GEOTECHNICAL SITE INVESTIGATION REPORT234567890

PROJECT:	**Manly Warringah Gymnastic-New Facility Project, NSW**
CLIENT:	**MWGC**
DATE:	**19 November 2021**
REPORT NO:	**NE1469**

GEOTESTA

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1. INTRODUCTION

Geotesta was engaged by Manly Warringah Gymnastics (MWGC) to conduct a geotechnical site investigation at the new facility of MWGC (opposite to 502 Pittwater Road, North Manly). Based on the information received from the Client, it is understood that the proposed development is a new single-story gymnastic facility. This site investigation was carried out in general accordance with the approved fee proposal and scope of work provided by Geotesta Pty Ltd (Geotesta) to the Client and approved in October 2022.

The fieldwork was carried out on the 03rd of November 2022. This report presents the geotechnical site investigation results including sub-surface soil profile with interpreted geotechnical properties of the assessed subsurface lithology; laboratory test results for site classification and soil salinity/aggressivity assessment; footing types, founding depths and allowable bearing capacity for strip/pad footings and piles; site preparation, excavation and earthworks and other construction issues.

This assessment has been carried out in general accordance with the following Australian Standards (AS):

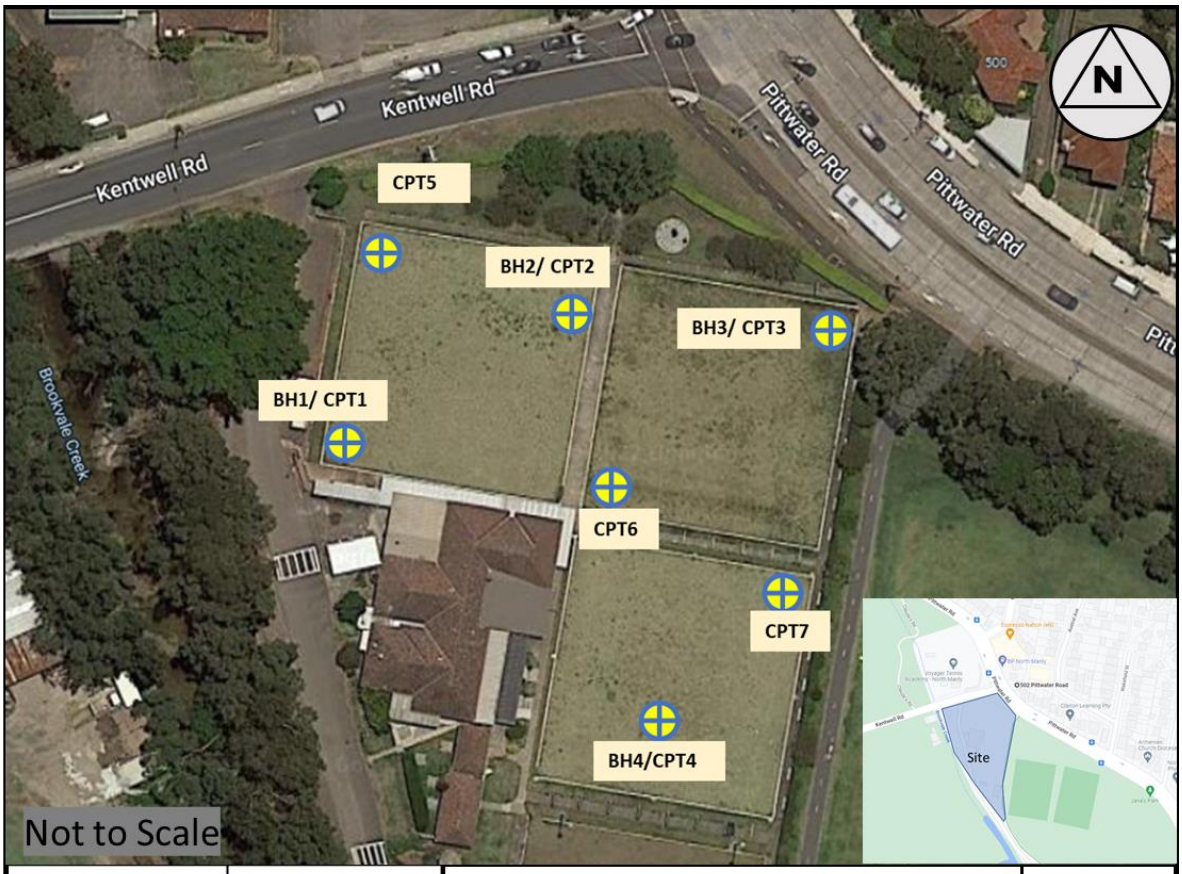
- AS 1726-2017, *Geotechnical site investigations*
- AS 2870-2011, *Residential slabs and footings*
- AS 3600-2009, *Concrete structures*
- AS 2159.2009, *Piling-Design and installation*
- AS 4678-2002, *Earth-retaining structures*
- AS 3798-1996, *Guidelines on earthworks for commercial and residential developments*
- *Western Sydney Salinity Code of Practice*, March 2003 (Amended January 2004)

2. FIELD INVESTIGATION

The site under investigation is situated at Manly Warringah Gymnastic New Facility (opposite to 502 Pittwater Road, North Manly) and is approximately 16 km (by road) North of the Sydney CBD. The site location is shown in Figure 1.

The field investigation involved the drilling of four (4) boreholes. The boreholes were drilled to the maximum depth of 6.0m using a Buggy Mounted Auger. The borehole locations were determined on-site by Geotesta Geotechnical Engineers according to site accessibility and considering the anticipated locations of underground services. Cone Penetrometer Test (CPT) testing was also undertaken at the site adjacent to each borehole and at three additional locations to estimate the consistency/density of the subsurface materials. The borehole and CPT locations are presented in Figure 1.

The fieldwork was performed in the presence of the Geotesta Geotechnical Engineer who positioned boreholes, collected samples, nominated testing depths and prepared borehole logs in accordance with AS 1726. All field observations and in-situ test results are presented on the borehole logs attached in Appendix A of this report.



Prepared:	Sameera Pitawala
Client:	MWGC
Date:	14/11/2022
Scale:	Not to Scale

Site Location

(Source: Google)

GEOTESTA

Figure 1: Site Location

3. FINDINGS

3.1 Site Condition and Topography

The site of the proposed development is a "L" shape block with an area of approximately 4500 m^2. At the time of investigation, the site was not occupied by any building and was almost flat.

Regional topographic maps indicate that the site is approximately 5.0m above sea level, referenced to the Australian Height Datum (AHD). The site is located within the Northern Beaches Council.

3.2 Site Geology

The geological origin of the soil profile was identified from our visual examination of the soil samples, geotechnical experience, and reference to geological maps of the area. The geological map of the area indicates that the site is underlain by silty to peaty quartz sand, silt, and clay, ferruginous and humic cementation in places (Geological Survey of NSW, Sydney, 1:100 000, Geological Sheet 9130, Edition 1, 1983).

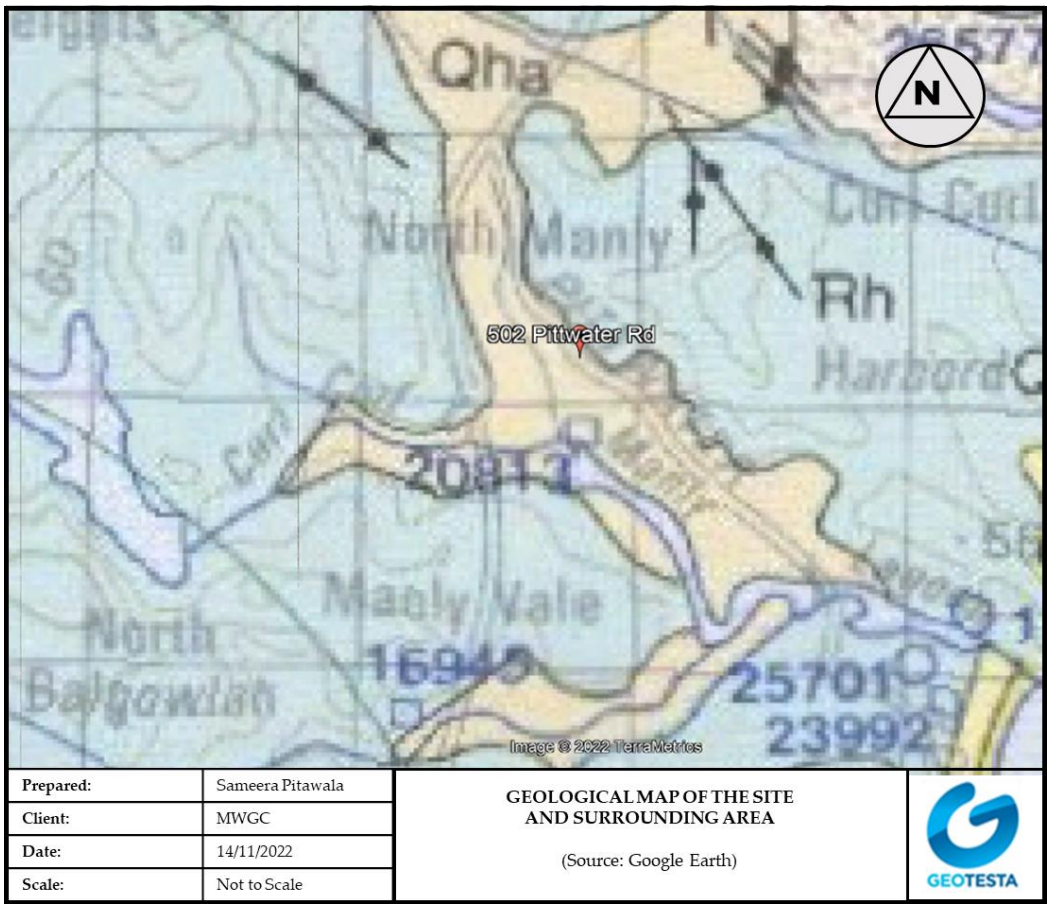


Figure 2. Geology map of the site and surrounding area

3.3 Soil Profile

The encountered soil profiles are presented in the borehole logs and CPT-interpreted logs in Appendix A, and Appendix B, respectively. The soil profile of each location is tabulated as a summary in Table 1.

Topsoil and Fill materials were encountered in the boreholes to a maximum depth of approximately 0.5 m followed by natural Silty Sand to depths ranging from approximately 0.4m to 8.0m. Four CPT tests (CPT 1-4) were carried out next to borehole locations up to 15.0m (Table 1). In addition, three (3) CPT tests (CPT 5-7) were undertaken covering the entire site.

A summary of sub-surface material based on the borehole observations is presented in Table 1 and a summary of the interpreted sub-surface material based on the CPT results is shown in Tables 1 & 2.

Table 1. Summary of Sub-Surface Materials (BH1-BH4)

Unit	Material	BH1/CPT1 (m)	BH2/CPT2 (m)	BH3/CPT 3 (m)	BH4/CPT4 (m)	Description
1	Topsoil/Fill	0.0-0.5	0.0-0.5	0.0-0.5	0.0-0.5	
2A	Silty Sand/Clayey Sand/Sand	2.1-6	0.5-1.2	1.5-3.4	10-15	Very Loose
2B	Silty Sand/Clayey Sand/Sand	0.5-1.0	1.2-1.5	0.5-1.0	1.0-10	Loose
3	Sandy Clay/sandy Slit	1.0-2.1	1.5-7.2	1.0-1.5	0.5-1.0	Soft
2C	Silty Sand/Sand			Below 3.4		Medium Dense

*Note: *Measured from ground surface. XW-Extremely Weathered, HW-Highly Weathered, VL-Very Loose, L-Loose, MD-Medium Dense*

Table 2. Summary of Sub-Surface Materials (CPT5-CPT7)

Unit	Material	CP5 (m)	CPT6 (m)	CPT7 (m)	Description
2A	Silty Sand/Clayey Sand/Sand	3-6	2.4-6	5.5-6.0	Very Loose
2B	Silty Sand/Clayey Sand/Sand	0-1.0 1.5-3	0-1.2	0.0-0.8 4.8-5.5	Loose
3	Sandy Clay/sandy Slit	1.0-1.5	1.2-4	0.8-4.8	Soft

3.4 Site Classification

Two (2) soil sample was taken from the natural silty clay soil and sent to Geotesta Pty Ltd in Melbourne, a NATA accredited laboratory, for testing of index properties to assess the site reactivity and classification. The laboratory test results are summarised in Table 3.

Table 3. Summary of Soil Laboratory Test Results

Bore No.	Depth (m)	Soil Type	LL %	PL %	PI%	LS %
BH03	0.8	Silty Clay	56	45	11	6.5
BH04	0.6	Silty Clay	26	20	6	5.5

Atterberg limit test results indicate that the natural Silty Clay at the site is low-plasticity soil.

After considering the area geology, soil profiles encountered in the bores, and the presence of loose sandy materials with slight clay content; the site is classified as CLASS "P" with respect to foundation construction (Australian Standard 2870-2011 Residential Slabs and Footings.

3.5 Groundwater

Groundwater was encountered approximately 2.0m below for all the boreholes drilled. CPT results also indicate noticeable water pressure at depths below 2.0m for all the CPT tests.

3.6 Salinity and Aggressivity Assessment

Four (4) soil samples were submitted to Eurofin MGT, a NATA accredited laboratory, for chemical tests for the salinity and aggressivity assessment. The testing was carried out for aggressivity suit and to assess the exposure classification for the proposed development.

Sampling was targeted to achieve a representative coverage of site conditions in line with assessed sub-surface profiles, proposed development, and the investigation scope. The laboratory testing certificates are presented in Appendix B.

3.6.1 Salinity Assessment

Laboratory test results for the salinity assessment are summarised in Table 4.

Table 4. Soil Salinity Test Results

Sample ID	Conductivity (Ec) (1:5 Aqueous extract ds/m)	Ece1 (ds/m)	Salinity Assessment
S1-BH1: (1.5m)	< 10	<0.14	Non-Saline
S2-BH2: (2.0m)	12	0.168	Non-Saline
S3-BH3: (0.9m)	28	0.392	Non-Saline
S4-BH9: (1.2m)	31	0.434	Non-Saline

[1]Based on EC to ECe multiplication factors in Department of Land and Water Conservation (2002) Guidelines (Table 6.1), a multiplication factor of 14 was applied to Sandy loam, fine sandy loam, light sandy clay loam. Based on Table

6.2 of Department of Land and Water Conservation (2002) where ECe < 2dS/m = Non-saline; ECe= 2-4dS/m = slightly saline; ECe = 4-8dS/m = moderately saline; ECe = 8-16dS/m = very saline; ECe > 16dS/m = highly saline.

Referring to the above test results, the foundation material is considered to be **non-Saline.**

3.6.2 Aggressivity assessment

Sulphate and pH test results for aggressivity assessment will be summarised in Table 5 following completion of the laboratory testing.

Table 5. Aggressivity Assessment test results for concrete and steel

Sample ID	pH (1:5 Aqueous extract)	Sulphate (SO4) (mg/kg)	Chloride	Aggressivity Assessment1 Concrete	Aggressivity Assessment1 Steel
S1-BH1: (1.5m)	5.2	16	< 10	Moderate	Non-aggressive
S2-BH2: (2.0m)	6.3	< 10	< 10	Mild	Non-aggressive
S3-BH3: (0.9m)	7.7	< 10	< 10	Mild	Non-aggressive
S4-BH9: (1.2m)	7.7	< 10	< 10	Mild	Non-aggressive

[1]In accordance with AS3600 (2009)

Referring to the above test result, the site is considered **mildly aggressive** to concrete and **non-aggressive** to steel.

3.6.3 Exposure Classifications for concrete and steel in Saline and Sulfate soils

The site foundation material is considered non saline, mildly-aggressive to concrete and non-aggressive to steel. An exposure classification of A1 for concrete in saline soils and an exposure classification of A2 for concrete and A1 for steel in sulphate soils should be adopted for preliminary design of proposed concrete structures.

4. FOUNDATION RECOMMENDATION

4.1 Geotechnical Design Parameters

The estimated geotechnical parameters of soil materials encountered below the site is provided in Table 6:

Table 6. Estimated Geotechnical Design Parameters

Unit/ Soil Type	γ (kN/m3)	Su (kPa)	c′ (kPa)	Φ′	E′ (MPa)	ν'
2A	15	-	-	25	5	0.3
2B	16	-	-	28	10	0.3
3	16	10	2	24	10	0.3
2C	17	-	-	32	25	0.3

4.2 Foundation Recommendations

The site subsurface material is overally assessed as fill materials underlain by very loose to loose sandy soil to a depth of 8m. Topsoil/fill material and the underlying loose sands are considered to be unsuitable to support the foundations of the proposed development. Light loads may be founded on well compacted fill overlying loose sands. A bearing capacity of 50KPa can be adopted. An engineer designed footing system to be designed for the proposed development. All footings for the same structure should be founded on strata of similar stiffness to minimize the risk of differential movements, with articulation provided where appropriate.

It should be noted that the soil profile may vary across the site. The foundation depths quoted in this report are measured from the surface during our testing and may vary accordingly if any filling or excavation works are carried out. It is recommended that a geotechnical engineer be engaged during footing excavation stage to confirm the founding depth and founding material for all units.

Screw piles are recommended as the preferred footing system to support the building loads. An allowable end bearing capacity of 250kPa can be adopted for the piles with a minimum length of 3m. An allowable shaft adhesion of 0.5kPa can be considered for the piles.

The pile foundations of the proposed construction is assumed to be a high redundancy system and the intrinsic test factor (ϕ_{tf}) is assumed to be equal to basic geotechnical strength reduction factor (ϕ_{gb}), in accordance to AS 2159. The overall design average risk rating (ARR) is to be calculated by the designer and the corresponding geotechnical strength reduction shall be adopted.

5. EXCAVATION, EARTHWORKS, RETAINING WALL & LATERAL EARTH PRESSURES

5.1 Site Preparation

The depth of topsoil/fill varies across the site up to a depth of 0.5 m. Any fill encountered during excavation should be treated as uncontrolled. The following measures should be adopted for the site preparation of the site:

- All topsoil/fill from the construction area should be stripped to subgrade/foundation level and stockpiled on site for possible re-use. Topsoil/fill not being re-used should be disposed of offsite following a waste classification report.
- Any evidence of contamination or asbestos-containing materials found during excavation works should be brought to the attention of the Project Engineer immediately.

It is recommended that Geotesta be engaged to provide a site inspection during the early stage of construction to confirm that the ground conditions of the subgrade for the proposed construction are consistent with the assumptions/findings in this report.

5.2 Excavation

Earthworks recommendations in this report should be read in conjunction with AS 3798-2007: 'Guidelines on Earthworks for Commercial and Residential Developments'. Based on the soil profile and conditions encountered at the borehole location, light excavation machinery should be adequate for the footing excavations. It should be comparable with a Soft Excavation Class as per SANS 1200D. Table 7 describes the excavation classes as per SANS 1200D.

Table 7. Excavation classes as per SANS 1200D

Excavation Class	Description
Soft	Excavation in material that can be efficiently removed by a back-acting excavator of flywheel power approximately 0.10kW per millimetre of tined-bucket width, without the use of pneumatic tools such as paving breakers
Intermediate	Excavation in material that requires a back-acting excavator of flywheel power exceeding 0.10 kW per millimetre of tined-bucket width or the use of pneumatic tools before removal by equipment equivalent to that specified for soft excavation.
Hard	Hard rock excavation shall be excavation in material (excluding boulder excavation) that cannot be efficiently removed without blasting or wedging and splitting.

5.3 Engineered Fill

Controlled or Rolled fill can be constructed in uniform layers to provide the required design level in accordance with the project foundation design requirements (if applicable). The fill must be well compacted in layers not exceeding 150 mm thick.

The fill material shall be uniformly compacted with the required moisture content to achieve satisfactory compaction and shall be graded and trimmed parallel to the designed finished surface.

Filling used to raise levels beneath foundations must be placed and compacted as per specifications for Controlled or Rolled fill.

All fill material is to be compacted to a minimum of 98% Standard Maximum Dry Density (SMDD) ratio determined in accordance AS 1289.5.4.1. Generally, the soils encountered on site are not suitable for reuse as engineered fill within the site.

5.4 Temporary Cut Batters

Excavations and retention systems will need to take into consideration the stability of adjoining structures so as not to have any adverse impact on the structures and infrastructures adjoining the excavation. Excavation in fill and sand to be battered with a slope not steeper than 2H:1V for cuts up to 3m high. However, the above recommendations assume that there is no existing structure directly adjacent to the excavation area. It should be noted that following rainy periods, some degree of deterioration and minor slumping of unsupported cut batters is to be anticipated.

The batter slope angles are recommended subject to the following measures:

- The batters should be protected against erosion
- Permanent batters should be drained
- Temporary batters shall not be left unsupported for more than 2 months without further advice. The site should be inspected by a geotechnical engineer after heavy rains (raining more than 6 hours with an intensity of greater than 15 mm/day).
- A minimum offset distance of 2m from the batter crest should be maintained for surcharge loads and the offset distance should be increased to match the maximum depth of excavation.

5.5 Retaining Walls

Any proposed retaining walls at the site should be engineer designed adopting the geotechnical parameters summarised in Table 8 below.

Table 8. Retaining wall design parameters

Unit/ Soil Type	γ (kN/m3)	K_0	K_a	K_p
2A	15	0.57	0.0.41	2.46
2B	16	0.53	0.36	2.77
3	16	0.59	0.42	2.37
2C	17	0.47	0.31	3.25

For construction methods which minimise deflection and where restraint is applied via struts, bracings or anchors, the temporary or short-term lateral earth pressure distribution should be approximated as a rectangular distribution for the site sandy soils.

$$P_a = 0.65k\gamma h$$

Where k is the earth pressure coefficient and h is the retained height. Rankine Active/at rest and Passive earth pressures can be used for the cantilever retaining wall designs. It must be emphasised that where adjoining footings exist near the retaining walls, the "at rest" earth pressures must be maintained, and the active design condition is not appropriate.

5.6 Compaction Requirements

Compaction of backfill material is required to ensure that excessive surface settlement does not occur. The required backfill density and minimum frequency of testing for compaction control as detailed in AS 3798 are summarised below:

- 1 test per layer per 500 m^2; or
- 1 test per 100 m^3 distributed reasonably evenly throughout full depth and area; or
- 3 tests per visit (whichever requires the most tests)

Testing should be undertaken in accordance with AS 1289, *Methods of testing for soil engineering purposes*. Tested layers that do not satisfy the outlined criteria are to be stripped, replaced, re-compacted and re-tested to achieve the minimum compaction requirement specified above.

Testing of compaction density should be undertaken by a suitably qualified geotechnical testing company.

DOCUMENT CONTROL

Date	Version	Report Prepared By:	Report Reviewed by:
6 December 2022	-	**Sameera Pitawala** BSc. Eng (Hons), MEng, PhD, MIEAust Geotechnical Engineer	**Dr. Mohammad Hossein Bazyar** BEng MEng Ph.D MIEAust CPEng NER Associate Geotechnical Engineer

6. REFERENCES

- Australian Standard AS 1726-2017, *Geotechnical site investigations*
- Australian Standard AS 2870-2011, *Residential slabs and footings*
- Australian Standard AS 3600-2009, *Concrete structures*
- Australian Standard AS 2159.2009, *Piling-Design and installation*
- Australian Standard AS 4678-2002, *Earth-retaining structures*
- Australian Standard AS 5100.5-2004, *Bridge design Part 5: Concrete*
- Australian Standard AS 3798-1996, *Guidelines on earthworks for commercial and residential developments*
- *Western Salinity Code of Practice,* March 2003 (Amended January 2004)

Information about This Report

The report contains the results of Soil and water quality Assessment conducted for a specific purpose and client. The results should not be used by other parties, or for other purposes, as they may contain neither adequate nor appropriate information.

Test Hole Logging

The information on the test hole logs (boreholes, test pits, exposures etc.) is based on a visual and tactile assessment, except at the discrete locations where test information is available (field and/or laboratory results). The test hole logs include both factual data and inferred information.

Groundwater

Unless otherwise indicated, the water levels presented on the test hole logs are the levels of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater level may differ from this recorded level depending on material permeability (i.e. depending on response time of the measuring instrument). Further, variations of this level could occur with time due to such effects as seasonal, environmental and tidal fluctuations or construction activities. Confirmation of groundwater levels, pheratic surfaces or piezometric pressures can only be made by appropriate instrumentation techniques and monitoring programmes.

Interpretation of Results

The discussion or recommendations contained within this report normally are based on a site evaluation from discrete test hole data. Generalised, idealised or inferred subsurface conditions (including any geotechnical cross-sections) have been assumed or prepared by interpolation and/or extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

Change in Conditions

Local variations or anomalies in the generalised ground conditions do occur in the natural environment, particularly between discrete test hole locations. Additionally, certain design or construction procedures may have been assumed in assessing the soil-structure interaction behaviour of the site. Furthermore, conditions may change at the site from those encountered at the time of the geotechnical investigation through construction activities and constantly changing natural forces.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed or reported should be referred to GEOTESTA for appropriate assessment and comment.

Reproduction of Reports

Where it is desired to reproduce the information contained in our geotechnical report, or other technical information, for the inclusion in contract documents or engineering specification of the subject development, such reproductions should include at least all of the relevant test hole and test data, together with the appropriate standard description sheets and remarks made in the written report of a factual or descriptive nature. Reports are the subject of copyright and shall not be reproduced without the permission of Geotesta.

Appendix A
Borehole Logs

BOREHOLE LOG

BOREHOLE No: BH1

Page: 1 **of** 1

C Client:	Many Warringah Gymnastic Club North Manly Warringah Gymnastic	Drilling Co:	Geotesta	Easting:	---
P Project:	Facility	Driller:	MA	Northing:	---
J‹ Job No:	NE1469	Rig Type:	Buggy mounted Auger	Grid Ref:	See Figure 1
L‹ Location:	North Manly Warringah Gymnastic	Inclination:	Vertical	Collar RL:	
D Date Drilled:	03/11/22	Bearing:	Vertical	Logged by:	SP Checked by: M.H.B

Test Method: AS 1289.6.3.2-1997 & AS 1726-2017

Depth (m)	Drilling Method	Graphic Log	Group Symbol	MATERIAL DESCRIPTION Type, colour, particle size and shape, structure	Moisture	Consistency / Strength	CTP-qc	FIELD TESTS & NOTES	Sampling / Runs	Water Levels	Depth (m)
0.00										0.00	
			FILL	**TOPSOIL/ Fill:** Silty Sand with trace of clay, brown	M						
0.50											0.50
			SP	**Sand** with trace of clay: medium to coarse grained, poorly graded, white	M	L					
1.00											1.00
			ML	Sandy **Silt** with clay**:** fine to medium grained, brown	M	S					
1.50											1.50
2.00											2.00
	Solid Flight Auger		SM	Silty **Sand** with trace of clay: medium to coarse grained, poorly graded, dark brown	W	VL					
2.50											2.50
3.00											3.00
3.50											3.50
4.00											4.00
4.50											4.50
											5.00

consistency:

VS	very soft
S	soft
F	firm
ST	stiff
VST	very stiff
H	hard
WC	well compacted

relative density:

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

EL: extremly low strength

moisture:

D	Dry
M	Moist
W	Wet
S	Saturated

water:

water level

level risen to

water inflow

sampling / testing:

intact sample from core

intact tube sample (T)

Standard Penetration Test

B Bulk sample

Supp Su from Pocket Penetrometer

Suv Su from Field Vane Shear test

soil classification:
soil is classified in accordance with AS1726 unless otherwise noted

Notes:

BOREHOLE LOG

BOREHOLE No: BH1

C Client:	Many Warringah Gymnastic Club North Manly Warringah Gymnastic	Drilling Co:	Geotesta	Easting:	---
P Project:	Facility	Driller:	MA	Northing:	---
J‹ Job No:	NE1469	Rig Type:	Buggy mounted Auger	Grid Ref:	See Figure 1
L‹ Location:	North Manly Warringah Gymnastic	Inclination:	Vertical	Collar RL:	
D Date Drilled:	03/11/22	Bearing:	Vertical	Logged by:	SP Checked by: M.H.B

Test Method: AS 1289.6.3.2-1997 & AS 1726-2017

Depth (m)	Drilling Method	Graphic Log	Group Symbol	MATERIAL DESCRIPTION Type, colour, particle size and shape, structure	Moisture	Consistency / Strength	CTP	FIELD TESTS & NOTES	Sampling / Runs	Water Levels	Depth (m)
5.00											0.00
	Solid Flight Auger		SM	Silty **Sand** with trace of clay: medium to coarse grained, poorly graded, dark brown		VL					
5.50											0.50
6.00				Borehole terminated at 6.0m : Target depth reached							1.00
6.50											1.50
7.00											2.00
7.50											2.50
8.00											3.00
8.50											3.50
9.00											4.00
9.50											4.50
											5.00

consistency:

VS	very soft
S	soft
F	firm
ST	stiff
VST	very stiff
H	hard
WC	well compacted

relative density:

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

EL: extremly low strength

moisture:

D	Dry
M	Moist
W	Wet
S	Saturated

water:

water level

level risen to

water inflow

sampling / testing:

intact sample from core

intact tube sample

Standard Penetration Test

B Bulk sample

Supp Su from Pocket Penetrometer

Suv Su from Field Vane Shear test

soil classification:
soil is classified in accordance with AS1726 unless otherwise noted

Notes:

BOREHOLE LOG

BOREHOLE No: BH2

Page: 1 **of** 2

C Client:	Many Warringah Gymnastic Club North Manly Warringah Gymnastic	Drilling Co:	Geotesta	Easting:	---
P Project:	Facility	Driller:	MA	Northing:	---
J‹ Job No:	NE1469	Rig Type:	Buggy mounted Auger	Grid Ref:	See Figure 1
L‹ Location:	North Manly Warringah Gymnastic	Inclination:	Vertical	Collar RL:	
D Date Drilled:	03/11/22	Bearing:	Vertical	Logged by:	SP Checked by: M.H.B

Test Method: AS 1289.6.3.2-1997 & AS 1726-2017

Depth (m)	Drilling Method	Graphic Log	Group Symbol	MATERIAL DESCRIPTION Type, colour, particle size and shape, structure	Moisture	Consistency / Strength	CTP	FIELD TESTS & NOTES	Sampling / Runs	Water Levels	Depth (m)
0.00											0.00
			FILL	**TOPSOIL/ Fill:** Silty Sand with trace of clay, brown	M						
0.50											0.50
			SP	**Sand** with trace of clay: medium to coarse grained, poorly graded, white	M	MD					
1.00											1.00
			SM	Silty **Sand:** medium to coarse grained, brown	M	L					
1.50											1.50
	Solid Flight Auger		ML	Sandy **Silt** with clay: fine to medium grained, dark brown	W	F					
2.00											2.00
2.50											2.50
3.00											3.00
3.50											3.50
4.00											4.00
4.50											4.50
											5.00

consistency:

VS	very soft
S	soft
F	firm
ST	stiff
VST	very stiff
H	hard
WC	well compacted

relative density:

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

EL: extremly low strength

moisture:

D	Dry
M	Moist
W	Wet
S	Saturated

water: water level; level risen to; water inflow

soil classification: soil is classified in accordance with AS1726 unless otherwise noted

sampling / testing: intact sample from core; intact tube sample (T); Standard Penetration Test; B Bulk sample; Supp Su from Pocket Penetrometer; Suv Su from Field Vane Shear test

Notes:

BOREHOLE LOG

BOREHOLE No: BH2

Page: 2 **of** 2

C Client:	Many Warringah Gymnastic Club North Manly Warringah Gymnastic	Drilling Co:	Geotesta	Easting:	---
P Project:	Facility	Driller:	MA	Northing:	---
J‹ Job No:	NE1469	Rig Type:	Buggy mounted Auger	Grid Ref:	See Figure 1
L‹ Location:	North Manly Warringah Gymnastic	Inclination:	Vertical	Collar RL:	
D Date Drilled:	03/11/22	Bearing:	Vertical	Logged by:	SP Checked by: M.H.B

Test Method: AS 1289.6.3.2-1997 & AS 1726-2017

Depth (m)	Drilling Method	Graphic Log	Group Symbol	MATERIAL DESCRIPTION Type, colour, particle size and shape, structure	Moisture	Consistency / Strength	CTP	FIELD TESTS & NOTES	Sampling / Runs	Water Levels	Depth (m)
5.00										0.00	
			ML	Sandy **Silt** with clay: fine to medium grained, dark brown	W	F					
5.50										0.50	
6.00				Borehole terminated at 6.0m : Target depth reached						1.00	
6.50										1.50	
7.00	Solid Flight Auger									2.00	
7.50										2.50	
8.00										3.00	
8.50										3.50	
9.00										4.00	
9.50										4.50	
										5.00	

consistency:

VS	very soft
S	soft
F	firm
ST	stiff
VST	very stiff
H	hard
WC	well compacted

relative density:

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

EL: extremly low strength

moisture:

D	Dry
M	Moist
W	Wet
S	Saturated

water:

water level

level risen to

water inflow

sampling / testing:

intact sample from core

intact tube sample (T)

Standard Penetration Test

B Bulk sample

Supp Su from Pocket Penetrometer

Suv Su from Field Vane Shear test

soil classification:
soil is classified in accordance with AS1726 unless otherwise noted

Notes:

BOREHOLE LOG

BOREHOLE No: BH3

Page: 1 **of** 1

C Client:	Many Warringah Gymnastic Club North Manly Warringah Gymnastic	Drilling Co:	Geotesta	Easting:	---
P Project:	Facility	Driller:	MA	Northing:	---
J‹ Job No:	NE1469	Rig Type:	Buggy mounted Auger	Grid Ref:	See Figure 1
L‹ Location:	North Manly Warringah Gymnastic	Inclination:	Vertical	Collar RL:	
D Date Drilled:	03/11/22	Bearing:	Vertical	Logged by:	SP Checked by: M.H.B

Test Method: AS 1289.6.3.2-1997 & AS 1726-2017

Depth (m)	Drilling Method	Graphic Log	Group Symbol	MATERIAL DESCRIPTION Type, colour, particle size and shape, structure	Moisture	Consistency / Strength	CTP	FIELD TESTS & NOTES	Sampling / Runs	Water Levels	Depth (m)
0.00											0.00
			FILL	**TOPSOIL/ Fill:** Silty Sand with trace of clay, brown	M						
0.50											0.50
			SP	**Sand** with trace of clay: medium to coarse grained, poorly graded, brown	M	L					
				Grades: white							
1.00											1.00
			CL	Sandy **Clay:** low plasticity, black	M	F					
1.50											1.50
			SP	**Sand** with trace of clay: medium to coarse grained, poorly graded, dark brown	W	VL					
2.00											2.00
2.50	Solid Flight Auger										2.50
3.00											3.00
3.50											3.50
				Grades: little or no fines		L					
4.00						M					4.00
				Borehole terminated at 4.0m due to Auger refusal							
4.50											4.50
											5.00

consistency:

VS	very soft
S	soft
F	firm
ST	stiff
VST	very stiff
H	hard
WC	well compacted

relative density:

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

EL: extremly low strength

moisture:

D	Dry
M	Moist
W	Wet
S	Saturated

water: water level; level risen to; water inflow

sampling / testing: intact sample from core; intact tube sample; Standard Penetration Test; B Bulk sample; Supp Su from Pocket Penetrometer; Suv Su from Field Vane Shear test

soil classification: soil is classified in accordance with AS1726 unless otherwise noted

Notes:

BOREHOLE LOG

BOREHOLE No: BH4

Page: 1 **of** 2

C Client:	Many Warringah Gymnastic Club North Manly Warringah Gymnastic	Drilling Co:	Geotesta	Easting:	---
P Project:	Facility	Driller:	MA	Northing:	---
J‹ Job No:	NE1469	Rig Type:	Buggy mounted Auger	Grid Ref:	See Figure 1
L‹ Location:	North Manly Warringah Gymnastic	Inclination:	Vertical	Collar RL:	
D Date Drilled:	03/11/22	Bearing:	Vertical	Logged by:	SP Checked by: M.H.B

Test Method: AS 1289.6.3.2-1997 & AS 1726-2017

Depth (m)	Drilling Method	Graphic Log	Group Symbol	MATERIAL DESCRIPTION Type, colour, particle size and shape, structure	Moisture	Consistency / Strength	CTP	FIELD TESTS & NOTES	Sampling / Runs	Water Levels	Depth (m)
0.00										0.00	
			FILL	**TOPSOIL/ Fill:** Clayey Silt with trace of sand, brown	M						
0.50											0.50
			CL	Sandy **Clay** with silt: low plasticity, dark brown	M	S					
				Grades: white							
1.00											1.00
			SP	Sand**:** coarse grained, brown	M	L					
1.50											1.50
			ML	Sandy **Silt** with clay: fine to medium grained, dark brown	W	F					
2.00											2.00
	Solid Flight Auger										
2.50											2.50
3.00											3.00
3.50											3.50
4.00											4.00
4.50											4.50
											5.00

consistency:

VS	very soft
S	soft
F	firm
ST	stiff
VST	very stiff
H	hard
WC	well compacted

relative density:

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

EL: extremly low strength

moisture:

D	Dry
M	Moist
W	Wet
S	Saturated

water: water level; level risen to; water inflow

soil classification:
soil is classified in accordance with AS1726 unless otherwise noted

sampling / testing:
intact sample from core; intact tube sample; Standard Penetration Test

B Bulk sample
Supp Su from Pocket Penetrometer
Suv Su from Field Vane Shear test

Notes:

BOREHOLE LOG

BOREHOLE No: BH4

Page: 2 **of** 2

C Client:	Many Warringah Gymnastic Club North Manly Warringah Gymnastic	Drilling Co:	Geotesta	Easting:	---
P Project:	Facility	Driller:	MA	Northing:	---
J‹ Job No:	NE1469	Rig Type:	Buggy mounted Auger	Grid Ref:	See Figure 1
L‹ Location:	North Manly Warringah Gymnastic	Inclination:	Vertical	Collar RL:	
D Date Drilled:	03/11/22	Bearing:	Vertical	Logged by:	SP Checked by: M.H.B

Test Method: AS 1289.6.3.2-1997 & AS 1726-2017

Depth (m)	Drilling Method	Graphic Log	Group Symbol	MATERIAL DESCRIPTION Type, colour, particle size and shape, structure	Moisture	Consistency / Strength	CTP	FIELD TESTS & NOTES	Sampling / Runs	Water Levels	Depth (m)
5.00										0.00	
			ML	Sandy **Silt** with clay: fine to medium grained, dark brown	W	F					
5.50										0.50	
6.00				Borehole terminated at 6.0m : Target depth reached						1.00	
6.50										1.50	
7.00	Solid Flight Auger									2.00	
7.50										2.50	
8.00										3.00	
8.50										3.50	
9.00										4.00	
9.50										4.50	
										5.00	

consistency:

VS	very soft
S	soft
F	firm
ST	stiff
VST	very stiff
H	hard
WC	well compacted

relative density:

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

EL: extremly low strength

moisture:

D	Dry
M	Moist
W	Wet
S	Saturated

water: water level; level risen to; water inflow

sampling / testing: intact sample from core; intact tube sample; Standard Penetration Test; B Bulk sample; Supp Su from Pocket Penetrometer; Suv Su from Field Vane Shear test

soil classification: soil is classified in accordance with AS1726 unless otherwise noted

Notes:

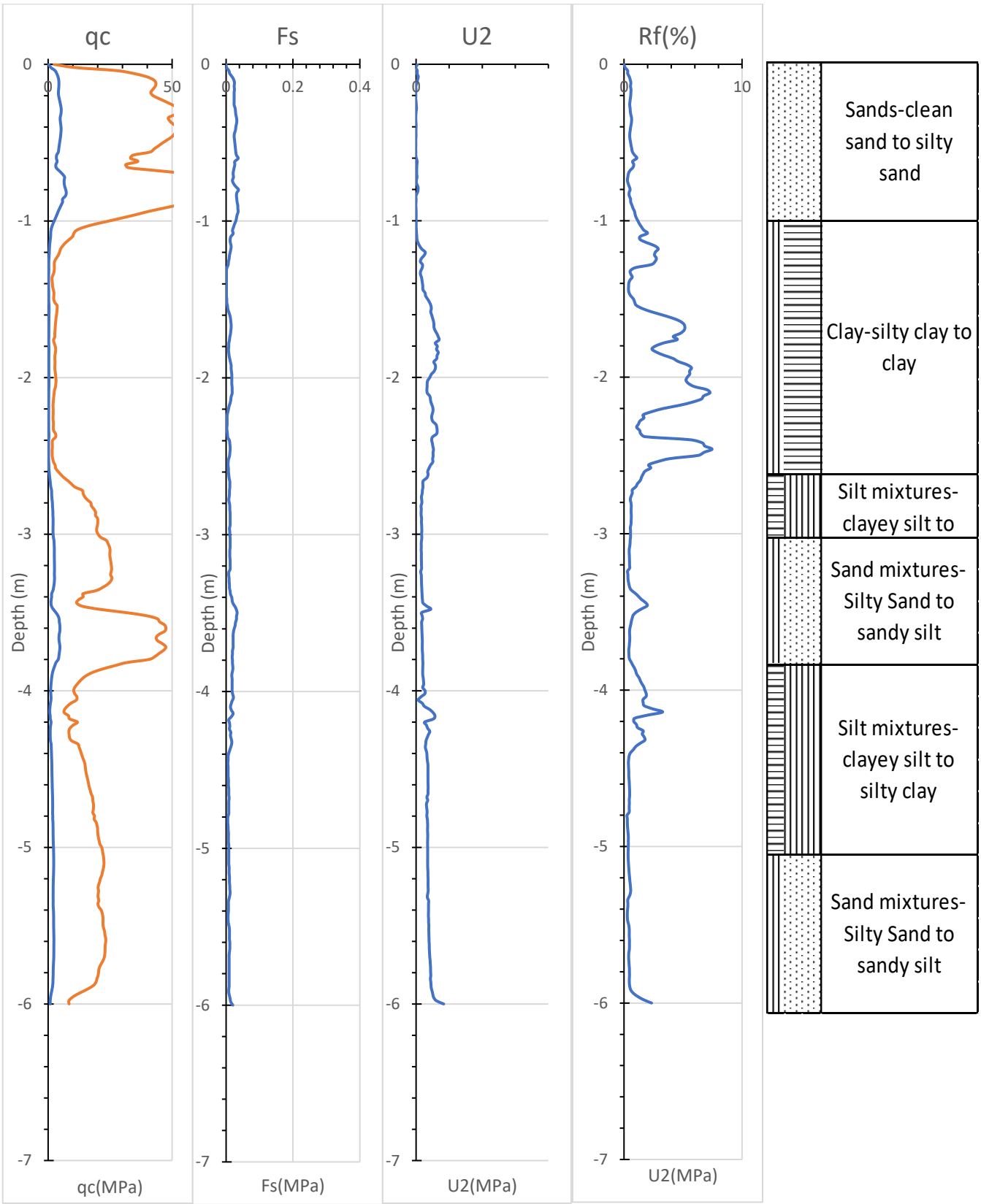
Appendix B

CPT Results

Geotesta : Cone Penetrometer Test Results

Client : Manly Warringah Gymnastic Facility
Address: Manly Warringah Gymnastic Facility, North Manly
Job No : NE1469

CPT No: CPT-01
R.L Surface: 2.5m
Date: 02/11/2022

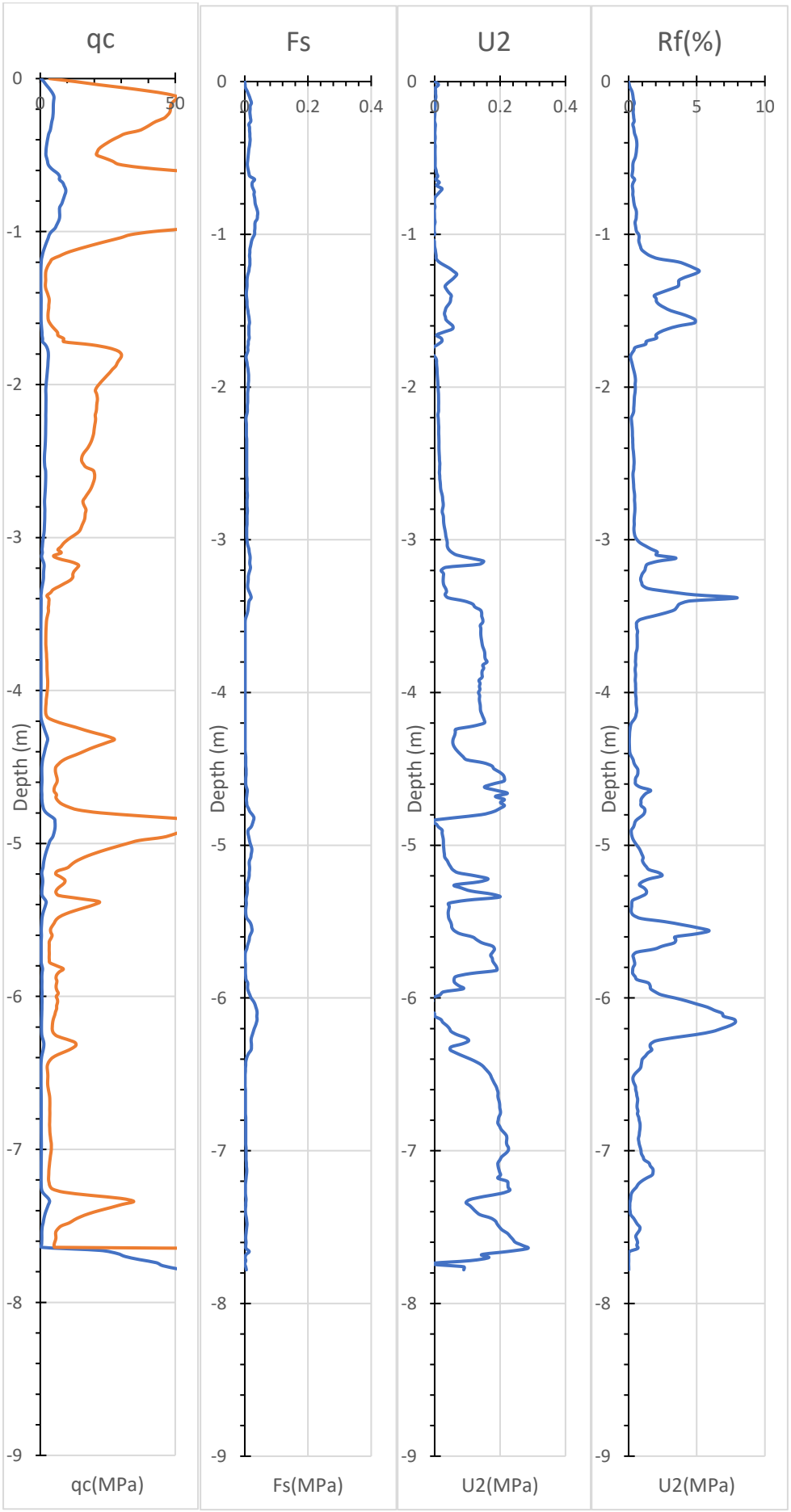


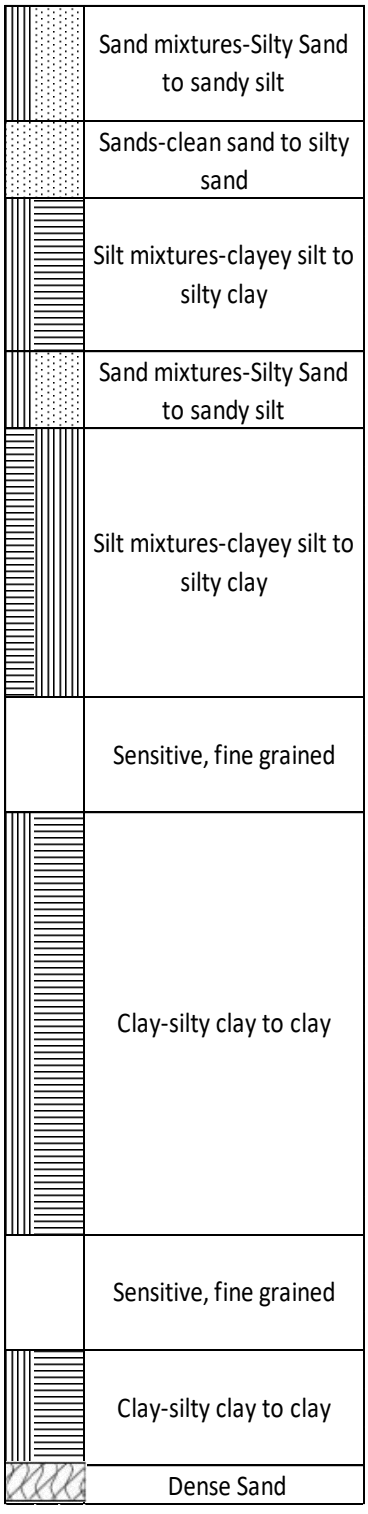
Geotesta : Cone Penetrometer Test Results

Client : Manly Warringah Gymnastic Facility
Address: Manly Warringah Gymnastic Facility, North Manly
Job No : NE1469

CPT No: CPT-02
R.L Surface: 2.75
Date: 02/11/2022

GEOTESTA

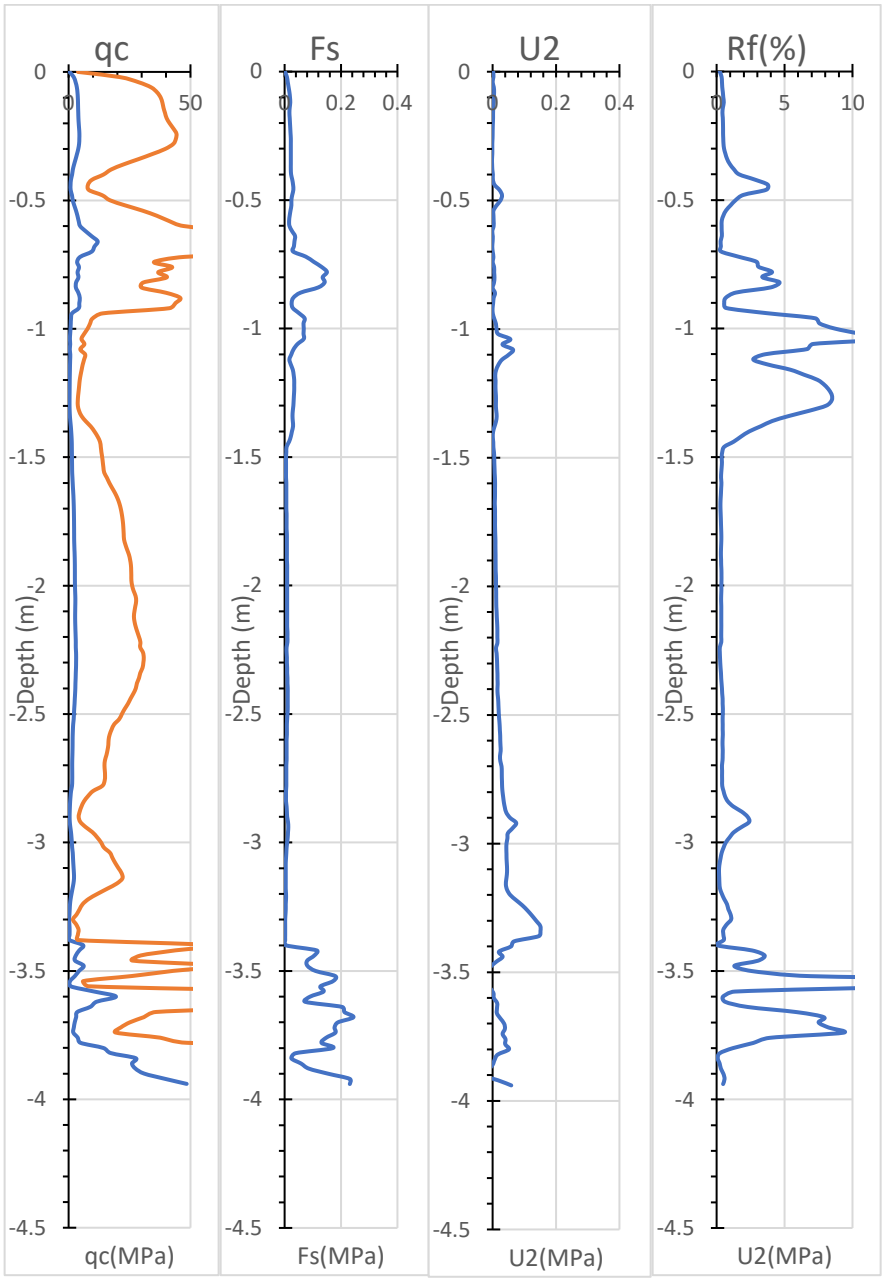


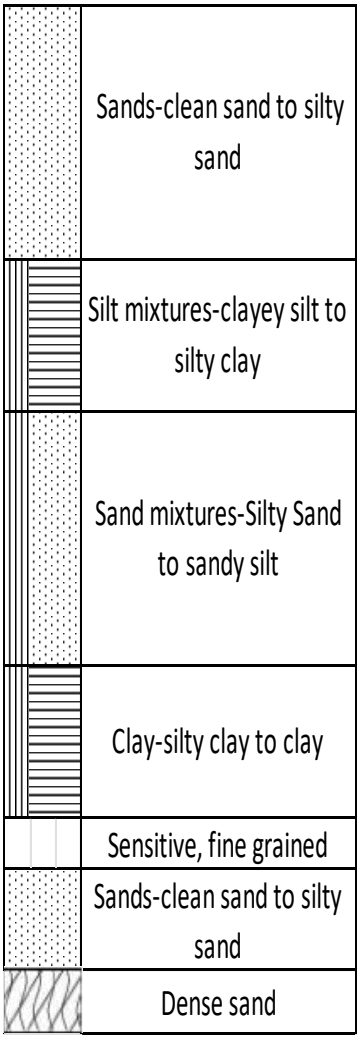


Geotesta : Cone Penetrometer Test Results

Client : Manly Warringah Gymnastic Facility
Address: Manly Warringah Gymnastic Facility, North Manly
Job No : NE1469

CPT No: CPT-03
R.L Surface: 2.90
Date: 02/11/2022



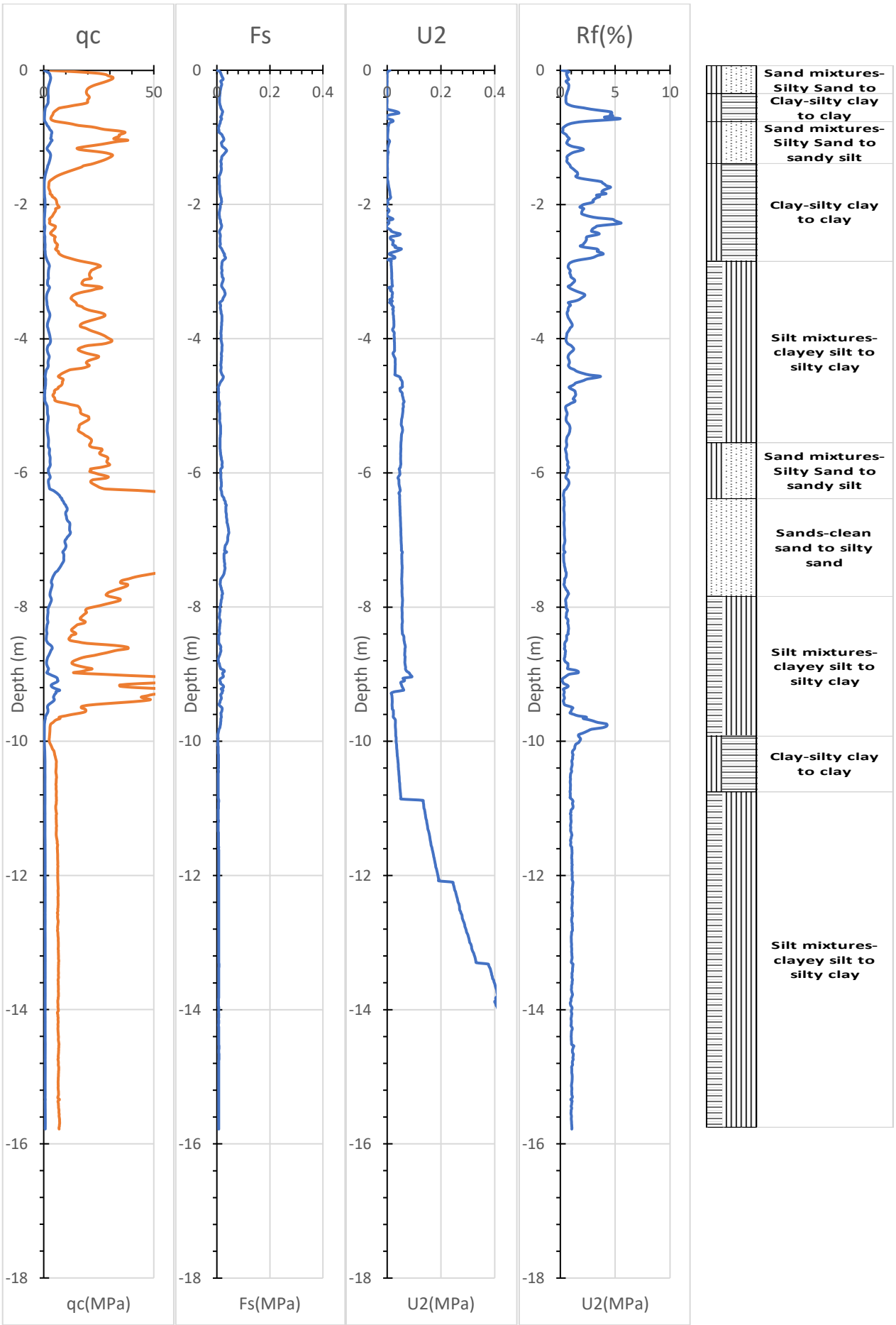


Geotesta : Cone Penetrometer Test Results

Client : Manly Warringah Gymnastic Facility
Address: Manly Warringah Gymnastic Facility, North Manly
Job No : NE1469

CPT No: CPT-04
R.L Surface: 3.10
Date: 02/11/2022

GEOTESTA

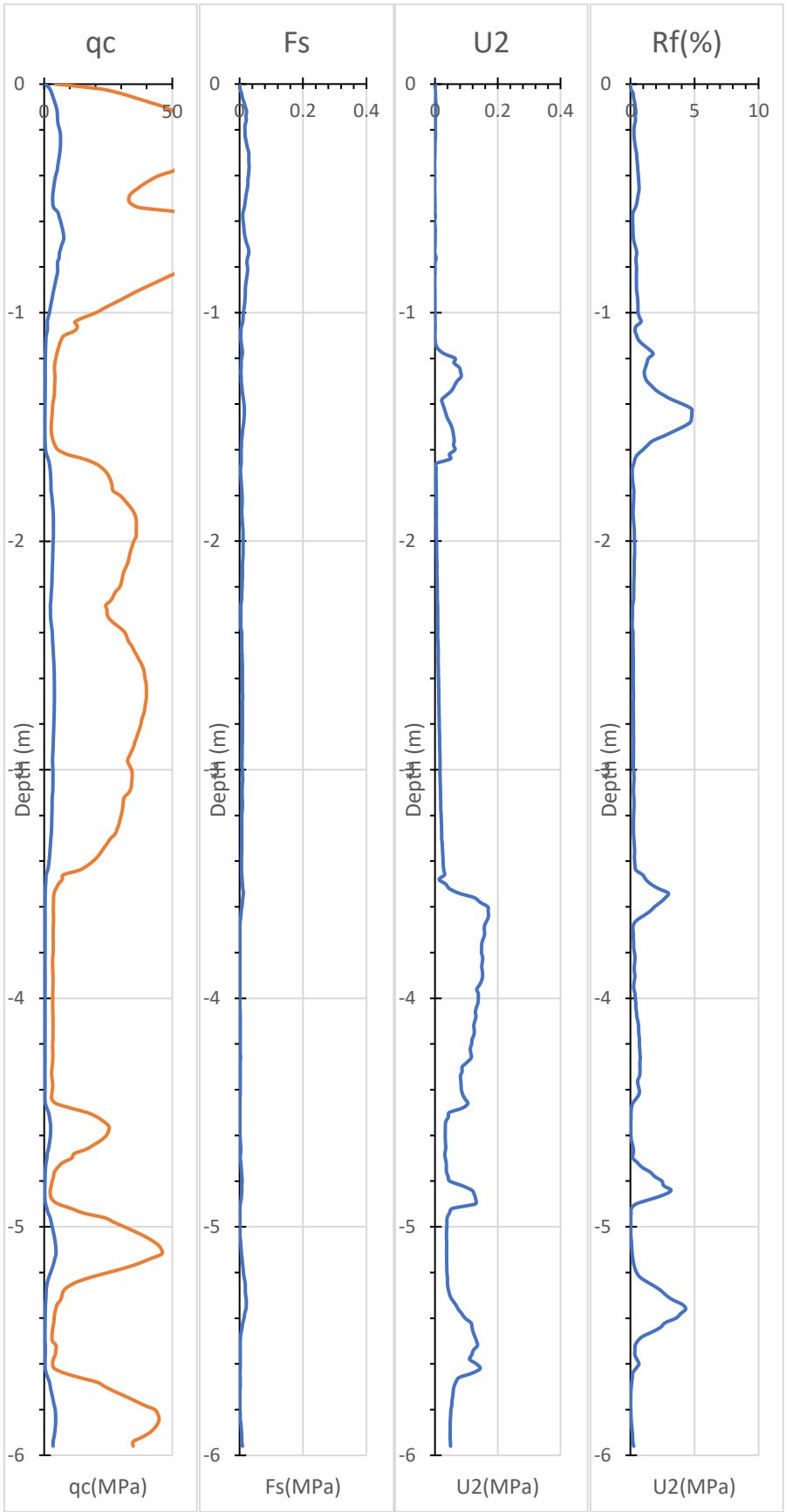


Geotesta : Cone Penetrometer Test Results

Client : Manly Warringah Gymnastic Facility
Address: Manly Warringah Gymnastic Facility, North Manly
Job No : NE1469

CPT No: CPT-05
R.L Surface: 2.50
Date: 02/11/2022

GEOTESTA

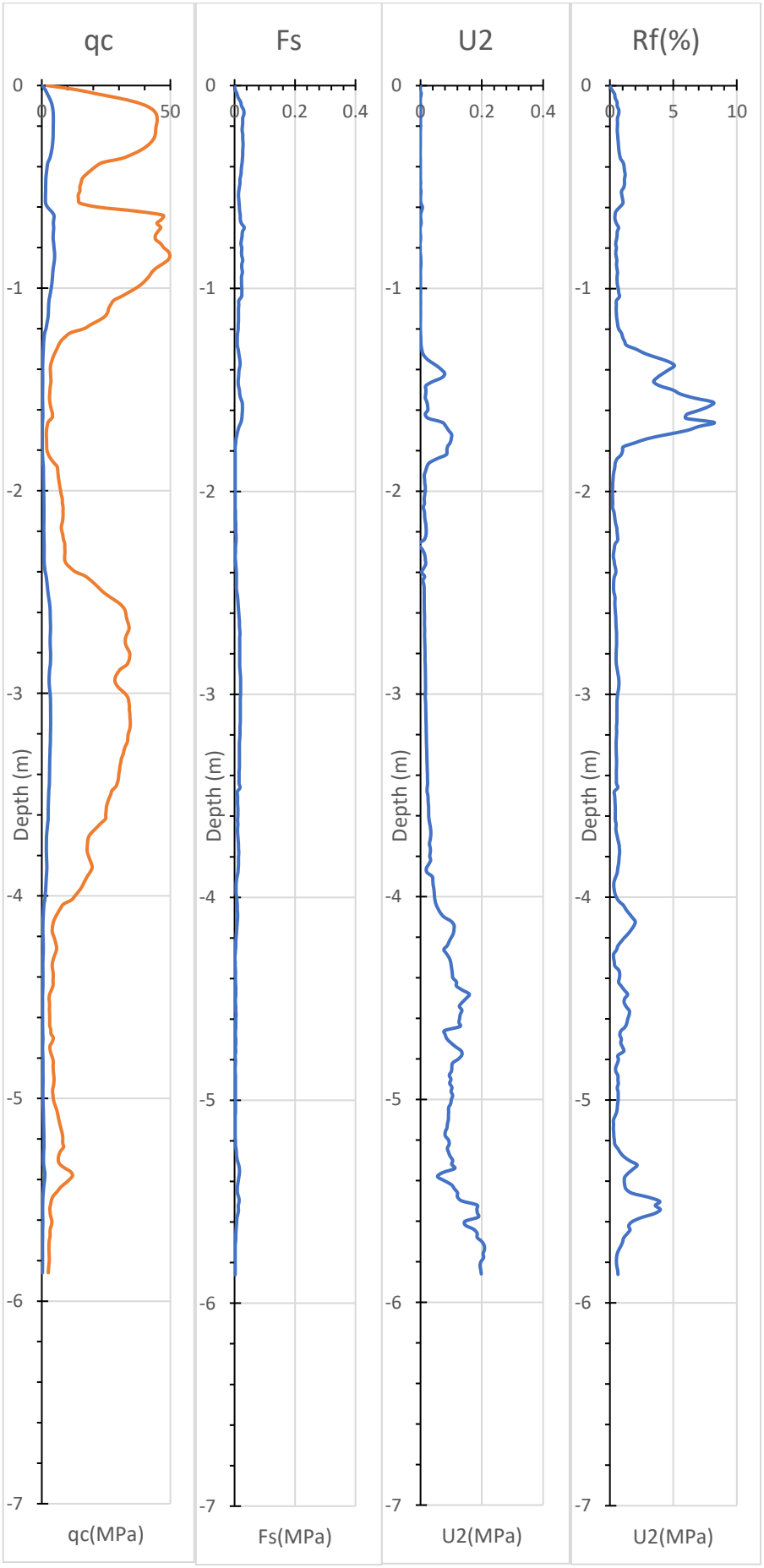


Geotesta : Cone Penetrometer Test Results

Client : Manly Warringah Gymnastic Facility
Address: Manly Warringah Gymnastic Facility, North Manly
Job No : NE1469

CPT No: CPT-06
R.L Surface: 2.90
Date: 02/11/2022

GEOTESTA

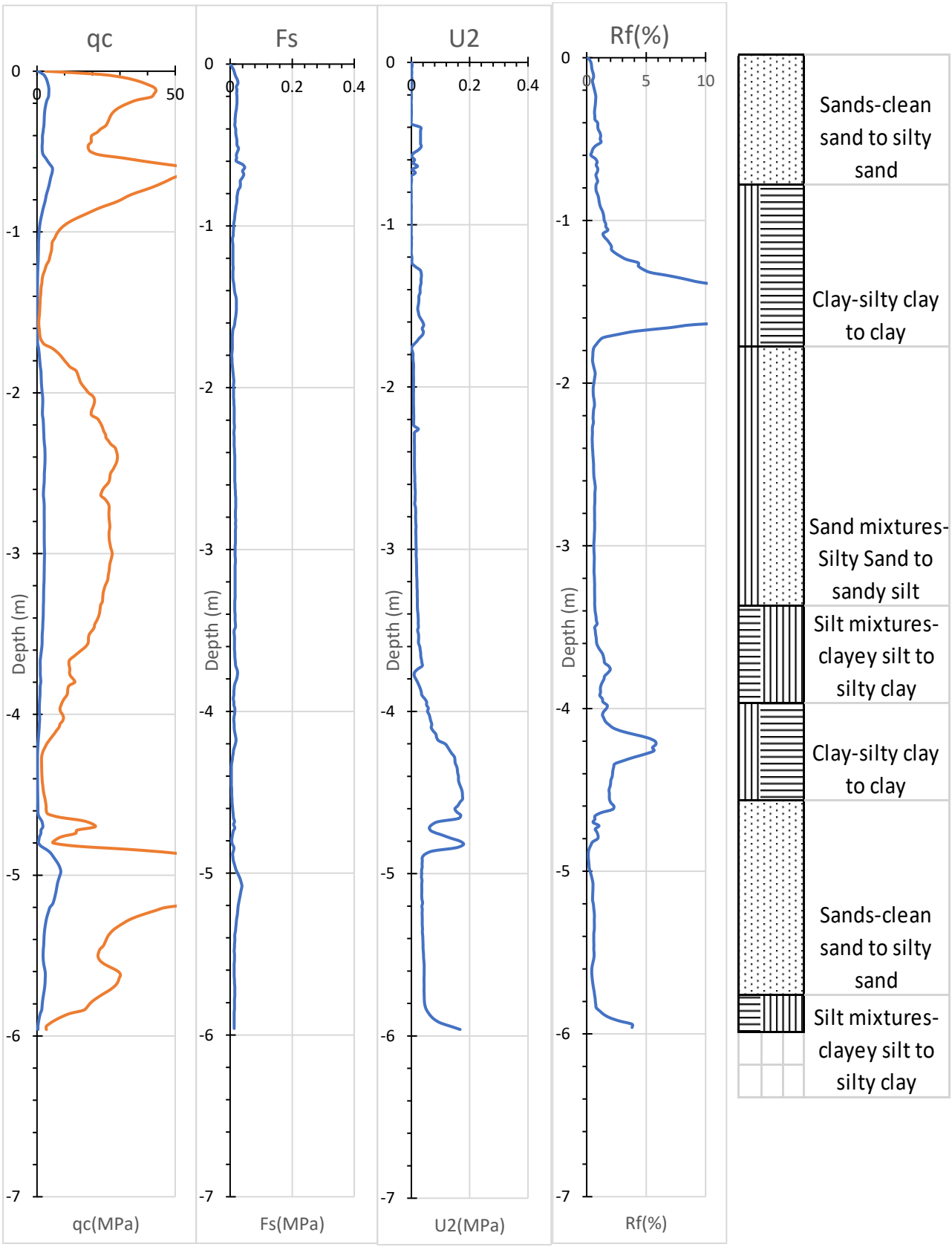


Geotesta : Cone Penetrometer Test Results

Client : Manly Warringah Gymnastic Facility
Address: Manly Warringah Gymnastic Facility, North Manly
Job No : NE1469

CPT No: CPT-07
R.L Surface: 2.95
Date: 02/11/2022

GEOTESTA



Appendix C

Laboratory test results

Moisture Content Report

Geotesta Pty Ltd
9 Redwood Drive, Notting Hill
VIC 3168
T. 03 9562 9135

Laboratory	Geotesta	**Project Type**	Geotechnical Investigation	**Client**	MWGC
Report No	SL1144	**Project No**	NE1469	**Client ID**	-
Sample ID	*As Below*	**Project**	431 Pittwater Road, North Manly NSW	**Address**	7 Business Park Drive, Notting Hill VIC 3168
Location ID	*As Below*				

Base Site: *9 Redwood Drive, Notting Hill, VIC 3168* **Branch Site:** *6/20-22 Foundry Road, Seven Hills, NSW 2147*

Sampling Method AS 1289.1.2.1 (6.5.3) - Power Auger Drilling

Test Method

Sample ID	Location ID (Depth)	Sample Description	Moisture Content (%)
S1383	BH3@0.80	Sandy SILT, Black	20.5
S1384	BH4@0.60	Sandy SILT, Dark Brown	24.6

Comments

NATA Accredited Facility No. 19167

Accredited for compliance with ISO/IEC 17025 - Testing

The results obtained in this report correspond exclusively to the sample(s) tested.

Report issued by: *Chandana Liyanage*

Date issued: 21/11/22

Atterberg Limits
Plasticity Index & Linear Shrinkage
Test Report

GEOTESTA Pty Ltd
9 Redwood Drive
Notting Hill , Vic 3168
Ph: 1300 852216

Laboratory	*Geotesta*	**Project Type**	*Geotechnical Investigation*	**Client**	*MWGC*
Report No	*S1386*	**Project No**	*NE1469*	**Client ID**	*-*
Sample ID	*SL1144-S1386*	**Project**	*431 Pittwater Road, North Manly NSW*	**Address**	*7 Business Park Drive, Notting Hill VIC 3168*
Location ID	*BH4@0.60m*				
Base Site:	*9 Redwood Drive, Notting Hill, VIC 3168*			**Branch Site:**	*6/20-22 Foundry Road, Seven Hills, NSW 2147*

Sample Description *Sandy SILT, non plastic, Dark Brown*

Sampling Method *CLIENT*

Results

Liquid limit	Not Obtained	AS 1289-3.1.2
Plastic limit	Non Plastic	AS 1289-3.2.1
Plasticity index	Non Plastic	AS 1289-3.3.1
Linear shrinkage	Not Obtained	AS 1289-3.4.1
Shrinkage type	_	

Preparation

History of sample:	Oven-dried ≤ 50 ºC
Method of preparation:	Dry Sieving
Linear shrinkage mould:	_

Comments

Test methods: AS 1289, 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

NATA Accredited Facility No. 19167

Accredited for compliance with ISO/IEC 17025 - Testing

The results obtained in this report correspond exclusively to the sample(s) tested.

Report issued by: *Chandana Liyanage*

Date issued: 21/11/22

Atterberg Limits
Plasticity Index & Linear Shrinkage
Test Report

GEOTESTA Pty Ltd
9 Redwood Drive
Notting Hill , Vic 3168
Ph: 1300 852216

Laboratory	*Geotesta*	**Project Type**	*Geotechnical Investigation*	**Client**	*MWGC*
Report No	*S1385*	**Project No**	*NE1469*	**Client ID**	*-*
Sample ID	*SL1144-S1385*	**Project**	*431 Pittwater Road, North Manly NSW*	**Address**	*7 Business Park Drive, Notting Hill VIC 3168*
Location ID	*BH3@0.80m*				

Base Site: *9 Redwood Drive, Notting Hill, VIC 3168* **Branch Site:** *6/20-22 Foundry Road, Seven Hills, NSW 2147*

Sample Description *sandy SILT, Black*

Sampling Method *CLIENT*

Results

Liquid limit	Not Obtained	AS 1289-3.1.2
Plastic limit	Non Plastic	AS 1289-3.2.1
Plasticity index	Non Plastic	AS 1289-3.3.1
Linear shrinkage	Not Obtained	AS 1289-3.4.1
Shrinkage type	_	

Preparation

History of sample:	Oven-dried ≤ 50 ºC
Method of preparation:	Dry Sieving
Linear shrinkage mould:	_

Comments

Test methods: AS 1289, 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

NATA Accredited Facility No. 19167

Accredited for compliance with ISO/IEC 17025 - Testing

The results obtained in this report correspond exclusively to the sample(s) tested.

Report issued by: *Chandana Liyanage*

Date issued: 21/11/22

Geotesta Pty Ltd (NSW)
Unit 6, 20/22 Foundry Road
Seven Hills
NSW 2147

Attention: **- Mohammad Hossein Bazyar**

Report **938030-S**
Project name MANLY WARRINGAH GYMNASTICS PITTWATER ROAD NORTH MANLY NSW
Project ID NE1469
Received Date Nov 04, 2022

Client Sample ID			**BH1:1.5m**	**BH2:2.0m**	**BH3:0.9-1.0m**	**BH9:1.2m**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S22-No0010480**	**S22-No0010481**	**S22-No0010482**	**S22-No0010483**
Date Sampled			**Nov 03, 2022**	**Nov 03, 2022**	**Nov 03, 2022**	**Nov 03, 2022**
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	< 10	< 10	< 10	< 10
Conductivity (1:5 aqueous extract at 25 °C as rec.)	10	uS/cm	< 10	12	28	31
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	5.2	6.3	7.7	7.7
Resistivity*	0.5	ohm.m	1200	850	360	330
Salinity* (1:5 aqueous extract calc. from EC at 25C)	1	mg/kg	20	19	23	25
Sulphate (as SO4)	10	mg/kg	16	< 10	< 10	< 10
% Moisture	1	%	33	25	11	12

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chloride	Sydney	Nov 09, 2022	28 Days
- Method: LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (1:5 aqueous extract at 25 °C as rec.)	Sydney	Nov 09, 2022	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25 °C as rec.)	Sydney	Nov 09, 2022	7 Days
- Method: LTM-GEN-7090 pH by ISE			
Sulphate (as SO4)	Sydney	Nov 09, 2022	28 Days
- Method: In-house method LTM-INO-4270 Sulphate by Ion Chromatograph			
Salinity* (1:5 aqueous extract calc. from EC at 25C)	Sydney	Nov 11, 2022	21 Days
- Method: LTM-INO-4030			
% Moisture	Sydney	Nov 04, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

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IANZ# 1327

Christchurch
43 Detroit Drive
Rolleston,
Christchurch 7675
Tel: 0800 856 450
IANZ# 1290

Company Name: Geotesta Pty Ltd (NSW)
Address: Unit 6, 20/22 Foundry Road
Seven Hills
NSW 2147

Order No.:
Report #: 938030
Phone: 1300852 216
Fax:

Received: Nov 4, 2022 11:31 AM
Due: Nov 11, 2022
Priority: 5 Day
Contact Name: - Mohammad Hossein Bazyar

Project Name: MANLY WARRINGAH GYMNASTICS PITTWATER ROAD NORTH MANLY NSW
Project ID: NE1469

Eurofins Analytical Services Manager : Asim Khan

Sample Detail						Salinity* (1:5 aqueous extract calc. from EC at 25C)	Aggressivity Soil Set	Moisture Set
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH1:1.5m	Nov 03, 2022		Soil	S22-No0010480	X	X	X
2	BH2:2.0m	Nov 03, 2022		Soil	S22-No0010481	X	X	X
3	BH3:0.9-1.0m	Nov 03, 2022		Soil	S22-No0010482	X	X	X
4	BH9:1.2m	Nov 03, 2022		Soil	S22-No0010483	X	X	X
Test Counts						4	4	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Chloride	mg/kg	< 10			10	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)	uS/cm	< 10			10	Pass	
Sulphate (as SO4)	mg/kg	< 10			10	Pass	
LCS - % Recovery							
Chloride	%	102			70-130	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)	%	81			70-130	Pass	
Resistivity*	%	81			70-130	Pass	
Sulphate (as SO4)	%	96			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	S22-No0013054	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Conductivity (1:5 aqueous extract at 25 °C as rec.)	S22-Oc0028050	NCP	uS/cm	98	110	11	30%	Pass	
pH (1:5 Aqueous extract at 25 °C as rec.)	W22-No0005729	NCP	pH Units	6.2	5.8	<1	30%	Pass	
Resistivity*	S22-Oc0028050	NCP	ohm.m	100	91	11	30%	Pass	
Sulphate (as SO4)	S22-No0013054	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
% Moisture	S22-No0010366	NCP	%	20	18	11	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

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Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.