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

Perpetual Corporate Trust Limited as custodian for Aliro Trusco 1 Pty Ltd as trustee for Harris Street Sub Trust
Level 38/ Gateway Tower
1 Macquarie Place
Sydney NSW 2000

Project 209967.01
6 December 2022
R.006.Rev0
AA

Attention: Jason Goldsworthy

Email: jgoldsworthy@novusaus.com

Preliminary Salinity Assessment
Proposed Mixed Use Development
39-43 Hassall Street, Parramatta

1. Introduction

Douglas Partners Pty Ltd (DP) has been engaged by Perpetual Corporate Trust Limited as custodian for Aliro Trusco 1 Pty Ltd as trustee for Harris Street Sub Trust (the Client) to complete this preliminary salinity assessment for a proposed mixed use development at 39-43 Hassall Street, Parramatta (the site).

DP has previously carried out a geotechnical investigation report for the project (Ref.: 209967.01.R.002). This letter describes a preliminary salinity assessment undertaken by DP based on published maps, available information from the geotechnical investigation and experience with similar projects in the area. Also, general comments on salinity and soil sodicity management are also provided to respond to the requirements of a State Significant Development Approval (SSDA) for the project.

It is understood that the proposed development of the site includes the construction of a 34-storey mixed-use development with three levels of basement carparking and two mezzanine lower ground levels. The design lower basement level is at RL -8.3 m AHD and a proposed lift pit level at RL -11.0 m AHD, which is located at the centre of the basement footprint. Excavation in the order of 13 m to 14 m depth is anticipated to facilitate construction of the proposed basement and locally deeper excavations are required for the construction of lift bases, footings and services trenches.

2. Site Description

The site, known as Lot 1 in Deposited Plan 633851 and Lot A in Deposited Plan 366506, is located at 39 – 43 Hassall Street, Parramatta. The site is approximately rectangular in shape, with plan dimensions of around 45 m by 35 m, and a plan area of approximately 1,448 m^2.

The site is bounded by Hassall Street to the north, Harris Street to the east, and an open stormwater channel (Clay Cliff Creek) to the south. The western site boundary is shared with a mixed-use, high-

rise development (31 – 37 Hassall Street). It is expected that the adjacent high-rise development incorporates a basement excavation, however, specific details on this basement (if present) were not available at the time of report preparation. Parramatta River lies approximately 300 m to the north of the site.

The site is currently vacant, with the ground surface covered in grass and low vegetation. The site is relatively flat, with ground surface levels generally in the vicinity of RL 5 m to RL 5.5 m, relative to the Australian Height Datum (AHD).

3. Published Information

3.1 Geology

Reference to the NSW Seamless Geology map indicates that the broader site is underlain by Quaternary aged alluvial river terrace deposits (QP_at) associated with the Parramatta River. This unit typically comprises a mixture of silt, clay and lithic to quartz-lithic sand and gravel.

To the south-west of the site is an area mapped as Quaternary aged alluvial valley deposits (Q_av), associated with a former watercourse (likely Clay Cliff Creek) running in a south-western direction. This unit comprises a similar mixture of soil to the alluvial river terrace deposits described above.

The site is also close to an area mapped as 'Ashfield Shale' (T_wia), which represents the bedrock unit below the site and across the broader area. The Ashfield Shale is underlain by the Mittagong Formation, which in turn is underlain by the Hawkesbury Sandstone. Ashfield Shale typically comprises dark grey siltstone and laminite, which weathers to a residual clay of medium to high plasticity. The Mittagong formation is a transitional unit often found between the Ashfield Shale and Hawkesbury Sandstone and typically includes laminite and fine-grained sandstone. Hawkesbury Sandstone typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

3.2 Soil Landscape

Reference to the Sydney 1:100,000 Soil Landscape Series Sheet (prepared by the NSW Department of Finance, Services and Innovation 2017) indicates that the majority of the site is underlain by alluvial 'Birrong Soils', which typically comprise deep (>2.5 m) podzolic and solodic soils on a level to gently undulating landscape.

To the east of the site (beyond Harris Street) is an area mapped as 'disturbed terrain', which indicates the natural ground surface may have been extensively disturbed by human activity (e.g. removal or burial of natural soil, placement of fill including soil, rock, building rubble and waste material).

To the south of the site (approximately 30 m) is an area mapped as erosional 'Glenorie' soils, which typically comprise an undulating landscape with shallow to moderately deep (1 – 1.5 m) podzolic soils formed on crests and upper slopes. On lower slopes and areas of poor drainage, deeper soil profiles (up to approximately 2 m depth) typically form.

3.3 Salinity

Reference to Salinity Potential of Western Sydney mapping indicates that the site is in an area of moderate salinity potential, associated with “areas on Wianamatta Group Shales”.

4. Preliminary Salinity Assessment

DP’s geotechnical investigation included a total of four cored boreholes. Selected soil samples were submitted for aggressivity testing (pH, sulphate, chloride, electrical conductivity and resistivity). The results are summarised in Table 1.

Table 1: Summary of Aggressivity Test Results

Bore No.	Sample Depth (m)	Description	pH	Sulphate- (mg/kg)	Chloride (mg/kg)	Electrical Conductivity (µS/cm)	Electrical Resistivity (ohm.m)
BH1	1.0	Silty Clay, brown	6.2	42	<10	39	260
BH2	6.0	Sandy Clay, brown	6.6	40	93	130	77
BH3	1.5	Sandy Clay, brown	6.8	<10	<10	20	510
BH4	5.5	Sand, grey	6.5	20	<10	25	400

The detailed test certificates of the laboratory tests are presented in attachments.

The soil salinity from conversion of all Electrical Conductivity test results is estimated to be lower than 2 ds/m, and thus the soil profile is considered to be non-saline (after DIPNR, 2002c). No samples of the underlying bedrock were tested, however, based on the experience from previous projects, it is anticipated that the rock profile would be of a non-saline or slightly saline nature.

5. Salinity Management

Based on the results of the preliminary assessment, no significant risk related to salinity is anticipated for the development, however, in the absence in more comprehensive laboratory testing regime, the following strategies for development should be planned to mitigate against the effects of any current or potential salinisation and sodicity related effects that could occur. These strategies need to be directed at all levels of the development process including:

- Site design, vegetation and landscaping; and
- Construction of the building.

In general, the strategies are directed at:

- Maintaining the natural water balance;
- Maintaining good drainage;
- Avoiding disturbance or exposure of sensitive soils;
- Retaining or increasing appropriate native vegetation in strategic areas; and
- Implementing building controls and engineering responses where appropriate.

Precautionary measures to reduce the potential for salinity problems in the development area include:

- Avoiding water collecting in low lying areas, behind fill embankments, or near trenches as this can lead to water logging of the soils, evaporative concentration of salts, and eventual breakdown in the soil structure resulting in accelerated erosion.
- Sealing of stormwater detention ponds to minimise infiltration.
- Minimising on-site sewerage disposal.
- Finished surfaces should have slopes no flatter than 1V:100H.
- Where possible, materials and waters used in the construction, should be selected to contain minimal or no salt. Where possible, place excavated materials in fill areas with similar salinity characteristics (ie the material should not be any more saline than the material within which it is to be placed). Under these circumstances, where salinisation could be a problem, a capping layer of either topsoil or sandy materials should be placed to reduce capillary rise, act as a drainage layer and also reduce the potential for dispersive behaviour in any sodic soils.
- Sodic soils can also be managed by maintaining vegetation where possible and planting tolerant vegetation species. The addition of organic matter, gypsum and lime into fill containing sodic soils can also be considered where appropriate. After gypsum addition, the reduction of sodicity levels may require some time for sufficient infiltration and leaching into the subsoils, so capping of exposed sodic material should remain the primary management method. Topsoil added at the completion of bulk earthworks is, in effect, also adding organic matter which may help the infiltration and leaching process.
- Salt tolerant grasses and trees should be considered in areas of moderate and greater salinity to reduce soil erosion and maintain the existing evapotranspiration and groundwater levels. Reference should be made to an experienced landscape planner or agronomist."

We trust this satisfies your present requirements. Please do not hesitate to contact the undersigned if you have any further queries.

Yours faithfully
Douglas Partners Pty Ltd

Arash Afzali
Senior Geotechnical Engineer

Reviewed by

Bruce McPherson
Principal

Attachments: About this Report
Laboratory Test Results

About this Report

Douglas Partners

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

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 302325

Client Details

Client	Douglas Partners Pty Ltd
Attention	Arash Afzali
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**209967.01, Parramatta**
Number of Samples	4 Soil
Date samples received	04/08/2022
Date completed instructions received	04/08/2022

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.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	11/08/2022
Date of Issue	11/08/2022

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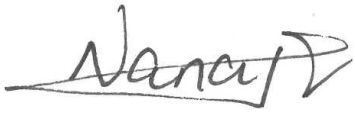
Results Approved By
Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Soil Aggressivity					
Our Reference		302325-1	302325-2	302325-3	302325-4
Your Reference	UNITS	BH1	BH2	BH3	BH4
Depth		1.0	6.0	1.5	5.5
Date Sampled		13/07/2022	11/07/2022	14/07/2022	15/07/2022
Type of sample		Soil	Soil	Soil	Soil
pH 1:5 soil:water	pH Units	6.2	6.6	6.8	6.5
Electrical Conductivity 1:5 soil:water	µS/cm	39	130	20	25
Chloride, Cl 1:5 soil:water	mg/kg	<10	93	<10	<10
Sulphate, SO4 1:5 soil:water	mg/kg	42	40	<10	20
Resistivity in soil*	ohm m	260	77	510	400

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. 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 at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25oC in accordance with APHA 22nd ED 2510 and Rayment & Lyons. Resistivity is calculated from Conductivity (non NATA). Resistivity (calculated) may not correlate with results otherwise obtained using Resistivity-Current method, depending on the nature of the soil being analysed.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.

QUALITY CONTROL: Soil Aggressivity						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	98	[NT]
Electrical Conductivity 1:5 soil:water	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Chloride, Cl 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	96	[NT]
Sulphate, SO4 1:5 soil:water	mg/kg	10	Inorg-081	<10	[NT]	[NT]	[NT]	[NT]	91	[NT]
Resistivity in soil*	ohm m	1	Inorg-002	<1	[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.

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.

Report Comments

pH/EC
Samples were out of the recommended holding time for this analysis.