PL(A)=2MPa		
	-20	22																	
	-21																		

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

PLANT: Comacchio 305
METHOD: AD/T to 2.5m, WB to 5.9m, NMLC to 20.5m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 2.5m, then HQ to 6m

Refer to explanatory notes for symbol and abbreviation definitions

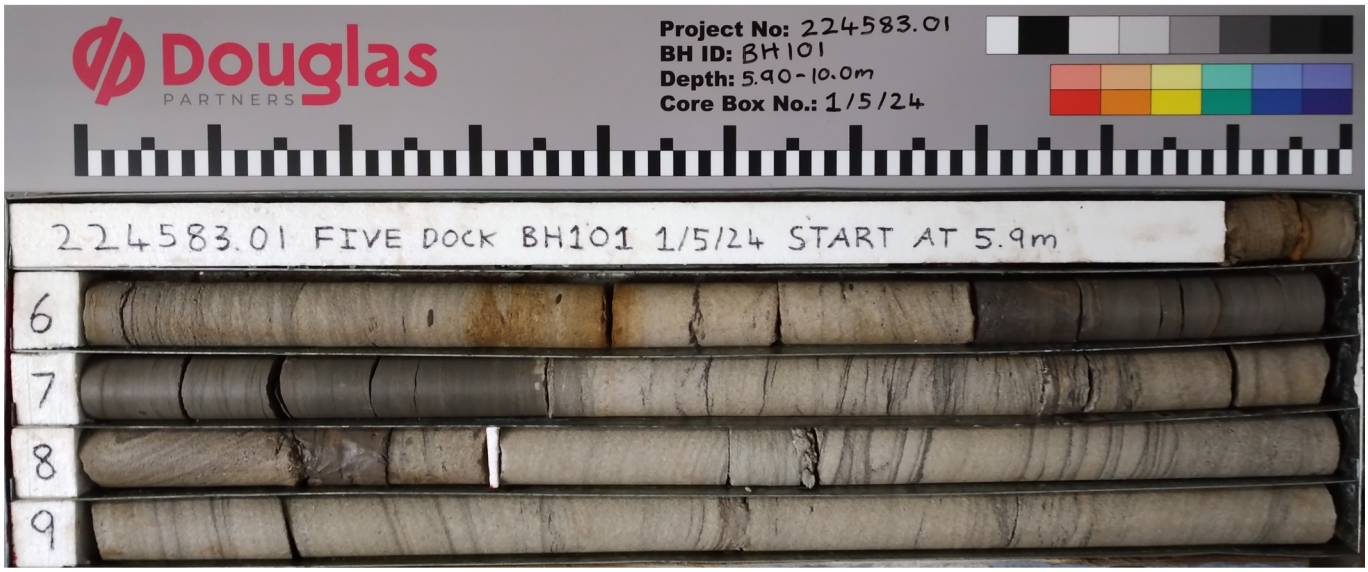
Generated with CORE-GS by Geroc - Split Soil-Rock Log

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325978.4, N:6250752.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 224583.01
DATE: 01/05/24 - 02/05/24
SHEET: 1 of 2



5.90-10.00 m depth



10.00-15.00 m depth

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Douglas PARTNERS

CORE PHOTO LOG

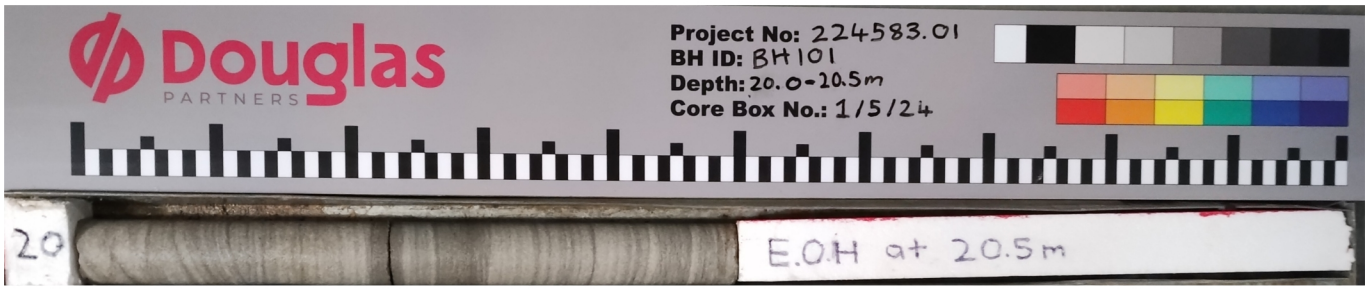
CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325978.4, N:6250752.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 224583.01
DATE: 01/05/24 - 02/05/24
SHEET: 2 of 2



15.00-20.00 m depth



20.00-20.50 m depth

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

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325955.7, N:6250733.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH102
PROJECT No: 224583.01
DATE: 29/04/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
seepage 29/04/24		0.15	CONCRETE 150mm thick			ND	ND		A/ES		0.10		
			FILL / Sandy CLAY: brown, orange and red; medium plasticity.		FILL	(S)	w>PL	PFAS	A/ES		0.50		
		1.10	Peaty CLAY (CI): grey and dark grey; medium plasticity.		ALV	S			A/ES		1.00	SPT	0,1,0 N=1
▼ 01/05/24		1.50	Silty SAND (SM): grey-brown; fine to medium.		ALV	L	W		ES		1.50		
		2.10	CLAY (CI-CH): orange, brown and red; medium to high plasticity. From 2.50m: pale grey; with ironstone bands		RS	St	w<PL		ES		3.00	SPT	3,5,6 N=11
									ES		4.50	SPT	9,19,22 N=41
						H			ES		6.00	SPT	8,12,25 N=37
									ES		6.20		
			Borehole discontinued at 6.25m depth. Refusal on inferred medium strength sandstone.										

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: Comacchio 305
METHOD: AD/T to 6.25m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 2.5m, then HQ to 5.9m

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325956.0, N:6250755.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 224583.01
DATE: 29/04/24 - 30/04/24
SHEET: 1 of 4

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*)	DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
seepage 29/04/24		0.15	CONCRETE			ND		ND		A/ES		0.10			Bentonite	
			FILL / Sandy CLAY: orange-brown; medium plasticity.		FILL	(S)		w>PL	PFAS	A/ES		0.50				
		1.00	Sandy CLAY: orange-brown mottled red; medium plasticity.		ALV	VS				A/ES		1.00	SPT	0,0,0 N=0		
seepage		1.50	Clayey SAND: grey-brown; fine to medium.		ALV	L		M		ES		1.50				
		2.20	CLAY (Cl): pale grey, orange and brown; medium plasticity.				St						SPT	3,6,7 N=13		
			From 2.80m: pale grey mottled red; with ironstone bands							ES		3.00			Gravel	
			From 4.00m: yellow, orange-brown mottled red; extremely weathered		RS		VSt	w<PL					SPT	6,12,19 N=31		
										ES		4.50				
		5.78	Continued as rock										SPT	12,30/130	Bentonite	50mm
															Gravel	
															Bentonite	

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: Comacchio 305
METHOD: AD/T to 2.5m, WB to 5.9m, NMLC to 30.24M
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 4m, then HQ to 5.9m

Refer to explanatory notes for symbol and abbreviation definitions

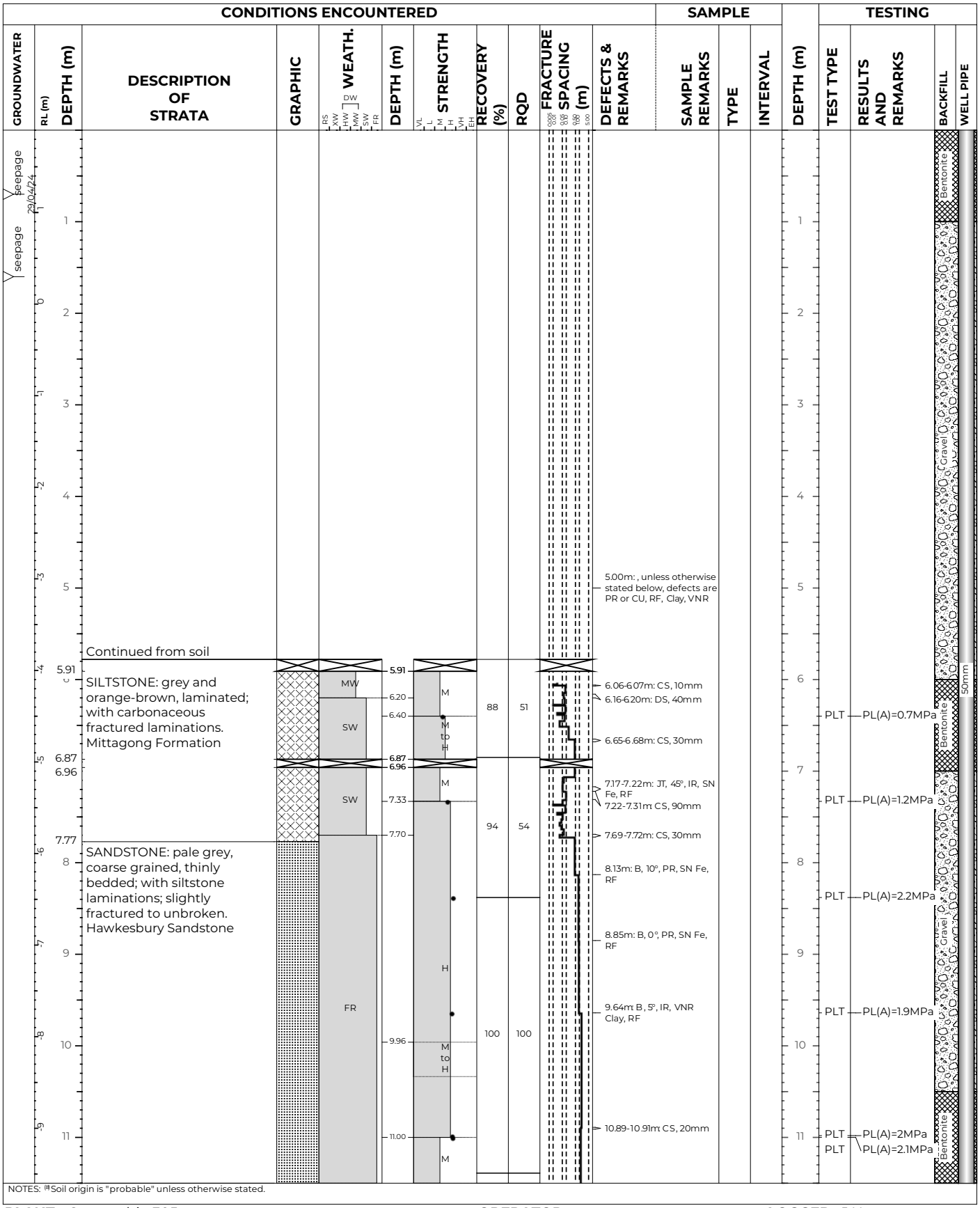
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BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325956.0, N:6250755.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 224583.01
DATE: 29/04/24 - 30/04/24
SHEET: 2 of 4



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

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

PLANT: Comacchio 305
METHOD: AD/T to 2.5m, WB to 5.9m, NMLC to 30.24M
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 4m, then HQ to 5.9m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325956.0, N:6250755.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 224583.01
DATE: 29/04/24 - 30/04/24
SHEET: 3 of 4

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	-10	12	[CONT] SANDSTONE: pale grey, coarse grained, thinly bedded; with siltstone laminations; slightly fractured to unbroken. Hawkesbury Sandstone 11.40m-12.00m: dark grey siltstone bed				M				11.98m: B, 0°, PR, VNR Clay, RF 12.04m: B, 10°, IR, SN Fe, RF 12.22m: B, 5°, IR, SN Fe, RF 12.56-12.60m: DS, 40mm 12.64m: B, 0°, IR, VNR Clay, RF 12.73-12.78m: B x5, 0°, PR CBS, RF				12	PLT	PL(A)=0.8MPa		
	-11	13				13.07		100	91		13.10-13.82m: B x5, 5 -10°, CU, SN Fe, RF				13	PLT	PL(A)=0.7MPa		
	-12	14	12.55m-13.00m: dark grey siltstone bed												14	PLT	PL(A)=2.5MPa		
	-13	15					H to VH				14.38m: JT, 80°, IR, CN, RF 15.15m: B, 10°, PR, SN Fe, RF				15	PLT	PL(A)=1.6MPa		
	-14	16						100	99		16.04- 16.05m: B x2, 0°, PR, VNR Clay, RF				16	PLT	PL(A)=3.1MPa		
	-15	17			FR						17.21m: B, 0°, PR, CN, RF				17	PLT	PL(A)=2.2MPa		
	-16	18				18.00									18	PLT	PL(A)=3.3MPa		
	-17	19						100	100						19	PLT	PL(A)=2.7MPa		
	-18	20					H				19.64m: B, 5°, PR, VNR Clay, RF 20.15m: B, 15°, PR, VNR Clay, RF 20.63-20.68m: B x2, 5°, IR, CBS, RF				20	PLT	PL(A)=1.7MPa		
	-19	21													21	PLT	PL(A)=2.7MPa	Gravel	50mm
	-20	22						100	98		21.70-21.86m: B x2, 5°, IR, VNR Clay, RF				22	PLT	PL(A)=2.1MPa		
	-21										22.80m: B, 15°, PR, SN Fe, RF					PLT	PL(A)=2.2MPa		

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

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

PLANT: Comacchio 305
METHOD: AD/T to 2.5m, WB to 5.9m, NMLC to 30.24M
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 4m, then HQ to 5.9m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325956.0, N:6250755.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 224583.01
DATE: 29/04/24 - 30/04/24
SHEET: 4 of 4

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH. (PS, XW, DW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.20, 0.60, 2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	-22	24	[CONT] SANDSTONE: pale grey, coarse grained, thinly bedded; with siltstone laminations; slightly fractured to unbroken. Hawkesbury Sandstone					100	98							24	PLT	PL(A)=1.7MPa		
	-23	25						100	100		24.78m: B, 0°, PR, SN Fe, RF					25	PLT	PL(A)=2.1MPa		
	-24	26														26	PLT	PL(A)=2.4MPa		
	-25	27			FR		H									27	PLT	PL(A)=1.6MPa		
	-26	28						100	100		27.50m: B, 10°, IR, VNR Clay, RF					28	PLT	PL(A)=1.2MPa		
	-27	29	28.61m-28.67m: dark grey siltstone bed 28.81m-28.98m: dark grey siltstone bed													29	PLT	PL(A)=2.4MPa		
	-28	30						100	100							30	PLT	PL(A)=2.4MPa		
	-29	31	Borehole discontinued at 30.24m depth. Target depth reached.																	
	-30	32																		
	-31	33																		
	-32	34																		

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

PLANT: Comacchio 305
METHOD: AD/T to 2.5m, WB to 5.9m, NMLC to 30.24M
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: HW to 4m, then HQ to 5.9m

Refer to explanatory notes for symbol and abbreviation definitions

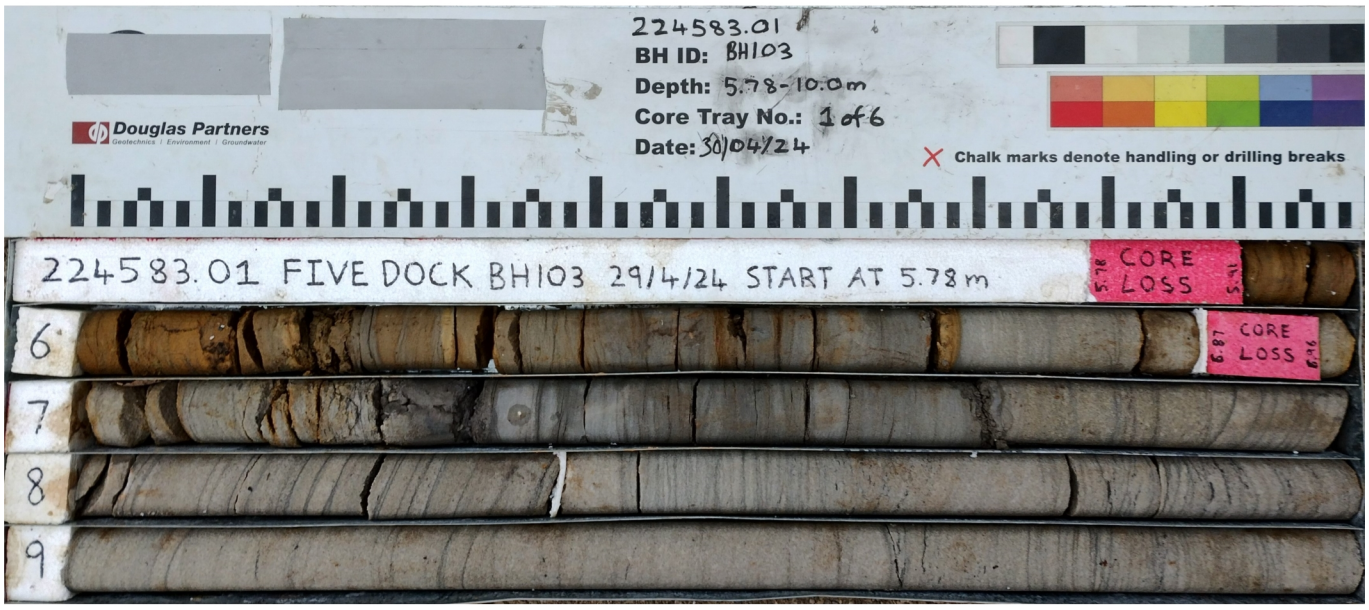
Generated with CORE-GS by Geroc - Split Soil-Rock Log

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325956.0, N:6250755.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 224583.01
DATE: 29/04/24 - 30/04/24
SHEET: 1 of 3



5.78-10.00 m depth



10.00-15.00 m depth

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

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325956.0, N:6250755.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 224583.01
DATE: 29/04/24 - 30/04/24
SHEET: 2 of 3



15.00-20.00 m depth



20.00-25.00 m depth

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

CORE PHOTO LOG

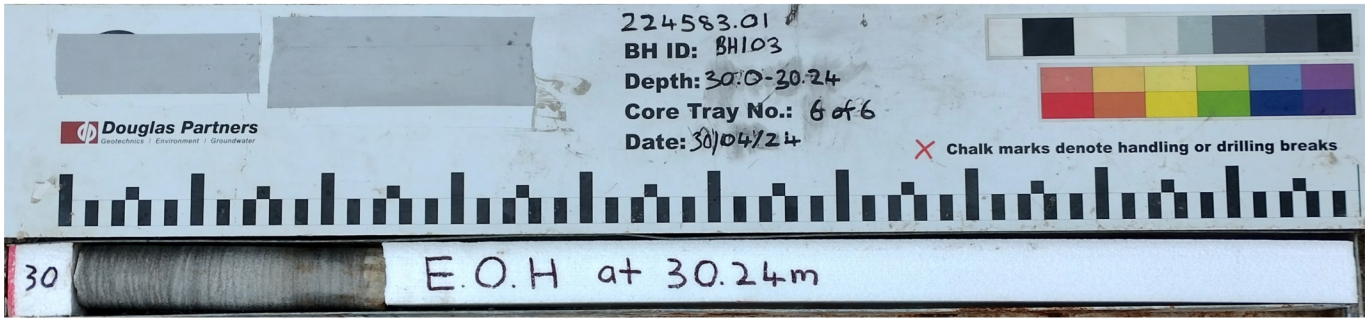
CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.9 AHD
COORDINATE: E:325956.0, N:6250755.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 224583.01
DATE: 29/04/24 - 30/04/24
SHEET: 3 of 3



25.00-30.00 m depth



30.00-30.24 m depth

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

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325968.2, N:6250732.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH104
PROJECT No: 224583.01
DATE: 29/04/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	TESTING AND REMARKS: RESULTS AND REMARKS
		0.15	CONCRETE.			ND	ND						
Seepage 29/04/24			FILL / Sandy CLAY: orange, grey-brown; low to medium plasticity; fine to coarse sand.		FILL	MC	w<PL		A/ES	0.20–0.50		DCP9/150	5 10 15 23
		1							A/ES		0.90		
Seepage 29/04/24		1.10	Silty CLAY (OH): orange, grey-brown; medium to high plasticity.		ALV	F	w>PL		A/ES		1.50		
		1.60	Silty SAND (SC): grey brown; fine to medium.		ALV	L	M						
		2									2		
		2.20	CLAY (CI-CH): orange, red, brown; medium to high plasticity.						A/ES		2.90		
			From 4.50m: orange yellow brown		RS	St to VSt	w>PL		A/ES		4.40		
			From 6.80m: extremely weathered sandstone						A/ES		5.90		
		7	Borehole discontinued at 7.10m depth. TC bit refusal on inferred medium strength sandstone.						A/ES		7.00		

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: Comacchio 205
METHOD: Diatube to 0.15m, AD/T to 7.1m
REMARKS:

OPERATOR: Ground Test (Jack)

LOGGED: JAL
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325961.7, N:6250700.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH105
PROJECT No: 224583.01
DATE: 14/05/24
SHEET: 1 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
Seepage 14/05/24		0.15	CONCRETE			ND	ND		A/ES		0.20	DCP9/150	5 10 15	Backfill	50mm
			FILL / Sandy CLAY: grey, orange-brown; medium plasticity. From 0.60m: saturated		FILL	PC			A/ES		0.50				
		1.00	Sandy CLAY (CI): grey, orange-brown; medium plasticity.		ALV	F	w>LL	*	A/ES		0.90				
									A/ES		1.50				
		2.10	CLAY (CI-CH): grey mottled, orange-red; medium to high plasticity.		RS	VSt to St	w<PL	PFAS	A/ES		2.90				
									A/ES		4.40				
			From 5.50m: extremely weathered sandstone						A/ES		5.50				
		5.75	Continued as rock											Bentonite	
MW3 31/05/24															

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: Comacchio 205
OPERATOR: Ground Test (Jack)
LOGGED: JAL
METHOD: Diatube to 0.15m, AD/T to 2.5m, WB to 5.75m, NMLC to 19.17m
CASING: HW to 2.5m, then HQ to 5.8m
REMARKS: *Field replicate BD1/20240514 taken from 0.9-1.0m.
Per- and polyfluoroalkyl substances

Refer to explanatory notes for symbol and abbreviation definitions

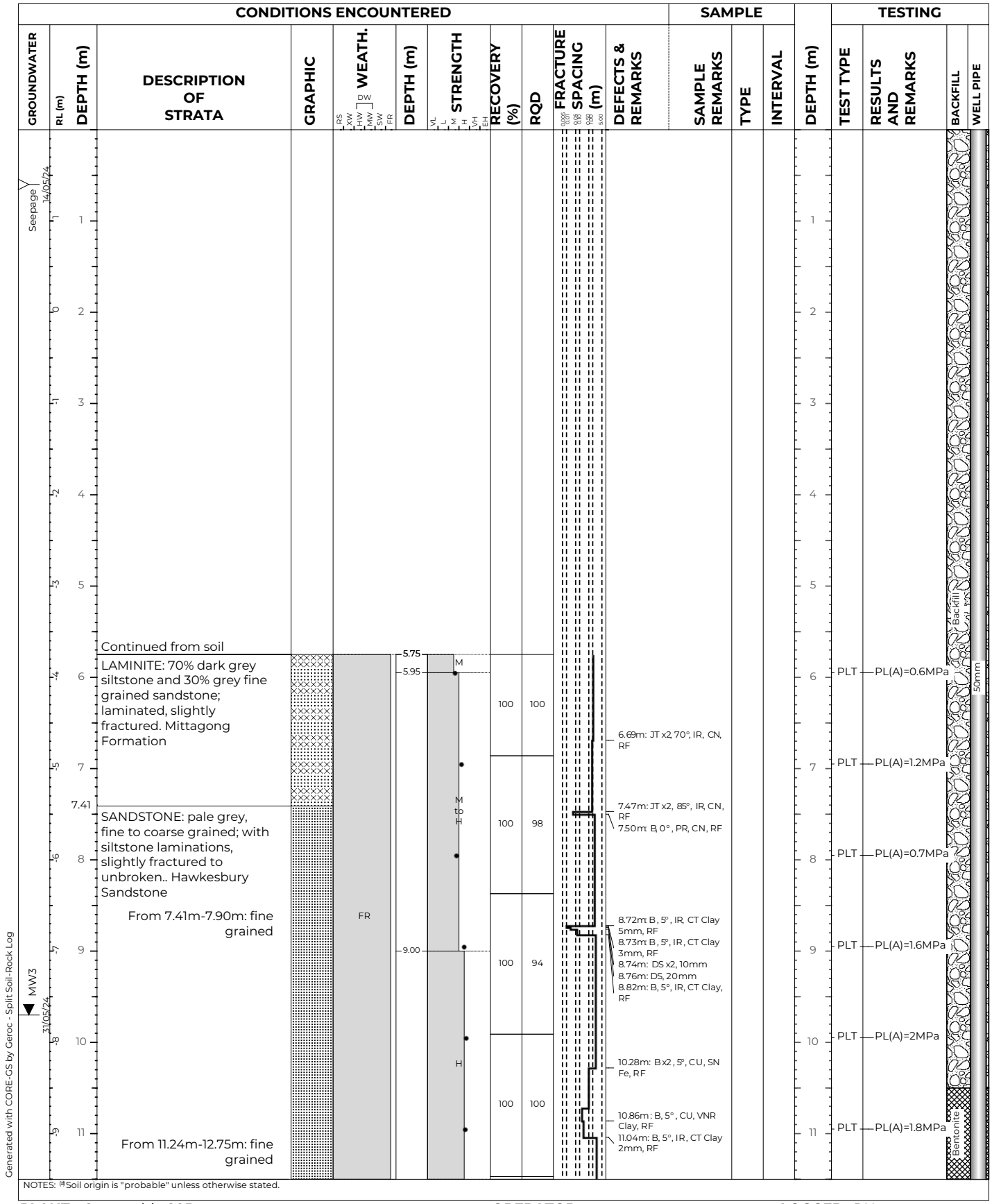
Generated with CORE-GS by Geroc - Split Soil-Rock Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325961.7, N:6250700.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH105
PROJECT No: 224583.01
DATE: 14/05/24
SHEET: 2 of 3



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

PLANT: Comacchio 205
OPERATOR: Ground Test (Jack)
LOGGED: JAL

METHOD: Diatube to 0.15m, AD/T to 2.5m, WB to 5.75m, NMLC to 19.17m
CASING: HW to 2.5m, then HQ to 5.8m

REMARKS: *Field replicate BD1/20240514 taken from 0.9-1.0m.
Per- and polyfluoroalkyl substances

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325961.7, N:6250700.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH105
PROJECT No: 224583.01
DATE: 14/05/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH. (PS, XW, DW, HW, MW, SW, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.03, 0.06, 0.20, 0.60, 2.00, >2.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	-10	12	[CONT] SANDSTONE: pale grey, fine to coarse grained; with siltstone laminations, slightly fractured to unbroken.. Hawkesbury Sandstone					100	100		12.73m: B, 0°, PR, SN Fe, RF				12	PLT	PL(A)=1.9MPa		
	-11	13	From 12.27m-12.74m: siltstone band					100	98		13.39m: DS, 10 mm 13.41m: B, 0°, PR, VNR Clay, RF 13.43m: B, 0°, PR, VNR Clay, RF				13	PLT	PL(A)=1.2MPa		
	-12	14													14	PLT	PL(A)=2.4MPa		
	-13	15			FR		H	100	100						15	PLT	PL(A)=2.3MPa	Gravel	50mm
	-14	16													16	PLT	PL(A)=2.2MPa		
	-15	17						100	100						17	PLT	PL(A)=2.4MPa		
	-16	18						100	100		18.17m: B, 10°, CU, VNR Clay, RF 18.43m: B, 0°, IR, VNR Clay, RF				18	PLT	PL(A)=1.9MPa		
	-17	19						100	100		19.06m: B, 0°, IR, CT Clay 3mm, RF				19	PLT	PL(A)=2MPa		
	-18	20	Borehole discontinued at 19.17m depth.																
	-19	21																	
	-20	22																	

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

PLANT: Comacchio 205
OPERATOR: Ground Test (Jack)
LOGGED: JAL
METHOD: Diatube to 0.15m, AD/T to 2.5m, WB to 5.75m, NMLC to 19.17m
CASING: HW to 2.5m, then HQ to 5.8m
REMARKS: *Field replicate BD1/20240514 taken from 0.9-1.0m.
Per- and polyfluoroalkyl substances

Refer to explanatory notes for symbol and abbreviation definitions

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

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325961.7, N:6250700.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH105
PROJECT No: 224583.01
DATE: 14/05/24
SHEET: 1 of 2



5.75-10.00 m depth



10.00-15.00 m depth

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

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325961.7, N:6250700.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH105
PROJECT No: 224583.01
DATE: 14/05/24
SHEET: 2 of 2



15.00-19.17 m depth

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

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325980.6, N:6250705.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH106
PROJECT No: 224583.01
DATE: 16/05/24
SHEET: 1 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[^]	DENSITY.[^]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	2	0.15	CONCRETE					NA		A/ES		0.20		
			FILL / Sandy CLAY: orange-brown, mottled red; medium to high plasticity; trace gravel and bluestone.		FILL	MC		w<PL		A/ES		0.50		
		0.90								* A/ES		0.90		
	1		Silty CLAY (CI-CH): orange-brown, mottled red; medium to high plasticity.		ALV	St		w>PL		A/ES		1.00		
Seepage 16/05/24		1.20	Silty SAND (SC): orange-brown, mottled red; fine to medium.		ALV	L		W		A/ES		1.50	DCP9/150	5 10 15
		1.90								A/ES		1.60		
	0		CLAY (CI-CH): pale grey mottled orange-red; medium to high plasticity.							A/ES		2		
	-1	3	3.60m-5.00m: clay with ironstone		RS	St to VSt		w<PL		A/ES		2.90 3.00		
	-2	4								A/ES		4		
	-3	5										4.40 4.50		
	-4	6	From 6.00m: extremely weathered sandstone									5		
		6.30	Continued as rock									6		
	-5	7										7		
	-6	8										8		
	-7	9										9		
	-8	10										10		
	-9	11										11		

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: Comacchio 205
METHOD: Diatube to 0.15m, AD/T to 2.5m, WB to 6.3m, NMLC to 19.0m
REMARKS: *Field replicate BD2/20240516 taken at 0.9-1.0m

OPERATOR: Ground Test (Jack)

LOGGED: JAL
CASING: HW to 2.5m, then HQ to 6.3m

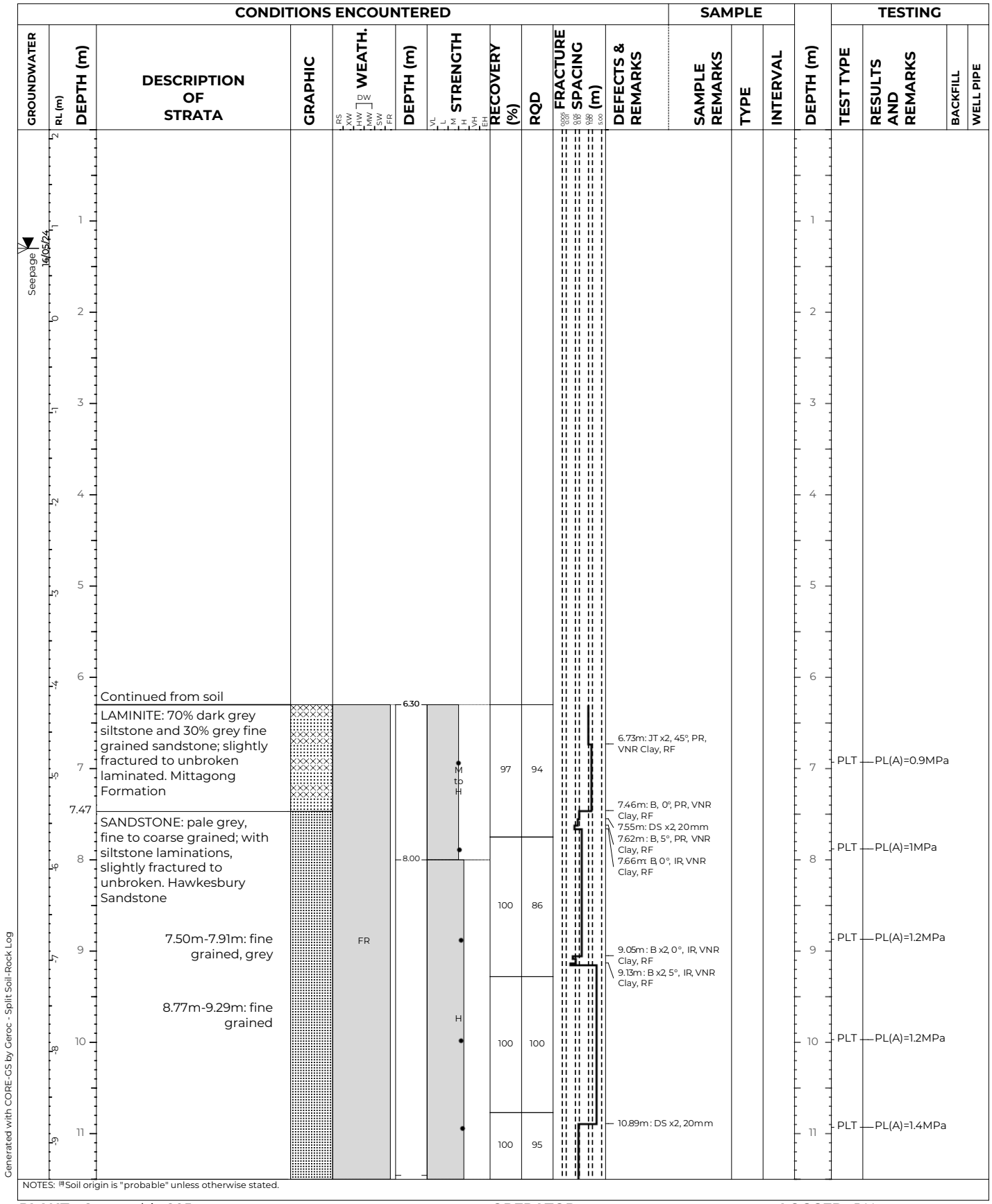
Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

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

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock
SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325980.6, N:6250705.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°
LOCATION ID: BH106
PROJECT No: 224583.01
DATE: 16/05/24
SHEET: 2 of 3



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

PLANT: Comacchio 205
OPERATOR: Ground Test (Jack)
LOGGED: JAL
METHOD: Diatube to 0.15m, AD/T to 2.5m, WB to 6.3m, NMLC to 19.0m
CASING: HW to 2.5m, then HQ to 6.3m
REMARKS: *Field replicate BD2/20240516 taken at 0.9-1.0m

Douglas PARTNERS

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325980.6, N:6250705.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH106
PROJECT No: 224583.01
DATE: 16/05/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	-10	12	[CONT] SANDSTONE: pale grey, fine to coarse grained; with siltstone laminations, slightly fractured to unbroken. Hawkesbury Sandstone		FR	11.50	M	100	95		11.97m: B, 0°, PR, SN Fe, RF				12	PLT	PL(A)=0.8MPa		
	-11	13				12.50	H	100	100		13.37m: B, 5°, CU, VNR Clay, RF 13.65m: B, 10°, CU, VNR Clay, RF				13	PLT	PL(A)=1.1MPa		
	-12	14													14	PLT	PL(A)=1.7MPa		
	-13	15				14.50	M	100	100		14.50m: B, 10°, CU, SN Fe, RF				15	PLT	PL(A)=0.5MPa		
	-14	16				15.50		93	100		15.67m: B, 5°, PR, CT Clay 2mm, RF 15.79m: B, 0°, IR, VNR Clay, RF				16	PLT	PL(A)=2MPa		
	-15	17					H	100	100						17	PLT	PL(A)=1.7MPa		
	-16	18									18.16m: B, 10°, CU, VNR Clay, RF				18	PLT	PL(A)=1.6MPa		
	-17	19	Borehole discontinued at 19.00m depth. .					100	100		18.95m: B, 0°, PR, VNR Clay, RF				19	PLT	PL(A)=1.2MPa		
	-18	20																	
	-19	21																	
	-20	22																	

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

PLANT: Comacchio 205
METHOD: Diatube to 0.15m, AD/T to 2.5m, WB to 6.3m, NMLC to 19.0m
REMARKS: *Field replicate BD2/20240516 taken at 0.9-1.0m

OPERATOR: Ground Test (Jack)

LOGGED: JAL
CASING: HW to 2.5m, then HQ to 6.3m

Refer to explanatory notes for symbol and abbreviation definitions

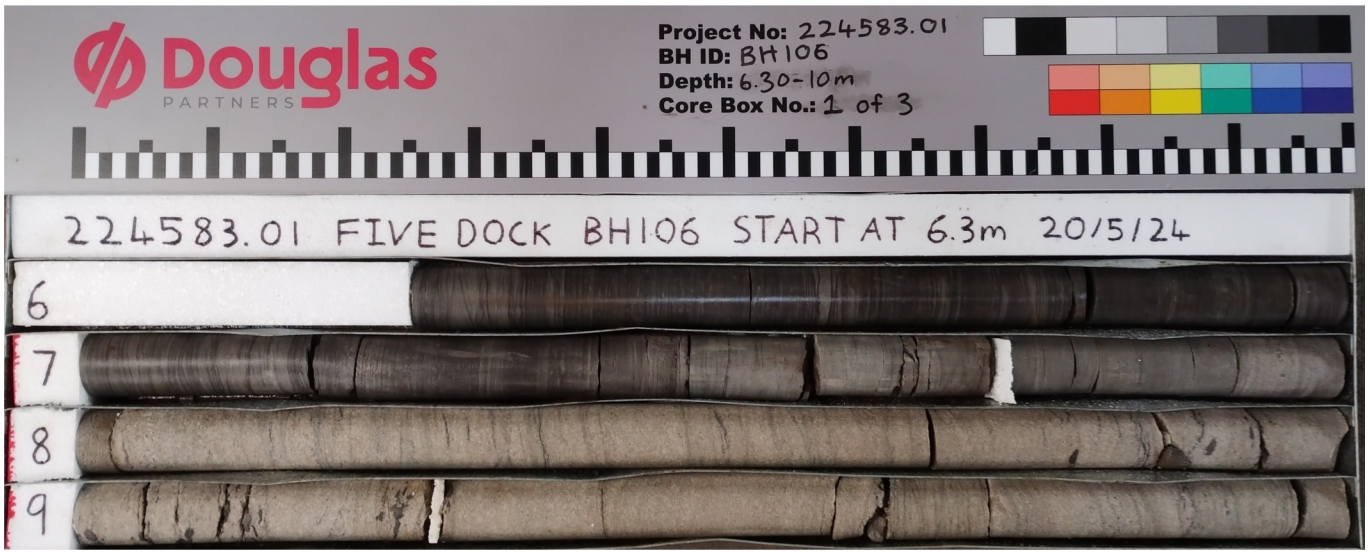
Generated with CORE-GS by Geroc - Split Soil-Rock Log

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325980.6, N:6250705.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH106
PROJECT No: 224583.01
DATE: 16/05/24
SHEET: 1 of 2



6.30-10.00 m depth



10.00-15.00 m depth

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

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325980.6, N:6250705.0
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH106
PROJECT No: 224583.01
DATE: 16/05/24
SHEET: 2 of 2



15.00-19.00 m depth

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

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325989.6, N:6250729.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH107
PROJECT No: 224583.01
DATE: 22/05/24 - 23/05/24
SHEET: 1 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
		0.15	CONCRETE			ND	NA								
		0.80	FILL / Sandy CLAY, trace gravel: grey-brown; medium plasticity; fine to coarse sand; fine to coarse gravel.		FILL	VSt	w<PL	PFAS	ES		0.50			Bentonite / Gravel	
Seepage 14/05/24		1.30	Silty SAND (SC): orange-brown, grey; fine to medium.		ALV	D / L	W		ES		0.90				
Seepage 31/05/24 01:00		2.80	Silty CLAY (OH): orange-brown; medium to high plasticity.		ALV	(St)	w>PL		ES		1.50			Bentonite	
		5.55	CLAY (CI-CH): orange, red-brown, mottled pale grey; medium to high plasticity. From 3.50m: orange, red-yellow, pale grey with ironstone		RS	(VSt)	w<PL		ES		2.90				
			Continued as rock						ES		4.40			Gravel	50mm
31/05/24														Bentonite	

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: Comacchio 205
METHOD: HA to 4.5m, WB to 5.5m, NMLC to 19.1
REMARKS:

OPERATOR: Ground Test (George)

LOGGED: JAL/JJ
CASING: HW to 2.5m, then HQ to 5.5m

Refer to explanatory notes for symbol and abbreviation definitions

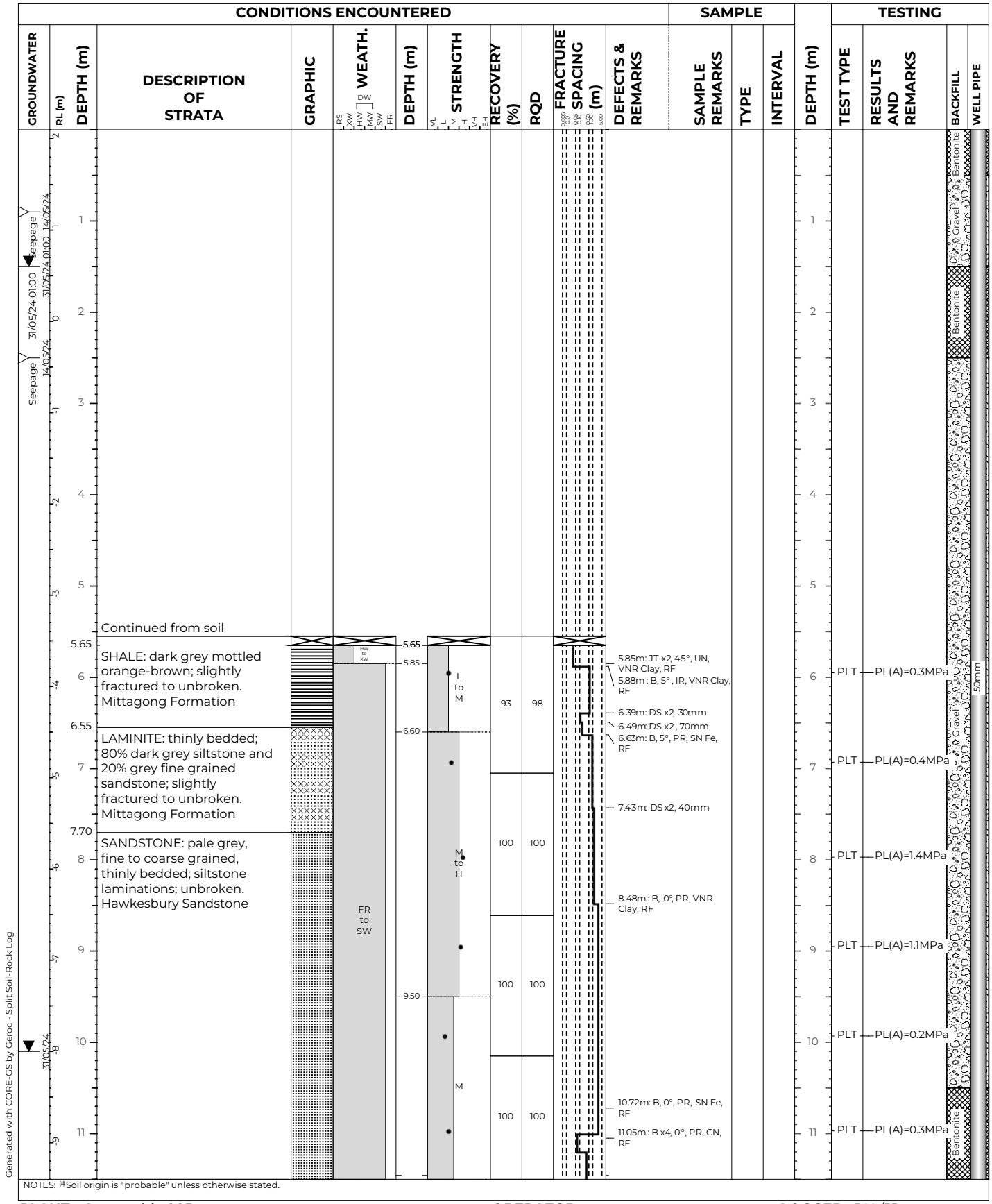
Generated with CORE-GS by Geroc - Split Soil-Rock Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325989.6, N:6250729.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH107
PROJECT No: 224583.01
DATE: 22/05/24 - 23/05/24
SHEET: 2 of 3



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

PLANT: Comacchio 205
METHOD: HA to 4.5m, WB to 5.5m, NMLC to 19.1
REMARKS:

OPERATOR: Ground Test (George)

LOGGED: JAL/JJ
CASING: HW to 2.5m, then HQ to 5.5m

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325989.6, N:6250729.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH107
PROJECT No: 224583.01
DATE: 22/05/24 - 23/05/24
SHEET: 3 of 3

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS	BACKFILL	WELL PIPE
	12	12	[CONT] SANDSTONE: pale grey, fine to coarse grained, thinly bedded; siltstone laminations; unbroken Hawkesbury Sandstone 11.05m: 1.2m broken band 12.50m-13.00m: siltstone inclusions		FR to SW	11.50		96	87		11.50m: DB 11.63m: DB 11.94m: B, 5°, PR, CN 12.15m: DB 12.51m: B, 0°, UN, CN, RF 12.62m: B x2, 5°, UN, CN, RF 12.92m: B, 15°, PR, CN, RF 12.95m: B, 15°, PR, INF, RF, sand infill				12	PLT	PL(A)=1.4MPa		
	13	13.00	SANDSTONE: grey, fine to coarse grained, thinly laminated to thinly bedded; with dark grey laminations, unbronken. Hawkesbury Sandstone 14.60m-19.10m: unbroken			13.00	H	100	100		13.00m: B, 15°, PR, CN, RF 13.60m: B, 5°, UN, CN, RF 13.80m: B, 10°, UN, CN, RF 14.24m: B, 5°, UN, CN, RF				13	PLT	PL(A)=1.1MPa		
	14														14	PLT	PL(A)=0.9MPa		
	15							100	100		14.65m: DB 14.70m: HB 14.74m: HB 14.84m: HB 15.25m: HB				15	PLT	PL(A)=1.6MPa	Gravel	50mm
	16				FR										16	PLT	PL(A)=1.4MPa		
	17							100	100		16.20m: DB 17.00m: HB				17	PLT	PL(A)=1.4MPa		
	18					17.50	M to H	100	100		17.70m: HB 17.80m: DB 18.00m: HB				18	PLT	PL(A)=0.4MPa		
	19					18.50	H				19.00m: HB 19.10m: DB				19	PLT	PL(A)=1MPa		
			Borehole discontinued at 19.10m depth. Target depth reached.																
	20																		
	21																		
	22																		

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

PLANT: Comacchio 205
METHOD: HA to 4.5m, WB to 5.5m, NMLC to 19.1
REMARKS:

OPERATOR: Ground Test (George)

LOGGED: JAL/JJ
CASING: HW to 2.5m, then HQ to 5.5m

Refer to explanatory notes for symbol and abbreviation definitions

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

CORE PHOTO LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325989.6, N:6250729.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH107
PROJECT No: 224583.01
DATE: 22/05/24 - 23/05/24
SHEET: 1 of 2



5.55-10.00 m depth



10.00-14.00 m depth

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

CORE PHOTO LOG

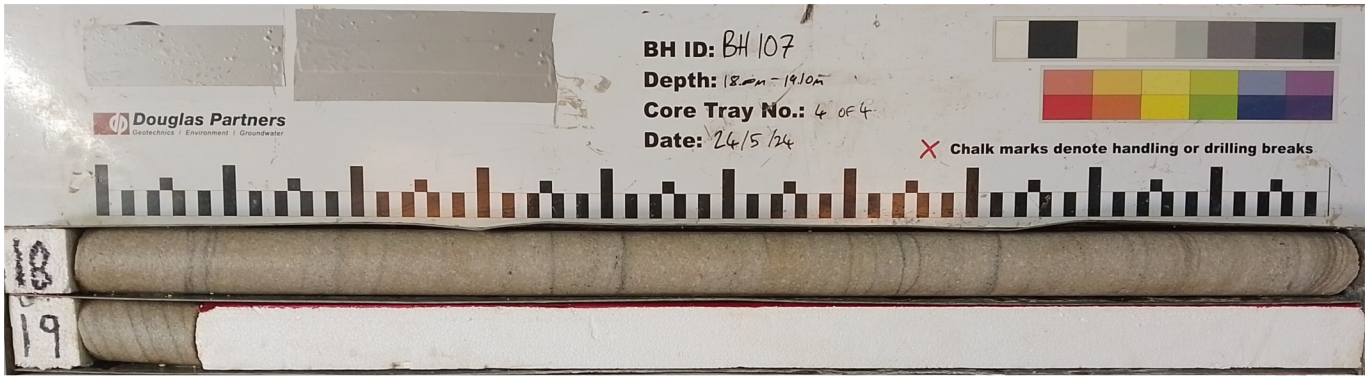
CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:325989.6, N:6250729.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH107
PROJECT No: 224583.01
DATE: 22/05/24 - 23/05/24
SHEET: 2 of 2



14.00-18.00 m depth



18.00-19.10 m depth

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

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325963.7, N:6250709.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH109
PROJECT No: 224583.01
DATE: 24/04/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	0.10	CONCRETE								0.10		
		FILL / Crushed SANDSTONE, with clay, with gravel: orange-brown; brown clay; angular to sub-angular, igneous gravel.		FILL	ND	M		A/ES		0.20		
24/04/24						W						
	1.00			FILL				A/ES		1.00		
	1.10	FILL / Sandy CLAY: grey, orange-brown mottled red; medium plasticity; fine to medium sand.								1.10		
		Sandy CLAY (CI): grey, orange-brown mottled red; medium plasticity.		ALV		w>LL						
							PFAS	A/ES		1.50		
										1.60		
		Borehole discontinued at 1.60m 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: Hand Tools
METHOD: HA to 1.6m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325972.0, N:6250693.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH110
PROJECT No: 224583.01
DATE: 24/04/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
saturated from 0.5m 01/05/24	0.10	CONCRETE				ND						
		FILL / Sandy CLAY: grey, orange and brown; medium to high plasticity; suspected perched water in fill.		FILL	ND	w>LL		A/ES		0.10 0.20		
		0.40m-0.50m: layer of gravel (ash)						A/ES		0.40 0.50		
	1.10	Sandy CLAY (CI): grey, orange-brown mottled red; medium plasticity.		ALV				A/ES		0.90 1.00		
							PFAS	A/ES		1.40 1.50		
		Borehole discontinued at 1.50m 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: Hand Tools
METHOD: HA to 1.5m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 1.8 AHD
COORDINATE: E:325968.0, N:6250749.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH111
PROJECT No: 224583.01
DATE: 24/04/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
seepage 29/04/24	0.15	CONCRETE						A/ES		0.10 – 0.20		
		FILL / Sandy CLAY: pale grey and orange-yellow; medium plasticity; fine to medium sand.		FILL	ND	ND		A/ES		0.50 – 0.60		
	0.80	Peaty CLAY (CI): dark grey and pale grey; medium plasticity.		ALV		w>PL						
	1.00	Clayey SAND: red, orange and brown; fine to medium.		ALV	(L)	M		A/ES		1.00 – 1.10		
	1.20	CLAY (CI): brown-grey; medium plasticity.		RS		w>PL						
	1.50	CLAY (CI-CH): pale grey and brown; medium to high plasticity.		RS	ND	w<PL		A/ES		1.50 – 1.60		
								A/ES		2.00 – 2.10		
							PFAS	A/ES		2.50 – 2.60		
	3	Borehole discontinued at 3.00m depth. Target depth reached.						A/ES		2.90 – 3.00		

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: Comacchio 305
METHOD: AD/T to 3.0m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: DPG Project 37 Pty Ltd
PROJECT: Proposed Mixed Use Development
LOCATION: 79-85 Queens Road & 2-16 Spencer Street, Five Dock

SURFACE LEVEL: 2.0 AHD
COORDINATE: E:325946.6, N:6250744.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH112
PROJECT No: 224583.01
DATE: 24/04/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(##)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
01/05/24 No free groundwater observed whilst augering	0.10	CONCRETE										
		FILL / SAND, with clay, with gravel; fine to medium; brown clay; (ash) gravel.		FILL	ND	M to W	PFAS	A A A		0.10 0.20 0.30 0.40	PID PID PID	<1ppm <1ppm <1ppm
	0.90	FILL / Sandy CLAY: grey; fine to medium sand; (possibly reworked natural).		FILL				A		1.00 1.10	PID	<1ppm
		Borehole discontinued at 1.50m 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: Hand Tools
METHOD: HA to 1.5m
REMARKS:

OPERATOR: Ground Test

LOGGED: JAL
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

Appendix D

Laboratory Test Reports

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

CERTIFICATE OF ANALYSIS 350634

Client Details

Client	Douglas Partners Pty Ltd
Attention	Alex Gibson
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**224583.01 Five Dock**
Number of Samples	10 Soil
Date samples received	07/05/2024
Date completed instructions received	07/05/2024

Analysis Details

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

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

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

Report Details

Date results requested by	14/05/2024
Date of Issue	14/05/2024

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

Results Approved By
Diego Bigolin, Inorganics Supervisor
Nick Sarlamis, Assistant Operation Manager

Authorised By
Nancy Zhang, Laboratory Manager

Misc Inorg - Soil			
Our Reference		350634-9	350634-10
Your Reference	UNITS	BH102	BH101
Depth		1-1.45	4-4.45
Date Sampled		29/04/2024	01/05/2024
Type of sample		Soil	Soil
Date prepared	-	07/05/2024	07/05/2024
Date analysed	-	09/05/2024	09/05/2024
pH 1:5 soil:water	pH Units	6.6	7.3
Electrical Conductivity 1:5 soil:water	µS/cm	210	1,800
Chloride, Cl 1:5 soil:water	mg/kg	26	2,200
Sulphate, SO4 1:5 soil:water	mg/kg	140	670

sPOCAS field test						
Our Reference		350634-1	350634-2	350634-3	350634-4	350634-5
Your Reference	UNITS	BH101	BH101	BH102	BH102	BH103
Depth		0.9-1	2.9-3	0.5-0.6	3-3.1	0.5-0.6
Date Sampled		01/05/2024	01/05/2024	29/04/2024	29/04/2024	29/04/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	07/05/2024	07/05/2024	07/05/2024	07/05/2024	07/05/2024
Date analysed	-	08/05/2024	08/05/2024	08/05/2024	08/05/2024	08/05/2024
pH_F (field pH test)	pH Units	7.8	8.0	8.2	5.2	7.8
pH_{FOX} (field peroxide test)	pH Units	3.3	3.5	6.8	3.3	5.6
Reaction Rate*	-	Extreme reaction	Medium reaction	Medium reaction	High reaction	High reaction

sPOCAS field test				
Our Reference		350634-6	350634-7	350634-8
Your Reference	UNITS	BH103	BH111	BH111
Depth		1.5-1.6	1-1.1	2.5-2.6
Date Sampled		29/04/2024	29/04/2024	29/04/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	07/05/2024	07/05/2024	07/05/2024
Date analysed	-	08/05/2024	08/05/2024	08/05/2024
pH_F (field pH test)	pH Units	6.5	7.3	8.1
pH_{FOX} (field peroxide test)	pH Units	2.5	4.0	5.1
Reaction Rate*	-	Medium reaction	High 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.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			07/05/2024	[NT]	[NT]	[NT]	[NT]	07/05/2024	[NT]
Date analysed	-			09/05/2024	[NT]	[NT]	[NT]	[NT]	09/05/2024	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	100	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	82	[NT]

QUALITY CONTROL: sPOCAS field test						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			07/05/2024	[NT]	[NT]	[NT]	[NT]	07/05/2024	[NT]
Date analysed	-			08/05/2024	[NT]	[NT]	[NT]	[NT]	08/05/2024	[NT]
pH_F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
pH_{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

CERTIFICATE OF ANALYSIS 350634-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Alex Gibson
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**224583.01 Five Dock**
Number of Samples	Additional analysis
Date samples received	07/05/2024
Date completed instructions received	15/05/2024

Analysis Details

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

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

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

Report Details

Date results requested by	22/05/2024
Date of Issue	22/05/2024

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Results Approved By
Nick Sarlamis, Assistant Operation Manager

Authorised By
Nancy Zhang, Laboratory Manager

sPOCAS + %S w/w		
Our Reference		350634-A-4
Your Reference	UNITS	BH102
Depth		3-3.1
Date Sampled		29/04/2024
Type of sample		Soil
Date prepared	-	07/05/2024
Date analysed	-	16/05/2024
pH $_{kcl}$	pH units	4.8
TAA pH 6.5	moles H^+ /t	12
s-TAA pH 6.5	%w/w S	0.02
pH $_{Ox}$	pH units	4.5
TPA pH 6.5	moles H^+ /t	43
s-TPA pH 6.5	%w/w S	0.07
TSA pH 6.5	moles H^+ /t	31
s-TSA pH 6.5	%w/w S	0.05
ANC_E	% $CaCO_3$	[NT]
a-ANC_E	moles H^+ /t	[NT]
s-ANC_E	%w/w S	[NT]
S_{KCl}	%w/w S	0.04
S_P	%w/w	0.11
S_{POS}	%w/w	0.07
a-S_{POS}	moles H^+ /t	45
Ca_{KCl}	%w/w	0.03
Ca_P	%w/w	0.04
Ca_A	%w/w	0.006
Mg_{KCl}	%w/w	0.058
Mg_P	%w/w	0.062
Mg_A	%w/w	0.005
S_{HCl}	%w/w S	[NT]
S_{NAS}	%w/w S	[NT]
a-S_{NAS}	moles H^+ /t	[NT]
s-S_{NAS}	%w/w S	[NT]
Fineness Factor	-	1.5
a-Net Acidity	moles H^+ /t	57
s-Net Acidity	%w/w S	0.09
Liming rate	kg $CaCO_3$ /t	4.3
s-Net Acidity without -ANCE	%w/w S	0.09
a-Net Acidity without ANCE	moles H^+ /t	57
Liming rate without ANCE	kg $CaCO_3$ /t	4.3

SCr		
Our Reference	UNITS	350634-A-4
Your Reference		BH102
Depth		3-3.1
Date Sampled		29/04/2024
Type of sample		Soil
Date prepared	-	07/05/2024
Date analysed	-	16/05/2024
Chromium Reducible Sulfur	%w/w	0.02
a-Chromium Reducible Sulfur	moles H^+ /t	16

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Ideally samples should be received in the laboratory at <6oC. Please refer to SRA for sample temperature on receipt. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: SNAS % = (SHCL-SKCL)x2
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: SNAS % = (SHCL-SKCL)x2

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			07/05/2024	[NT]	[NT]	[NT]	[NT]	07/05/2024	[NT]
Date analysed	-			16/05/2024	[NT]	[NT]	[NT]	[NT]	16/05/2024	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
TAA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	96	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
TPA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	90	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
TSA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-ANC_E	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{POS}	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{NAS}	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
a-Net Acidity without ANCE	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: SCr						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			07/05/2024	[NT]	[NT]	[NT]	[NT]	07/05/2024	[NT]
Date analysed	-			16/05/2024	[NT]	[NT]	[NT]	[NT]	16/05/2024	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	98	[NT]
a-Chromium Reducible Sulfur	moles H^+ /t	3	Inorg-068	<3	[NT]	[NT]	[NT]	[NT]	[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.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	224583.01	**Suburb:**	Five Dock	**To:**	Envirolab Services
Project Manager:	Alex Gibson	**Order Number:**		**Sampler:** JL	12 Ashley St, Chatswood NSW 2067
Email:	Alex.Gibson@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, handle, transport, store in accordance with FPM HAZID)	

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: ASS Screening	sPOCAS	Aggresivity Suite (EC, pH, SO4, Cl)	sPOCAS suite	sCR					Notes/ Preservation/ Additional Requirements
	BH101	0.9	1	1/05/24	S	P										
	BH101	2.9	3	1/05/24	S	P										
	BH102	0.5	0.6	29/04/24	S	P										
Y	BH102	3	3.1	29/04/24	S	P				X	X					Chromium reduceable sulfur testing to be confirmed on results of screening tests
	BH103	0.5	0.6	29/04/24	S	P										
	BH103	1.5	1.6	29/04/24	S	P										
	BH111	1	1.1	29/04/24	S	P										
	BH111	2.5	2.6	29/04/24	S	P										
	BH102	1	1.45	29/04/24	S	P										Soil:Water 1:5
	BH101	4	4.45	1/05/24	S	P										Soil:Water 1:5

Metals to analyse:		**LAB RECEIPT**	
Number of samples in container:	**Transported to laboratory by:**	**Lab Ref. No:**	350634-A
Send results to:	Douglas Partners Pty Ltd	**Received by:**	A.BV1
Address:	96 Hermitage Road, West Ryde NSW 211 **Phone:** (02) 9809 0666	**Date & Tim**	15/5/24 0855
Relinquished by:	**Date:** **Signed:**	**Signed:**	

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

CERTIFICATE OF ANALYSIS 350634-B

Client Details

Client	Douglas Partners Pty Ltd
Attention	Alex Gibson
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**224583.01 Five Dock**
Number of Samples	Additional analysis 1 sample
Date samples received	07/05/2024
Date completed instructions received	06/06/2024

Analysis Details

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

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

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

Report Details

Date results requested by	14/06/2024
Date of Issue	14/06/2024

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Results Approved By
Jenny He, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

sPOCAS + %S w/w		
Our Reference		350634-B-6
Your Reference	UNITS	BH103
Depth		1.5-1.6
Date Sampled		29/04/2024
Type of sample		Soil
Date prepared	-	07/05/2024
Date analysed	-	11/06/2024
pH $_{kcl}$	pH units	6.5
TAA pH 6.5	moles H^+ /t	<5
s-TAA pH 6.5	%w/w S	<0.01
pH $_{Ox}$	pH units	6.3
TPA pH 6.5	moles H^+ /t	<5
s-TPA pH 6.5	%w/w S	<0.01
TSA pH 6.5	moles H^+ /t	<5
s-TSA pH 6.5	%w/w S	<0.01
ANC_E	% $CaCO_3$	[NT]
a-ANC_E	moles H^+ /t	[NT]
s-ANC_E	%w/w S	[NT]
S_{KCl}	%w/w S	0.02
S_P	%w/w	0.07
S_{POS}	%w/w	0.05
a-S_{POS}	moles H^+ /t	32
Ca_{KCl}	%w/w	0.24
Ca_P	%w/w	0.26
Ca_A	%w/w	0.016
Mg_{KCl}	%w/w	0.011
Mg_P	%w/w	0.017
Mg_A	%w/w	0.005
S_{HCl}	%w/w S	[NT]
S_{NAS}	%w/w S	[NT]
a-S_{NAS}	moles H^+ /t	[NT]
s-S_{NAS}	%w/w S	[NT]
Fineness Factor	-	1.5
a-Net Acidity	moles H^+ /t	32
s-Net Acidity	%w/w S	0.05
Liming rate	kg $CaCO_3$ /t	2.4
s-Net Acidity without -ANCE	%w/w S	0.05
a-Net Acidity without ANCE	moles H^+ /t	32
Liming rate without ANCE	kg $CaCO_3$ /t	2.4

SCr		
Our Reference		350634-B-6
Your Reference	UNITS	BH103
Depth		1.5-1.6
Date Sampled		29/04/2024
Type of sample		Soil
Date prepared	-	07/05/2024
Date analysed	-	11/06/2024
Chromium Reducible Sulfur	%w/w	0.04
a-Chromium Reducible Sulfur	moles H^+ /t	25

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Ideally samples should be received in the laboratory at <6oC. Please refer to SRA for sample temperature on receipt. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: SNAS % = (SHCL-SKCL)x2
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: SNAS % = (SHCL-SKCL)x2

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			07/05/2024	[NT]	[NT]	[NT]	[NT]	07/05/2024	[NT]
Date analysed	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
TAA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	96	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	96	[NT]
TPA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	90	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
TSA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-ANC_E	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{POS}	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{NAS}	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: SCr						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			07/05/2024	[NT]	[NT]	[NT]	[NT]	07/05/2024	[NT]
Date analysed	-			11/06/2024	[NT]	[NT]	[NT]	[NT]	11/06/2024	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	97	[NT]
a-Chromium Reducible Sulfur	moles H^+ /t	3	Inorg-068	<3	[NT]	[NT]	[NT]	[NT]	[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.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

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

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

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	224583.01	**Suburb:**	Five Dock	**To:**	Envirolab Services
Project Manager:	Alex Gibson	**Order Number:**		**Sampler:** JL	12 Ashley St, Chatswood NSW 2067
Email:	Alex.Gibson@douglaspartners.com.au			**Attn:**	Sample Receipt
Turnaround time	☑ Standard ☐ 72 hour ☐ 48 hour ☐ 24 hour ☐ Same day				(02) 9910 6200 samplereceipt@envirolab.cor
Prior Storage	☐ Fridge ☑ Freezer ☑ Esky ☐ Shelf	**Do samples contain 'potential' HBM?**	☑ No ☐ Yes (If YES, handle, transport, store in accordance with FPM HAZID)		

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: ASS Screening	sPOCAS	Aggresivity Suite (EC, pH, SO4, Cl)	sPOCAS suite	sCR					Notes/ Preservation/ Additional Requirements
	BH101	0.9	1	1/05/24	S	P										
	BH101	2.9	3	1/05/24	S	P										
	BH102	0.5	0.6	29/04/24	S	P										
	BH102	3	3.1	29/04/24	S	P										
	BH103	0.5	0.6	29/04/24	S	P										
6	BH103	1.5	1.6	29/04/24	S	P				X	X					
	BH111	1	1.1	29/04/24	S	P										
	BH111	2.5	2.6	29/04/24	S	P										

Metals to analyse:			**LAB RECEIPT**
Number of samples in container:	**Transported to laboratory by:**		**Lab Ref. No:** 350634-B
Send results to:	Douglas Partners Pty Ltd		**Received by:** A.BUI
Address:	96 Hermitage Road, West Ryde NSW 211	**Phone:** (02) 9809 0666	**Date & Tim:** 6/6/24 1602
Relinquished by:	**Date:**	**Signed:**	**Signed:**

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No:	224583.01	**Suburb:**	Five Dock	**To:**	Envirolab Services
Project Manager:	Alex Gibson	**Order Number:**		**Sampler:** JL	12 Ashley St, Chatswood NSW 2067
Email:	Alex.Gibson@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, handle, transport, store in accordance with FPM HAZID)

Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: ASS Screening	sPOCAS	Aggresivity Suite (EC, pH, SO4, Cl)								Notes/ Preservation/ Additional Requirements
1	BH101	0.9	1	1/05/24	S	P	X										Chromium reduceable sulfur testing to be confirmed on results of screening tests
2	BH101	2.9	3	1/05/24	S	P	X										
3	BH102	0.5	0.6	29/04/24	S	P	X										
4	BH102	3	3.1	29/04/24	S	P	X										
5	BH103	0.5	0.6	29/04/24	S	P	X										
6	BH103	1.5	1.6	29/04/24	S	P	X										
7	BH111	1	1.1	29/04/24	S	P	X										
8	BH111	2.5	2.6	29/04/24	S	P	X										
9	BH102	1	1.45	29/04/24	S	P			X								Soil:Water 1:5
10	BH101	4	4.45	1/05/24	S	P			X								Soil:Water 1:5

ENVIROLAB Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200

Job No: 350634

Date Received: 7/5/24

Time Received: 1445

Received By: EW

Temp: Cool/Ambient

Cooling: Ice/Icepack 2.0

Security: Intact/Broken/None

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

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

CERTIFICATE OF ANALYSIS 352229

Client Details

Client	Douglas Partners Pty Ltd
Attention	Alex Gibson
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**224583.01, Five Dock**
Number of Samples	11 Soil
Date samples received	24/05/2024
Date completed instructions received	24/05/2024

Analysis Details

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

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

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

Report Details

Date results requested by	31/05/2024
Date of Issue	31/05/2024

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Results Approved By
Jenny He, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

Misc Inorg - Soil				
Our Reference		352229-1	352229-2	352229-3
Your Reference	UNITS	BH104	BH105	BH106
Depth		2.9-3	0.5-0.6	1.5-1.6
Date Sampled		13/05/2024	14/05/2024	16/05/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	24/05/2024	24/05/2024	24/05/2024
Date analysed	-	28/05/2024	28/05/2024	28/05/2024
pH 1:5 soil:water	pH Units	6.5	7.5	7.4
Electrical Conductivity 1:5 soil:water	µS/cm	310	160	54
Chloride, Cl 1:5 soil:water	mg/kg	190	34	<10
Sulphate, SO4 1:5 soil:water	mg/kg	350	59	27

sPOCAS field test						
Our Reference		352229-4	352229-5	352229-6	352229-7	352229-8
Your Reference	UNITS	BH104	BH105	BH105	BH106	BH106
Depth		1.5-1.6	0.9-1	4.4-4.5	0.9-1	2.9-3
Date Sampled		13/05/2024	14/05/2024	14/05/2024	16/05/2024	16/05/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	27/05/2024	27/05/2024	27/05/2024	27/05/2024	27/05/2024
Date analysed	-	28/05/2024	28/05/2024	28/05/2024	28/05/2024	28/05/2024
pH_F (field pH test)	pH Units	6.3	7.3	7.6	7.2	6.8
pH_{FOX} (field peroxide test)	pH Units	3.2	3.7	8.3	4.0	4.5
Reaction Rate*	-	Medium reaction	Medium reaction	Volcanic reaction	Medium reaction	Medium reaction

sPOCAS field test				
Our Reference		352229-9	352229-10	352229-11
Your Reference	UNITS	BH107	BH107	BH104
Depth		1.5-1.6	4.4-4.5	2.9-3
Date Sampled		22/05/2024	22/05/2024	13/05/2024
Type of sample		Soil	Soil	Soil
Date prepared	-	27/05/2024	27/05/2024	27/05/2024
Date analysed	-	28/05/2024	28/05/2024	28/05/2024
pH_F (field pH test)	pH Units	7.3	7.0	6.0
pH_{FOX} (field peroxide test)	pH Units	3.3	5.0	4.5
Reaction Rate*	-	Medium reaction	Medium 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.

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			24/05/2024	[NT]	[NT]	[NT]	[NT]	24/05/2024	[NT]
Date analysed	-			28/05/2024	[NT]	[NT]	[NT]	[NT]	28/05/2024	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	99	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	87	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	89	[NT]

QUALITY CONTROL: sPOCAS field test						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			27/05/2024	[NT]	[NT]	[NT]	[NT]	27/05/2024	[NT]
Date analysed	-			28/05/2024	[NT]	[NT]	[NT]	[NT]	28/05/2024	[NT]
pH_F (field pH test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]
pH_{FOX} (field peroxide test)	pH Units		Inorg-063	[NT]	[NT]	[NT]	[NT]	[NT]	100	[NT]

Result Definitions

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

Quality Control Definitions

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

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

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

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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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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.

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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.

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

Measurement Uncertainty estimates are available for most tests upon request.

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

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

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

CERTIFICATE OF ANALYSIS 352229-A

Client Details

Client	Douglas Partners Pty Ltd
Attention	Alex Gibson
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**224583.01, Five Dock**
Number of Samples	Additional analysis 1 sample
Date samples received	24/05/2024
Date completed instructions received	05/07/2024

Analysis Details

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

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

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

Report Details

Date results requested by	12/07/2024
Date of Issue	12/07/2024

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

Results Approved By
Nick Sarlamis, Assistant Operation Manager

Authorised By
Nancy Zhang, Laboratory Manager

sPOCAS + %S w/w		
Our Reference		352229-A-9
Your Reference	UNITS	BH107
Depth		1.5-1.6
Date Sampled		22/05/2024
Type of sample		Soil
Date prepared	-	27/05/2024
Date analysed	-	08/07/2024
pH $_{kcl}$	pH units	5.8
TAA pH 6.5	moles H^+ /t	<5
s-TAA pH 6.5	%w/w S	<0.01
pH $_{Ox}$	pH units	3.7
TPA pH 6.5	moles H^+ /t	67
s-TPA pH 6.5	%w/w S	0.11
TSA pH 6.5	moles H^+ /t	63
s-TSA pH 6.5	%w/w S	0.10
ANC_E	% $CaCO_3$	[NT]
a-ANC_E	moles H^+ /t	[NT]
s-ANC_E	%w/w S	[NT]
S_{KCl}	%w/w S	0.01
S_P	%w/w	0.08
S_{POS}	%w/w	0.07
a-S_{POS}	moles H^+ /t	41
Ca_{KCl}	%w/w	0.08
Ca_P	%w/w	0.1
Ca_A	%w/w	0.014
Mg_{KCl}	%w/w	0.044
Mg_P	%w/w	0.049
Mg_A	%w/w	0.005
S_{HCl}	%w/w S	[NT]
S_{NAS}	%w/w S	[NT]
a-S_{NAS}	moles H^+ /t	[NT]
s-S_{NAS}	%w/w S	[NT]
Fineness Factor	-	1.5
a-Net Acidity	moles H^+ /t	45
s-Net Acidity	%w/w S	0.07
Liming rate	kg $CaCO_3$ /t	3.4
s-Net Acidity without -ANCE	%w/w S	0.07
a-Net Acidity without ANCE	moles H^+ /t	45
Liming rate without ANCE	kg $CaCO_3$ /t	3.4

SCr		
Our Reference	UNITS	352229-A-9
Your Reference		BH107
Depth		1.5-1.6
Date Sampled		22/05/2024
Type of sample		Soil
Date prepared	-	27/05/2024
Date analysed	-	08/07/2024
Chromium Reducible Sulfur	%w/w	0.05
a-Chromium Reducible Sulfur	moles H^+ /t	32

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Ideally samples should be received in the laboratory at <6oC. Please refer to SRA for sample temperature on receipt. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: SNAS % = (SHCL-SKCL)x2
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Net acidity including ANC has a safety factor of 1.5 applied. Neutralising value (NV) of 100% is assumed for liming rate. The recommendation that the SHCL concentration be multiplied by a factor of 2 to ensure retained acidity is not underestimated, has not been applied in the SHCL result. However, it has been applied in the SNAS calculation: SNAS % = (SHCL-SKCL)x2

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			27/05/2024	[NT]	[NT]	[NT]	[NT]	27/05/2024	[NT]
Date analysed	-			08/07/2024	[NT]	[NT]	[NT]	[NT]	08/07/2024	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
TAA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	96	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	[NT]	[NT]	[NT]	[NT]	96	[NT]
TPA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	91	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
TSA pH 6.5	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-ANC_E	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{POS}	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-S_{NAS}	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
a-Net Acidity	moles H^+/t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

QUALITY CONTROL: SCr						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			27/05/2024	[NT]	[NT]	[NT]	[NT]	27/05/2024	[NT]
Date analysed	-			08/07/2024	[NT]	[NT]	[NT]	[NT]	08/07/2024	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	[NT]	[NT]	[NT]	[NT]	98	[NT]
a-Chromium Reducible Sulfur	moles H^+ /t	3	Inorg-068	<3	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]

Result Definitions

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INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
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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.

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

Anna Bui

From: Anna Bui
Sent: Friday, 5 July 2024 2:14 PM
To: Alex Gibson; Nancy Zhang; Samplereceipt
Subject: RE: 224583.01 - Five Dock - Extra Testing

Hi Alex,

I'll get that organised on BH107, 1.5-1.6m (352229-9).

Thanks,

From: Alex Gibson <Alex.Gibson@douglaspartners.com.au>
Sent: Friday, July 5, 2024 12:16 PM
To: Nancy Zhang <NZhang@envirolab.com.au>; Samplereceipt <Samplereceipt@envirolab.com.au>
Subject: 224583.01 - Five Dock - Extra Testing

CAUTION: This email originated from outside of the organisation. Do not act on instructions, click links or open attachments unless you recognise the sender and know the content is authentic and safe.

Hi Nancy,

Can you please additional SPOCAS and SCr testing on sample BH107, 1.4-1.5m for the above job please?

Thanks,

Alex Gibson | Geotechnical Engineer

02 9809 0666 +61 484 257 770 Alex.Gibson@douglaspartners.com.au

www.douglaspartners.com.au 96 Hermitage Road, West Ryde
NSW 2114 | Wallumedegal Country
PO Box 472, West Ryde, NSW 1685

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ELS REF: 352229-A
TAT: STANDARD
DUE: 12/7/24
AB

Douglas PARTNERS

CHAIN OF CUSTODY DESPATCH SHEET

Project No: 224583.01	**Suburb:** Five Dock		**To:** Envirolab Services
Project Manager: Alex Gibson	**Order Number:**	**Sampler:** JL	12 Ashley St, Chatswood NSW 2067
Email: Alex.Gibson@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, handle, transport, store in accordance with FPM HAZID)		

	Lab ID	Sample ID: Location / Other ID	Depth From	Depth To	Date Sampled	Sample Type: S - soil W - water M - Material	Container Type: G - glass P - plastic	Analytes: Aggressivity Suite (EC, pH, SO4, Cl)	ASS Screening	sPOCAS	sCr						Notes/ Preservation/ Additional Requirements
✓	1	BH104	2.9	3	13/05/24	S	P	x									Soil:water 1:5
✓	2	BH105	0.5	0.6	14/05/24	S	P	x									Soil:water 1:5
	3	BH106	1.5	1.6	16/05/24	S	P	x									Soil:water 1:5
✓	4	BH104	1.5	1.6	13/05/24	S	P		x								Chromium Reducable sulfur and sPOCAS testing to be confirmed on results of screening
11 ✓	~~AR~~ AG	BH104	2.9	3	13/05/24	S	P		x								
✓	5	BH105	0.9	1	14/05/24	S	P		x								
✓	6	BH105	4.4	4.5	14/05/24	S	P		x								
✓	7	BH106	0.9	1	16/05/24	S	P		x								
✓	8	BH106	2.9	3	16/05/24	S	P		x								
✓	9	BH107	1.5	1.6	22/05/24	S	P		x								
✓	10	BH107	4.4	4.5	22/05/24	S	P		x								

ENVIROLAB — Envirolab Services, 12 Ashley St, Ph: (02) 9910 6200
Job No: 355220
Date Received: 24/5/24
Time Received: 1450
Temp: Ambient
Cooling: Ice
Security: Intact / Broken / None

Metals to analyse:			**LAB RECEIPT**
Number of samples in container:	**Transported to laboratory by:**		**Lab Ref. No:**
Send results to: Douglas Partners Pty Ltd			**Received by:**
Address: 96 Hermitage Road, West Ryde NSW 2114	**Phone:** (02) 9809 0666		**Date & Tim**
Relinquished by: Alex Gibson	**Date:** 24/05/2024	**Signed:**	**Signed:**