15/08/2021

RE: Panel presentation from Vicky Muises-Khoury (63 Pintail Drive)

Reference JW1624119

Application to Alter an existing dam at 1075 Horseshoe Bend Road, Torquay

Dear members of the Independent Panel,

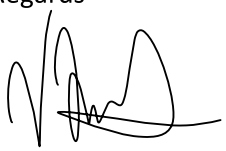
As mentioned at previous panel hearing and in reference to the panel hearing on Monday 23rd August, 2021, please see below outline of the content I will be speaking to before the panel.

- Continuous backyard flooding
- Reiterate initial submission, and for points addressed in submission lodged in June 2020, to be considered when deciding

Attached you will find photo/s to support the continuous backyard flooding. Every time Torquay is subject to one day of heavy rain or a couple of days of light rain, our backyard is subject to flooding due to the extent of moisture still evident in our soil. This is despite us adding additional drainage to our property, as advised by our builders, due to dam flooding prior to our build. Please refer to Geotech results and evidence provided in initial submission to corroborate this.

I appreciate the efforts of the panel in supporting an appropriate resolution.

Regards



Vicky Muises-Khoury

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Mr Luke Andrews
61 Pintail Drive
Torquay VIC 3228

Project 87104.00
December 2020
R.001.Rev0
GG/SG

Attention: Luke Andrews

Email: andrews.luke@yahoo.co.uk

Preliminary Geotechnical Investigation
Pintail Drive Investigation
61 Pintail Drive, Torquay

1. Introduction

This investigation report presents the findings of a preliminary geotechnical investigation carried out by Douglas Partners Pty Ltd (DP) at the properties of 59, 61 and 63 Pintail Drive, Torquay. The aim of the investigation was to provide factual data and advise on subsurface moisture conditions across the site pertaining to a potentially faulty dam located on a neighbouring property approximately 30 m to the north east.

The area of investigation extends across the rear of three residential properties approximately 40 m x 10 m.

2. Geological Setting

Reference to the geovic digital dataset (http://earthresources.vic.gov.au/earth-resources/maps-reports-and-data/geovic) indicates that the site is underlain by Oligocene to Miocene age Torquay Group. These deposits generally comprise Marlstone, limestone, mudstone and sandstone associated with a shallow clastic sea environment. The findings of the investigation broadly align with the expected geology.

3. Field Work Methods

The fieldwork was carried out on 16 November 2020 and comprised three hand auger boreholes and the excavation of two hand dug test pits. (See Exploratory Hole Location Plan attached).

The boreholes were excavated to a depth of up to 1 m below the existing surface level. Disturbed samples were collected for subsequent laboratory testing.

The hand dug test pits were carried out adjacent to the existing slab footing of 61 and 63 Pintail Drive.

Two groundwater monitoring standpipes were installed in HA2 and HA3 to 0.8 m and 0.95 m depth respectively. Detailed of these standpipes are given on the respective logs and water level measurements are given in Table 1.

Upon completion of logging and sampling, borehole HA1 and the test pits were backfilled using excavated spoil and reinstated to the existing surface level.

The field work was supervised by a geotechnical engineer from Douglas Partners who was responsible for client liaison, field work co-ordination, logging and photographing the strata encountered, sampling and sample handling.

4. Ground Conditions

Details of the conditions encountered in the exploratory holes are contained in the log sheets attached. These should be read in conjunction with the attached explanatory notes, which define the descriptive terms and classification methods.

4.1 Fill: Silty Sand / Sandy Silt

Fill was encountered in all exploratory holes and typically comprised poorly compacted dark brown, grey silty sand or sandy silt up to 0.5 m depth.

4.2 Silty Sand

Directly beneath the fill material, pale brown, fine to coarse grained silty sand, inferred to be medium dense, was encountered up to 0.7 m depth.

4.3 Silty Clay

Directly beneath the silty sand, orange brown silty clay with firm to very stiff consistency was encountered up to 0.95 m depth.

4.4 Sandy Clay

Sandy clay was encountered in HA01 and TP02 at 0.9 m and 0.6 m respectively. This layer was stiff to very stiff, orange brown with fine to coarse grained sand.

4.5 Groundwater

Signs of groundwater encountered during the investigation included seepage noted in TP02 against the slab footing and saturation of the silty sand strata within HA2 and HA3. This is discussed further in Section 6 below.

It should be noted that groundwater levels will vary due to seasonal and climatic variations and anthropogenic changes. Furthermore, they may not be the same at the time of construction, accordingly ongoing monitoring should be performed to assess long term groundwater level trends.

Table 1: Groundwater Monitoring Results

Date	Location	Water Level (m)	Standpipe Depth (m)	Comment
27/11/20	HA2 (61 Pintail Drive)	0.74	0.80	
	HA3 (63 Pintail Drive)	0.54	0.95	
	*59	2.95	5.55	
	*67	3.49	5.50	
09/12/20	HA2 (61 Pintail Drive)	0.77	-	Likely residual water in end cap
	HA3 (63 Pintail Drive)	0.67	-	
	*59	3.08	-	
	*67	3.55	-	
21/12/20	HA2 (61 Pintail Drive)	0.78	-	Likely residual water in end cap
	HA3 (63 Pintail Drive)	0.71	-	
	*59	3.16	-	
	*67	4.10	-	

*Standpipe drilled and installed by others on adjacent property.

5. Laboratory Testing

The results of the scheduled laboratory tests performed on samples recovered from the investigation are given in the attached reports. A summary of the results is presented in Tables 1 below:

Table 2: Results of Moisture Content

Location	Depth (m)	Moisture Content (%)	Moisture Condition Observation	Description
HA1	0.2-0.3	8.1	Moist	Silty Sand
HA1	0.4-0.5	28.4	w<PL	Silty Clay
HA1	0.7-0.8	29.4	w<PL	Silty Clay
HA1	0.9-1.0	18.9	w=PL	Sandy Clay
HA2	0.3-0.4	11	Moist	Filling / Sandy Silt
HA2	0.6-0.7	24.4	Wet	Silty Sand
HA3	0.15-0.25	16.4	Wet	Filling / Sandy Silt
HA3	0.3-0.4	9.4	Wet	Silty Sand
HA3	0.4-0.5	9.9	Wet	Silty Sand
HA3	0.6-0.7	26.3	w=PL	Silty Clay
TP02	0.35-0.4	21.2	w>PL	Silty Clay
TP02	0.4-0.5	9.1	Wet	Silty Sand
TP02	0.5-0.6	14.5	Wet	Silty Sand

The soil laboratory test results indicate the subgrade moisture content varies from 8.1 % to 29.4 % across the site.

6. Discussion

6.1 Site Observations

During the initial office-based study and site visit it was noted that the footprint of an old de-salination plant was located over the properties of 59 and 61 Pintail Drive. The plant is evident in aerial images from November 2009 and the extent of the footprint is shown on the exploratory hole location plan attached. The location and presence of the associated pipework is unknown, but it should be noted that disused in-ground services and backfilled alignments of removed services can potentially act as conduits for seepage flow.

During the intrusive investigation, observations of the natural silty sand layer encountered between 0.25 m and 0.7 m in HA2, HA3 and TP02 showed this material to be wet compared to the same layer in HA01 where it was recorded as moist.

Photograph 1: Silty Sand and Silty Clay Layer from HA02

Hand dug test pit TP02 was carried out against the slab footing of 63 Pintail Drive. From 0.4 m depth to 0.6 m depth the silty sand encountered was saturated (see Photograph 2).

At the time of investigation it was not possible to access the slab footing of 61 Pintail Drive.

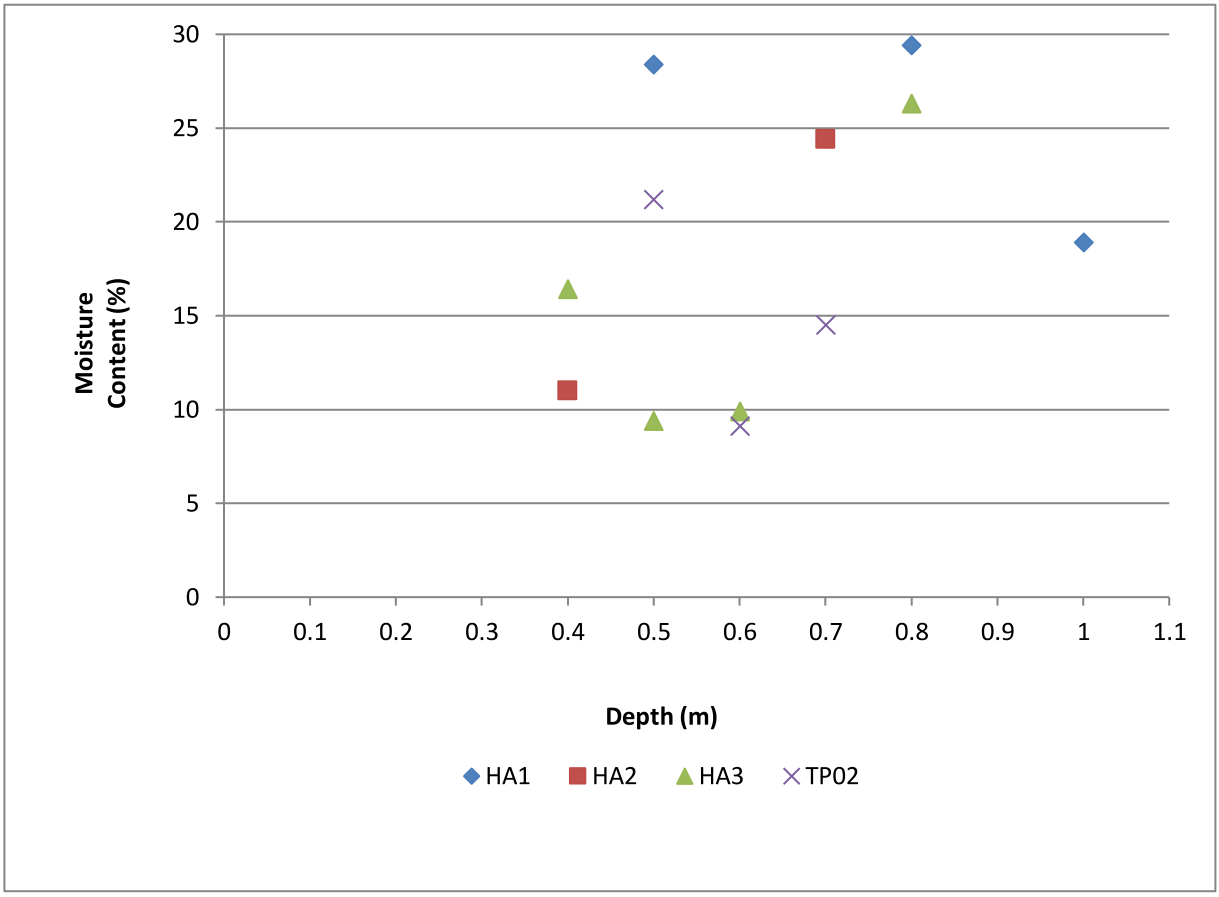
Photograph 2: Base of Silty Sand layer Against Slab Footing

6.2 Moisture Content Results

The moisture content tests carried out on representative samples of the silty sand layer across the site confirmed the above observations with higher moisture content values of between 9.1 % to 24.4% compared to 8.1% in HA1 (See Figure 1 below).

Typically the cohesive silty clays encountered retain a greater percentage of moisture than predominantly granular silty sand materials.

Figure 1: Moisture Content vs Depth Graph



6.3 Groundwater Monitoring Results

Groundwater levels from the installed standpipes show standing water levels between 0.6 m and 0.7 m depth within HA2 and HA3.

Two standpipes (installed by others between 22 October and 16 November) are located either side of the site to a depth of 5.5 m. Groundwater levels within these standpipes are typically between 2.95 m and 4.10 m depth. These values correspond with the VVG Website (www.vvg.org.au/vvg_map), which gives an indicated depth to groundwater of up to approximately 5.0 m below ground level.

It is considered likely that the groundwater levels within standpipes HA2 and HA3 are from locally perched or mounded groundwater and not representative of the broadscale groundwater. The origin of the groundwater is unknown.

6.4 Recommendations for Further Investigation

Chemical analysis of the groundwater within the standpipes may aid in identifying the source of the water. This should include analysis of major cations and anions and creation of a Piper Plot to compare the relative contribution of each ion to the overall salinity in each of the standpipes as well as nearby water sources, if accessible. Further investigation around the slab footing may also be considered to further assess the extents of the moisture content changes within the subsurface soils.

Further advice should be sought from a structural engineer to assess the slab footing condition.

7. Limitations

Douglas Partners (DP) has prepared this report for this project at 59, 61, 63 Pintail drive, Torquay in accordance with DP's proposal GGG200094 dated 28 October 2020 and acceptance received from Luke Andrews dated 4 October 2020. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Luke Andrews for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

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

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

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical and groundwater components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

Please contact the undersigned if you have any questions on this matter.

Yours faithfully
Douglas Partners Pty Ltd

Gareth Griffiths
Geotechnical Engineer

Reviewed by

Stephen Gamble
Principal

Attachments: About this Report
Site Drawing
Borehole Logs
Laboratory Test Results

About this Report

Douglas Partners

Introduction

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

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

Copyright

Borehole and Test Pit Logs

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

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

Groundwater

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

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

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

Reports

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

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

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

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

About this Report

Site Anomalies

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

Information for Contractual Purposes

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

Site Inspection

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

Sampling Methods

Douglas Partners

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil 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.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm 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 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

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

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with ‘Mix of Soil and Cobbles/Boulders’ with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

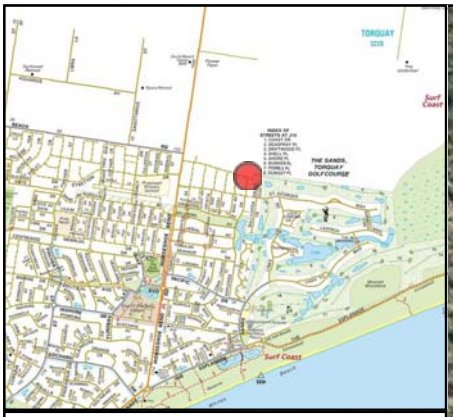
For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).



Site Locality

0 5 10 15 20 25 30 35 m

Legend

- Standpipes (installed by others)
- Exploratory Holes
- Footprint of former de-Salination Plant

Nearmap Image 20200428

Douglas Partners Geotechnics / Environment / Groundwater	TITLE: Exploratory Hole Location Plan Preliminary Geotechnical Investigation 59 - 63 Pintail Drive, Torquay			N MGA
CLIENT: Mr Luke Andrews		PROJECT #: 87104.00		DRAWING No: 1
OFFICE: Geelong	DRAWN BY: GSG	DATE: 30.11.2020	SCALE: 1:400	REVISION: 0

BOREHOLE LOG

CLIENT: Mr Luke Andrews
PROJECT: Pintail Drive Investigation
LOCATION: 61 Pintail Drive, Torquay

SURFACE LEVEL: --
EASTING: 267952
NORTHING: 5757117
DIP/AZIMUTH: 90°/--

BORE No: HA01
PROJECT No: 87104.00
DATE: 16/11/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		Inferred FILL / SILTY SAND (SM): grey, brown, fine to medium grained, dry. (possibly reworked).							
	0.2	SILTY SAND (SM): pale brown, fine to medium grained, moist, inferred medium dense.		D	0.2				
					0.3				
	0.35	SILTY CLAY (CL): orange brown, w<PL, trace fine to medium sand, firm to stiff.		D	0.4				
					0.5				
		...becoming sandy, stiff to very stiff below 0.7 m depth.		D	0.7				
					0.8				
	0.9	SANDY CLAY (CL): orange, dark brown, fine to coarse grained sand, w=PL, stiff to very stiff.		D	0.9				
	1 1.0	Bore discontinued at 1.0m			1.0				1

RIG: Hand Auger **DRILLER:** GG **LOGGED:** GG **CASING:** N/A
TYPE OF BORING:
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 55 H.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Mr Luke Andrews
PROJECT: Pintail Drive Investigation
LOCATION: 61 Pintail Drive, Torquay

SURFACE LEVEL: --
EASTING: 267954
NORTHING: 5757115
DIP/AZIMUTH: 90°/--

BORE No: HA02
PROJECT No: 87104.00
DATE: 16/11/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILL / SANDY SILT (ML): dark grey, brown, fine to medium grained sand, poorly compacted, moist.							
		from 0.33 m: with fine to medium basalt gravel.		E	0.3				Plain 32mm PVC to 0.5 m.
					0.4				
	0.5	SILTY SAND (SM): pale brown, fine to medium grained, wet, inferred medium dense.		E	0.6				
	0.7	SILTY CLAY (CL): orange brown, w=PL, trace fine to medium sand, very stiff.			0.7				Slotted 32mm PVC 0.5 m to 2.0 m
		...becoming sandy, very stiff below 0.8 m depth.							
	0.95	Bore discontinued at 0.95m							
	1								1

RIG: Hand Auger **DRILLER:** GG **LOGGED:** GG **CASING:** N/A
TYPE OF BORING:
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 55 H.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Mr Luke Andrews
PROJECT: Pintail Drive Investigation
LOCATION: 61 Pintail Drive, Torquay

SURFACE LEVEL: --
EASTING: 267968
NORTHING: 5757110
DIP/AZIMUTH: 90°/--

BORE No: HA03
PROJECT No: 87104.00
DATE: 16/11/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILL / SILTY SAND (SP): fine to coarse grained, pale brown, poorly compacted, moist							
	0.1	Inferred FILL / SANDY SILT (ML): dark brown, fine to coarse sand, inferred poorly compacted, wet.		D	0.15				Plain 32mm PVC to 0.3 m.
	0.25	SILTY SAND (SM): pale brown, fine to medium grained, wet, inferred medium dense.		D	0.25 0.3				
				D	0.4				
	0.5	SILTY CLAY (CL): orange brown, w=PL, trace fine to medium sand, firm to stiff.		D	0.5 0.6				Slotted 32mm PVC 0.3 m to 2.0 m
		below 0.8 m: becoming sandy, very stiff.			0.7				
	0.95	Bore discontinued at 0.95m							
-1									-1

RIG: Hand Auger **DRILLER:** GG **LOGGED:** GG **CASING:** N/A
TYPE OF BORING:
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Location coordinates are in MGA94 Zone 55 H.

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Mr Luke Andrews
PROJECT: Pintail Drive Investigation
LOCATION: 61 Pintail Drive, Torquay

SURFACE LEVEL: --
EASTING: 267957
NORTHING: 5757114

PIT No: TP01
PROJECT No: 87104.00
DATE: 16/11/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILL / CONCRETE.							
	0.1	FILL / SANDY SILT (ML): grey brown, fine to coarse grained sand, poorly compacted, dry, with some scoria gravel.							
	0.4	Pit discontinued at 0.4m							
	1								1

RIG: Hand Auger

LOGGED: GG

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: No free groundwater observed

REMARKS: No evidence of washout or erosion noted under slab.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Mr Luke Andrews
PROJECT: Pintail Drive Investigation
LOCATION: 61 Pintail Drive, Torquay

SURFACE LEVEL: --
EASTING: 267970
NORTHING: 5757107

PIT No: TP02
PROJECT No: 87104.00
DATE: 16/11/2020
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILL / CLAYEY SAND (SC): fine to coarse grained, well compacted.							
	0.25	SILTY SAND (SM): pale brown, fine to medium grained, damp, inferred medium dense.							
	0.35	SILTY CLAY (CL): orange brown, w>PL, trace fine to medium sand, firm to stiff.		D	0.35				
	0.4	SILTY SAND (SM): pale brown, fine to medium grained, wet, inferred medium dense.		D	0.4				
				D	0.5				
	0.6	SANDY CLAY (CL): orange, dark brown, fine to coarse grained sand, w>PL, stiff to very stiff.			0.6				
	0.65	Pit discontinued at 0.65m							
	1								1

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: Hand Auger

LOGGED: GG

SURVEY DATUM: MGA94 Zone 55 H

WATER OBSERVATIONS: Some seepage of perched water from 0.5 m to 0.65 m depth.

REMARKS: No evidence of washout or erosion noted under slab.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Material Test Report

Douglas Partners
Geotechnics / Environment / Groundwater
Douglas Partners Pty Ltd
Melbourne Laboratory
231 Normanby Road South Melbourne Vic 3205
Phone: (03) 9673 3500
Fax: (03) 9673 3599
Email: scott.benbow@douglaspartners.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Scott Benbow
Lab Manager
NATA Accredited Laboratory Number: 828

Report Number: **87104.00-1**
Issue Number: 1
Date Issued: 15/12/2020
Client: Mr Luke Andrews
61 Pintail Drive, Torquay VIC 3228
Contact: Luke Andrews
Project Number: 87104.00
Project Name: Pintail Drive Investigation
Project Location: 61 Pintail Drive, Torquay
Client Reference: LTR-87104_00-23-11-20
Work Request: 2111
Date Sampled: 21/11/2020
Dates Tested: 01/12/2020 - 01/12/2020
Sampling Method: Sampled by Engineering Department
The results apply to the sample as received

Moisture Content AS 1289 2.1.1

Sample Number	Sample Location	Moisture Content (%)	Material
ME-2111A	HA1, Depth: 0.20-0.30m	8.1 %	Silty Sand
ME-2111B	HA1, Depth: 0.40-0.50m	28.4 %	Silty Clay
ME-2111C	HA1, Depth: 0.70-0.80m	29.4 %	Silty Clay
ME-2111D	HA1, Depth: 0.90-1.00m	18.9 %	Sandy Clay
ME-2111E	HA2, Depth: 0.30-0.40m	11.0 %	Sandy Silt
ME-2111F	HA2, Depth: 0.60-0.70m	24.4 %	Silty Sand
ME-2111G	HA3, Depth: 0.15-0.25m	16.4 %	Sandy Silt
ME-2111H	HA3, Depth: 0.30-0.40m	9.4 %	Silty Sand
ME-2111I	HA3, Depth: 0.40-0.50m	9.9 %	Silty Sand
ME-2111J	HA3, Depth: 0.60-0.70m	26.3 %	Silty Clay
ME-2111K	TP02, Depth: 0.35-0.40m	21.2 %	Silty Clay
ME-2111L	TP02, Depth: 0.40-0.50m	9.1 %	**
ME-2111M	TP02, Depth: 0.50-0.60m	14.5 %	Silty Sand