Butler Partners
geotechnical • geo-environmental • groundwater

Geotechnical Investigation
SC 1.5 Data Centre Expansion - Stages 2 and 3

Lot 10 South Sea Islander Way, Maroochydore

Prepared for
NEXTDC Limited
Project No. SG24-1501A

11 June 2024

Butler Partners
geotechnical • geo–environmental • groundwater

Butler Partners Pty Ltd
ABN 14 816 574 868
2/23 Traders Way
Currumbin Queensland 4223
PO Box 234
Currumbin LPO
Queensland 4223
Ph: 61 7 5535 2539
enquiries@butlerpartners.com.au

TABLE OF CONTENTS

TABLES:

ATTACHMENTS:

SECTION 1 - INTRODUCTION

1.1 Project

It is understood that NEXTDC Limited (NEXTDC) is proposing to develop the site, adjacent to the SC1 existing facility, by the construction of a two and three storey data centre building with associated car parking areas. The location and extent of the proposed development are indicated approximately on Drawing No. 1, attached.

1.2 Proposed Scope of Work

Based on prior knowledge of the area, it was anticipated that the site ground conditions may comprise some near surface fill overlying medium dense to dense sands then soft to stiff clays that would be underlain in turn by weathered sedimentary rock at depth.

For the scope of the proposed development and the anticipated ground conditions, it was proposed to geotechnically investigate the site by drilling and sampling six 'deep' bores to 25m to 30m depth within the footprint of the proposed building. It was further proposed that six additional 'shallow' bores to 2m to 3m depth would be drilled within proposed pavement areas for pavement design. Dynamic cone penetrometer (DCP) testing was also proposed adjacent to each 'shallow' pavement bore.

Using the results of the fieldwork and laboratory testing outcomes, it was proposed that a report would be produced that would provide geotechnical design information on each of the following topics:

- subsurface conditions;
- site classification and estimation of the characteristic shrink/swell surface movement;
- site seismicity classification;
- footing recommendations/commentary;
- typical geotechnical design parameters; including allowable/ultimate bearing capacity and skin friction in tension/compression, unit weights, Young's modulus, phi, apparent cohesion, Poisson's ratio, retaining wall design parameters;
- structural springs to simulate bearing and lateral stiffness;
- structural springs to simulate centre/edge heave effect if ground floor slab is to be on grade; and
- groundwater levels.

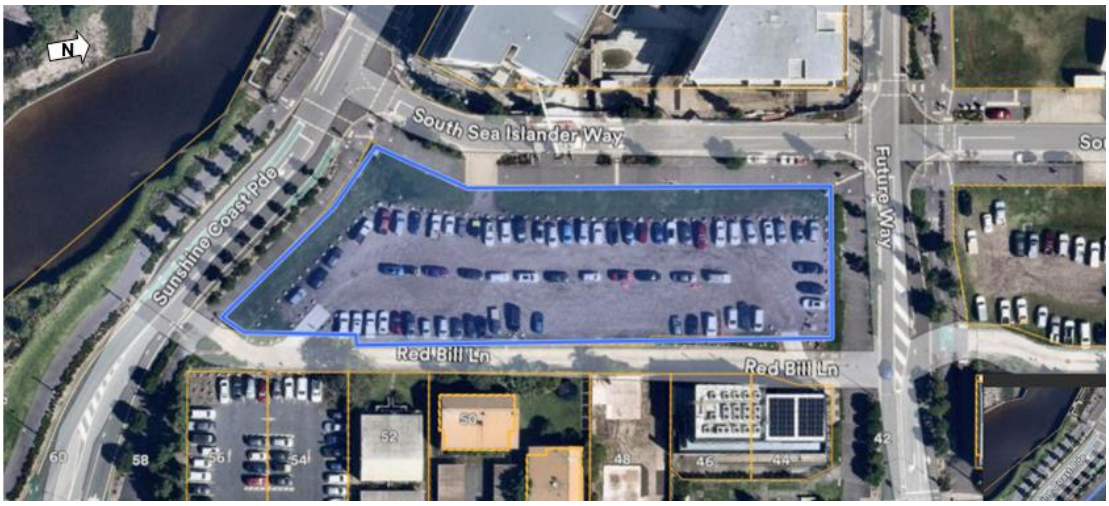
1.3 Commission

A fee to undertake the geotechnical investigation (in conjunction with a contamination assessment) was presented in a proposal dated 24 January 2024. Butler Partners Pty Ltd (Butler Partners) was subsequently commissioned by NEXTDC to conduct the geotechnical investigation as proposed.

SECTION 2 - THE SITE

2.1 Site Description

The site is located north of the Maroochydore River and it is bounded by Sunshine Coast Parade to the south and Future Way to the north. A residential development is located to the west, while the existing SC1 facility lies to the northeast, and dwellings to the southeast. At the time of the investigation, the site was being used as a car park, consisting mainly of unsealed parking areas surrounded by garden beds and small to medium size shrubs. The ground surface levels across the site appeared to be relatively level at approximately RL2.8m and formed by past earthworks at the site. A recent aerial view of the site taken on 10 April 2024 (with the approximate extent of the site outlined in blue) is given in Photograph 1 and a general view of the site taken at the time of the investigation is presented in Photograph 2.



Photograph 1: Aerial view of the site taken on 10 April 2024, with the approximate site boundary outlined in blue (Nearmap Image)

Photograph 2: General view of the site looking north from Sunshine Coast Parade

2.2 Geology

Reference to the Geological Survey of Queensland's 1:100,000 series Caloundra Sheet indicates that the site is mapped within areas of Pleistocene aged deposits consisting of sand, silt, mud and minor gravel, from undifferentiated coastal plain deposits, underlain by the Landsborough Sandstone formation (comprising lithofeldspathic labile and quartzose sandstone, siltstone, shale, minor coal, ferruginous oolite marker).

SECTION 3 - FIELDWORK

3.1 Drilling and Sampling Methods

The geotechnical investigation comprised the drilling and sampling of twelve bores (Bores 1 to 12) with a truck mounted Hydrapower Scout drilling rig, to depths varying between 1.5m and 30.5m approximately. The bores were drilled using a combination of solid flight auger and washbore drilling methods. Strata identification was based on inspection of cuttings recovered from the augers, supplemented with inspection of 'undisturbed' thin wall tube and 'disturbed' Standard Penetration Test (SPT) samples, recovered at selected depths.

On completion of drilling, all bores (except Bores 1 and 6) were backfilled with drill spoil and surface plugged.

3.2 Dynamic Cone Penetrometer Testing

A DCP test was undertaken adjacent to each 'shallow' bore (Bores 7 to 12) located within proposed pavement areas, to between 0.6m and 1.0m depth approximately.

3.3 Groundwater Monitoring Wells

To allow the groundwater depth to be monitored after completion of the fieldwork, single stage slotted PVC standpipe groundwater monitoring wells were installed in Bores 1 and 6. Construction details for each well are given in Table 1 and on the relevant Bore Report sheets.

Table 1: Summary Groundwater Monitoring Well Construction Details

Bore	Well Construction Details	
	Total Well Depth (m)	Screen Interval (m)
1	30.3	24.3
6	30.4	15.0

3.4 Bore Locations and Supervision

The bores were set out in the field by direct measurement from existing site features/boundaries and their approximate locations are shown on Drawing No. 1, attached. The ground surface level at each test location was determined by interpolation from ONF Surveyors' *Contour Detail Survey and Underground Service Location*, Drawing No. 12125_D1, dated 22 March 2024.

An experienced geotechnical engineer set out the bore locations, logged the stratigraphy encountered in the bore locations, directed the in-situ sampling and testing program and supervised the fieldwork.

SECTION 4 - INVESTIGATION RESULTS

4.1 Subsurface Conditions

The subsurface conditions encountered in Bores 1 to 12 are given on Bore Report sheets included in Appendix A, using classification and descriptive terms defined in the accompanying notes (which are based on Australian Standard AS1726-1993). The DCP test results for the investigation are tabulated with test depth in Appendix A.

For a description of the ground conditions encountered at the bore locations, the Bore Report sheets should be consulted. However, in broad summary the ground conditions encountered at the bore locations generally comprised a surface layer of sandy gravel fill to between 0.2m and 0.8m depth approximately (deepest on Bore 12), underlain by interbedded layers of very loose to very dense sand and gravelly/clayey/silty sands (with indurated layers) and soft to hard silty/sandy clays.

It should be carefully noted that 'strength inversions' (i.e. 'stronger' materials underlain by 'weaker' materials) were noted at a several locations. For example, loose sand underlying medium dense sand at 1.5m depth in Bore 1; medium dense sand underlying dense sand at 4.5m depth in Bore 1, at 6.0m depth in Bore 4, and at 7.5m depth in Bore 6; very loose clayey sand underlying medium dense sand at 7.5m depth in Bore 1; dense sand underlying very dense sand at between 4.5m and 6.0m depth in Bores 2, 4, 5 and 6; loose silty sand underlying medium dense sand at 7.5m depth in Bore 4; dense clayey sand underlying very dense clayey sand at 19.5m depth in Bore 6.

4.2 Groundwater

Free groundwater was only encountered during the auger drilling of Bore 3 at 3.0m depth approximately. Groundwater observations below the maximum depth of auger drilling (typically 3.0m) cannot be made during drilling as they are observed by the use of drilling fluid during washbore drilling. The groundwater observations made during auger drilling of Bore 3, and subsequently in the monitoring wells installed in Bores 1 and 6 are given in Table 2.

Table 2: Groundwater Observations During Auger Drilling and in Monitoring Well

Bore/Well	Groundwater Observations					
	During Auger Drilling			In Monitoring Well		
	Date	Depth (m)	Reduced Level (m)	Date	Depth (m)	Reduced Level (m)
1	-			17 May 2024	2.2	RL0.6
6					2.3	RL0.6
3	29 April 2024	3.0	RL-0.2	-	-	-

It is considered that groundwater levels could vary across and around the site and may be dependent upon seasonal effects and the prevailing weather. It is also considered possible that 'perched' groundwater conditions could also occur in fill elsewhere at the site.

4.3 Laboratory Testing

Selected samples of fill and soil recovered from the bores were submitted to Butler Partners' NATA registered geotechnical testing laboratory and tested using Australian Standards AS1289 methods to assess erosion and sediment control parameters, particle size distribution, plasticity, moisture-density relationship, and California bearing ratio (CBR). Selected samples were also submitted to a chemical testing laboratory to determine ASS potential and soil aggressivity to concrete and steel. The results of the testing are summarised in the following sections and laboratory test report sheets are included in Appendix B.

It should be noted that sample descriptions provided in the laboratory results summary tables (and the laboratory test result sheets) are based on the inspection of each individual laboratory test sample only. No allowance has been made in sample descriptions for sampling, sub-sampling or test methodology in determination of the mass material properties. Estimates of mass material properties are provided on each individual Bore Report sheet and as such, the laboratory test results should be read in conjunction with the relevant bore report sheets.

4.3.1 Erosion and Sediment Control Parameters

Three selected samples of fill/soil recovered from the bores were tested for dispersiveness/erosion potential in the Emerson Class Number test. A summary of the reported test results is presented in Table 3. The test results indicate that the samples tested had a low to moderate potential for dispersion, in distilled water.

Table 3: Summary of Emerson Class Test Results

Bore	Depth (m)	Sample Description	Sample Moisture Content (%)	Emerson Class No.	pH	Electrical Conductivity (µS/cm)
5	1.5 – 1.94	Sand	19.3	3	4.5	323.5
8	0.2 – 1.0	Sand	8.9	3	6.5	88.2
12	0.2 – 0.5	Fill – Sandy Gravel	8.7	5	7.4	68.7

4.3.2 Particle Size Distribution

Eight selected samples of fill/soil recovered from the bores were tested for measurement of particle size distribution using wash sieve grading techniques and the reported results are summarised in Table 4.

Table 4: Summary of Reported Particle Size Distribution Test Results

Bore	Depth (m)	Sample Description	Sample Moisture Content (%)	Gravel Fraction [1] (%)	Sand Fraction [2] (%)	Silt and Clay Fraction [3] (%)
2	7.5 – 7.95	Sandy Clay	16.4	0	43	57
	16.5 – 16.95	Clayey Sand	17.1	0	53	47
4	7.5 – 7.95	Clayey Sand	27.9	0	71	29
5	9.0 – 9.45	Silty Clay	27.5	0	16	84
7	0.2 – 0.5	Gravelly Sand	9.2	31	64	5
8	0.2 – 1.0	Sand	8.9	13	81	6
9	0.2 – 0.5	Fill – Sandy Gravel	13.9	59	36	5
12	0.2 – 0.5	Fill – Sandy Gravel	8.7	64	29	7

[1] Particle size <60mm, >2mm; [2] Particle size (approximately) <2mm, >0.075mm; [3] Particle size (approximately) <0.075mm

4.3.3 Plasticity

Four selected samples of fill/soil recovered from the bores were tested for measurement of plasticity using Atterberg limit and linear shrinkage test methods. The reported test results are summarised in Table 5 (together with the sample classification) and indicate that the samples tested ranged from low to medium plasticity.

Table 5: Summary of Reported Plasticity Results

Bore	Depth (m)	Sample Description	Sample Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Classification [1]
2	7.5 – 7.95	Sandy Clay	16.4	22	11	11	4.5	CL
4	7.5 – 7.95	Clayey Sand	27.9	20	12	8	3.5	SC
5	9.0 – 9.45	Silty Clay	27.5	42	15	27	10.0	CI
9	0.2 – 0.5	Fill – Sandy Gravel	13.9	NO [2]	NO [2]	NP [3]	-	-

[1] Australian Standard AS1726-1993, *Geotechnical site investigations;* [2] Not Obtainable; [3] Non Plastic

4.3.4 Moisture-Density Relationship

Four bulk samples of fill/soil material recovered from Bores 7, 8, 9 and 12 were tested to determine (Standard) laboratory moisture-density relationship, and the reported maximum dry density (MDD) and Optimum moisture content (OMC) results for the samples tested are summarised in Table 6.

Table 6: Summary of Reported Moisture-Density Relationship Results

Bore	Depth (m)	Sample Description	Sample Moisture Content (%)	Standard Compaction	
				Maximum Dry Density (t/m^3)	Optimum Moisture Content (%)
7	0.2 – 0.5	Gravelly Sand	9.2	1.9	9.5
8	0.2 – 1.0	Sand	8.9	1.8	11.0
9	0.2 – 0.5	Fill – Sandy Gravel	13.9	2.0	9.0
12	0.2 – 0.5	Fill – Sandy Gravel	8.7	2.0	9.5

The results of the moisture-density testing indicate that the (insitu) moisture contents of the samples tested were between 2.1% dry and 4.9% wet (approximately) of Standard OMC at the time of sampling.

4.3.5 California Bearing Ratio

Sub-samples of the fill/soil materials tested for moisture-density relationship were also tested to determine soaked CBR. The samples were recompacted to a target dry density ratio of 100% at near optimum moisture content and then soaked under a surcharge loading of 4.5kg for four days. A summary of the reported results is presented in Table 7.

Table 7: Summary of Reported California Bearing Ratio Test Results

Bore	Depth (m)	Sample Description	Sample Preparation		Swell on Soaking (%)	Reported CBR (%)
			Moisture Content (%)	Dry Density (t/m^3)		
7	0.2 – 0.5	Gravelly Sand	9.6	1.9	-	45
8	0.2 – 1.0	Sand	11.1	1.8	-	30
9	0.2 – 0.5	Fill – Sandy Gravel	9.0	2.0	-0.5	70
12	0.2 – 0.5	Fill – Sandy Gravel	9.2	2.1	-1.0	50

4.3.6 Acid Sulfate Soils

Ten samples of soil were selected for Chromium Suite analysis and were refrigerated until transported to Australian Laboratory Services Pty Ltd (ALS) under standard chain of custody protocol. A summary of the results is given in Table 8, together ALS's calculated liming rates to neutralise any generated acidity (at a factor of safety of 1.5), and a copy of the laboratory results are included in Appendix B.

Table 8: Summary of Chromium Suite Results

Bore	Depth (m)	Sample Description	pH_{KCL}	Titratable Actual Acidity (%S)	Chromium Reducible Sulfur – S_{CR} (%S)	Acid Neutralising Capacity ANC (%S)	Net Acidity Excluding ANC (%S)	Calculated Liming Rate Excluding ANC (kg $CaCo_3$/t)*
1	1.5 – 1.8	Sand	4.5	0.13	0.018	-	**0.15**	7
	7.5 – 7.95	Clayey Sand	5.0	0.03	**0.631**	-	**0.66**	31
2	4.5 – 4.93	Sand	5.3	0.03	**0.079**	-	**0.11**	5
	7.5 – 7.95	Sandy Clay	4.7	0.05	**0.362**	-	**0.42**	19
4	7.5 – 7.95	Clayey Sand	5.1	0.03	**0.610**	-	**0.64**	30
	9.0 – 9.45	Clayey Sand	5.0	<0.02	**0.032**	-	**0.04**	2
5	4.5 – 4.91	Sand	5.4	0.02	**0.062**	-	**0.08**	4
	9.0 – 9.45	Silty Clay	4.6	0.05	**0.091**	-	**0.14**	6
6	3.0 – 3.30	Sand	8.2	<0.02	0.018	0.19	<0.02	<1
	9.0 – 9.45	Silty Clay	4.6	0.06	**0.097**	-	**0.15**	7

Bold results exceed or equal the State Planning Policy 2013 Action Criteria for disturbance of >1000 tonnes of 'coarse' texture soils
* Dry Weight; calculated by ALS using good quality ag-lime ($CaCo_3$) with a neutralising value of 100% and a factor of safety of 1.5

4.3.7 Aggressivity

Two combined samples of soil recovered from Bores 1 and 6 were tested to assess soil aggressivity to concrete and steel by measurement of pH, electrical conductivity, resistivity, sulfate (as SO_4) and chloride and a summary of the reported results are presented in Table 9. The test results indicate that the samples of soil tested have a mild to moderate exposure classification for concrete and non-aggressive exposure classification for steel in accordance with Australian Standard AS2159.

Table 9: Reported Concrete Aggressivity Test Results

Bore	Depth (m)	pH value	Electrical Conductivity @ 25°C (µs/cm)	Resistivity @ 25°C (ohm cm)	Sulfate as SO_4 (mg/kg)	Chloride (mg/kg)
1	10.5 – 30.3	5.5	50	20000	40	40
6	3.0 – 9.0	5.2	68	14700	110	50

SECTION 5 - ACID SULFATE SOILS DISCUSSION

5.1 Acid Sulfate Soil Assessment Criteria

ASS in Queensland are assessed in accordance with the Water Quality Australia's National Acid Sulfate Soils Guidance: *National acid sulfate soils sampling and identification methods manual – June 2018* and the Queensland State Planning Policy– *State Interest guidance material – Emissions and Hazardous Activities – February 2018*. The State Planning Policy 2018 Guideline provides Action Criteria for assessing the results of laboratory testing quantifying the acid producing effects based on the sum of existing plus potential acidity. These action criteria are presented in Table 10.

Table 10: Action Criteria based on ASS Analysis for Three Broad Texture Categories

Type of Material		Action Criteria (1 – 1000 tonnes disturbed)		Action Criteria (> 1000 tonnes disturbed)	
		Existing + Potential Acidity		Existing + Potential Acidity	
Texture Range	Approximate Clay Content (%)	Equivalent Sulfur %S	Equivalent Acidity Mol H^+/tonne	Equivalent Sulfur %S	Equivalent Acidity Mol H^+/tonne
Fine Texture Medium to heavy clays, silty clays	>40	≥0.10	≥62	≥0.03	≥18
Medium Texture Sandy loams to light clays	5-40	≥0.06	≥36	≥0.03	≥18
Coarse Texture Sands to loamy sands	<5	≥0.03	≥18	≥0.03	≥18

It has been assumed that the volume of natural soil to be disturbed during site development works will exceed 1,000 tonnes and the *'>1000 tonnes disturbed Action Criteria'* from Table 10 has therefore been used as the basis for assessment of the presence of ASS requiring treatment.

5.2 Discussion of Results

The results of the Chromium Suite analysis indicate that nine of the ten samples tested reported levels of chromium reducible sulfur (Scr) and net acidity exceeding the action criteria of 0.03% S, which is an indicator of the potential of the soils to generate acidity if they are allowed to oxidise. Therefore, excavations across the site are likely to encounter levels of Potential Acid Sulfate Soils (PASS) that will require management upon disturbance.

The soil samples tested had a maximum reported required liming rate of 31kg of lime per dry tonne of soil for neutralization. The liming rates given are based on the use of good quality fine Ag-lime with a neutralising value of 100% at a factor of safety of 1.5.

SECTION 6 - GEOTECHNICAL DESIGN DISCUSSION

6.1 Ground Model

The results of the investigation indicate that the site is underlain at the bore locations by a surface layer of sandy gravel fill to between 0.2m and 0.8m depth approximately, overlying interbedded layers of very loose to very dense sand and clayey/silty sands (with indurated layers) and soft to hard silty/sandy clays. Strength inversions were encountered in the soils for Bores 1 to 6. Groundwater has been observed in monitoring wells at approximately RL0.6m, but the level would be expected to vary. In these ground conditions, geotechnical design will need to consider (at least), the following key issues:

- presence of existing fill and control on placement;
- subgrade preparation, earthworks and site drainage;
- site trafficability;
- batter stability;
- retaining wall pressures;
- erosion and sediment control parameters;
- presence of strength inversions and possible effect of foundation design;
- suitable foundation types;
- suitable founding strata and variation over the site;
- bearing capacity of proposed founding strata;
- site and foundation settlement;
- ground movements from reactive soils;
- subgrade material parameters for slab and pavement design;
- groundwater control (temporary and permanent); and
- construction issues.

Discussion of geotechnical design parameters, as well as general design and construction recommendations and suggestions are detailed in the following sections.

6.2 Existing Fill

It is not known whether the existing fill material encountered in the bores is ‘controlled’ (i.e. it is not known whether the fill has been placed and uniformly compacted to an appropriate engineering specification). If the existing fill is required to support settlement sensitive elements, supporting documentation should be obtained and checked to confirm that the fill has been placed in a controlled manner to a specification that is appropriate for the proposed development. If documentation does not exist (or the specification used for filling is not appropriate) then it is suggested that the existing fill be assumed to be uncontrolled.

If the fill cannot be shown to be controlled, then consideration should be given to the potential for variations in both the composition and degree of compaction of the fill. The presence of voids within uncontrolled fill as well as potential soft/loose zones or inclusions of deleterious materials may lead to potentially significant future total and differential settlements, occurring possibly over relatively short distances.

6.3 Earthworks

6.3.1 Excavatability

Bulk and confined excavation of the fill and soils encountered in the bores should be readily achievable using a large hydraulic excavator.

All confined excavations should be fully supported or battered/benched to a stable angle to ensure personnel safety.

6.3.2 Site Preparation

The extent of future earthworks at the site will be primarily dependent upon the settlement tolerance of elements to be supported 'on-ground' and the acceptable risk of future settlements occurring in uncontrolled fill (i.e. fill that has not been placed, compacted and tested for conformance to an appropriate engineering specification).

Care will be required to ensure that the effect of site earthworks does not impact adversely upon adjacent services and buildings (e.g. as potential settlements induced by vibratory compaction, etc.). It is also recommended that dilapidation surveys of adjacent buildings, structures and services, etc. be undertaken prior to construction commencing on site.

6.3.2.1 Existing Fill to Remain in Place

The required site preparation will depend on the type of foundation to be adopted for the proposed structures. If the structures are to be fully supported on piles, then essentially no site preparation would be expected to be required, except for the trimming of the site to design subgrade level. It should be noted that if additional fill is to be placed to bring the site to level, settlement of any uncontrolled fill and underlying compressible soils will occur which will need to be allowed for when setting temporary bench levels for floor slab casting.

6.3.2.2 Remove and Replace Existing Fill

Site preparation for a slab on ground/raft should involve removal of any 'old' footings/services etc, clearance of vegetation, stripping of topsoil and any 'uncontrolled fill'.

6.3.3 Compaction

All fill proposed to support settlement sensitive structures/features should be placed in layers not greater than 250mm (loose thickness) and be uniformly compacted to the appropriate minimum dry density ratio/density index values nominated in Table 11.

Table 11: Subgrade and Fill Compaction Levels

Description	Cohesive Materials Minimum Dry Density Ratio	Non Cohesive Materials Density Index
Foundation support	100 % (Standard compaction)	80%
General floor slab support	98 % (Standard compaction)	75%
Pavement Subgrade - >500mm below subgrade level - top 500mm of subgrade	98 % (Standard compaction) 100 % (Standard compaction)	75% 80%
General Fill (non-structural support)	95% (Standard compaction)	65%

To assist with the achievement of adequate control over fill placement, geotechnical overview and control testing during construction to not less than Level 2 (as described in Section 8 of Australian Standard AS3798-2007 *Guidelines on earthworks for commercial and residential developments*) should be considered and Level 1 is recommended where fill settlement is to be minimised.

Any reactive (clayey) fill should be placed and maintained at a moisture content not less than Standard optimum moisture content in order to reduce potential shrink-swell movements. It should be noted that over-compacting reactive clay fill (particularly at a moisture content below optimum) should be avoided as potentially significant expansion could occur on 'wetting up'. Due allowance must be made in design and detailing for reactive fill movements if reactive fill is used.

6.3.4 Excavation Stability

Unsurcharged, temporary and permanent, batter slopes, up to 3m high could be formed at the angles given in Table 12, subject to confirmation on a location by location basis, by stability analysis and by engineering inspection during construction. Batter slopes may be required to be benched for stability, access and drainage at regular intervals of around 3m height. At the batter slopes given, some movements at and behind slope crests are anticipated.

Table 12: Maximum Unsurcharged (Dry) Batter Slopes

Material	Strength	Temporary Batter(1)	Permanent Batter(1)
Existing Fill	-	1V:2.5H	1V:3.5H
Sandy/Silty Clay	soft to firm stiff very stiff/hard	1V:3H 1V:1.5H 1V:1H	1V:4H 1V:2.5H 1V:2H
Silty/Clayey/Gravelly Sand	very loose to loose medium dense dense/very dense	1V:3H 1V:2H 1V:1.5H	1V:4H 1V:3H 1V:2.5H

(1) Not underlain by 'weaker' materials and protected from erosion

At the batter angles nominated in Table 12 there may be some localised slumping of batter slopes and it will be necessary to ensure that the faces are protected from any surface water or groundwater seepage effects. It is also suggested that an allowance be made in project costing for the installation of mechanical support 'as required', to support any localised zones of unstable material. The amount of mechanical support required will depend on the material type and the height of the unstable zone, groundwater conditions etc. and must be confirmed by detailed analysis and inspection.

All excavated and fill batters should be protected from weathering and erosion and be inspected by an experienced engineer during excavation to confirm stability and revise batter slopes, if required.

6.3.5 Erosion and Sediment Control and Dispersion

Based on the results of the erosion and sediment control testing given in Table 3, some of the soils at the site have a moderate dispersion potential and it is anticipated that some cut and fill batters at the site will erode and require ongoing maintenance and weather protection. All exposed fill/soil should be protected from weathering, erosion and groundwater seepage (if relevant). It is suggested that consideration be given to concrete lining of stormwater collection drains to minimise erosion.

The results of testing on selected samples given in Table 3 can be used, in conjunction with relevant classifications from the Bore Report sheets, to input an erosion hazard assessment for the site (e.g. IECA, 2008[1]).

6.3.6 Site Drainage and Trafficability

Site earthworks will need to be properly drained so that groundwater does not cause wetting up and softening of subgrade soils. Where the existing gravel pavement surface is removed, trafficability across the site is likely to be restricted to tracked plant during and following periods of wet weather. It is therefore suggested that consideration be given to leaving the existing surface in place (where possible) or to the placement of a granular layer to provide a convenient working platform and improve site trafficability.

An equipment specific assessment will be required for construction equipment imposing significant bearing pressures, such as foundation piling rigs and crane outriggers.

[1] IECA (2008), *Best Practice Erosion and Sediment Control, International Erosion Control Association* (Australiasia), Picton NSW – Book 4

6.4 Groundwater Control

Based on groundwater observations made in the groundwater monitoring wells installed in Bores 1 and 6 and past experience with similar sites with similar geology, it is considered that free groundwater seepage could occur in cut areas and that the ground water level has the potential to rise with rainfall and tidal influxes. Temporary groundwater control measures for shallow excavation (and existing areas with shallow groundwater), should include open graded drains across the site. The number, location and depth of open drains would be dependent on the prevailing weather conditions at the time of earthworks and the depth to groundwater.

To enable 'dry' construction to be undertaken in deep excavation areas, lowering of the groundwater table may be required. Suitable control methods would need to be properly assessed, but would most likely comprise a system of spear points in relatively clean 'sands', and sumps and pumps (potentially supplemented by deep pumped wells) in all other ground conditions. Inflow values must be confirmed by detailed analysis.

6.5 Retaining Wall Pressures

Permanent retaining wall pressures can be obtained for both 'flexible' and 'rigid' walls under drained conditions, with horizontal backfill, using a triangular pressure distribution in conjunction with the parameters given in Table 13.

Table 13: Retaining Wall Design Parameters

Material	Strength/Density	Total Weight (t/m^3)	Flexible Wall 'Active' pressure coefficient – k_a	Inflexible Wall "At rest' pressure coefficient - k_o
Controlled Fill ('Level 1')	-	1.9	0.45(1)	0.65(1)
Sandy/Silty Clay	soft to firm	1.8	0.45	0.65
	stiff	1.9	0.40	0.60
	very stiff/hard	2.0	0.35	0.55
Silty/Clayey/Gravelly Sand	very loose	1.8	0.40	0.60
	loose	1.8	0.35	0.55
	medium dense	1.9	0.30	0.45
	dense	1.9	0.25	0.40
	very dense	2.0	0.20	0.35

(1) Potentially highly variable

Due allowance must also be included in the calculation of wall pressure for groundwater pressure, back fill compaction, surcharge effects from adjacent structures and/or construction loading, the effects of sloping retained materials, reactive soil/fill pressures etc.

Even if a drainage system is installed behind retaining walls, consideration should be given to the potential for water pressures to act on the wall as elevated groundwater levels may occur during or following prolonged 'wet' weather, or from blocked drainage etc. Drain design should incorporate free draining backfill and slotted pipe discharging into a sealed disposal system.

A 'global' stability assessment of any proposed retaining wall should be carried out as part of a detailed design.

6.6 Site Settlement

If fill and/or structural load is added to the site, site settlement will potentially occur within any uncontrolled fill and the soft to firm (compressible) clay soils due to a combination of:

- The existing fill was 'controlled' on placement to an appropriate specification;
- ongoing, long term, creep settlements induced by the existing fill and any new site loading; and
- primary consolidation settlements due to the application of additional structural loads or placement of additional fill as well as any portion of primary consolidation due to the existing fill which is yet to occur.

Placement of additional fill and/or applied structural loadings at the site will result in consolidation settlement of the soft to firm clays and it is very approximately estimated that these settlements could be between 15mm and 30mm per 1m depth of additional fill placed. If consolidation settlement magnitude is important, detailed consolidation settlement analysis will be required.

The approximate estimate of the range of possible consolidation settlement given above does not include any allowance for settlements induced in very loose and loose sands by vibration and/or earthquake, nor do they include any allowance for reactive ground movement.

If consolidation settlement occurs in the soft to firm clays (and very loose sands) allowance for negative skin friction must be made in pile design.

6.7 Reactive Ground Movements

The site is underlain at the bore locations by sandy gravel fill and natural sandy soils that are slightly reactive. The magnitude of potential reactive soil movements can be estimated using the following equation (from Australian Standard AS2870 – 2011 *Residential slabs and footings*) and parameters for the site selected based on recommendations in AS2870:

$$y_s = \frac{1}{100}\sum_{n=1}^{N}\left(\alpha.I_{ss}.\overline{\Delta u}.h\right)_n$$

where y_s is the characteristic surface movement, in millimetres;
α is the lateral restraint factor;
I_{ss} is the shrink-swell index (taken as approximately 0.5% per pF to 1.0% per pF for the natural soils and 0.1% per pF to 0.5% per pF for the existing fill, based on visual tactile assessment of soil/fill grading and plasticity and past experience)
$\overline{\Delta u}$ is the soil suction change averaged over the thickness of the layer under consideration (estimated to vary between 1.2pF at the ground surface to zero at the design depth of suction change);
h is the thickness of layer under consideration, in millimetres; and
N is the number of soil/fill layers within the design depth of suction change (H_s – taken as 1.5m in Maroochydore).

Based on the materials encountered in the bores and using the methods described in Australian Standard AS 2870, it is estimated that free ground surface movements as a result of soil shrinking and swelling from normal soil moisture variations for the site in its current condition could vary between 8mm and 12mm, assuming that the existing fill have been in place for more than 5 years. If the time since placement of the exiting fill is less than 5 years, then greater ground surface movements than the calculated above may occur.

It is anticipated that additional earthworks will be carried out at the site as part of the proposed development, which has the potential to significantly alter the magnitude of the calculated characteristic ground surface movements. The calculated characteristic ground surface movements should be reviewed/revised following site earthworks.

6.8 Site Classification

Because the site is underlain by fill, AS2870 requires the site to be classified as 'Class P'. Where fill has been placed to existing ground surface level as 'controlled fill' the site may be reclassified based on soil reactivity. The site could be reclassified as 'Class S' based on the following assumptions:

- the existing fill is more than five years old; and
- the site will be properly maintained in accordance with the recommendations given in AS2870-2011.

6.9 Foundations

6.9.1 Foundation Types

Suitable foundations for the proposed development will be dependent upon structure type, structural loadings, and tolerance of the structure to movements. Strip/pad footings can potentially be adopted for light weight ancillary structures that can be designed and detailed to accommodate significant differential settlement, however due to the presence of potentially uncontrolled fill, it is expected that the proposed structure would require to be fully supported on piles.

To minimise the risk of unacceptable differential movements, it is recommended that all foundations for individual structures be supported in similar materials (e.g. footings for a particular structure should not found partly in fill and partly in soil, unless potential differential movements can be tolerated or designed for).

It will be necessary to allow for differential settlement between any sections of the development supported on different foundation types.

6.9.1.1 Pad and Strip Footings

The use of strip and pad footings would only be expected to be suitable for the support of relatively light, flexible structures. Allowable bearing capacity is dependent upon density/consistency of soils as well as footing size, shape and founding depth, and will require detailed assessment. The parameters given in Table 14 could be used for **preliminary** design of pad footings however, location and footing specific settlement analysis of foundations (together with the reassessment of design bearing capacity) will be required as part of detailed design. The assessment of bearing capacity and settlement will need to consider 'group effects' where footings are closely spaced. Ultimate bearing stress design values can be obtained by multiplying the working stress bearing pressure values given in Table 14 by 2.5.

Table 14: Maximum Working Stress Design Parameters for Footings

Founding Material	Strength	Maximum Allowable Working Bearing Pressure[1] (kPa)
Uncontrolled Fill	-	not recommended
Fill – controlled	Level 1	100
Silty/Clayey/Gravelly Sand	very loose loose medium dense dense very dense	not recommended[3] 50[2][3] 100[2] 250[2] 350[2]

[1] Not underlain by any 'softer/loose' zones within the zone of footing influence; [2] Preliminary only – subject to footing dimensions, depth and groundwater level; [3] Sensitive to vibration

All foundation excavations should be inspected by an experienced geotechnical engineer prior to casting, to confirm adequate bearing capacity (and final foundation dimensions/depths) and all footing excavations should be clean, dry and free of loose/softened materials immediately prior to casting. If footing excavations are to remain open for longer than ten hours prior to casting (which is not recommended) and/or wet weather is likely, it is suggested that a concrete blinding layer be cast in the base to prevent moisture ingress (and base softening).

At the values of stress given in Table 14, individual footing settlement would not be expected to exceed 1.0% to 1.5% of footing width for a properly constructed pad footing and 2.0% to 2.5% of footing width for strip footings. Actual foundation settlements should be checked by analysis once footing size, layout, and loads are confirmed.

Due to the possible variability in soil strength with depth across the site, it is suggested that inspection and testing be undertaken during footing construction to confirm the bearing capacity of soils in the influence zone below founding level (i.e. not less than two times footing width or 1.5m, whichever is greater).

6.9.1.2 Stiffened Raft Foundation

For the **preliminary** assessment of the potential feasibility of a raft foundation (with all uncontrolled and/or inadequately compacted fill removed), the soil parameters presented in Table 15 could be used and have been based on the results of the investigation, past experience and published correlations. Detailed analysis will be required if a raft option appears feasible. Differential settlement between a raft and any pile-supported sections of the development must be carefully assessed.

Table 15: Settlement Modulus and Poisson's Ratio Values for Raft Design

Material	Strength	Settlement Modulus – E (MPa)	Poisson's Ratio - ν
Controlled Fill	Level 1	8 – 20	0.3
Sandy/Silty Clay	soft firm stiff very stiff hard	2 – 5 4 – 8 8 – 15 15 – 30 30 – 60	
Silty/Clayey/Gravelly Sand	very loose loose medium dense dense very dense	unpredictable – vibration sensitive 7-15 (vibration sensitive) 20 – 50 40 – 80 70 – 120	

6.9.1.3 Bored Piles

Bored piles could be adopted and design could be based on the maximum allowable working end bearing and shaft adhesion values nominated in Table 16. Maximum allowable working pressure values for bored pile design are given in Table 16.
Use of steel liners may be required to support bored pile excavation sides in 'soft' clays and loose sands and in all soils in the presence of groundwater. An estimate of the ultimate (failure) bearing pressure values can be determined by multiplying the working stress values by 2.5.

Table 16: Working Shaft/End Bearing Capacity for Bored Pile Design

Material	Strength [2]	Shaft Adhesion (kPa)	End Bearing [1] (kPa)
Controlled Fill - Level 1 (100% Standard) – sandy clay/clayey sand fill	-	10	-
Silty/Sandy Clay	soft to firm stiff very stiff hard	not recommended 10 15 20	not recommended 150 200 350
Silty/Clayey/Gravelly Sand	very loose to loose medium dense dense very dense	not recommended 10 20 30	not recommended 150 350 400

[1] For pile length to pile diameter ratio >4.0 in founding strata and no 'softer/loose' underlying material and dry conditions.

At the values of bearing pressure nominated in Table 16, approximate individual bored pile settlements, due to structural load only, (i.e. not including any reactive soil movement) would no be expected to exceed 0.7% to 1.0% of pile diameter for properly constructed bored piles. Actual foundation settlements should be checked by analysis once foundation sizes, layout and loads are confirmed.

6.9.1.4 Continuous Flight Auger Piles

Continuous flight auger (CFA) piles could be considered for support of working loads up to approximately 3000kN and **preliminary** estimates of maximum single pile working loads, based on the structural capacity of various CFA pile sizes, are summarised in Table 17. Some variation to the values given in Table 17 may occur between piling contractors, depending on the structural properties of their piles and their respective installation methods.

Table 17: Maximum Working Loads for CFA Piles

Pile Diameter	Maximum Working Load (kN)
500	1,200
600	1,600
700	2,300
800	3,000

6.9.2 Pile Groups

If pile groups are used, then lower capacities may result where piles are closely spaced and higher pile settlements would also result.

6.9.3 Geotechnical Reduction Factor

For piles, the appropriate geotechnical strength reduction factor depends on a number of factors (e.g. structural redundancy, pile load tests allowed for, 'level' of supervision during installation etc.) and Section 4.3 of AS2159 – 2009 should be used for guidance. It would be expected that the geotechnical strength reduction factor could vary from 0.45, for minimal pile load testing and minimal structural redundancy, to approximately 0.65, for substantial pile load testing and structural redundancy.

6.9.4 Uplift Capacity

Assessment of the uplift capacity of single pile foundations could be based on the lesser of the following:

- 75% of the shaft adhesion values presented in Table 16 (ignoring the fill material), or
- a 'cone of uplift' with a cone apex angle of 45º and adopting a buoyant unit weight of 8kN/m^3.

It will be necessary to carefully consider the spacing and size of pile groups as the uplift capacity of a group of 'closely' spaced piles would be expected to be less than the sum of the individual pile capacities.

6.9.5 Lateral Capacity

Broms[2] method of calculating lateral capacity of piles could be used to assess the lateral resistance capacity for single piles. The soil parameters presented in Table 18 could be used with this method.

[2] Broms, B Lateral Resistance of Piles in Cohesionless Soils, *Journal of the Soil Mechanics Division*, American Society of Civil Engineers, Vol. 90, No. SM3, Vol 90, 1964, pp.123-156

Table 18: Soil Parameters for Calculation of Lateral Load Capacity of Piles

Material	Strength	Undrained Cohesion (C_u)	Angle of Shearing Resistance (ϕ)	Total Bulk Density (kN/m^3)
'Uncontrolled' Fill	-	unreliable	unreliable	18
Sandy/Silty Clay	soft	12	-	17
	firm	25	-	18
	stiff	50	-	19
	very stiff	100	-	20
	hard	200	-	20
Silty/Clayey/Gravelly Sand	very loose	-	22	17
	loose	-	25	18
	medium dense	-	30	19
	dense	-	36	20
	very dense	-	38	20

A material factor of 0.4 applied to the shear strength (calculated using the undrained cohesion and angle of internal friction values nominated in Table 18 for the 'natural' soils) is suggested for assessment of design lateral capacity of piles.

6.10 Pavement Subgrade Properties

6.10.1 Insitu Estimates of CBR

The correlation between DCP results and insitu CBR given by AUSTROADS[3], is reproduced in Figure 1 and can be used to estimate the CBR of proposed subgrade materials. Caution should be exercised with the interpretation of the DCP values as they are only relevant for the moisture conditions existing at the time of testing and 'false' interpreted CBR values can result from the presence of gravels etc. contained with otherwise 'clayey' soils.

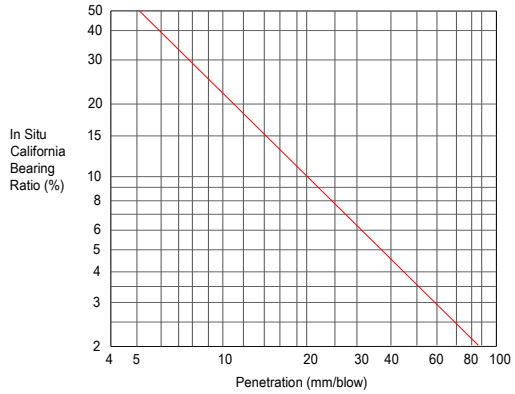


Figure 1: Correlation of DCP Results and Insitu CBR

6.10.2 On-Ground Slabs and Pavement

Subgrade properties may vary significantly over the site following bulk earthworks and detailed subgrade testing will be required at the time of construction in order to confirm design values. For the purposes of initial costing and preliminary design the subgrade values given in Table 19 may be adopted. These values are based on the assumption that the subgrade is prepared in accordance with Section 6.3.

[3] AUSTROADS' Publication No. AP-17/92 (1992) Pavement Design: A Guide to the Structural Design of Road Pavements – Figure 5.2.

Table 19: Preliminary Subgrade Design Values

Subgrade Material	CBR (%)	Modulus of Subgrade Reaction [1] (kPa/mm)
Sandy/Silty Clay (natural or controlled fill)	3 – 5	30 - 40
Silty/Clayey Sand (natural or controlled fill)	5 – 10	35 - 55
Gravelly Sand/Sand (natural or controlled fill)	30 – 45	90 – 130
Sandy Gravel (natural or controlled fill)	50 – 70	135 – 175

[1] For transient loading only

On-ground slabs should be fully dowelled and joints between slabs sealed to control differential movements and minimise under-slab moisture changes. It is suggested that floor slabs be tied into shallow footings to prevent relative movement. However, if the slabs are not tied in, they should be detailed to enable movement, independent of foundations, fixtures, etc.

Reactive subgrade materials should not be allowed to 'dry out', otherwise significant softening and swell movements on 'wetting up' could potentially occur.

6.11 Construction Vibration

Vibration will be caused by construction at the site and will require monitoring and assessment to avoid nuisance and to avoid damage to adjoining structures.

The vibration damage criteria given in British Standard BS 7385: Part 2 – 1993 *Evaluation and Measurement for Vibration in Buildings* provide values against which the likelihood of cosmetic building damage from ground vibration can be assessed and this Standard is referenced for assessment of transitory vibrations in Appendix J of Australian Standard AS2187.2– 2006 *Explosives – Storage and use – Part 2: Use of explosives*. Sources of vibration which are considered in the Standard include demolition, blasting (carried out during mineral extraction or construction excavation), piling, ground treatments (e.g. compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

BS 7385 – 2 sets guide values which are given in Table 20 and are for building vibration based on the lowest vibration levels above which cosmetic damage has been credibly demonstrated. These levels are judged to give a **minimal risk of vibration induced cosmetic damage**, where 'minimal risk' for a named effect is usually taken as a 95% probability of no effect.

Table 20: Transient Vibration Guide Values for Cosmetic Damage (BS 7385 – 2)

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4Hz to 15Hz	15Hz and above
1	Reinforced or framed structures, industrial and heavy commercial buildings	50mm/s at 4Hz and above	
2	Unreinforced or light framed structure. Residential or light commercial type buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above

Alternatively, German Standard DIN 4150: Part 3 also provides commonly referenced guidelines for evaluating the effects of vibration on structures. The DIN Standard give 'safe levels' up to which no cosmetic damage due to vibration effects has been observed and these levels are reproduced in Table 21.

Table 21: Vibration Guideline for Evaluating the Effects of Short-Term Vibration on Structures

Line	Type of Structure	Guideline Values for Velocity, v_i, in mm/s			
		Vibration at the Foundation at a Frequency of			Vibration at Horizontal Plane of Highest Floor at All Frequencies
		1Hz to 10Hz	10Hz to 50Hz	50Hz to 100Hz*	
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10	8

* At frequencies above 100Hz, the values given in this column may be used as minimum values

The DIN 4150 – 3 Levels are more conservative than BS 7385 – 2, to avoid a small risk of cosmetic cracking.

A dilapidation survey of adjacent buildings (services, roads etc.) is strongly recommended prior to commencement of site work.

6.12 Earthquake Site Factor

With reference to Australian Standard AS1170.4 – 2007 (R2018/Amdt2-2018) *Structural design actions- Earthquake actions in Australia*, it is considered that the following may be adopted for the site:

Hazard Design Factor (Z): 0.08

Class Definitions: The site in its current condition is considered to be a Class D-Deep or soft soil site, due to layers of very loose to loose sand encountered at 7.5m depth in Bores 1 and 4. The appropriate Class Definition must be assessed on a location by location basis, once earthworks design has been completed.

BUTLER PARTNERS PTY LTD

RICARDO ZANNIN-PESCE
Associate

Reviewed by:
MIKE NEIGHBOUR
Principal

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

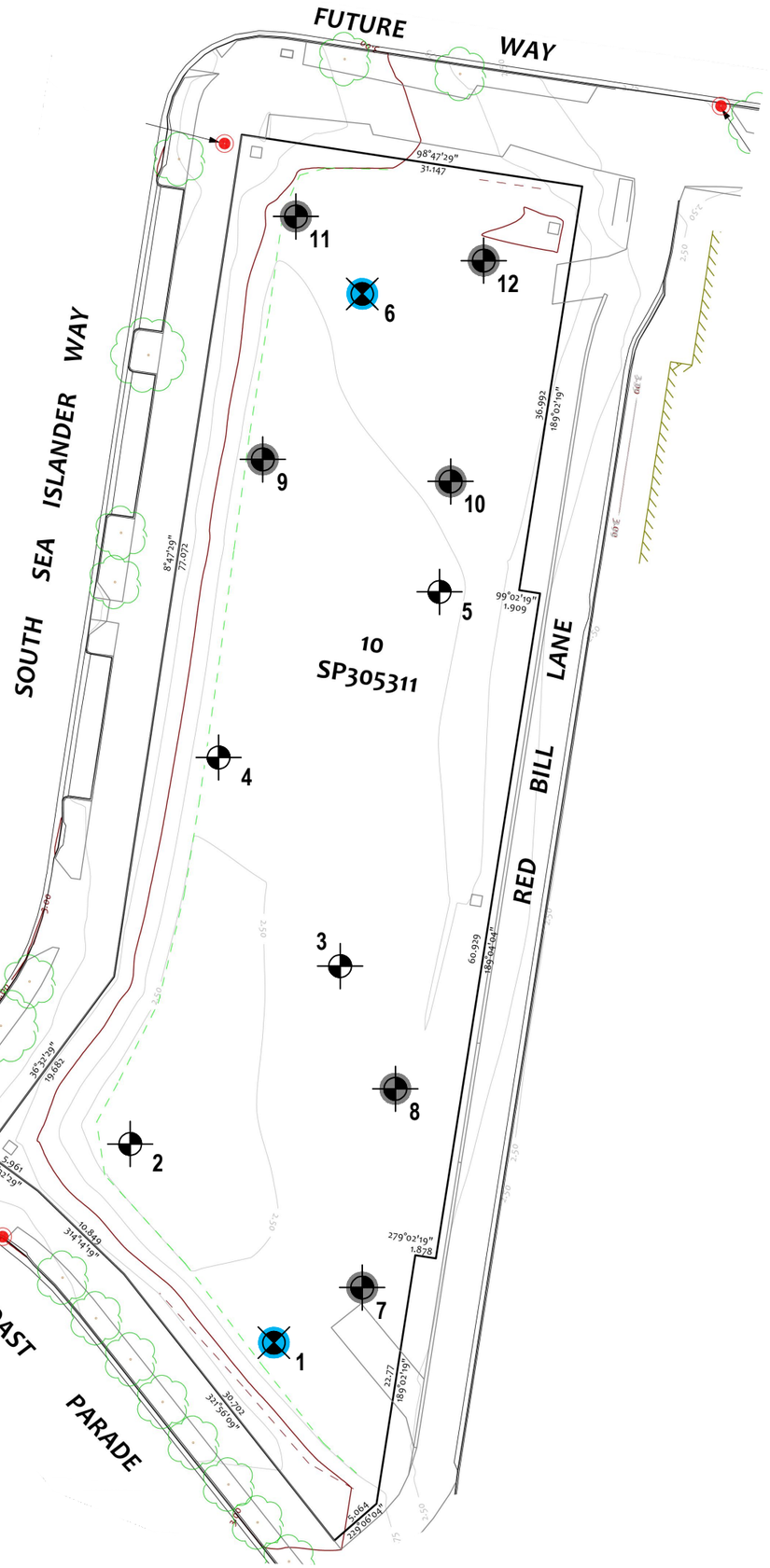
Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
THE BEST PEOPLE ON EARTH

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

IIGER06085.0MRP



LEGEND

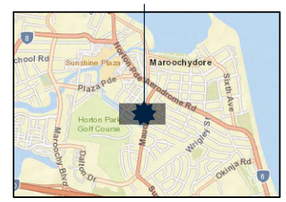
- 2 Deep Bore
- 7 Shallow Bore
- 1 Deep Bore / Monitoring Well

Imagery Reference: ONF Surveyors, 'Contour Detail Survey and Underground Service Location, Drawing No. 12125_D1, dated 22/03/2024.

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners Pty Ltd
ABN 43 603 849 305
1/6 Runway Drive
Marcoola, Queensland 4564
Ph: 07 3256 2900
enquires@butlerpartners.com.au

Site



Imagery Reference: Sunshine Coast Council Mapping

SC 1.5 Data Centre Expansion - Stages 2 and 3

Lot 10 South Sea Islander Way, Maroochydore

Locality Plan and Test Locations

CLIENT: **NEXTDC Limited**

SCALE AT A3:	Not to Scale
DATE:	MAY 2024
DRAWN:	LA
APPROVED:	RZ
PROJECT No:	SG24-1501A
DRAWING No:	1 REV: A

File Location: p:\projects 2024\sg24-1501a - maroochydore, lot 10 south sea islander way\graphics\drawings\sg24-1501a dwg [reva 300524.dwg Saved on: 6/6/2024 1:59:49 PM By: lalmeida

APPENDIX A

BORE REPORT SHEETS WITH EXPLANATORY NOTES

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 1

Page No: 1 of 3
Date: 9 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results
0		2.8			
	FILL - grey-dark brown, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to medium grained sand		S	0.5	8,12,10 N=22
1		2.0		0.95	
	SAND (SP) - medium dense, dark brown, fine to medium grained, trace fine to coarse angular to sub-angular gravel		S	1.5	3,4,6 N=10
2	- loose	1.0		1.95	
		0.0	S	3.0	5,14,25 N=39
3	- dense (indurated sand)			3.45	
		-1.0	S	4.5	7,9,12 N=21
4				4.93	
	- medium dense	-2.0			
5					
		-3.0	S	6.0	4,5,8 N=13
6	- grey			6.45	
		-4.0			
7					
	CLAYEY SAND (SC) - very loose, grey, fine to medium grained	-5.0	S	7.5	2,1,0 N=1
8				7.95	
		-6.0			
9	- medium dense, pale grey		S	9.0	5,10,12 N=22
		-7.0		9.45	
10					

Groundwater Monitoring Bore: Casing, Backfill, Bentonite, Screen, Sand

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)		

Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Logged by: AH
Co-Ordinates E: 509187
Co-Ordinates N: 7051184
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 1

Page No: 2 of 3
Date: 9 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results
11	***SILTY CLAY (CH)*** - stiff, red-pale grey, with fine grained sand	-8.0	S	10.5	3,4,6 N=10
				10.95	
12		-9.0	U	12.0	
	- hard, interbedded with sandy clay bands			12.45	pp=600
13		-10.0			
	- very stiff		S	13.5	9,10,13 N=23
14		-11.0		13.92	
15		-12.0	S	15.0	12,17,23 N=40
				15.45	
16		-13.0			
	- hard		S	16.5	11,16,20 N=36
17		-14.0		16.95	
18		-15.0	S	18.0	13,20,25 N=45
				18.45	
19		-16.0			
	- pale grey-red		S	19.5	16,28 30/120mm
20		-17.0		19.95	

Groundwater Monitoring Bore

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)		

Is(50)	Point Load Test Result (MPa)
(d)	Diametral Test
(a)	Axial Test
(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

Logged by: AH
Co-Ordinates E: 509187
Co-Ordinates N: 7051184

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 1

Page No: 3 of 3
Date: 9 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
21	- brown-pale grey	-18.0		S	21.0 21.45	14,21,28 N=49	
22		-19.0		S	22.5 22.95	14,20,24 N=44	
23	***CLAYEY SAND (SC)*** - very dense, grey, fine to coarse grained	-20.0		S	24.0 24.13	30/125mm	
24		-21.0					
25		-22.0		S	25.5 25.8	20, 30/105mm	
26	***SANDY CLAY (CI)*** - hard, grey brown, fine to medium grained sand	-23.0		S	27.0 27.3	19, 30/125mm	
27		-24.0		S	28.5 28.74	30, 30/85mm	
28		-25.0					
29		-26.0		S	30.0 30.3	25, 30/110mm	
30	End of Bore at 30.3 m	-27.0					

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**		

Is(50)	**Point Load Test Result (MPa)**
(d)	**Diametral Test**
(a)	**Axial Test**
(i)	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

Logged by: AH
Co-Ordinates E: 509187
Co-Ordinates N: 7051184

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 2

Page No: 1 of 3
Date: 30 April 2024
Ground Surface Level: RL2.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		2.5				
	FILL - grey-dark brown, sandy gravel, fine to medium grained angular to sub-angular gravel, fine to coarse grained sand			S	0.5	6,10,11 N=21
1	***SAND (SP)*** - medium dense, pale grey, fine to medium grained, with clay	1.0			0.95	
				S	1.5	5,6,9 N=15
2		0.0			1.95	
3	- very dense, dark brown (indurated sand)			S	3.0	29, 30/100mm
		-1.0			3.25	
4						
		-2.0		S	4.5	25,29, 30/130mm
5					4.93	
		-3.0				
6	- dense			S	6.0	10,16,18 N=34
		-4.0			6.45	
7						
	SANDY CLAY (CL) - very stiff, grey, fine to medium grained sand	-5.0		S	7.5	2,4,8 N=12
8					7.95	
		-6.0				
9	***CLAYEY SAND (SC)*** - dense, grey, fine to medium grained, trace fine to coarse grained angular to sub-angular gravel			S	9.0	18,16,14 N=30
		-7.0			9.45	
10						

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: JS
Co-Ordinates E: 509187
Co-Ordinates N: 7051184

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 2

Page No: 2 of 3
Date: 30 April 2024
Ground Surface Level: RL2.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
11	***SILTY CLAY (CH)*** - very stiff, grey, with fine grained sand	-8.0		S	10.5	5,8,10 N=18
					10.95	
		-9.0				
12	- stiff, grey mottled brown			S	12.0	3,4,8 N=12
		-10.0			12.45	
13						
	- trace fine to medium grained angular to sub-angular gravel	-11.0		U	13.5	pp=300
14					13.92	
		-12.0				
15	- hard			S	15.0	9,14,20 N=34
		-13.0			15.45	
16						
	CLAYEY SAND (SC) - dense, grey mottled brown, fine to medium grained	-14.0		S	16.5	9,14,22 N=36
17					16.95	
		-15.0				
18				S	18.0	12,17,22 N=39
		-16.0			18.45	
19						
		-17.0		S	19.5	14,20,28 N=48
20					19.95	

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: JS
Co-Ordinates E: 509187
Co-Ordinates N: 7051184

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 2

Page No: 3 of 3
Date: 30 April 2024
Ground Surface Level: RL2.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
21	***SILTY CLAY (CH)*** - hard, grey mottled brown, with fine to coarse grained sand, trace fine to medium grained angular to sub-angular gravel	-18.0		S	21.0 21.45	14,21,26 N=47
22		-19.0				
23	***CLAYEY SAND (SC)*** - very dense, grey, fine to medium grained	-20.0		S	22.5 22.74	30, 30/90mm
24		-21.0		S	24.0 24.45	14,28,29 N=57
25		-22.0				
26	- grey-brown mottled red	-23.0		S	25.5 25.8	25, 30/105mm
27	***SILTY CLAY (CH)*** - hard, grey-brown, with fine grained sand	-24.0		S	27.0 27.3	25, 30/135mm
28		-25.0				
29		-26.0		S	28.5 28.73	30, 30/75mm
30	End of Bore at 30.12 m	-27.0		S	30.0 30.12	30/120mm (HB)

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: JS
Co-Ordinates E: 509187
Co-Ordinates N: 7051184

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 3

Page No: 1 of 3
Date: 29 April 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		2.8				
	FILL - grey-dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to coarse grained sand			S	0.5	9,12,16 N=28
1	***SAND (SP)*** - medium dense, grey, fine to medium grained	2.0			0.95	
	- very dense, dark brown-dark grey (indurated sand)	1.0		S	1.5	12,24, 30/120mm
2					1.92	
3		0.0		S	3.0	27, 30/60mm
					3.21	
4		-1.0				
				S	4.5	30/115mm
5		-2.0			4.61	
6	- medium dense, grey	-3.0		S	6.0	9,11,11 N=22
					6.45	
7		-4.0				
	SILTY CLAY (CH) - soft, brown, with fine grained sand			S	7.5	3,2,1 N=3
8	- grey	-5.0			7.95	
9		-6.0				
	CLAYEY SAND (SC) - medium dense, grey, fine to medium grained, trace medium to coarse grained angular to sub-angular gravel			(U)	9.0	
10		-7.0			9.45	

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: Free groundwater encountered at approximately 3m depth
Logged by: ST/CO
Co-Ordinates E: 509203
Co-Ordinates N: 7051202
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 3

Page No: 2 of 3
Date: 29 April 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
11	- medium dense to dense, fine to coarse grained	-8.0		S	10.5 10.95	5,8,22 N=30
12	- dense, medium to coarse grained	-9.0		S	12.0 12.45	20,22,19 N=41
13		-10.0				
14	***SILTY CLAY (CH)*** - very stiff, brown mottled grey, with fine grained sand	-11.0		S	13.5 13.95	7,12,17 N=29
15	- hard	-12.0		S	15.0 15.45	8,20,28 N=48
16		-13.0				
17		-14.0		S	16.5 16.92	15,25, 30/120mm
18	- grey mottled brown	-15.0		S	18.0 18.45	9,13,25 N=38
19		-16.0				
20	- with fine to medium grained sand	-17.0		S	19.5 19.76	25, 30/110mm

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: Free groundwater encountered at approximately 3m depth
Logged by: ST/CO
Co-Ordinates E: 509203
Co-Ordinates N: 7051202
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo–environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 3

Page No: 3 of 3
Date: 29 April 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
21	***SILTY CLAY (CH)*** - very stiff, brown mottled grey, with fine to medium grained sand	-18.0		S	21.0 21.25	8, 30/105mm
22		-19.0				
23	***SANDY CLAY (CI)*** - hard, grey mottled brown, fine to medium grained sand	-20.0		S	22.5 22.93	13,25, 30/105mm
24	***CLAYEY SAND (SC)*** - very dense, pale brown-pale grey, fine to medium grained	-21.0		S	24.0 24.12	27, 30/125mm
25		-22.0				
26	***SANDY CLAY (CH)*** - hard, pale grey, fine grained sand, with layers of clayey sand	-23.0		S	25.5 25.94	20,28, 30/140mm
27		-24.0		U	27.0	pp>600
28	- grey mottled brown, fine to medium grained sand	-25.0		S S	27.5 27.79 28.5 28.61	28, 30/135mm 30/110mm
29		-26.0				
30	End of Bore at 30.15 m	-27.0		S	30.0 30.15	30/135mm

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: Free groundwater encountered at approximately 3m depth
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

Logged by: ST/CO
Co-Ordinates E: 509203
Co-Ordinates N: 7051202

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 4

Page No: 1 of 3
Date: 2 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results
0		2.8			
	FILL - grey-dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to coarse grained sand		S	0.5	7,13,16 N=29
1	***SAND (SP)*** - medium dense, grey, fine to medium grained	2.0		0.95	
	- pale brown, grey		S	1.5	16, 30/125mm
2	- dense, dark brown (indurated sand)	1.0		1.8	
		0.0	S	3.0	27, 30/80mm
3				3.23	
4		-1.0			
	- dense		S	4.5	15,20,23 N=43
5		-2.0		4.95	
		-3.0			
6	- medium dense		S	6.0	8,8,10 N=18
				6.45	
7		-4.0			
	CLAYEY SAND (SC) - very loose, grey, fine to coarse grained		S	7.5	0,1,3 N=4
8		-5.0		7.95	
		-6.0			
9	- loose		S	9.0	4,1,4 N=5
				9.45	
10		-7.0			

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509191
Co-Ordinates N: 7051215

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 4

Page No: 2 of 3
Date: 2 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
11	- medium dense, grey, fine to medium grained, trace of fine to medium grained angular to sub-angular gravel	-8.0		S	10.5 10.95	7,11,12 N=23
12		-9.0		S	12.0 12.45	9,5,7 N=12
13	***SILTY CLAY (CH)*** - stiff, grey, trace of fine grained sand	-10.0				
14	- very stiff, brown pale grey	-11.0		S	13.5 13.95	8,10,15 N=25
15	- hard, with fine grained sand	-12.0		U	15.0 15.3	pp>600
16		-13.0				
17	- pale grey, trace fine grained sand	-14.0		S	16.5 16.95	12,16,19 N=35
18	- brown red pale grey	-15.0		S	18.0 18.45	11,17,21 N=38
19		-16.0				
20	***CLAYEY SAND (SC)*** - dense, pale grey, fine to medium grained	-17.0		S	19.5 19.95	12,19,22 N=41

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509191
Co-Ordinates N: 7051215

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 4

Page No: 3 of 3
Date: 2 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
21	- very dense, orange mottled pale grey	-18.0		S	21.0 21.26	29, 30/110mm
22		-19.0				
23		-20.0		S	22.5 22.91	21,30, 30/105mm
24	- pale grey	-21.0		S	24.0 24.42	23,29, 30/120mm
25		-22.0				
26	***SILTY CLAY (CH)*** - hard, mottled brown pale grey, trace fine to medium grained sand	-23.0		S	25.5 25.8	24, 30/115mm
27	***CLAYEY SAND (SC)*** - very dense, grey, fine to medium grained	-24.0		S	27.0 27.14	30/135mm
28		-25.0				
29	- grey brown	-26.0		S	28.5 28.61	30/110mm
30		-27.0		S	30.0 30.14	30/135mm
	End of Bore at 30.14 m					

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509191
Co-Ordinates N: 7051215

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 5

Page No: 1 of 3
Date: 9 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		0.0				
	FILL - grey-dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to coarse grained sand			S	0.5	12,13,14 N=27
1	***SAND (SP)*** - medium dense, dark brown, fine to medium grained	-1.0			0.95	
	- pale brown-dark brown			S	1.5	18,22, 30/135mm
2	- dark brown-pale grey	-2.0			1.94	
	- very dense, dark brown (indurated sand)			S	3.0	21,30, 30/120mm
3		-3.0			3.42	
4		-4.0		S	4.5	17,28, 30/110mm
5		-5.0			4.91	
6	- dense	-6.0		S	6.0	11,16,20 N=36
					6.45	
7	- loose, grey, trace fine to medium grained angular to sub-angular gravel	-7.0		S	7.5	5,5,2 N=7
8	***SILTY CLAY (CI)*** - firm, grey, with fine to medium grained sand	-8.0			7.95	
9	- soft	-9.0		S	9.0	0,0,3 N=3
					9.45	
10		-10.0				

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509187
Co-Ordinates N: 7051184

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 5

Page No: 2 of 3
Date: 9 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
	SILTY CLAY (CH) - soft, grey, trace fine grained sand				10.5	
11		-11.0		(U)	10.95	
12	- very stiff, brown-pale grey	-12.0		S	12.0	4,7,9 N=16
					12.45	
13		-13.0				
	- with fine to medium grained sand			S	13.5	8,8,10 N=18
14		-14.0			13.95	
15	***CLAYEY SAND (SC)*** - medium dense to dense, brown-pale grey, fine to coarse grained	-15.0		S	15.0	13,12,18 N=30
					15.45	
16		-16.0				
	- very dense			S	16.5	28, 30/140mm
17		-17.0			16.8	
18	- dense	-18.0		S	18.0	12,17,21 N=38
					18.45	
19		-19.0		S	19.5	12,24,28 N=47
20	***SILTY CLAY (CH)*** - hard, brown-pale grey, with fine to medium grained sand	-20.0			19.95	

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Logged by: AH
Co-Ordinates E: 509187
Co-Ordinates N: 7051184
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 5

Page No: 3 of 3
Date: 9 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
21	***SILTY CLAY (CH)*** - hard, brown-pale grey, with fine to medium grained sand	-21.0		S	21.0 21.3	20, 30/130mm
22		-22.0				
23	***CLAYEY SAND (SC)*** - very dense, grey, fine to coarse grained, trace fine angular to sub-angular gravel	-23.0		S	22.5 22.6	30/105mm
24	***SILTY CLAY (CH)*** - hard, brown-grey	-24.0		S	24.0 24.45	12,22,24 N=46
25		-25.0				
26	***CLAYEY SAND (SC)*** - very dense, grey, fine to medium grained	-26.0		S	25.5 25.62	30/115mm
27	- brown-grey	-27.0		S	27.0 27.3	26, 30/120mm
28		-28.0		S	28.5 28.8	28, 30/120mm
29		-29.0				
30		-30.0		S	30.0 30.3	30, 30/140mm
	End of Bore at 30.3 m					

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509187
Co-Ordinates N: 7051184

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 6

Page No: 1 of 3
Date: 7 May 2024
Ground Surface Level: RL2.9m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
0		2.9					
	FILL - grey-dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to medium grained sand			S	0.5	11,15,23 N=38	
1		2.0			0.95		
	SAND (SP) - medium dense, grey, fine to medium grained			S	1.5	25, 30/100mm	
2	- pale grey	1.0			1.8		
	- very dense, dark brown (indurated sand)						
3		0.0		S	3.0	22, 30/120mm	
					3.3		
4		-1.0					
	- dense			S	4.5	15,20,22 N=42	
5		-2.0			4.95		
6	- brown	-3.0		S	6.0	12,18,21 N=39	
					6.45		
7		-4.0					
	- medium dense			S	7.5	10,12,13 N=25	
8		-5.0			7.95		
9	***SILTY CLAY (CH)*** - soft, grey, trace fine grained sand	-6.0		S	9.0	1,1,2 N=3	
					9.45		
10		-7.0					

Backfill
Casing
Bentonite
Sand
Screen

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509202
Co-Ordinates N: 7051243

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 6

Page No: 2 of 3
Date: 7 May 2024
Ground Surface Level: RL2.9m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results
11	***SILTY CLAY (CH)*** - soft, grey, trace fine grained sand	-8.0	U	10.5	
	- stiff, red-brown mottled pale grey			10.9	pp=270
12		-9.0	U	12.0	
	- very stiff			12.3	pp=600
13		-10.0			
	SANDY CLAY (CH)		S	13.5	10,14,19
14	- hard, orange mottled pale grey and grey, fine to medium grained sand	-11.0		13.95	N=33
15		-12.0	S	15.0	9,14,16
				15.45	N=30
16		-13.0			
	SILTY CLAY (CH)		S	16.5	12,15,21
17	- hard, orange mottled pale grey	-14.0		16.95	N=36
18		-15.0	S	18.0	21,
	CLAYEY SAND (SC)			18.3	30/120mm
19	- very dense, brown, fine to medium grained	-16.0			
	- dense		S	19.5	18,24,25
20		-17.0		19.95	N=49

D Disturbed Sample
U Undisturbed Tube (50mm dia)
B Bulk Sample
pp Pocket Penetrometer Test (kPa)
S Standard Penetration Test (SPT)
HB SPT Hammer Bouncing
( ) No Sample Recovery
V Vane Shear Strength, Uncorrected (kPa)
E Environmental Sample
Up Pushtube Sample
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Logged by: AH
Co-Ordinates E: 509202
Co-Ordinates N: 7051243
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

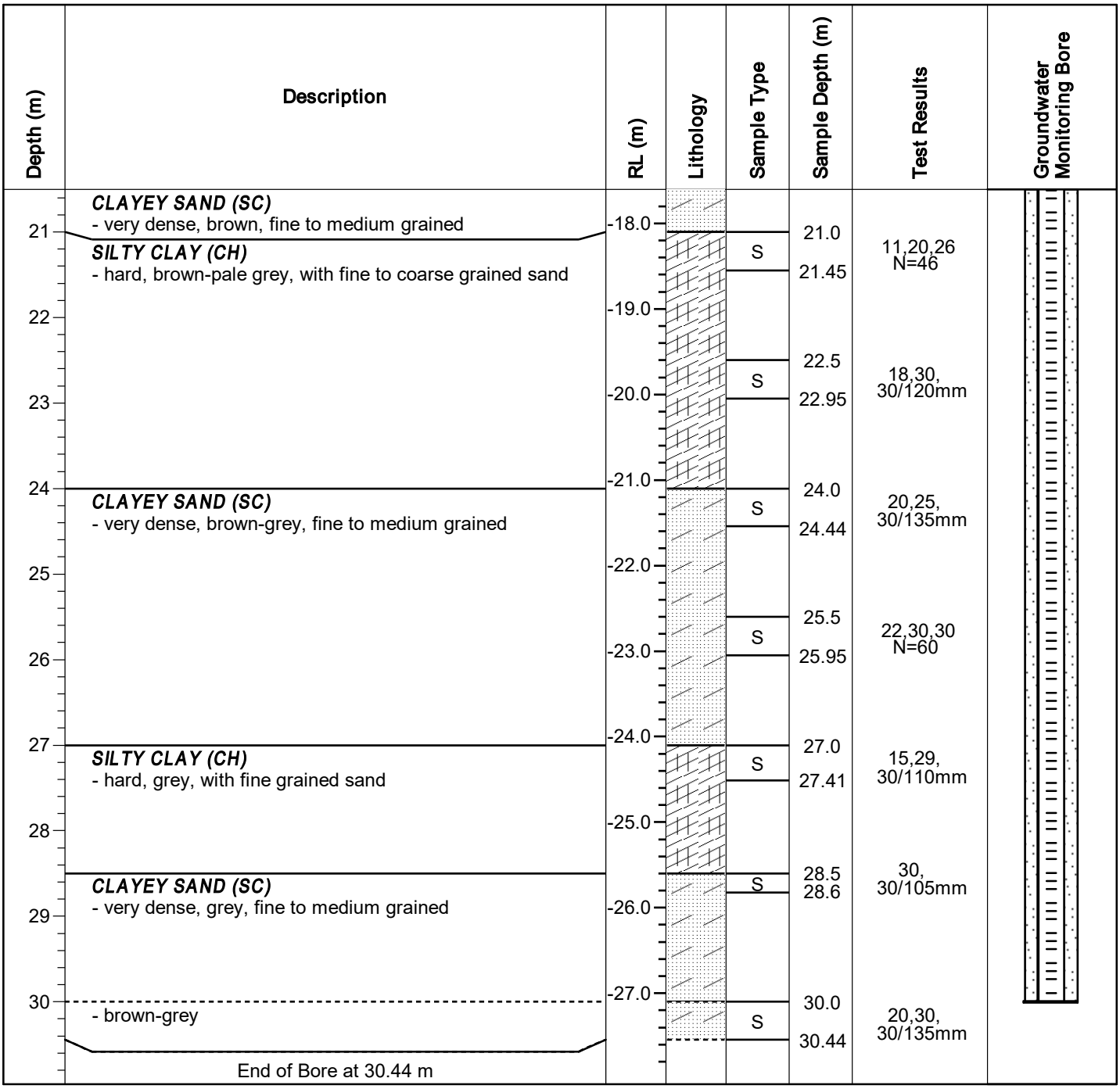
BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 6

Page No: 3 of 3
Date: 7 May 2024
Ground Surface Level: RL2.9m*



D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509202
Co-Ordinates N: 7051243

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 7

Page No: 1 of 1
Date: 7 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		2.8				
	FILL - grey to dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to coarse grained sand			B	0.2 0.5	
1	***GRAVELLY SAND (SP)*** - medium dense, dark brown, fine to coarse grained gravel, fine to coarse grained gravel	2.0				
2	- very dense, grey	1.0				
	End of Bore at 2 m	0.0				
3		-1.0				
4		-2.0				
5		-3.0				
6		-4.0				
7		-5.0				
8		-6.0				
9		-7.0				
10						

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509215
Co-Ordinates N: 7051177

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 8

Page No: 1 of 1
Date: 7 May 2024
Ground Surface Level: RL2.8

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		2.8				
	FILL - grey to dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to medium grained sand				0.2	
1		2.0		B		
	SAND (SP) - medium dense, dark brown, fine to medium grained				1.0	
2	- very dense, grey	1.0				
	End of Bore at 1.5 m					
3		0.0				
4		-1.0				
5		-2.0				
6		-3.0				
7		-4.0				
8		-5.0				
9		-6.0				
10		-7.0				

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509207
Co-Ordinates N: 7051198

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 9

Page No: 1 of 1
Date: 7 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		2.8				
	FILL - grey to dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to medium grained sand			B	0.2	
0.5					0.5	
1	- dark brown	2.0				
	SAND (SP) - very dense, grey	1.0				
2	End of Bore at 1.5 m					
3		0.0				
4		-1.0				
5		-2.0				
6		-3.0				
7		-4.0				
8		-5.0				
9		-6.0				
10		-7.0				

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509207
Co-Ordinates N: 7051198

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 10

Page No: 1 of 1
Date: 7 May 2024
Ground Surface Level: RL2.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		2.8				
	FILL - grey to dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to medium grained sand				0.2 0.4	
1		2.0				
	SAND (SP) - medium dense, dark brown, fine to medium grained					
2	- very dense, pale grey	1.0				
	End of Bore at 1.5 m	0.0				
3		-1.0				
4		-2.0				
5		-3.0				
6		-4.0				
7		-5.0				
8		-6.0				
9		-7.0				
10						

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger
Groundwater: No free groundwater encountered during auger drilling
Logged by: AH
Co-Ordinates E: 509213
Co-Ordinates N: 7051242
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 11

Page No: 1 of 1
Date: 7 May 2024
Ground Surface Level: RL3.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		3.0				
	FILL - grey to dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to medium grained sand			B	0.2 0.5	
1		2.0				
	SAND (SP) - medium dense, dark grey, fine to medium grained, trace fine to coarse grained angular to sub-angular gravel					
2		1.0				
	End of Bore at 1.5 m					
3		0.0				
4		-1.0				
5		-2.0				
6		-3.0				
7		-4.0				
8		-5.0				
9		-6.0				
10		-7.0				

D	Disturbed Sample	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm dia)	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Drilling Method: Auger
Groundwater: No free groundwater encountered during auger drilling
Logged by: AH
Co-Ordinates E: 509213
Co-Ordinates N: 7051242
Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

BORE REPORT

Butler Partners
geotechnical • geo-environmental • groundwater

Client: NEXTDC Limited
Project: SC 1.5 Data Centre Expansion - Stage 2 & 3
Location: Lot 10 South Sea Islander Way, Maroochydore
Project No: SG24-1501A

BORE 12

Page No: 1 of 1
Date: 7 May 2024
Ground Surface Level: RL3.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		3.0				
	FILL - grey to dark grey, sandy gravel, fine to coarse grained angular to sub-angular gravel, fine to medium grained sand			B	0.2 0.5	
1	***SAND (SP)*** - medium dense, dark brown, fine to medium grained	2.0				
2	End of Bore at 1.5 m	1.0				
3		0.0				
4		-1.0				
5		-2.0				
6		-3.0				
7		-4.0				
8		-5.0				
9		-6.0				
10		-7.0				

D	**Disturbed Sample**	**S**	**Standard Penetration Test (SPT)**	**E**	**Environmental Sample**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm dia)**	**HB**	**SPT Hammer Bouncing**	**Up**	**Pushtube Sample**	**(d)**	**Diametral Test**
B	**Bulk Sample**	**( )**	**No Sample Recovery**	**C**	**NMLC Coring**	**(a)**	**Axial Test**
pp	**Pocket Penetrometer Test (kPa)**	**V**	**Vane Shear Strength, Uncorrected (kPa)**			**(i)**	**Lump Test**

Rig: Hydrapower Scout
Drilling Method: Auger
Groundwater: No free groundwater encountered during auger drilling

Logged by: AH
Co-Ordinates E: 509213
Co-Ordinates N: 7051242

Remarks: *Approximate ground surface level interpolated from ONF Surveyors' Contour Details Survey Drawing No. 12125_D1, dated 22/3/24

Butler Partners
geotechnical • geo-environmental • groundwater

Gold Coast Laboratory
2/23 Traders Way
Currumbin Queensland 4223
Telephone 61 (07) 5535 2539
Accreditation No. 18820

Accredited for compliance with ISO/IEC 17025 - Testing

Dynamic Cone Penetrometer

Test Method: AS1289.6.3.2

Client:	NextDC Limited	**Report No.:**	**SG24-1501A_DCP_BH7-11**
Project:	SC1.5 Data Centre Expansion-Stg 2&3	Tested by:	AH
Location:	Lot 10 South Sea Islander Way	Date:	7/05/2024
	Maroochydore	Checked by:	RZP
Project No.:	SG24 - 1501A	Date:	20/05/2024

Sample No.:					
Bore:	7	8	9	10	11
Sample Description:	-	-	-	-	-
Location of Groundwater Table if known:	-	-	-	-	-
Moisture Condition:	-	-	-	-	-

PENETRATION RESISTANCE - BLOWS / 100mm

Depth (m):	Test Location Number				
0.0-0.1	17	-	-	12	-
0.1-0.2	15	12	9	15	7
0.2-0.3	20	14	10	17	8
0.3-0.4	18	17	8	21	6
0.4-0.5	18	22	17	21	4
0.5-0.6	16	>25	16	>25	6
0.6-0.7	12	End	23	End	6
0.7-0.8	>25		21		15
0.8-0.9	End		>25		19
0.9-1.0			End		>25
1.0-1.1					End
1.1-1.2					
1.2-1.3					
1.3-1.4					
1.4-1.5					
1.5-1.6					
1.6-1.7					
1.7-1.8					
1.8-1.9					
1.9-2.0					
2.0-2.1					
2.1-2.2					
2.2-2.3					
2.3-2.4					
2.4-2.5					
2.5-2.6					
2.6-2.7					
2.7-2.8					
2.8-2.9					
2.9-3.0					

Comments

Butler Partners
geotechnical • geo-environmental • groundwater

Gold Coast Laboratory
2/23 Traders Way
Currumbin Queensland 4223
Telephone 61 (07) 5535 2539
Accreditation No. 18820

Accredited for compliance with ISO/IEC 17025 - Testing

Dynamic Cone Penetrometer

Test Method: AS1289.6.3.2

Client:	NextDC Limited	**Report No.:**	**SG24-1501A_DCP_BH12**
Project:	SC1.5 Data Centre Expansion-Stg 2&3	Tested by:	AH
Location:	Lot 10 South Sea Islander Way	Date:	7/05/2024
	Maroochydore	Checked by:	RZP
Project No.:	SG24 - 1501A	Date:	20/05/2024

Sample No.:					
Bore:	12				
Sample Description:	-				
Location of Groundwater Table if known:	-				
Moisture Condition:	-				

PENETRATION RESISTANCE - BLOWS / 100mm

Depth (m):	Test Location Number				
0.0-0.1	-				
0.1-0.2	7				
0.2-0.3	12				
0.3-0.4	12				
0.4-0.5	20				
0.5-0.6	19				
0.6-0.7	20				
0.7-0.8	>25				
0.8-0.9	End				
0.9-1.0					
1.0-1.1					
1.1-1.2					
1.2-1.3					
1.3-1.4					
1.4-1.5					
1.5-1.6					
1.6-1.7					
1.7-1.8					
1.8-1.9					
1.9-2.0					
2.0-2.1					
2.1-2.2					
2.2-2.3					
2.3-2.4					
2.4-2.5					
2.5-2.6					
2.6-2.7					
2.7-2.8					
2.8-2.9					
2.9-3.0					

Comments

Butler Partners
geotechnical • geo-environmental • groundwater

Notes on Description and Classification of Soil

The methods of description and classification of soils used in this report are generally based on Australian Standard AS1726-1993 Geotechnical Site Investigations.

Soil description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures or in undisturbed samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

In the case of cone or piezocone penetrometer tests, actual soil samples are not recovered and soil description is inferred based on published correlations, past experience and comparison with bore and/or test pit data (if available).

Soil classification is based on the particle size distribution of the soil and the plasticity of the portion of the material finer than 0.425mm. The description of particle size distribution and plasticity is based on the results of visual field estimation, laboratory testing or both. When assessed in the field, the properties of the soil are estimated; precise description will always require laboratory testing to define soil properties.

Where soil can be clearly identified as FILL this will be noted as the main soil type followed by a description of the composition of the fill (e.g. FILL – yellow-brown, fine to coarse grained gravelly clay fill with concrete rubble). If the soil is assessed as possibly being fill this will be noted as an additional observation.

Soils are generally described using the following sequence of terms. In certain instances, not all of the terms will be included in the soil description.

MAIN SOIL TYPE (CLASSIFICATION GROUP SYMBOL)
- strength/density, colour, structure/grain size, secondary and minor components, additional observations

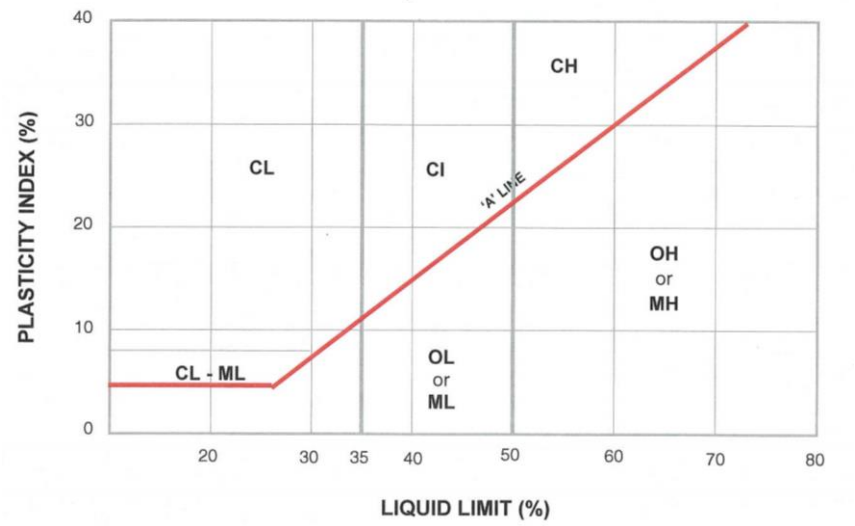
Information on the definition of descriptive and classification terms follows.

SOIL TYPE and CLASSIFICATION GROUP SYMBOLS

	Major Divisions	Particle Size	Classification Group Symbol	Typical Names
COARSE GRAINED SOILS (more than half of material is larger than 0.075mm)	BOULDERS	>200mm		
	COBBLES	63 – 200mm		
	GRAVELS (more than half of coarse fraction is larger than 2.36mm)	Coarse: 20 – 63mm Medium: 6 – 20mm Fine: 2.36 – 6mm	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels.
			GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than 2.36mm)	Coarse: 0.6 – 2.36mm Medium: 0.2 – 0.6mm Fine: 0.075 – 0.2mm	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands.
			SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (more than half of material is smaller than 0.075mm)	SILTS & CLAYS (liquid limit <50%)		ML	Inorganic silts and very fine sands, silty/clayey fine sands or clayey silts with low plasticity.
			CL and CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS & CLAYS (liquid limit >50%)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils.
			CH	Inorganic clays of high plasticity.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Butler Partners
geotechnical • geo-environmental • groundwater

PLASTICITY CHART FOR CLASSIFICATION OF FINE GRAINED SOILS



(Reference: Australian Standard AS1726-1993 Geotechnical site investigations)

DESCRIPTIVE TERMS FOR MATERIAL PROPORTIONS

Coarse Grained Soils		Fine Grained Soils	
% Fines	Modifier	% Coarse	Modifier
<5	Omit, or use 'trace'	<15	Omit, or use trace.
5 – 12	Describe as 'with clay/silt' as applicable.	15 – 30	Describe as 'with sand/gravel' as applicable.
>12	Prefix soil as 'silty/clayey' as applicable	>30	Prefix soil as 'sandy/gravelly' as applicable.

STRENGTH TERMS – COHESIVE SOILS

Strength Term	Undrained Shear Strength	Field Guide to Strength
Very soft	<12kPa	Exudes between the fingers when squeezed in hand.
Soft	12 – 25kPa	Can be moulded by light finger pressure.
Firm	25 – 50kPa	Can be moulded by strong finger pressure.
Stiff	50 – 100kPa	Cannot be moulded by fingers, can be indented by thumb.
Very stiff	100 – 200kPa	Can be indented by thumb nail.
Hard	>200kPa	Can be indented with difficulty by thumb nail.

DENSITY TERMS – NON COHESIVE SOILS

Density Term	Density Index	SPT "N"	CPT Cone Resistance
Very loose	<15%	0 – 5	0 – 2MPa
Loose	15 – 35%	5 – 10	2 – 5MPa
Medium dense	35 – 65%	10 – 30	5 – 15MPa
Dense	65 – 85%	30 – 50	15 – 25MPa
Very dense	>85%	>50	>25MPa

COLOUR

The colour of a soil will generally be described in a 'moist' condition using simple colour terms (e.g. black, grey, red, brown etc.) modified as necessary by "pale", "dark", "light" or "mottled". Borderline colours will be described as a combination of colours (e.g. grey-brown).

EXAMPLE

e.g. CLAYEY SAND (SC) – medium dense, grey-brown, fine to medium grained with silt.

Indicates a medium dense, grey-brown, fine to medium grained clayey sand with silt.

APPENDIX B

LABORATORY TEST RESULTS

Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

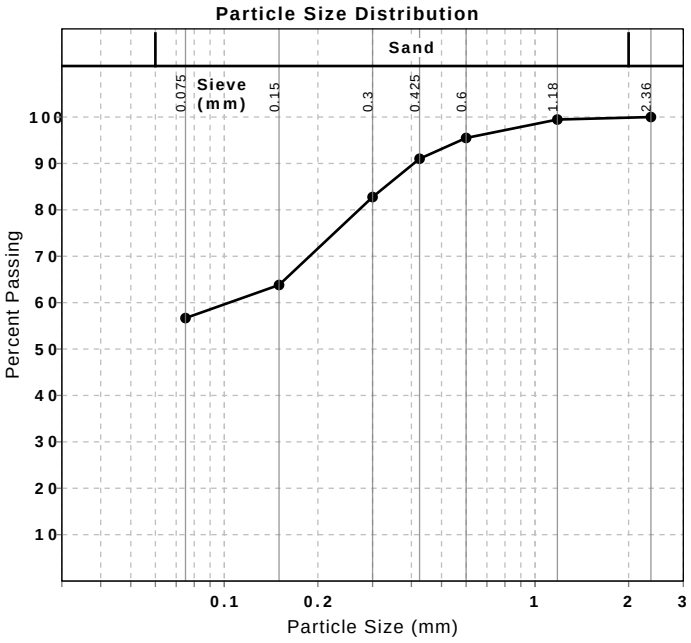
Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174A
Date Sampled: 30/04/2024
Dates Tested: 15/05/2024 - 30/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 2 , Depth: 7.5 - 7.95m**

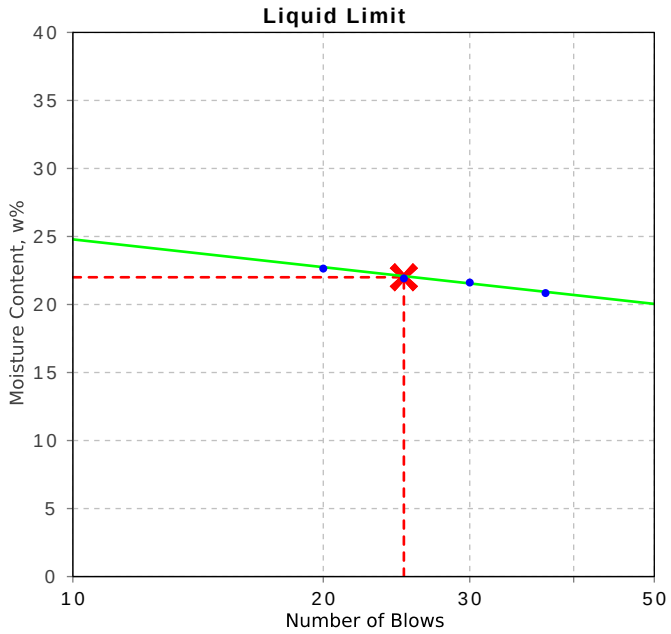
Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
2.36 mm	**100**			0		
1.18 mm	**99**			1		
0.6 mm	**95**			4		
0.425 mm	**91**			4		
0.3 mm	**83**			8		
0.15 mm	**64**			19		
0.075 mm	**57**			7		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	22		
Plastic Limit (%)	11		
Plasticity Index (%)	**11**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	**4.5**		
Cracking Crumbling Curling	None		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	16.4		





Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

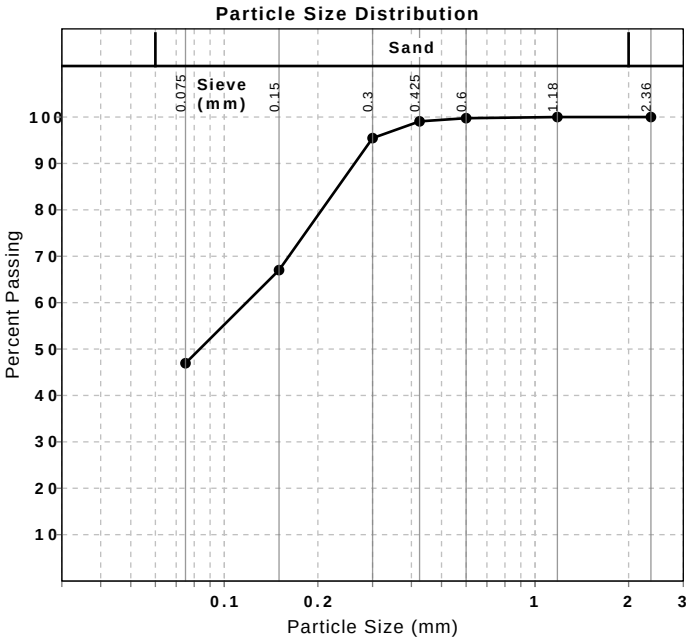
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number:	**SG24-1501A-1**
Issue Number:	1
Date Issued:	06/06/2024
Client:	NEXTDC Limited
	GPO Box 3219, Brisbane QLD 4001
Contact:	Angus Barron
Project Number:	SG24-1501A
Project Name:	SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location:	Lot 10 South Sea Islander Way, Maroochydore
Work Request:	3174
Sample Number:	G24-3174B
Date Sampled:	30/04/2024
Dates Tested:	15/05/2024 - 30/05/2024
Sampling Method:	Sampled by Client
	The results apply to the sample as received
Preparation Method:	AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location:	**Bore 2 , Depth: 16.5 - 16.95**

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
2.36 mm	**100**			0		
1.18 mm	**100**			0		
0.6 mm	**100**			0		
0.425 mm	**99**			1		
0.3 mm	**95**			4		
0.15 mm	**67**			28		
0.075 mm	**47**			20		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	17.1		



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

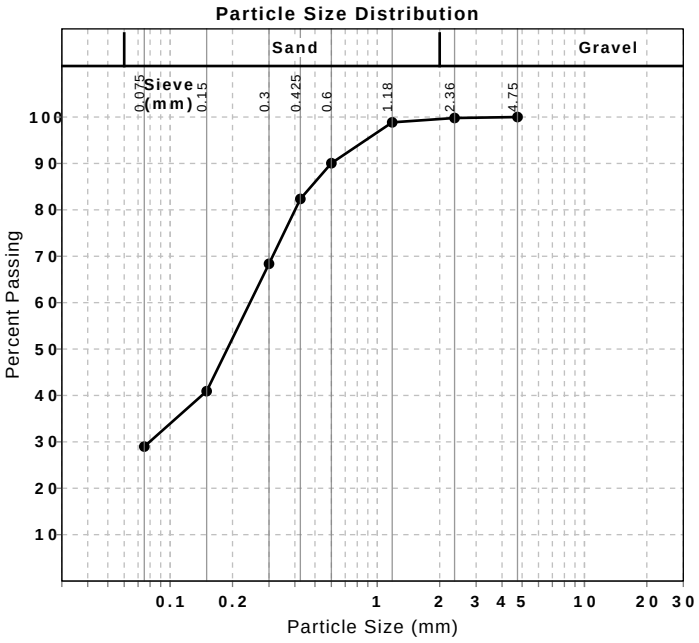
Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174C
Date Sampled: 02/05/2024
Dates Tested: 15/05/2024 - 01/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 4 , Depth: 7.5 - 7.95m**

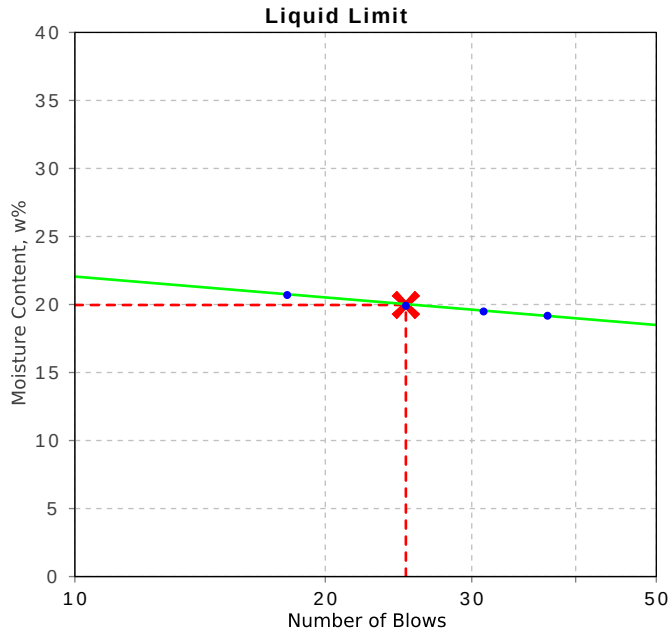
Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
4.75 mm	**100**			0		
2.36 mm	**100**			0		
1.18 mm	**99**			1		
0.6 mm	**90**			9		
0.425 mm	**82**			8		
0.3 mm	**68**			14		
0.15 mm	**41**			27		
0.075 mm	**29**			12		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	20		
Plastic Limit (%)	12		
Plasticity Index (%)	**8**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	**3.5**		
Cracking Crumbling Curling	Cracking		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	27.9		





Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174D
Date Sampled: 09/05/2024
Dates Tested: 15/05/2024 - 29/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 5 , Depth: 1.5 - 1.94m**

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	Sand		
Nature of Water	Distilled		
Temperature of Water (°C)	18		

pH Value of Soil (AS 1289 4.3.1)		Min	Max
Soil-suspension Temperature (°C)	18		
Distilled Water pH	7.2		
Depth	1.5 - 1.94		
Material Description	Sand		
Moisture Condition	Air-dried		
pH	4.5		
Electrical Conductivity (µS/cm)	323.5		
For Conductivity - 1 dS/m = 1 mS/cm = 1000 µS/cm			
Electrical Conductivity not covered by accreditation.			

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	19.3		

Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

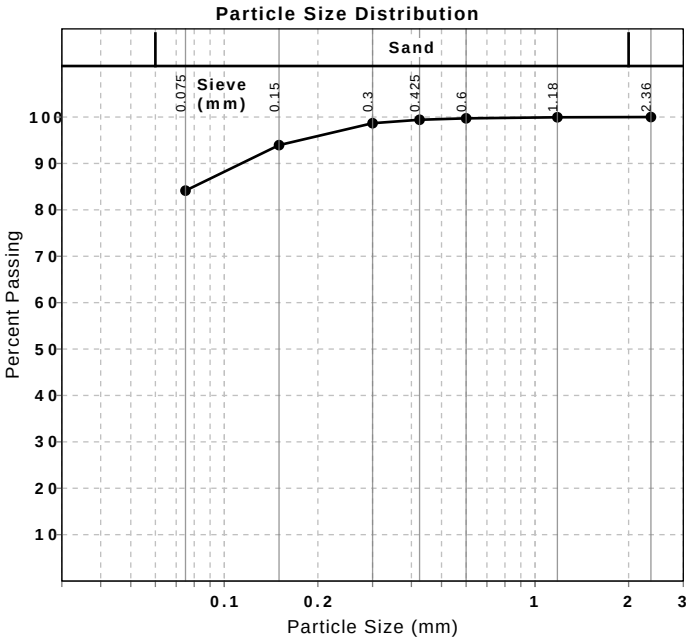
Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174E
Date Sampled: 09/05/2024
Dates Tested: 15/05/2024 - 01/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 5 , Depth: 9.0 - 9.45m**

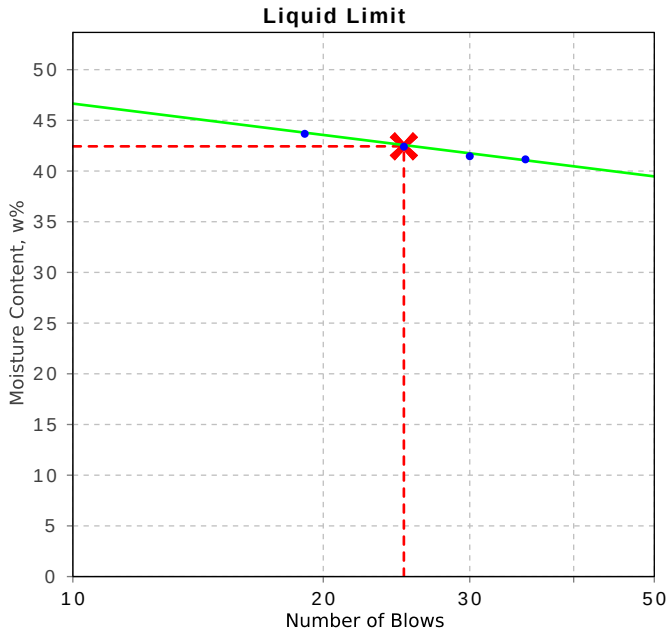
Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
2.36 mm	**100**			0		
1.18 mm	**100**			0		
0.6 mm	**100**			0		
0.425 mm	**99**			0		
0.3 mm	**99**			1		
0.15 mm	**94**			5		
0.075 mm	**84**			10		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	42		
Plastic Limit (%)	15		
Plasticity Index (%)	**27**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)	**10.0**		
Cracking Crumbling Curling	Curling		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	27.5		





Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

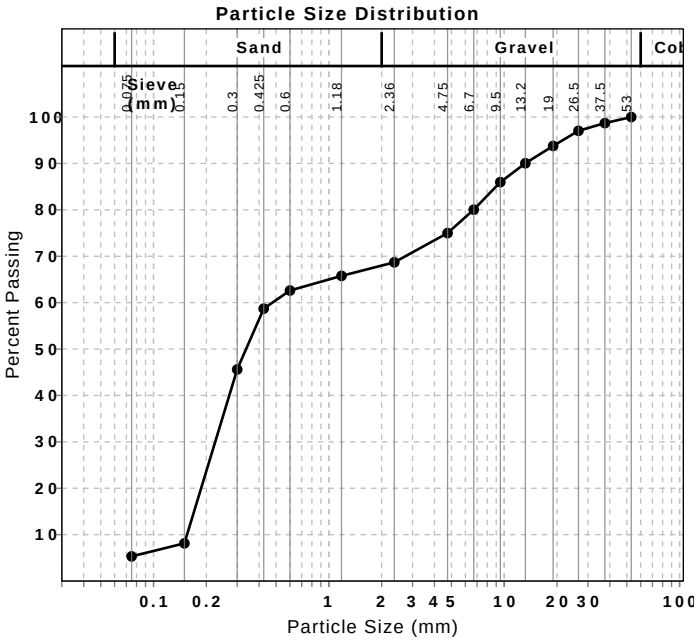
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174F
Date Sampled: 07/05/2024
Dates Tested: 15/05/2024 - 01/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 7 , Depth: 0.2 - 0.5m**

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
53 mm	**100**			0		
37.5 mm	**99**			1		
26.5 mm	**97**			2		
19 mm	**94**			3		
13.2 mm	**90**			4		
9.5 mm	**86**			4		
6.7 mm	**80**			6		
4.75 mm	**75**			5		
2.36 mm	**69**			6		
1.18 mm	**66**			3		
0.6 mm	**63**			3		
0.425 mm	**59**			4		
0.3 mm	**46**			13		
0.15 mm	**8**			37		
0.075 mm	**5**			3		

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	9.2		



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

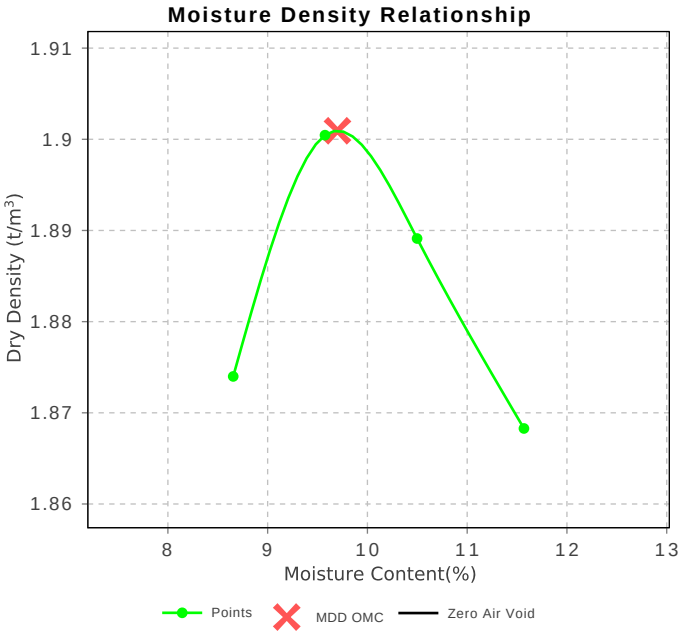
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174F
Date Sampled: 07/05/2024
Dates Tested: 15/05/2024 - 27/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 7 , Depth: 0.2 - 0.5m**

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	1.90		
Optimum Moisture Content (%)	9.5		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	6		
Method used to Determine Plasticity	Visual		
Curing Hours (h)	146.7		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	9.2



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

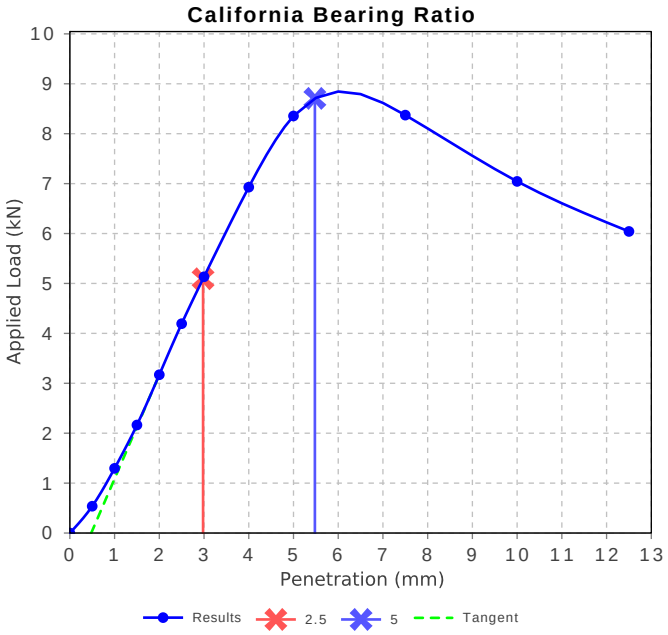
Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174F
Date Sampled: 07/05/2024
Dates Tested: 15/05/2024 - 03/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 7 , Depth: 0.2 - 0.5m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**45**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.90		
Optimum Moisture Content (%)	9.5		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	99.0		
Dry Density after Soaking (t/m^3)	1.90		
Field Moisture Content (%)	9.2		
Moisture Content at Placement (%)	9.6		
Moisture Content Top 30mm (%)	11.9		
Moisture Content Rest of Sample (%)	11.8		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	26.0		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	5.8		



Material Test Report

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174G
Date Sampled: 07/05/2024
Dates Tested: 15/05/2024 - 01/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 8 , Depth: 0.2 - 1.0m**

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

NATA
WORLD RECOGNISED ACCREDITATION

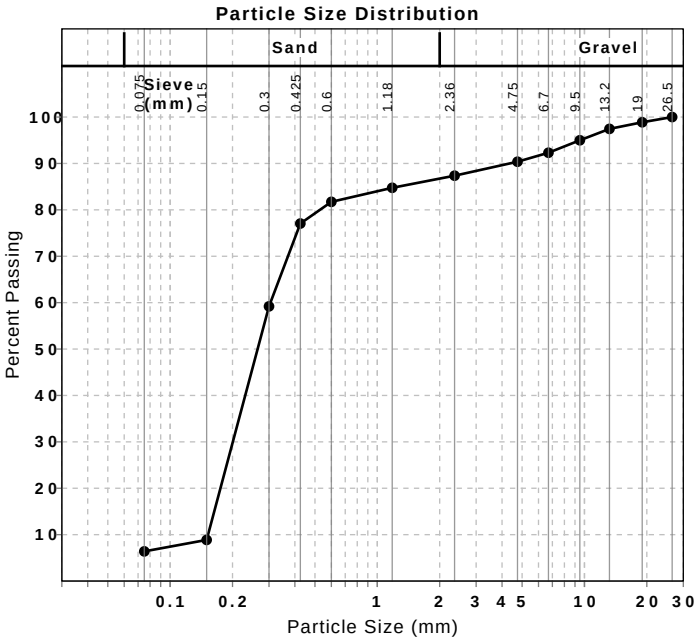
Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**3**		
Soil Description	Sand		
Nature of Water	Distilled		
Temperature of Water (°C)	18		

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
26.5 mm	**100**			0		
19 mm	**99**			1		
13.2 mm	**97**			1		
9.5 mm	**95**			2		
6.7 mm	**92**			3		
4.75 mm	**90**			2		
2.36 mm	**87**			3		
1.18 mm	**85**			3		
0.6 mm	**82**			3		
0.425 mm	**77**			5		
0.3 mm	**59**			18		
0.15 mm	**9**			50		
0.075 mm	**6**			2		

pH Value of Soil (AS 1289 4.3.1)		Min	Max
Soil-suspension Temperature (°C)	18		
Distilled Water pH	7.2		
Depth	0.2 - 1.0		
Material Description	Sand		
Moisture Condition	Air-dried		
pH	6.5		
Electrical Conductivity (µS/cm)	88.2		
For Conductivity - 1 dS/m = 1 mS/cm = 1000 µS/cm			
Electrical Conductivity not covered by accreditation.			

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	8.9		



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

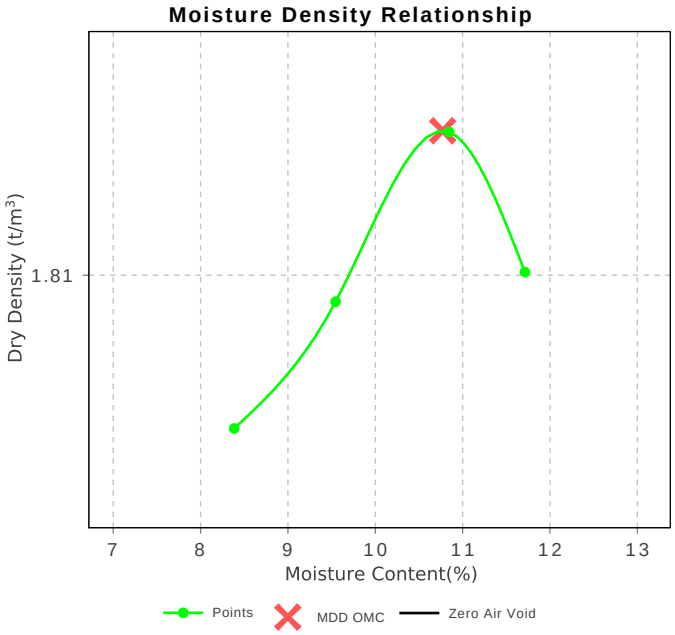
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174G
Date Sampled: 07/05/2024
Dates Tested: 15/05/2024 - 27/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 8 , Depth: 0.2 - 1.0m**

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	1.81		
Optimum Moisture Content (%)	11.0		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	1		
Method used to Determine Plasticity	Visual		
Curing Hours (h)	146.8		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	8.9



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

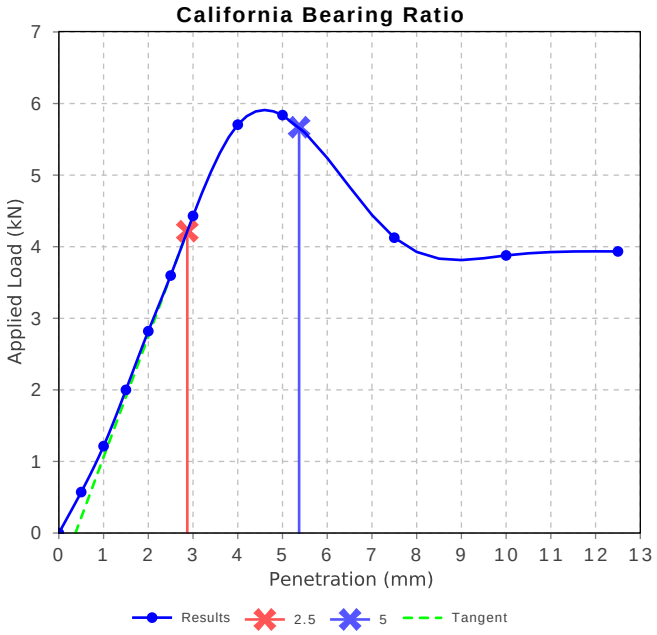
Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174G
Date Sampled: 07/05/2024
Dates Tested: 15/05/2024 - 03/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 8 , Depth: 0.2 - 1.0m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	**30**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.81		
Optimum Moisture Content (%)	11.0		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	102.5		
Dry Density after Soaking (t/m^3)	1.81		
Field Moisture Content (%)	8.9		
Moisture Content at Placement (%)	11.1		
Moisture Content Top 30mm (%)	13.4		
Moisture Content Rest of Sample (%)	13.1		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	26.2		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	1.0		



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

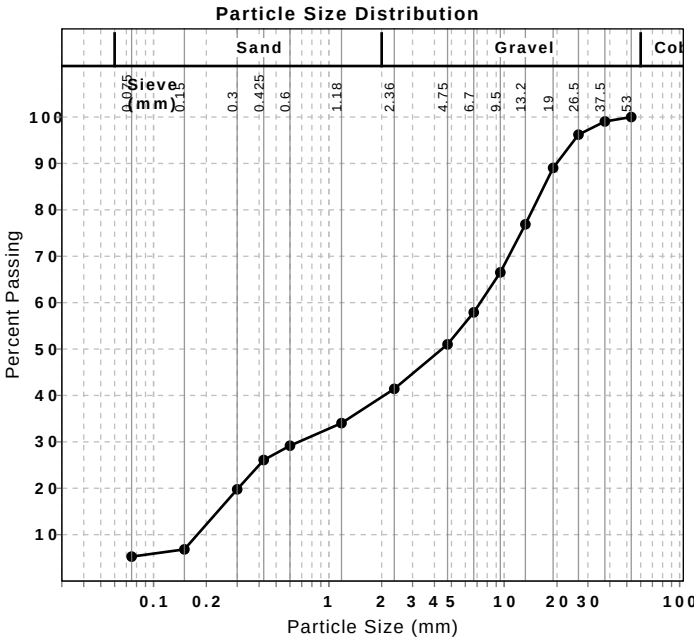
Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174H
Date Sampled: 04/05/2024
Dates Tested: 15/05/2024 - 01/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 9 , Depth: 0.2 - 0.5m**

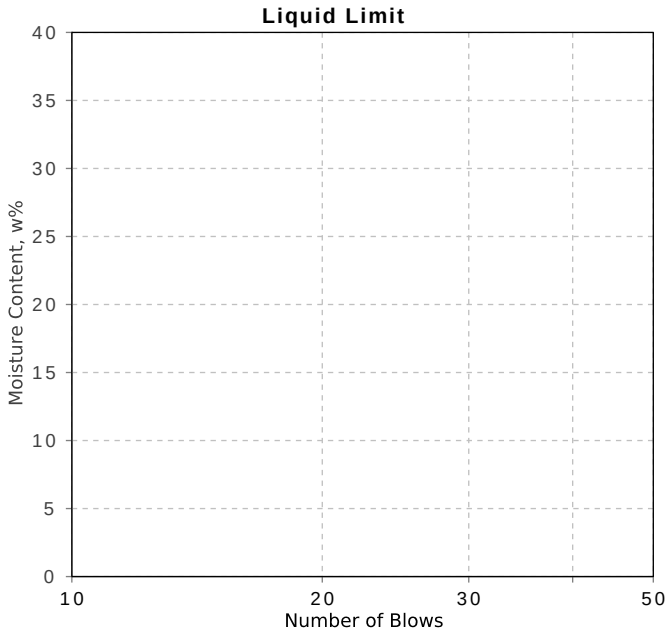
Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
53 mm	**100**			0		
37.5 mm	**99**			1		
26.5 mm	**96**			3		
19 mm	**89**			7		
13.2 mm	**77**			12		
9.5 mm	**67**			10		
6.7 mm	**58**			9		
4.75 mm	**51**			7		
2.36 mm	**41**			10		
1.18 mm	**34**			7		
0.6 mm	**29**			5		
0.425 mm	**26**			3		
0.3 mm	**20**			6		
0.15 mm	**7**			13		
0.075 mm	**5**			2		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	Not Obtainable		
Plastic Limit (%)	Not Obtainable		
Plasticity Index (%)	**Non Plastic**		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1		
Linear Shrinkage (%)			
Cracking Crumbling Curling			

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	13.9		





Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

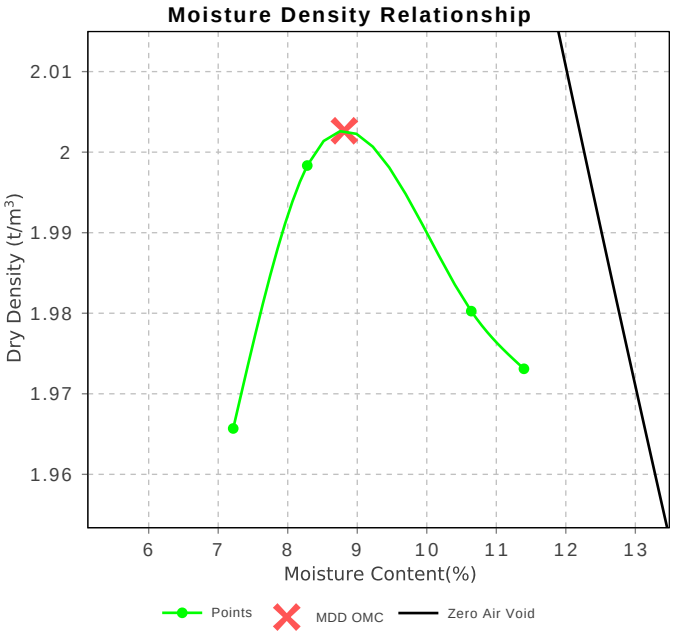
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174H
Date Sampled: 04/05/2024
Dates Tested: 15/05/2024 - 27/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 9 , Depth: 0.2 - 0.5m**

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	2.00		
Optimum Moisture Content (%)	9.0		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	10		
Method used to Determine Plasticity	Visual		
Curing Hours (h)	146.4		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	13.9



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

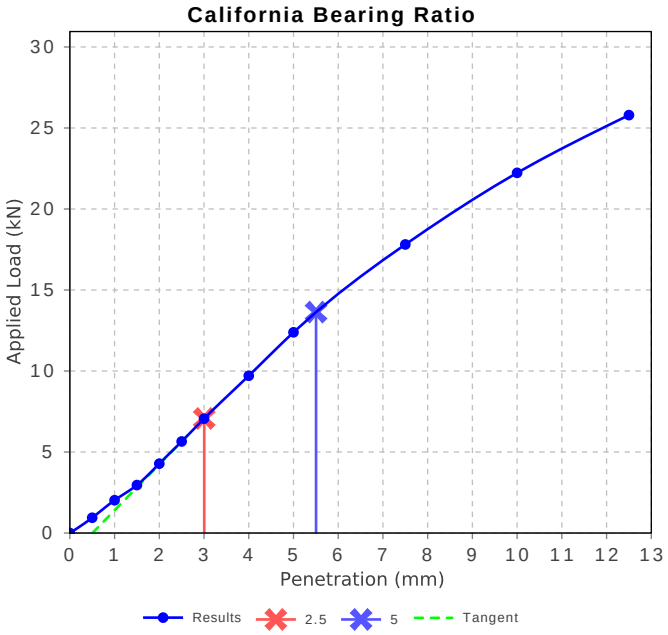
Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174H
Date Sampled: 04/05/2024
Dates Tested: 15/05/2024 - 03/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 9 , Depth: 0.2 - 0.5m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**70**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	2.00		
Optimum Moisture Content (%)	9.0		
Laboratory Density Ratio (%)	100.0		
Laboratory Moisture Ratio (%)	102.0		
Dry Density after Soaking (t/m^3)	2.00		
Field Moisture Content (%)	13.9		
Moisture Content at Placement (%)	9.0		
Moisture Content Top 30mm (%)	9.7		
Moisture Content Rest of Sample (%)	9.4		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	26.4		
Swell (%)	-0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	9.9		



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

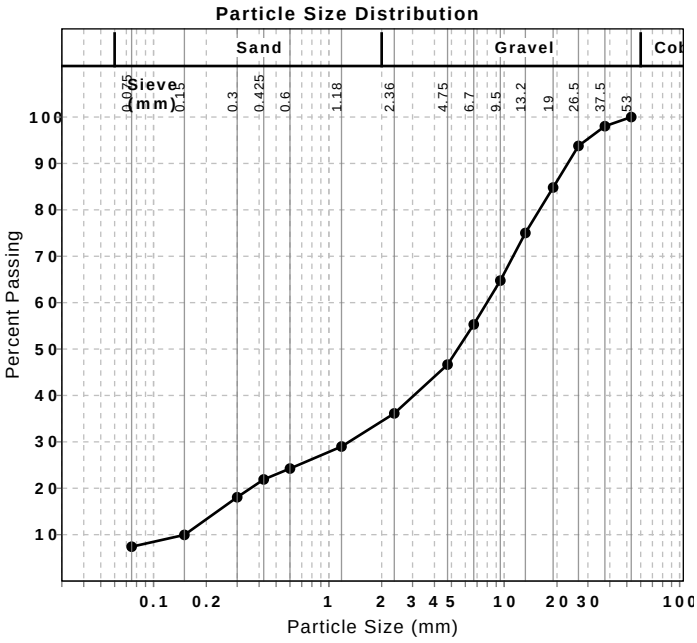
Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174I
Date Sampled: 20/04/2024
Dates Tested: 15/05/2024 - 01/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 12 , Depth: 0.2 - 0.5m**

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	**5**		
Soil Description	Gravelly Sand		
Nature of Water	Distilled		
Temperature of Water (°C)	18		

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
53 mm	**100**			0		
37.5 mm	**98**			2		
26.5 mm	**94**			4		
19 mm	**85**			9		
13.2 mm	**75**			10		
9.5 mm	**65**			10		
6.7 mm	**55**			9		
4.75 mm	**47**			9		
2.36 mm	**36**			11		
1.18 mm	**29**			7		
0.6 mm	**24**			5		
0.425 mm	**22**			2		
0.3 mm	**18**			4		
0.15 mm	**10**			8		
0.075 mm	**7**			3		

pH Value of Soil (AS 1289 4.3.1)		Min	Max
Soil-suspension Temperature (°C)	18		
Distilled Water pH	7.2		
Depth	0.2 - 0.5		
Material Description	Sand		
Moisture Condition	Air-dried		
pH	7.4		
Electrical Conductivity (µS/cm)	68.7		
For Conductivity - 1 dS/m = 1 mS/cm = 1000 µS/cm			
Electrical Conductivity not covered by accreditation.			

Moisture Content (AS 1289 2.1.1)		Min	Max
Moisture Content (%)	8.7		



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

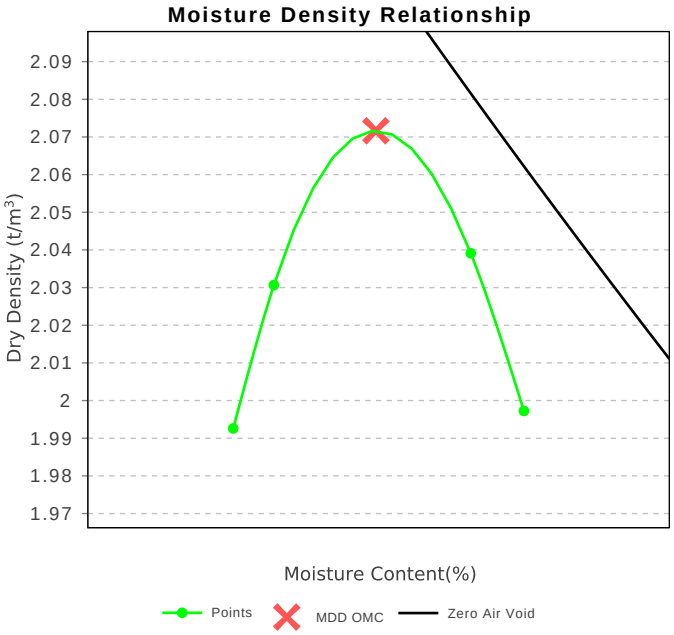
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174I
Date Sampled: 20/04/2024
Dates Tested: 15/05/2024 - 27/05/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 12 , Depth: 0.2 - 0.5m**

Dry Density - Moisture Relationship (AS 1289 5.1.1 & 2.1.1)		Min	Max
Mould Type	1 LITRE MOULD A		
Compaction	Standard		
Maximum Dry Density (t/m^3)	2.07		
Optimum Moisture Content (%)	9.5		
Oversize Sieve (mm)	19.0		
Oversize Material Wet (%)	14		
Method used to Determine Plasticity	Visual		
Curing Hours (h)	143.3		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	8.7



Material Test Report

Butler Partners
geotechnical • geo-environmental • groundwater

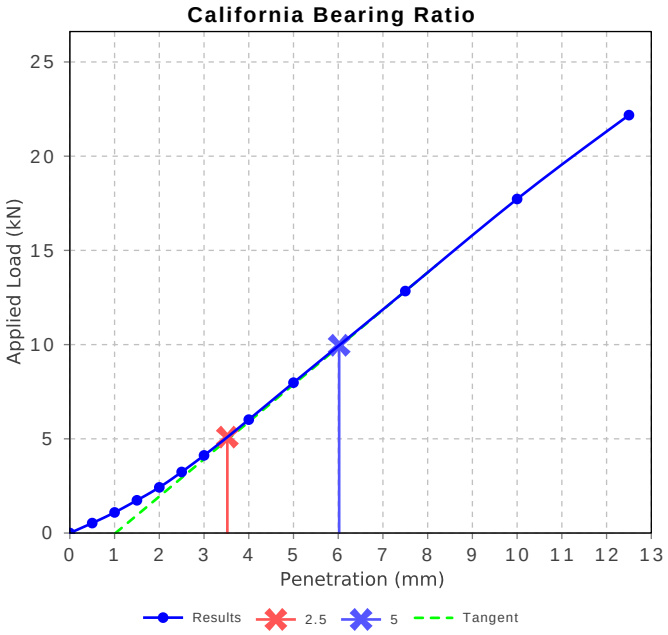
Butler Partners (Regional) Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: rirwin@butlerpartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Ricky Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Report Number: **SG24-1501A-1**
Issue Number: 1
Date Issued: 06/06/2024
Client: NEXTDC Limited
GPO Box 3219, Brisbane QLD 4001
Contact: Angus Barron
Project Number: SG24-1501A
Project Name: SC 1.5 DATA Centre Expantion – Stage 2 & 3
Project Location: Lot 10 South Sea Islander Way, Maroochydore
Work Request: 3174
Sample Number: G24-3174I
Date Sampled: 20/04/2024
Dates Tested: 15/05/2024 - 03/06/2024
Sampling Method: Sampled by Client
The results apply to the sample as received
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **Bore 12 , Depth: 0.2 - 0.5m**

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**50**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	2.07		
Optimum Moisture Content (%)	9.5		
Laboratory Density Ratio (%)	100.5		
Laboratory Moisture Ratio (%)	97.0		
Dry Density after Soaking (t/m^3)	2.10		
Field Moisture Content (%)	8.7		
Moisture Content at Placement (%)	9.2		
Moisture Content Top 30mm (%)	10.7		
Moisture Content Rest of Sample (%)	8.7		
Mass Surcharge (kg)	4.5		
Soaking Period (days)	4		
Curing Hours (h)	26.4		
Swell (%)	-1.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	14.0		



CERTIFICATE OF ANALYSIS

Work Order	: **EB2416847**	Page	: 1 of 5
Client	: **BUTLER PARTNERS PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: MR RICARDO ZANNIN-PESCE	Contact	: Nathan King
Address	: 22 CORUNNA STREET ALBION QLD, AUSTRALIA 4010	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: +61 07 3852 3800	Telephone	: +61-7-3243 7222
Project	: SG24-1501A	Date Samples Received	: 17-May-2024 14:40
Order number	: CG-353	Date Analysis Commenced	: 21-May-2024
C-O-C number	: SG24-1501A-COC2	Issue Date	: 22-May-2024 16:54
Sampler	: ALI HASSAAN		
Site	: MAROOCHYDORE		
Quote number	: EN/222 (Planned event Tables)		
No. of samples received	: 12		
No. of samples analysed	: 12		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Soil Preparation, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Corrosion assessment for Concrete and Steel piles in soil per Australian Standard AS2159-2009 uses a combination of soil and groundwater data (Tables 6.4.2 C & 6.5.2 C). In the absence of groundwater data, assessment has been made against soil criteria only. Refer to AS2159-2009 section 6.4 for further interpretation of corrosion assessment. ALS is not NATA accredited for Corrosion Assessment comments
- EA167: Soil Condition A – High permeability soils (e.g. sands and gravels) which are in groundwater
- EA167: Soil Condition B – Low permeability soils (e.g. silts and clays) or all soils above groundwater
- ASS: EA033 (CRS Suite): Analysis is performed as per the Acid Sulfate Soils Laboratory Methods Guidelines (2004) and the updated National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT (2018)
- ASS: EA033 (CRS Suite):Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): Laboratory determinations of ANC needs to be corroborated by effectiveness of the measured ANC in relation to incubation ANC. Unless corroborated, the results of ANC testing should be discounted when determining Net Acidity for comparison with action criteria, or for the determination of the acidity hazard and required liming amounts.
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	BH1_1.5 - 1.8 1.5 - 1.8	BH1_7.5 - 7.95 7.5 - 7.95	BH2_4.5 - 4.93 4.5 - 4.93	BH2_7.5 - 7.95 7.5 - 7.95	BH4_7.5 - 7.95 7.5 - 7.95
			Sampling date / time	09-May-2024 00:00	09-May-2024 00:00	30-Apr-2024 00:00	30-Apr-2024 00:00	02-May-2024 00:00
Compound	CAS Number	LOR	Unit	EB2416847-001	EB2416847-002	EB2416847-003	EB2416847-004	EB2416847-005
				Result	Result	Result	Result	Result
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**4.5**	**5.0**	**5.3**	**4.7**	**5.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**80**	**20**	**21**	**33**	**21**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.13**	**0.03**	**0.03**	**0.05**	**0.03**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.005	% S	**0.018**	**0.631**	**0.079**	**0.362**	**0.610**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**11**	**393**	**49**	**226**	**381**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.15**	**0.66**	**0.11**	**0.42**	**0.64**
Net Acidity (acidity units)	----	10	mole H+ / t	**91**	**413**	**70**	**260**	**402**
Liming Rate	----	1	kg CaCO3/t	**7**	**31**	**5**	**19**	**30**
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	**0.15**	**0.66**	**0.11**	**0.42**	**0.64**
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	**91**	**413**	**70**	**260**	**402**
Liming Rate excluding ANC	----	1	kg CaCO3/t	**7**	**31**	**5**	**19**	**30**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH4_9.0 - 9.45 9.0 - 9.45	BH5_4.5 - 4.91 4.5 - 4.91	BH5_9.0 - 9.45 9.0 - 9.45	BH6_3.0 - 3.30 3.0 - 3.30	BH6_9.0 - 9.45 9.0 - 9.45
				Sampling date / time	02-May-2024 00:00	09-May-2024 00:00	09-May-2024 00:00	07-May-2024 00:00	07-May-2024 00:00
Compound	CAS Number	LOR	Unit		EB2416847-006	EB2416847-007	EB2416847-008	EB2416847-009	EB2416847-010
					Result	Result	Result	Result	Result
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		5.0	5.4	4.6	8.2	4.6
Titratable Actual Acidity (23F)	----	2	mole H+ / t		8	14	30	<2	36
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	0.02	0.05	<0.02	0.06
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S		0.032	0.062	0.091	0.018	0.097
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		20	39	57	12	60
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3		----	----	----	0.60	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t		----	----	----	121	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		----	----	----	0.19	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S		0.04	0.08	0.14	<0.02	0.15
Net Acidity (acidity units)	----	10	mole H+ / t		28	53	88	<10	96
Liming Rate	----	1	kg CaCO3/t		2	4	6	<1	7
Net Acidity excluding ANC (sulfur units)	----	0.02	% S		0.04	0.08	0.14	<0.02	0.15
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t		28	53	88	12	96
Liming Rate excluding ANC	----	1	kg CaCO3/t		2	4	6	<1	7

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH1_10.5 - 30.3 10.5 - 30.3 (Combined)	BH6_3.0 - 9.0 3.0 - 9.0 (Combined)	----	----	----
				Sampling date / time	09-May-2024 00:00	07-May-2024 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EB2416847-011	EB2416847-012	--------	--------	--------
					Result	Result	----	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		**5.5**	**5.2**	----	----	----
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		**50**	**68**	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**16.3**	**16.9**	----	----	----
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		**20000**	**14700**	----	----	----
EA167: Corrosion Classification (per AS2159-2009)									
ø Exposure Classification - Concrete Piles Soil Condition A	----	-	-		**Moderate**	**Moderate**	----	----	----
ø Exposure Classification - Concrete Piles Soil Condition B	----	-	-		**Mild**	**Mild**	----	----	----
ø Exposure Classification - Steel Piles Soil Condition A	----	-	-		**Non Aggressive**	**Non Aggressive**	----	----	----
ø Exposure Classification - Steel Piles Soil Condition B	----	-	-		**Non Aggressive**	**Non Aggressive**	----	----	----
ED040S: Soluble Major Anions									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**40**	**110**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		**40**	**50**	----	----	----