Pacific Geotech
Consulting Geotechnical Engineers

ACID SULFATE SOIL REPORT: Proposed High Rise Development

19-21 Anne Avenue

Broadbeach

Maryanne Developments Pty Ltd

August 2025

PG-13778

E: info@pacgeo.com.au
www.pacgeo.com.au ABN: 62 615 248 952

Pacific Geotech
Consulting Geotechnical Engineers

Ref: PG-13778, 2025-08-18, ASR VER 1
Author: Peter Elkington

19th August, 2025

Maryanne Developments Pty Ltd
Email: tony@altitudeconstructiongroup.com.au
CC: leo@bassargroup.com / simon@bassargroup.com /
gareth.hodgins@hutchinsonbuilders.com.au

ATTN: ANTONIOS BASSIL

Dear Sir,

ACID SULFATE SOIL INVESTIGATION – PROPOSED HIGH RISE DEVELOPMENT
19-21 ANNE AVENUE, BROADBEACH

Enclosed is a copy of our report for the above project dated August 2025. An electronic copy of the report has been issued.

Should you have any queries regarding this report, please do not hesitate to contact Peter Elkington at this office.

Yours faithfully,

P. ELKINGTON (RPEQ 7226)

For and on behalf of
PACIFIC GEOTECH PTY LTD

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 METHODOLOGY 3

3.0 SITE DESCRIPTION 3

4.0 GEOLOGICAL MODEL 6

5.0 LABORATORY TESTING 6

6.0 LIMITATIONS 8

Appendices

Appendix A
Notes relating to this report

Appendix B
Borehole Record Sheets

Appendix C
Laboratory Test Certificates

Appendix D
Site Plan

Appendix E
Acid Sulfate Soil Management Plan

1.0 INTRODUCTION

This report contains the results of the acid sulfate soil investigation by Pacific Geotech and contains advice and recommendations relating to:

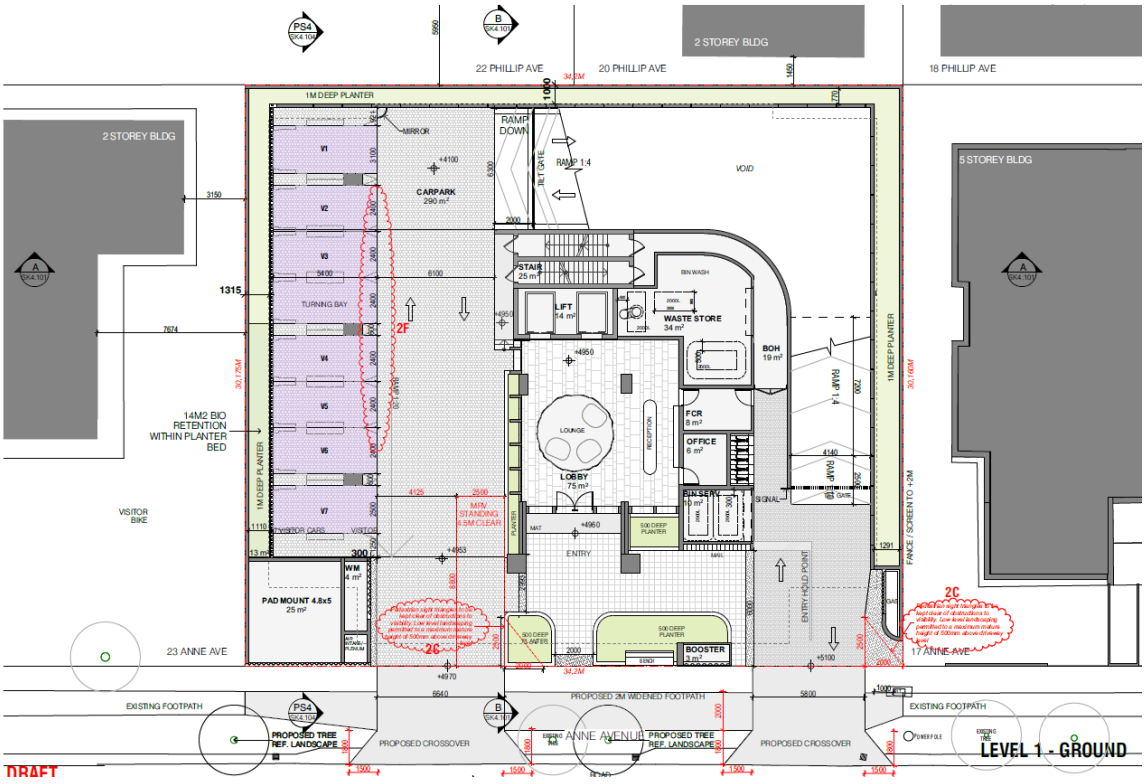
- Acid sulfate soil conditions
- Development of an Acid Sulfate Soil Management Plan

Proposed Development

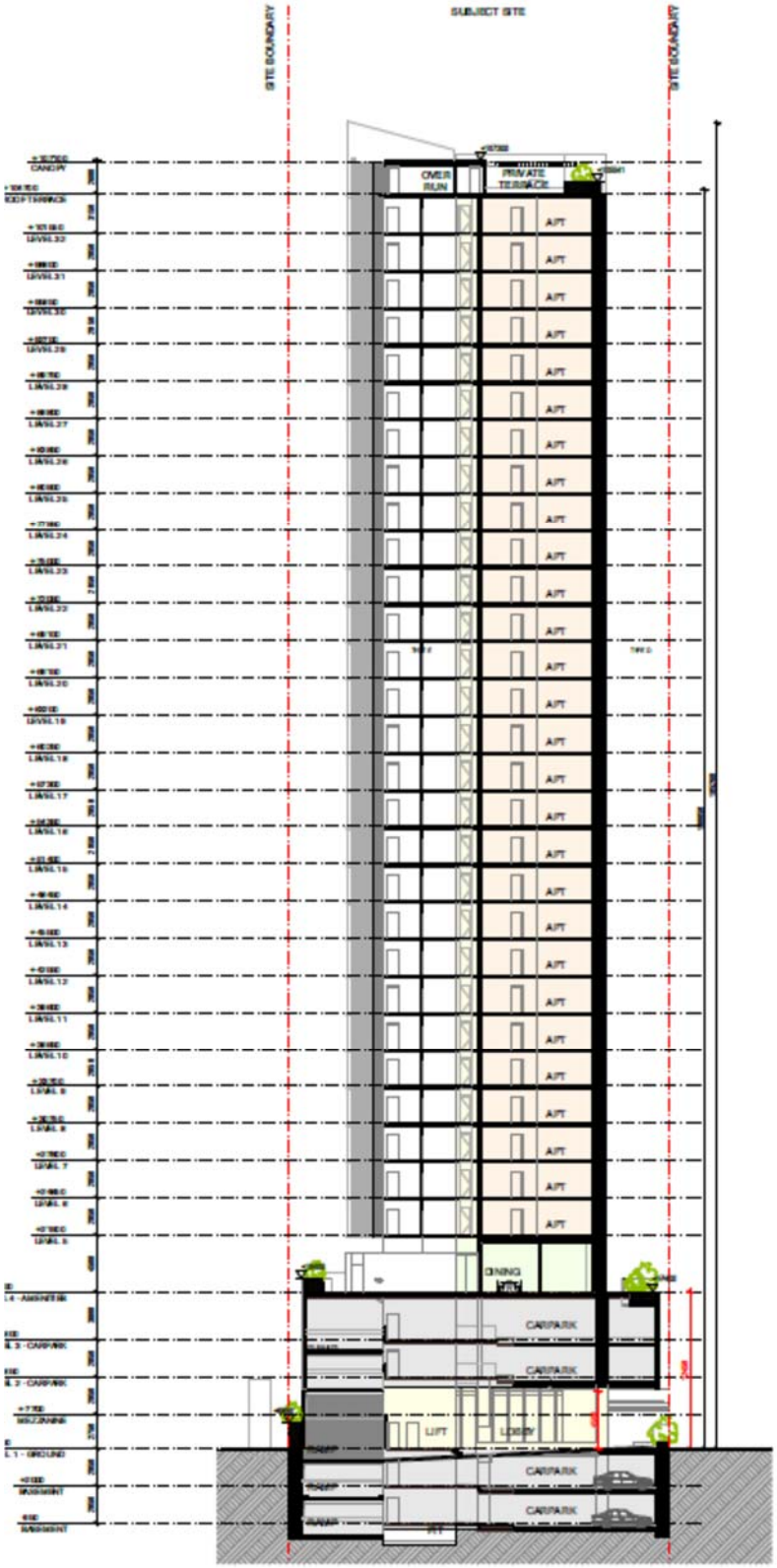
It is understood that the proposed development is comprise the construction of a 32 storey tower over a double level basement. Earthworks are envisaged to consist of cuts of up to 7m for the basement.

The proposed development is indicated below.

PROPOSED LAYOUT



PROPOSED DEVELOPMENT



2.0 METHODOLOGY

The investigation comprised the drilling and sampling of 1 borehole to d depth of 9m, using a Compac018 drilling rig, utilising solid flight auger techniques. Dynamic Cone Penetrometer (DCP) testing was undertaken adjacent to the borehole and at an additional 4 locations.

The boreholes were sampled for Acid Sulfate purposes, in addition to geotechnical sampling.

The boreholes were located by an experienced geotechnical engineer with reference to the site features and locations were recorded using a hand held GPS. At the completion of the drilling, the holes were checked for groundwater intrusion and then backfilled.

The soil classification descriptions and field tests were carried out in general accordance with Australian Standards.

AS 1726	Geotechnical Site Investigations
QASSIT	Queensland Acid Sulfate Soil Investigation Team Dept. of Natural Resources, 'Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland, 1998' (Oct. 1998, Revision 4.0).
GOLD COAST CITY COUNCIL	'Policy 14 - Management of Activities located within Acid Sulfate Soils - Version 1.0
QUEENSLAND GOVERNMENT	State Planning Policy Guideline, December 2013, Acid Sulfate Soils

Borehole records, Dynamic Cone Penetrometer test results and a site plan showing the test locations are appended to the report.

3.0 SITE DESCRIPTION

The site of the proposed development is located at 19-21 Anne Avenue, Broadbeach.

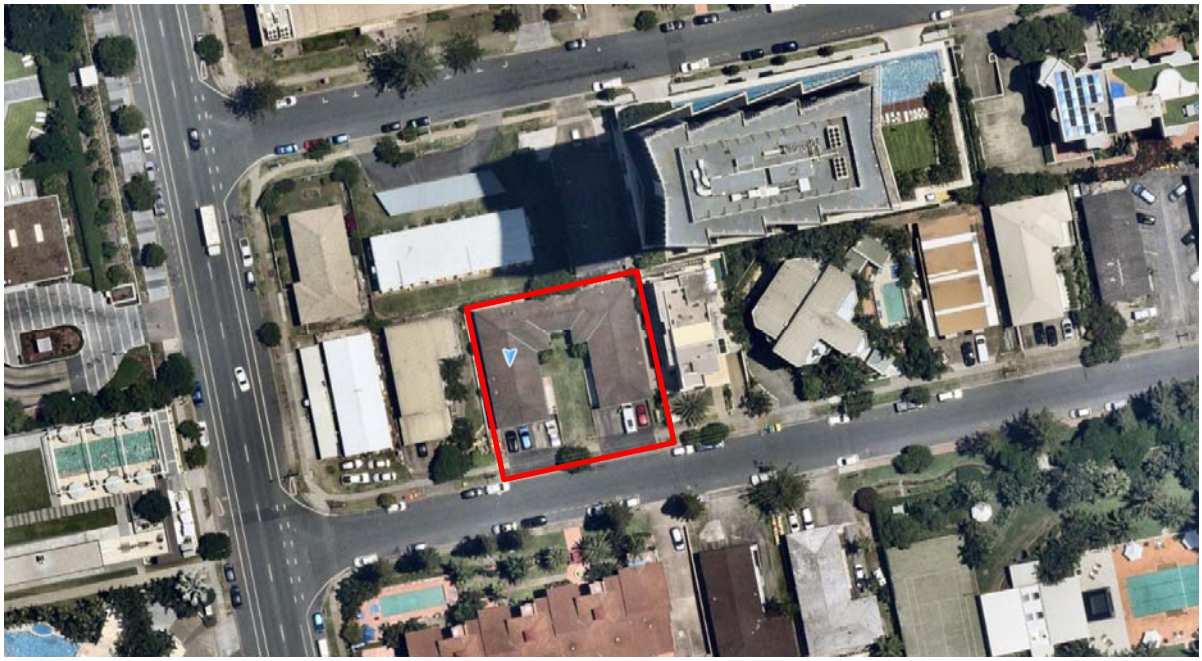
At the time of the investigation, the site was occupied by an existing double storey horse shoe apartment building above a single level partial basement.

Vegetation typically comprised grassed areas and some small to medium sized shrubs surrounding the building.

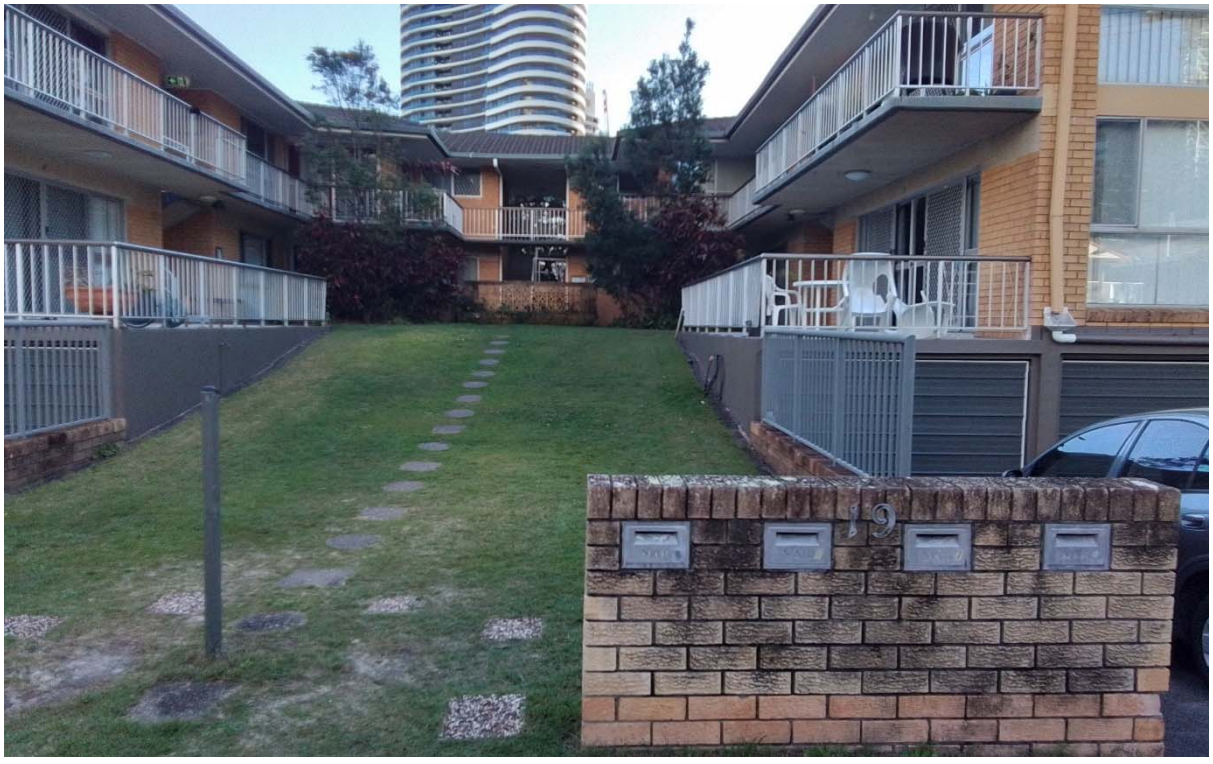
The site was relatively level with a slight fall towards the road. Drainage was considered to be fair to poor.

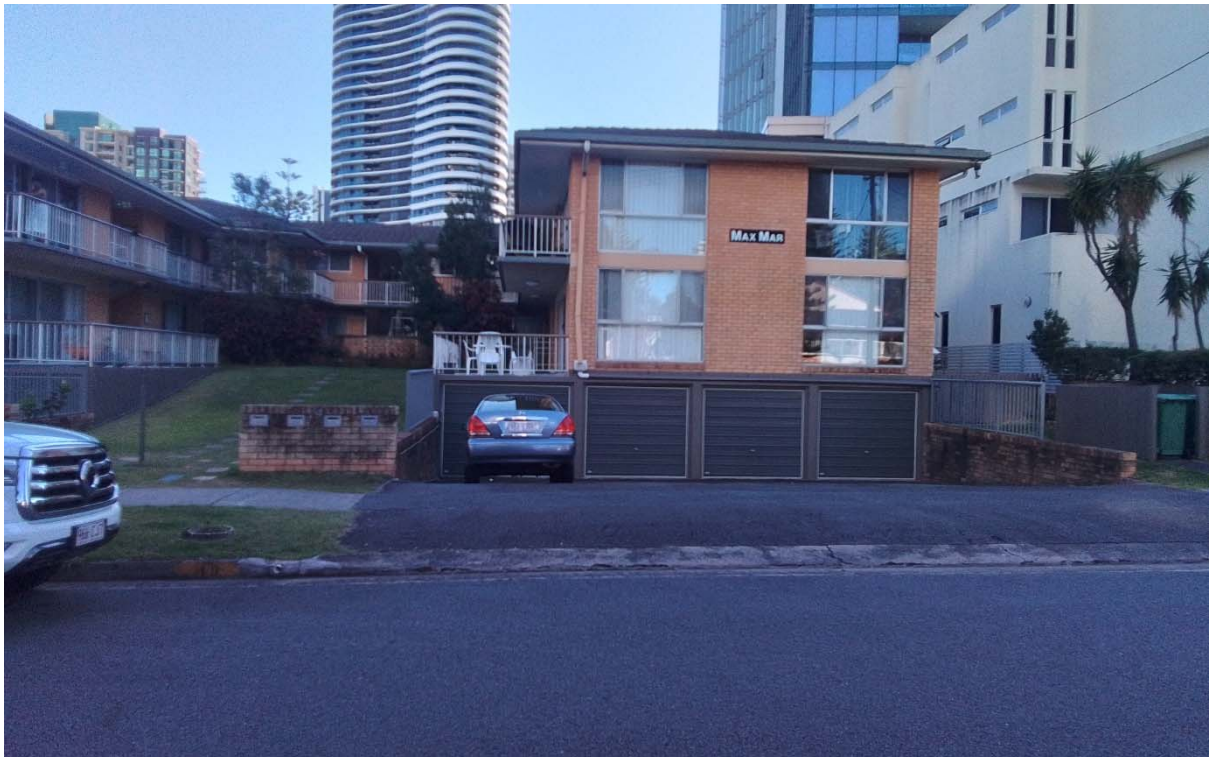
Refer following aerial and site photographs for typical site conditions.

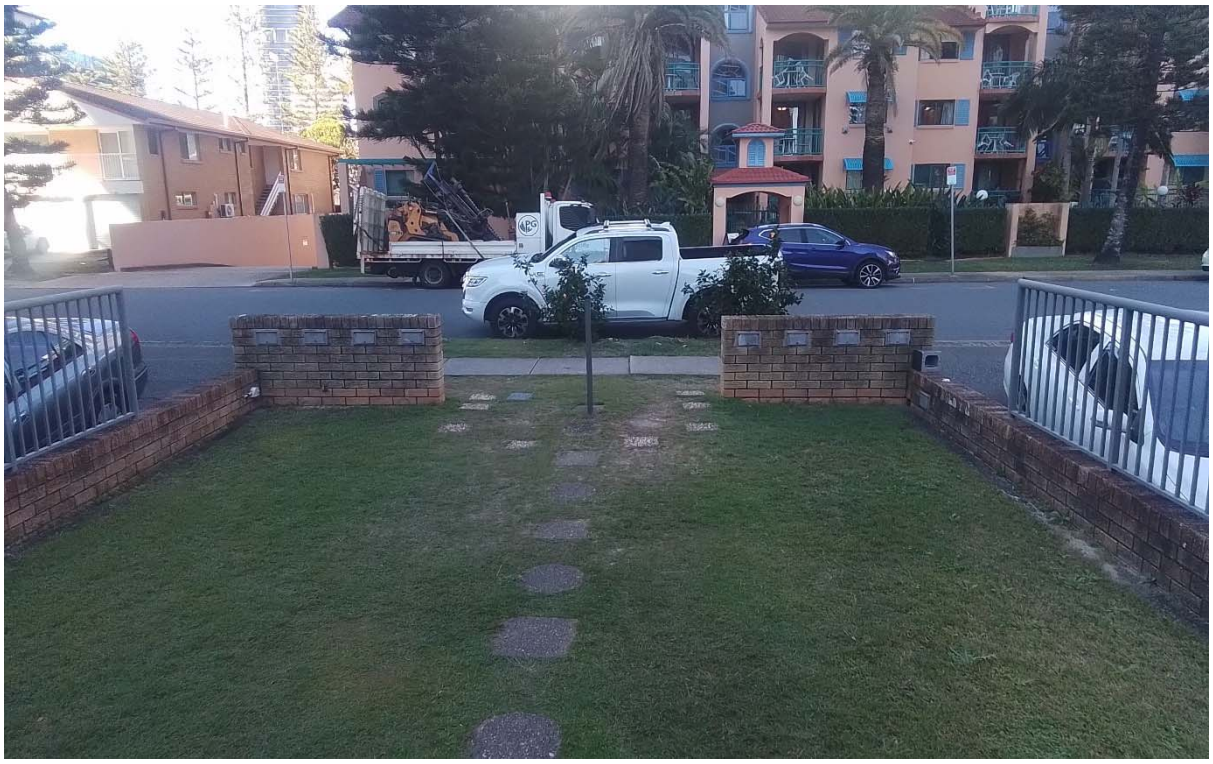
AERIAL IMAGE



SITE PHOTOGRAPHS




MAX MAR



4.0 GEOLOGICAL MODEL

The general subsurface profile encountered on the site comprised fill material overlying a natural sand profile that was initially loose and medium dense and increase in density to become dense with depth.

Table 1 presents a summary of the encountered subsurface profile. Detailed borehole record sheets are appended to this report.

TABLE 1 SUBSURFACE PROFILE SUMMARY

BH No.	NATURAL						BH TD
	SAND			CLAY		META-SILTSTONE	
	Loose	Medium Dense	Dense to Very Dense	Stiff to Very Stiff	Hard		
BH01	0.0-4.1	4.1-5.5 19.8-22.7 32.7-34.1	5.5-19.8 34.1-39.6	22.7-27.2	27.2-32.7	39.6-TD	41.0
BH02	0.0-3.1	3.1-5.6	5.6-TD	NE	NE	NE	9.0

Notes:
1. All depths in metres below ground level at time of investigation.
2. NE - Not Encountered; TD - Termination Depth.

Groundwater was encountered in the borehole at a depth of 5.6m at the time of drilling. A groundwater monitoring well was installed in BH02 to allow for ongoing groundwater monitoring.

Typically the groundwater levels in the area are encountered at levels of approximately RL 0.5m to RL 1.0m. Fluctuations of +/- 0.5m are typically noted in the area.

5.0 LABORATORY TESTING

Laboratory testing was undertaken in general accordance with the recommendations outlined in the QASSIT 'Acid Sulfate Soils Laboratory Methods Guidelines 2004'. The results of the testing program are appended to this report.

The testing program comprised of initial screening tests on recovered samples, followed by quantitative testing using the Chromium Reducible Sulfur (CRS) suite.

Screening Tests

Screening tests were undertaken on each soil sample collected from the bores. Two small sub-samples of each soil sample were prepared; one sub-sample from each sample was mixed with approximately 20mL of distilled water, and the other sub-sample mixed with approximately 20mL of hydrogen peroxide (H_2O_2), buffered to a pH of 5.4 with sodium hydroxide.

Slurry pHs were measured with a calibrated pH meter. The pH of the distilled water/soil slurry (pH_F) was measured approximately one hour after mixing, whilst the pH of the hydrogen peroxide/soil slurry (pH_{FOX}) was measured approximately one to two hours after mixing.

The pH screening tests can be used for the preliminary identification of a potential or actual ASS using a combination of three trigger factors as follows:

a) The strength of the reaction with peroxide is a useful indicator but cannot be used alone. Organic matter and other soil constituents such as manganese oxides can also cause a reaction.

b) A pH_{FOX} value at least one unit below pH_F may indicate a potential ASS. The great the difference between the two measurements, the more indicative the value is of a potential ASS. The lower the final pH_{FOX} value the better the indication of a positive result.

c) If the pH_{FOX} is less than 3, and the other two conditions apply, then it strongly indicates a potential ASS. The more the pH_{FOX} drops below 3, the more positive the presence of sulfides.

In broad summary, the 'natural' soil samples tested did not show an indication of ASS presence. The results of the screening tests were used to assist in the selection of samples for more detailed, quantitative laboratory testing.

Chromium Suite Analysis

Chromium suite analysis was undertaken to quantify existing soil acidity and potential future acid generation from possible ASS. A summary of results is given in Table 2.

TABLE 2 CHROMIUM SUITE TESTING SUMMARY

BH No.	Depth (m)	Nett Acidity (mol H+/t)	Liming Rate (kg $CaCO_3$/t)
BH02	1.0	<1	NIL
	2.0	<1	NIL
	3.0	<1	NIL
	4.0	<1	NIL
	5.0	<1	NIL
	6.0	<1	NIL
	7.0	<1	NIL
	8.0	<1	NIL

Summary

On the basis of the testing undertaken, all samples provided nett acidity values below the QASSIT defined action criteria. Therefore, soils disturbed on-site do not require treatment for acid sulfate potential.

The results of the laboratory testing are appended to this report.

6.0 LIMITATIONS

We have prepared this report for the Proposed High Rise Development at 19-21 Anne Avenue, Broadbeach. The report is provided for the exclusive use of Maryanne Developments Pty Ltd, for this project only and for the purposes outlined in the report. It should not be used by, or relied upon, for other projects on the same or different sites or by a third party. In preparing this report, we have relied upon information provided by the client or their agents.

The results are indicative of the subsurface conditions on site only at the specific testing locations. Subsurface conditions can change between test locations and the design and construction should take the spacing of the testing and testing methods adopted and the potential for variation between the test locations.

This is not to reduce the level of responsibility accepted by Pacific Geotech, but rather to ensure that the parties who may rely on the information contained in this report are aware of the responsibilities they assume in doing so.



P. ELKINGTON (RPEQ 7226)

For and on behalf of
PACIFIC GEOTECH PTY LTD

APPENDICES

APPENDIX A

NOTES RELATING TO THIS REPORT

Notes Relating to this Report

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis.

Every care has been taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical conditions and contains recommendations or suggestions for design and construction. However, unexpected variations in ground conditions will occur. The potential for this will depend partly on testing, spacing and sampling frequency.

If variations are identified, Pacific Geotech would be pleased to assist with additional investigations or advice to resolve the matter.

Copyright

This report is the property of Pacific Geotech Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement of proposal. Unauthorised use of this report is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation.

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

Description and Classification Methods

The description and classification of soils and rocks used in this report are based on AS 1726.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the percent of other particles present (e.g. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silty	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density which can be correlated from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very Loose	less than 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) and can be quantified by the Pocket Penetrometer test, Vane Shear test, laboratory testing or engineering examination. The strength terms are defined as follows:

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 - 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 - 400
Hard	greater than 400
Friable	strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc.

Planarity	
CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

Roughness	
POL	Polished
RJ	Rough
S	Smooth
SL	Slickened
VR	Very Rough

Defects	Type
BP	Bedding Parting
CL	Cleavage
CO	Contact
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
DK	Dyke
DL	Drill Lift
DZ	Decomposed Zone
FC	Fracture
FL	Foliation
FZ	Fracture Zone
HB	Handling Break
IS	Infilled Seam
JT	Joint
H	Schistosity
SI	Sill
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void

Sampling

Sampling is undertaken during the fieldwork to allow examination of the soil or rock and to allow laboratory testing to be undertaken.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content and minor constituents. Bulk samples are similar but of greater volume required for some test procedures such as CBR testing.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and collecting a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

Investigation Methods

Test Pits: These are typically undertaken with a backhoe or a tracked excavator, allowing examination of the insitu soils. Limitations of test pits are the problems associated with collapse of the pits, disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of typical diameter of between 50mm to 75mm advance manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as fill, gravel, hard clays and collapse of the borehole (typically in non-cohesive soil).

Continuous Spiral flight Augers: The borehole is advanced using 65mm to 100mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. Augers of up to 300mm in diameter are used to recover larger volumes of sample. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights. Samples can be disturbed and layers may become mixed. Augering below the groundwater table can be less reliable than augering above the water table.

A Tungsten Carbide (TC) bit for auger drilling into rock can be used to indicate rock strength and continuity by variation in drilling resistance and from examination of recovered rock fragments but provides only an indication of the likely rock strength. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is advanced by a bit attached to the end of a hollow rod string, with water being pumped down the drill rods and returned up the annulus of the borehole, carrying the drill cuttings. Changes in stratification can be determined from the return, together with information from "feel" and rate of penetration.

The borehole can be stabilised through the use of drilling mud as a circulating fluid. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. This technique provides a reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel is used, which gives a core of about 50mm diameter. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a disturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposed", Test 6.3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer, with a free fall of 760mm. The sample is driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense soils, hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of , say, 4, 6 and 7 blows, as
  N = 13
  4, 6, 7
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as
  N > 30
  15, 30/40mm

Cone Penetrometer Testing (CPT): Cone Penetrometer Testing with or without pore pressure measurement (CPTu) is carried out using a Cone Penetrometer in general accordance with AS 1289 6.5.1, 1999.

In the tests, a 36mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the fractional resistance on a separate 135mm long sleeve, immediately behind the cone. Pore Pressure is recovered through a pore ring located either within, or more usually immediately behind the cone/tip.

As penetration occurs (at a rate of approximately 20mm per second) and data is recorded every 20mm of penetration, the results are presented graphically.

The information provided on the plot comprises:

- Cone resistance – expressed in mPa
- Sleeve friction – expressed in kPa
- Friction ratio – the ratio of sleeve friction to cone resistance expressed as a percentage.
- Pore pressure in kPa
- Tilt of probe (in degrees).

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and rising to 2% to as high as 8%, and higher in organic soils. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes, etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive.

Dynamic Cone Penetrometers:

Dynamic Cone Penetrometer (DCP) tests are carried out by driving a 16mm diameter rod into the ground with a 9kg sliding hammer dropping 510mm and counting the blows for successive 100mm increments of penetration.

Logs

The borehole or test pit logs are an interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of the boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

Groundwater

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

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be flushed from the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes from which ongoing monitoring can be undertaken.

Fill

The present of fill materials can often be determined only by the inclusion of foreign objects (e.g. bricks, steel ,etc.) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult to reliably determine the extent of the fill.

Laboratory Testing

Laboratory testing is carried out in general accordance with Australian Standard 1289 'Methods of Testing Soil for Engineering Purposes'.

Site Anomalies

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

Review of Design

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/constraints are quite complex, it is prudent to have a design review.

Site Inspection

Pacific Geotech would be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related:

Requirements could range from:

i. a site visit to confirm that conditions exposed are no worse than those interpreted, to
ii. a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or
iii. full time engineering present on site.

APPENDIX B

BOREHOLE RECORD SHEETS

Pacific Geotech
Consulting Geotechnical Engineers

Borehole No.
BH01
Page 1 of 5

Project No.: PG-13778

Client:	Maryanne Developments Pty Ltd	Commenced:	07/07/2025
Project Name:	Proposed Highrise Development	Logged By:	AS
Hole Location:	19-21 Anne Avenue, Broadbeach	Checked By:	
Hole Position:			
Drill Model and Mounting:	Hanjin 2012	RL Surface:	No survey
Hole Diameter:		Datum:	AHD Operator: AS

Drilling Information								***Soil Description***		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
AD/T						0.10		GP	Sandy GRAVEL (GP) Dense, fine to medium sized, brown mottled grey, fine to coarse grained sand, moist.
								SP	SAND (SP) Loose, fine to medium grained, pale brown, moist.
						1.90		SP	SAND (SP) Loose to medium dense, fine to medium grained, pale yellow brown, moist.
						2			
WB			SPT 3.00-3.45 m 3,7,8 N=15						
						4			
						4.10		SP	SAND (SP) Medium dense, fine to medium grained, pale yellow brown, moist.
						5.90		SP	SAND (SP) Dense, fine to medium grained, pale grey yellow brown, wet.
			SPT 6.00-6.45 m 18,21,25 N=46			6			
						8			
			SPT 9.00-9.45 m 17,19,23 N=42						
						9.80		SP	

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
Level (Date)
Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks
1. Groundwater not observed due to drilling method adopted.

Support
C - Casing

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

PACGEO 1.01.1 LIB.GLB Log PACGEO BOREHOLE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:45 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

Pacific Geotech
Consulting Geotechnical Engineers

Borehole No.
BH01
Page 2 of 5

Project No.: PG-13778

Client:	Maryanne Developments Pty Ltd	Commenced:	07/07/2025
Project Name:	Proposed Highrise Development	Logged By:	AS
Hole Location:	19-21 Anne Avenue, Broadbeach	Checked By:	
Hole Position:			
Drill Model and Mounting:	Hanjin 2012	RL Surface:	No survey
Hole Diameter:		Datum:	AHD Operator: AS

Drilling Information | ***Soil Description***

Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
WB			SPT 12.00-12.24 m 30,30/90mm N=30/90mm			12		SP	SAND (SP) Dense, fine to medium grained, pale grey yellow brown, with fine to medium sized gravel, moist (trace sea shells). *(continued)*
						13.90			
			SPT 15.00-15.45 m 12,21,30 N=51			14		SC	Clayey SAND (SC) Dense, fine to medium grained, pale brown, low plasticity clay, moist.
						16			
						16.40		SP	SAND (SP) Dense, fine to medium grained, pale grey brown, moist.
			SPT 18.00-18.45 m 18,20,21 N=41			18			
						19.10		SP	SAND (SP) Dense, fine to medium grained, pale brown, moist.
						19.80		SP	SAND (SP) Medium dense, fine to medium grained, dark brown, moist.

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
Level (Date)
Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks
1. Groundwater not observed due to drilling method adopted.

Support
C - Casing

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

PACGEO 1.01.1 LIB.GLB Log PACGEO BOREHOLE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:45 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

Pacific Geotech
Consulting Geotechnical Engineers

Borehole No.
BH01
Page 3 of 5

Project No.: PG-13778

Client:	Maryanne Developments Pty Ltd	Commenced:	07/07/2025
Project Name:	Proposed Highrise Development	Logged By:	AS
Hole Location:	19-21 Anne Avenue, Broadbeach	Checked By:	
Hole Position:			
Drill Model and Mounting:	Hanjin 2012	RL Surface:	No survey
Hole Diameter:		Datum:	AHD Operator: AS

Drilling Information								***Soil Description***	
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
WB			SPT 21.00-21.45 m 2,9,9 N=18			22		SP	SAND (SP) Medium dense, fine to medium grained, dark brown, moist. *(continued)*
						22.70		CH	Sandy CLAY (CH) Stiff to very stiff, high plasticity, pale yellow brown, fine to medium grained sand, moist.
			U50 24.00-24.40 m PP=180kPa			24			
						24.40		CH	Silty CLAY (CH) Very stiff, high plasticity, grey brown mottled pale yellow brown, moist.
						26			
			U50 27.00-27.40 m PP=490kPa			27.20		CH	Silty CLAY (CH) Hard, high plasticity, grey brown mottled pale yellow brown, moist.
						28			

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Support
C - Casing

Water
Level (Date)
Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Remarks
1. Groundwater not observed due to drilling method adopted.

PACGEO 1.01.1 LIB.GLB Log PACGEO BOREHOLE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:45 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

Pacific Geotech
Consulting Geotechnical Engineers

Borehole No.
BH01
Page 4 of 5

Project No.: PG-13778

Client:	Maryanne Developments Pty Ltd	Commenced:	07/07/2025
Project Name:	Proposed Highrise Development	Logged By:	AS
Hole Location:	19-21 Anne Avenue, Broadbeach	Checked By:	
Hole Position:			
Drill Model and Mounting:	Hanjin 2012	RL Surface:	No survey
Hole Diameter:		Datum:	AHD Operator: AS

Drilling Information							***Soil Description***		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
WB			U50 30.00-30.40 m PP=480kPa					CH	Silty CLAY (CH) Hard, high plasticity, grey brown mottled pale yellow brown, moist. *(continued)*
			U50 31.50-31.90 m PP=>600kPa			32			
						32.70		SC	Clayey SAND (SC) Medium dense, fine to medium grained, dark grey brown, low plasticity clay, moist.
			SPT 33.50-33.95 m 10,11,12 N=23			34 34.10		SP	Gravelly SAND (SP) Dense, fine to medium grained, grey dark grey, fine to medium sized gravel, with low plasticity clay, moist.
						36			
						38			
						39.60			METASILTSTONE (HW) Highly weathered, low to medium strength, pale grey yellow brown.

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
Level (Date)
Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Support
C - Casing

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Remarks
1. Groundwater not observed due to drilling method adopted.

PACGEO 1.01.1 LIB.GLB Log PACGEO BOREHOLE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:45 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

Pacific Geotech
Consulting Geotechnical Engineers

Borehole No.
BH01
Page 5 of 5

Project No.: PG-13778

Client:	Maryanne Developments Pty Ltd	Commenced:	07/07/2025
Project Name:	Proposed Highrise Development	Logged By:	AS
Hole Location:	19-21 Anne Avenue, Broadbeach	Checked By:	
Hole Position:			
Drill Model and Mounting:	Hanjin 2012	RL Surface:	No survey
Hole Diameter:		Datum:	AHD Operator: AS

Drilling Information							***Soil Description***		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
WB									METASILTSTONE (HW) Highly weathered, low to medium strength, pale grey yellow brown. *(continued)*
						41.00			Hole Terminated at 41.00 m
						42			
						44			
						46			
						48			

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
Level (Date)
Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks
1. Groundwater not observed due to drilling method adopted.

Support
C - Casing

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

PACGEO 1.01.1 LIB.GLB Log PACGEO BOREHOLE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:45 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

Pacific Geotech
Consulting Geotechnical Engineers

Borehole No.
BH02
Page 1 of 1

Project No.: PG-13778

Client:	Maryanne Developments Pty Ltd	Commenced:	03/07/2025
Project Name:	Proposed Highrise Development	Logged By:	RR
Hole Location:	19-21 Anne Avenue, Broadbeach	Checked By:	
Hole Position:			
Drill Model and Mounting:	Compac 018	RL Surface:	No survey
Hole Diameter:		Datum:	AHD Operator: RR

Drilling Information							Soil Description			DCP
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm
AD/T			ASS 0.00-0.50 m D 0.20-0.50 m ASS 0.50-1.00 m ASS 1.00-1.50 m D 1.10-1.50 m ASS 1.50-2.00 m ASS 2.00-2.50 m ASS 2.50-3.00 m ASS 3.00-3.50 m ASS 3.50-4.00 m ASS 4.00-4.50 m D 4.10-4.50 m ASS 4.50-5.00 m ASS 5.00-5.50 m ASS 5.50-6.00 m ASS 6.00-6.50 m ASS 6.50-7.00 m ASS 7.00-7.50 m ASS 7.50-8.00 m D 8.60-9.00 m			0.10 1.20 2.10 3.10 3.60 5.60 9.00		SM SP SP SP SP SP	FILL Silty SAND (SM) Very loose to loose, fine to medium grained, dark grey, with low plasticity clay, trace fine sized gravel, moist (with organics). FILL SAND (SP) Very loose, fine to medium grained, pale brown, moist. NATURAL SAND (SP) Very loose to loose, fine to medium grained, pale yellow brown, moist. SAND (SP) Loose, fine to medium grained, pale yellow brown, moist. SAND (SP) Dense, fine to medium grained, pale yellow brown, moist. SAND (SP) Medium dense to dense, fine to medium grained, pale yellow brown, moist. SAND (SP) Dense, fine to medium grained, pale yellow brown, wet. Hole Terminated at 9.00 m	0 5 10 15 20 25

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
Level (Date)
Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Support
C - Casing

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Remarks
1. Groundwater encountered at 5.60m.
2. DCP refusal at 3.14m.
3. Standpipe installed to 5.60m.

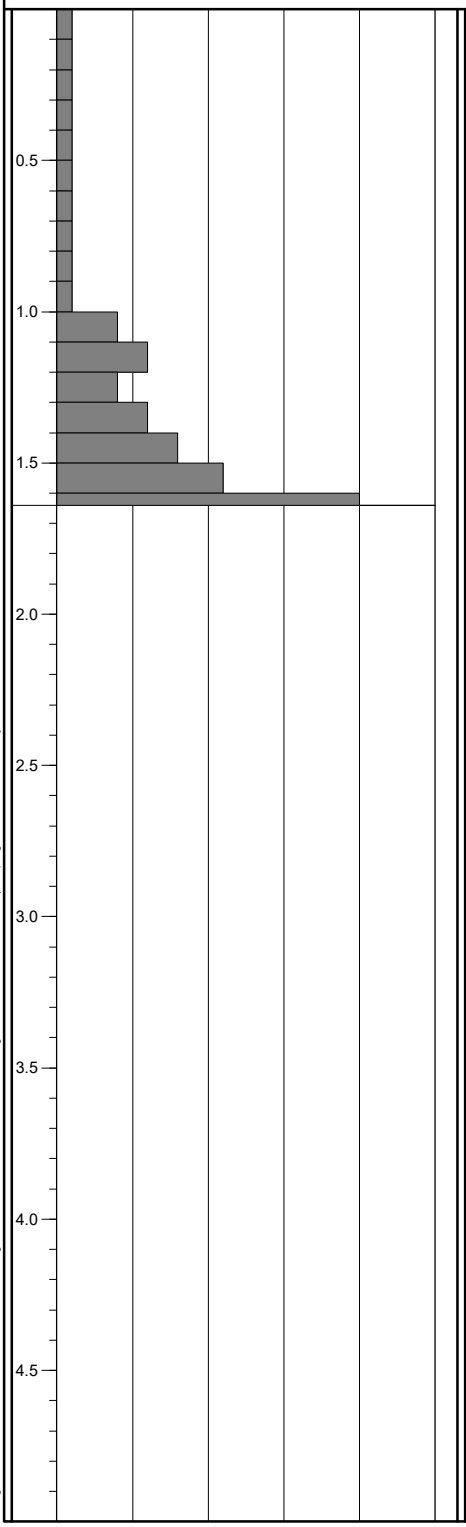
PACGEO 1.01.1 LIB.GLB Log PACGEO BOREHOLE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:45 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

Pacific Geotech
Consulting Geotechnical Engineers

CLIENT : Maryanne Developments Pty Ltd CONTRACTOR : PROJECT : Proposed Highrise Development LOCATION : 19-21 Anne Avenue, Broadbeach PROJECT No. : PG-13778		SHEET : 1 OF 2

TEST: DCP01

LOGGED: RR 03/07/2025

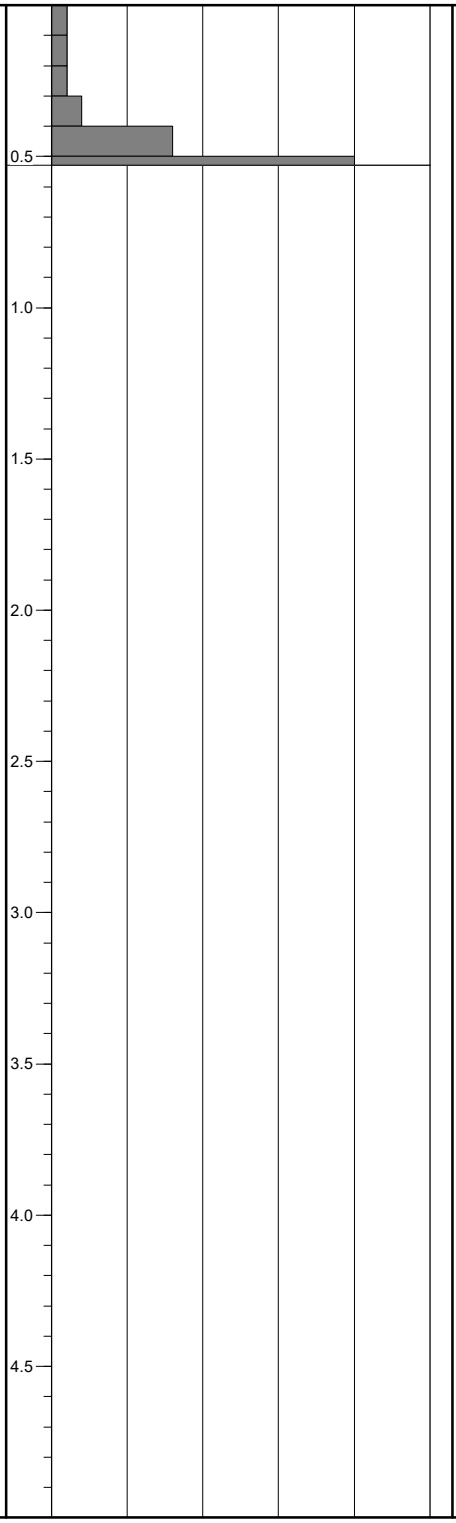


Comments

1. DCP refusal at 1.64m.

TEST: DCP02

LOGGED: RR 03/07/2025

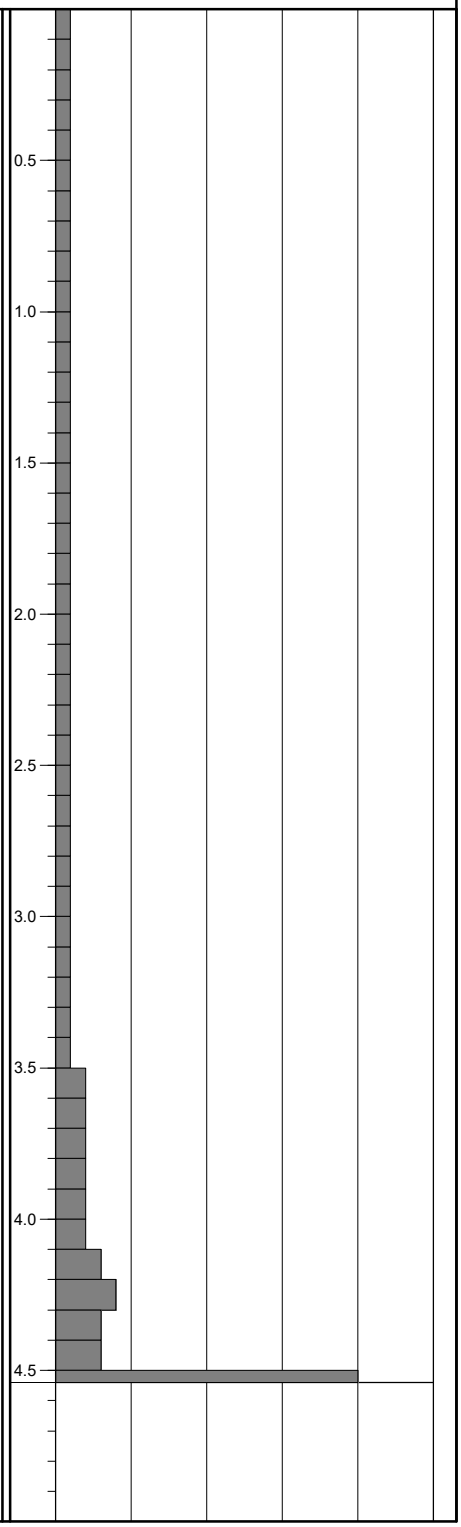


Comments

1. DCP refusal at 0.53m.

TEST: DCP03

LOGGED: RR 03/07/2025



Comments

1. DCP refusal at 4.54m.

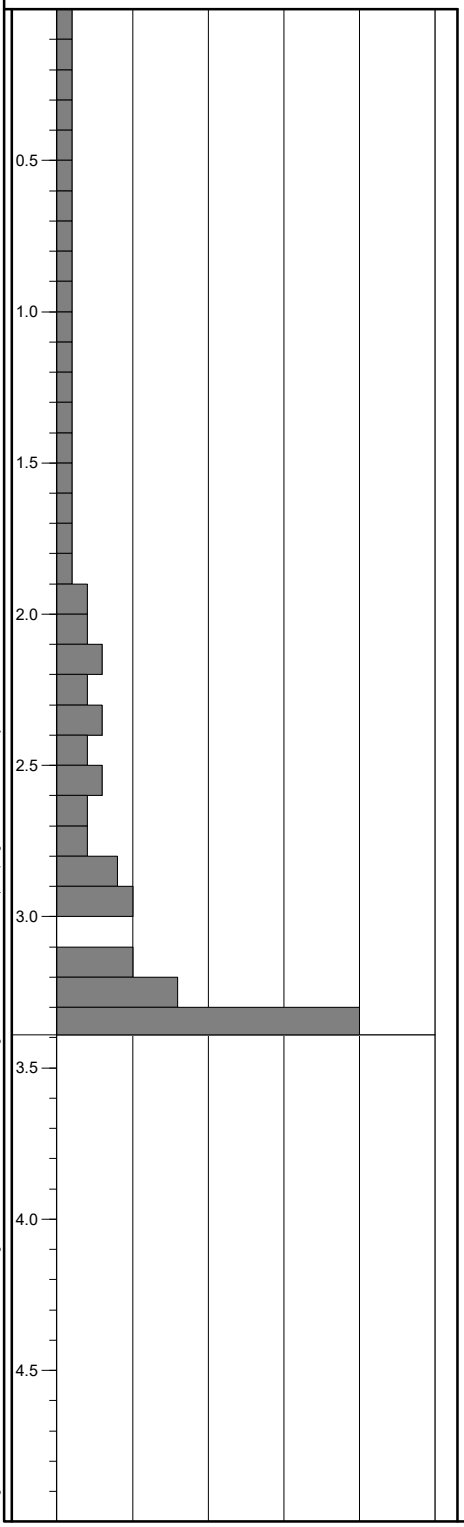
PACGEO 1.01.1.UB.GLB Log IS DCP 3 PER PAGE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:46 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

Pacific Geotech
Consulting Geotechnical Engineers

CLIENT : Maryanne Developments Pty Ltd CONTRACTOR : PROJECT : Proposed Highrise Development LOCATION : 19-21 Anne Avenue, Broadbeach PROJECT No. : PG-13778		SHEET : 2 OF 2

TEST: DCP04

LOGGED: RR 03/07/2025



Comments

1. DCP refusal at 3.39m.

PACGEO 1.01.1.UB.GLB Log IS DCP 3 PER PAGE PG-13778.GPJ <<DrawingFile>> 25/07/2025 17:46 10.03.00.09 Datgel Lab and In Situ Tool - DGD | Lib: pacgeo 1.01.1 2018-05-15 Prj: Precise 1.01 2016-11-23

APPENDIX C

LABORATORY TEST CERTIFICATES

Pacific Geotech
Consulting Geotechnical Engineers

pH Screen Report				
CLIENT:	Bassar Group	PROJECT NUMBER:	PG-13778	
ADDRESS:	19-21 Anne Avenue, Broadbeach	REPORT NUMBER:	E25-293	Rev. No.0
PROJECT NAME:	Proposed Highrise	REPORT DATE:	4.7.25	
		TEST METHOD:	ENV04	

SAMPLE LOCATION	
SAMPLING METHOD:	Disturbed
SAMPLED BY:	Pacific Geotech
DATE SAMPLED:	3.7.25
DATE RECEIVED:	4.7.25
DATE TESTED:	4.7.25

Lab Ref. No.	Sample Description	Depth (m)	pH	pH_{FOX}	pH_{FOX} Reaction Rating
E25-293-1	BH02	0.5	6.8	5.4	X
E25-293-2	BH02	1.0	6.8	5.2	X
E25-293-3	BH02	1.5	6.8	5.3	X
E25-293-4	BH02	2.0	7.0	5.3	X
E25-293-5	BH02	2.5	7.5	5.2	X
E25-293-6	BH02	3.0	7.5	5.2	X
E25-293-7	BH02	3.5	7.8	5.2	X
E25-293-8	BH02	4.0	7.7	5.2	X
E25-293-9	BH02	4.5	7.7	5.1	X
E25-293-10	BH02	5.0	7.6	5.1	X
E25-293-11	BH02	5.5	7.6	5.1	X
E25-293-12	BH02	6.0	7.6	5.1	X
E25-293-13	BH02	6.5	7.4	5.1	X
E25-293-14	BH02	7.0	7.2	5.1	X
E25-293-15	BH02	7.5	8.3	5.8	X
E25-293-16	BH02	8.0	9.1	5.9	X

pH Screen Reaction Rating Table

Reaction Scale	Reaction
X	Slight Reaction
XX	Moderate Reaction
XXX	High Reaction
XXXX	Vigorous Reaction, gas evolved, heat generated

Pacific Geotech accepts no responsibilty for the collection and transport of samples submitted by external parties.
Measurement uncertainty data is available upon request. LOR denotes Limit of Reporting

All samples are analysed on an as received basis and the results in rhis report pertain only to the sample submitted.

This report supercedes any previous report(s) issued with this reference number. This document shall not be reproduced except in full.

NATA WORLD RECOGNISED ACCREDITATION	Accredited for Compliance with ISO/IEC 17025 - Testing Pacific Geotech Pty Ltd - Accreditation No. 21130 Gold Coast Laboratory - Site No. 25487	Approved Signatory Daryl Surkitt Environmental Laboratory Manager

P: (07) 5636 4680 F: (07) 5636 0286 E: info@pacgeo.com.au
3 Jowett Street, Coomera, Qld, 4209 | PO Box 499, Paradise Point, Qld, 4216
www.pacgeo.com.au
ABN: 62 615 248 952

Pacific Geotech
Consulting Geotechnical Engineers

ACID SULFATE SOIL REPORT				
CLIENT:	Bassar Group	PROJECT NUMBER:	PG-13778	
ADDRESS:	19-21 Anne Avenue, Broadbeach	REPORT NUMBER:	E25-294	Rev. No.0
PROJECT NAME:	Proposed Highrise	REPORT DATE:	11.7.25	

SAMPLE LOCATION	
SAMPLING METHOD:	Disturbed
SAMPLED BY:	Pacific Geotech
DATE SAMPLED:	3.7.25
DATE RECEIVED:	4.7.25
DATE TESTED:	4.7.25
PREPERATION/ANALYSIS METHOD:	ENV01/ENV02

Lab Ref Number	Unit	LOR	E25-294-1	E25-294-2	E25-294-3	E25-294-4	E25-294-5	E25-294-6	E25-294-7	E25-294-8
Sample Description			BH02	BH02	BH02	BH02	BH02	BH02	BH02	BH02
Depth (m)			1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
pH_{KCL}	pH Unit	0.1	6.5	7.0	6.2	6.2	6.2	6.0	5.4	8.9
Chromium Reducible Sulfur	%w/w S	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur	mol H^+/t	3	<3	<3	<3	<3	<3	<3	<3	<3
TAA pH to 6.5	mol H^+/t	2	<2	<2	<2	<2	<2	<2	<2	<2
s-TAA pH to 6.5	%w/w S	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
KCl Ext S	%w/w S	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
HCl Ext S	%w/w S	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Retained Acidity (SNAS)	%w/w S	0.005	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Retained Acidity (SNAS)	mol H^+/t	3	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
ANC	%CaCO3	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	5.2
ANC	mol H^+/t	5	18	31	16	19	20	12	20	1042
Net Acidity	mol H^+/t	5	<5	<5	<5	<5	<5	<5	<5	<5
Net Acidity	%w/w S	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Net Acidity - ANC	mol H^+/t	1	<1	<1	<1	<1	<1	<1	<1	<1
Liming Rate	kg CaCO3/t	1	<1	<1	<1	<1	<1	<1	<1	<1
Liming Rate - ANC	kg CaCO3/t	1	<1	<1	<1	<1	<1	<1	<1	<1

Liming rate only includes ANC when its effectiveness has been corroborated by simulative oxidation procedures such as incubation. Unless corroborated, the results for ANC analyses should not be used when determining Net Acidity for comparison with action criteria. The Liming Rate-ANC calculation is only inluded when the amount of acid neutralising present in the soil is capable of buffering the soil at pH 6.5 or above. A liming safety factor of 1.5 has been applied. Results apply to samples that have been dried at 85±5°C. LOR denotes Limit of Reporting. N/R denotes Not Required. The results in this report pertain only to the samples as received. This document shall not be reproduced except in full. Method uncertainty data is available at www.pacgeo,com,au/safety-and -quality-assurance. This report supercedes any previous report(s) isssued with this reference number. Pacific Geotech accepts no responsibilty for the collection and transport of samples submitted by external parties.

NATA WORLD RECOGNISED ACCREDITATION	Accredited for Compliance with ISO/IEC 17025 - Testing Pacific Geotech Pty Ltd - Accreditation No. 21130 Gold Coast Laboratory - Site No. 25487	Approved Signatory Daryl Surkitt Environmental Laboratory Manager

Form ER004.1

P: (07) 5636 4680 F: (07) 5636 0286 E: info@pacgeo.com.au
3 Jowett Street, Coomera, Qld, 4209 | PO Box 499, Paradise Point, Qld, 4216
www.pacgeo.com.au
ABN: 62 615 248 952

APPENDIX D

SITE PLAN



Pacific Geotech
Consulting Geotechnical Engineers

Drawn ER	Project:	Proposed Highrise Development	Drawing No. PG-13778-01 SITE PLAN	A4
Date JULY 25	Location:	19-21 Anne Avenue, Broadbeach		
Checked	Client:	Maryanne Developments Pty Ltd		

APPENDIX E

ACID SULFATE SOIL MANAGEMENT PLAN

Pacific Geotech
Consulting Geotechnical Engineers

Ref: PG-13778, 2025-08-18, ASSMP VER 1
Author: Peter Elkington

19th August, 2024

Maryanne Developments Pty Ltd
Email: tony@altitudeconstructiongroup.com.au
CC: leo@bassargroup.com / simon@bassargroup.com /
gareth.hodgins@hutchinsonbuilders.com.au

ATTN: ANTONIOS BASSIL

Dear Sir,

ACID SULFATE SOIL MANAGEMENT PLAN – PROPOSED HIGH RISE DEVELOPMENT
19-21 ANNE AVENUE, BROADBEACH

It is understood that the proposed development is to comprise the construction of a 32 storey tower over a double level basement. Earthworks are envisaged to consist of cuts of up to 7m for the basement.

Fieldwork comprised the drilling and sampling of 1 borehole to d depth of 9m, using a Compac018 drilling rig, utilising solid flight auger techniques. Dynamic Cone Penetrometer (DCP) testing was undertaken adjacent to the borehole and at an additional 4 locations.

Laboratory testing was undertaken in general accordance with the recommendations outlined in the QASSIT 'Acid Sulfate Soils Laboratory Methods Guidelines 2004'.

The testing program comprised of initial screening tests on recovered samples, followed by quantitative testing using the Chromium Reducible Sulfur (CRS) suite.

Summary

On the basis of the testing undertaken, all samples provided nett acidity values below the QASSIT defined action criteria. Therefore, soils disturbed on-site do not require treatment for acid sulfate potential.

Should you have any queries in regards to the above, please do not hesitate to contact the undersigned at our office.

Yours faithfully,



P. ELKINGTON (RPEQ 7226)

For and on behalf of
PACIFIC GEOTECH PTY LTD