



Qualtest Geotechnical & Laboratory
Est. 1987

Geotechnical Investigation Proposed Trunk Sewer Line Monarch Glen ROL4 Flagstone

March 28, 2025

Presented To

Mirvac C/- Charlie Resolved

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**Geotechnical Investigation
Proposed Trunk Sewer Line
Monarch Glen ROL4, Flagstone**

Interpretative Report

Report Ref. No.: 8043 – 24-231

March 28, 2025

MIRVAC

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Report Ref. No.: 8043 – 24-231

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Revision	Date	Author	Reviewer	Description
0	28/03/2025	Kwaku Donkor: RPEQ - 33046	Dennis Alazigha: RPEQ - 22169	Issued for Comments

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1.1 Proposed Development

Mirvac's Monarch Glen development is described as a master-planned community covering over 1000 hectares. At completion, the community would include some 7300 houses, as well as essential amenities like schools, neighbourhood shops, parks, and sporting fields.

The Trunk Sewer Line is, therefore, required to service this new development. The proposed alignment of the sewer line is shown in *Figure 2* below. *Figure 2* shows the alignment starting at the western end of the existing Flagstone Community before tracking southwest and west into the Monarch Glen development. It is understood that the sewer trunk line for this stage would extend approximately 1600m and will be installed at about 3m to 4m deep.



Figure 2: Proposed Trunk Sewer Line Alignment shown in Orange (Source: Colliers No. 22-0408)

1.2 Purpose

The aim of this report is to present Mirvac and its partners with an interpretative geotechnical report that addresses the scope of work per Section 1.3.

1.3 Scope of Work

The scope of work for this assessment is included in Qualtest's fee proposal with reference QGQ24-152-5560 Rev C, dated February 10, 2025. The scope of work is summarised below:

- Excavate 12 test pits to 4m along sewer alignment at client-nominated locations.

Based on the above scope, it is requested that a report address the following:

- Topsoil thickness,
- Excavation conditions for trenching the sewer including the limitations for medium and large-sized plant requirements,
- Temporary safe batter/benching of the trench,
- Embedment recommendations for sewer service,
- Native Soil Modulus for design and pipe classification, and
- Gallagher Environmental has been engaged to deliver a DSMP.

2 METHODOLOGY

2.1 Standards

This investigation has predominantly been undertaken in line with the following Australian Standards:

- AS 1289 – Methods of testing soils for engineering purposes;
- AS 1726:2017 – Geotechnical Site Investigations.

2.2 Literature Review

An initial literature review was undertaken before conducting the site investigation, covering the site's geology and geomorphology, a review of documents provided by Charlie Resolved/Mirvac, and a search for any other information that was publicly available.

2.2.1 Information Provided

Mirvac/Charlie Resolved provided the following documents to aid the investigation:

- Geotechnical Brief – Contained in an email received from Adam Porter dated 19/03/2024;
- Engineering Drawing – Constraints Map Working Plan, Homestead Drive, Flagstone - Prepared by Colliers Project No:22-0408-1002, undated; and
- Engineering Drawing – Constraints Map Sewer Plan, Homestead Drive, Flagstone - Prepared by Colliers Project No:22-0408-2000, undated.

2.2.2 Previous Reports

At the time of writing the report, Qualtest is unaware of any previous geotechnical report for the site.

2.3 Site Geology

The NationalMap Detailed Surface Geology map (1:100k) shows that the site is predominately underlain by the Gatton Sandstone (Jbmg) geological unit. This early Jurassic-era unit is reported to be an arenite-dominant unit, with a lithological summary of lithic labile and feldspathic labile sandstone.

An extract from the Detailed Surface Geology map showing the site is presented in *Figure 3*.



Figure 3: The Detailed Surface Geology of the Proposed Sewer Main Alignment Site Highlighted Red

2.4 Site Description

The site is part of Mirvac's Monarch Glen Community in the suburb of Flagstone QLD within the Logan City Council area, approximately 38km from Brisbane's CBD.

The Trunk sewer alignment passes through a parcel of land sandwiched between Sandy Creek to the west and recently developed Flagstone residential developments to the east.

At the time of the investigation, the western section of the site was generally noted to be well-vegetated by a dense forest with several tracks crisscrossing the area. The topography was generally recorded as gently to moderately sloping hills and valleys with occasional eroded gullies.

The eastern end of the site had previously been cleared and generally contained short grass cover with patches of tree clumps. Rock outcrop was noted at the surface at a number of locations within this area.

Figure 4 (a, b) are photographs taken on the day of the investigation showing the site conditions.

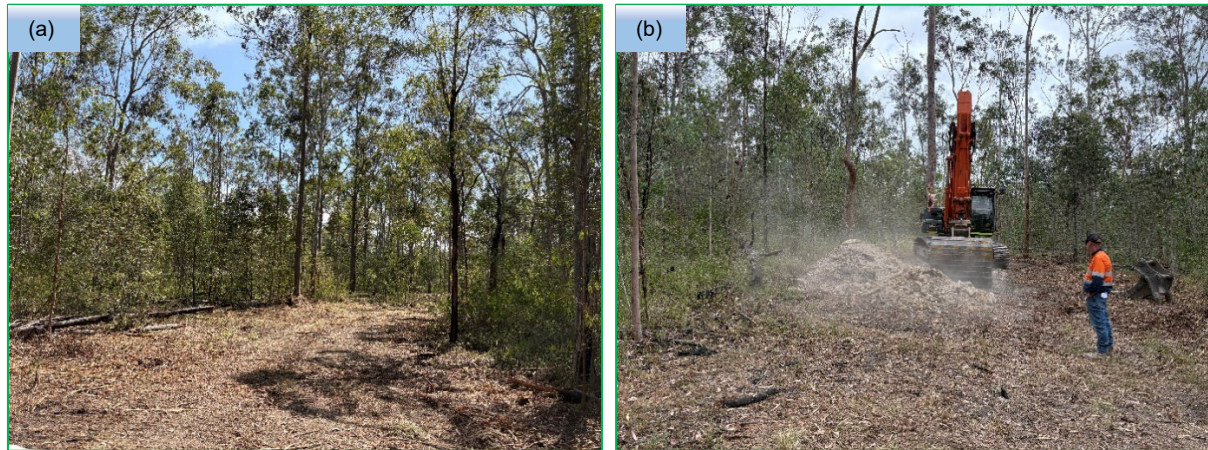


Figure 4: Photographs Showing the General Site Conditions

2.5 Underground Services

All test locations were “cleared” for any underground services before drilling commenced.

2.6 Geotechnical Investigation

The number and location of test pits were stipulated in the geotechnical brief provided to Qualtest. Onsite, all test holes were pegged to enable easy and accurate identification of test locations.

A 30-tonne Zaxis excavator was used to excavate 12 Test Pits to depths ranging between 0.9 to 4.0m bgl along the sewer alignment.

The test pit photographs are attached in Attachment 1.

The GPS coordinates (Eastings and Northings) of all test pits were recorded using a handheld device, and this is presented in *Table 1*.

For laboratory testing, soil samples, including topsoil and residual soils were collected and transported to Qualtest laboratory for testing.

The test pits were logged by Qualtest's Geotechnical Engineer per Australian Standard AS 1726-2017.

All test pits were backfilled with spoil won from the excavation operations onsite.

Figure 5 shows the location of the test pits as plotted on an aerial photograph of the site.

Table 1 - Coordinates of Borehole Locations

BH ID	UTM - Zone	Easting (m)	Northing (m)	Termination Depth (m)
STP1	56J	493735	6925126	1.0 ^(R)
STP2	56J	493671	6925039	1.4 ^(R)
STP3	56J	493612	6924952	1.2 ^(R)
STP4	56J	493564	6924880	0.9 ^(R)
STP5	56J	493500	6924862	1.5 ^(R)
STP6	56J	493187	6924899	3.2 ^(R)
STP7	56J	493185	6924860	1.7 ^(R)
STP8	56J	493103	6924766	4.0 ^(R)
STP9	56J	493027	6924685	1.8 ^(R)
STP10	56J	492899	6924616	1.2 ^(R)
STP11	56J	492823	6924603	2.4 ^(R)
STP12	56J	492728	6924561	3.6 ^(R)
<i>R = refusal depth</i>				



Figure 5: Site Plan Showing Approximate Trunk Sewer Test Locations

2.7 Subsurface Conditions

The detailed subsurface conditions encountered in the test pits are recorded on the engineering logs and are presented in *Appendix A*.

In general, the test pits show topsoil overlying residual soils, which in turn overlie weathered sandstone rock. The residual soils have generally been described as a relatively thin layer of sandy clay/clayey sand, low to medium plasticity, brown-mottled grey, very stiff to hard. The transition between residual soils and weathered rock was found to be gradual at many locations, making the distinction between extremely weathered rock and residual soils difficult.

The subsurface profile is further described as follows:

Topsoil	Encountered in all test pits and described as silty sand, fine to medium-grained, grey, dry, with organic matter and extended to a maximum depth of about 0.4m bgl.
Residual / Extremely Weathered Sandstone	Observed in all test pits except STP1 and STP4 below the topsoil and continued to various depths between 0.8 and 4m below ground level. These materials were generally described as sandy clay, low to medium plasticity, very stiff to hard. The materials transitioned into weathered sandstone rock with increasing depth.
Moderately Weathered sandstone	Encountered in all test pits, except STP8, underneath the residual/extremely weathered sandstone rock and extended to excavation refusal/termination depths. The sandstone bedrock was observed predominantly as moderately weathered with slightly weathered to fresh rock with depth. Judged by the rate of excavation, the rock strength is typically low to moderate; however, sections of high-strength rock were also recorded.

2.8 Groundwater

Free groundwater nor seepage was encountered in any of the excavated test pits. Excavations to depths of up to about 4m will likely not encounter groundwater. Nonetheless, it is noted that groundwater conditions may vary with seasonal/tidal climatic conditions and depend on the subsurface conditions and soil types.

2.9 Geotechnical Model

A preliminary geotechnical model of the subsurface conditions encountered based on the test pit profiles is presented in *Table 2*.

Table 2: Preliminary Geotechnical Model Based on Borehole/Test Pit Profiles

BH ID	Topsoil (m)	Residual / Extremely Weathered Sandstone (m)	Moderately Weathered Rock (m)	Termination depth (m)
STP1	0.0 – 0.30	NE	0.30 – 1.00	1.0 ^(R)
STP2	0.0 – 0.40	0.40 – 0.80	0.80 – 1.40	1.4 ^(R)
STP3	0.0 – 0.20	0.20 – 0.80	0.80 – 1.20	1.2 ^(R)
STP4	0.0 – 0.05	NE	0.05 – 0.90	0.9 ^(R)
STP5	0.0 – 0.35	0.35 – 0.90	0.90 – 1.50	1.5 ^(R)
STP6	0.0 – 0.20	0.20 – 2.00	2.00 – 3.20	3.2 ^(R)
STP7	0.0 – 0.35	0.35 – 1.20	1.20 – 1.70	1.7 ^(R)
STP8	0.0 – 0.30	0.30 – 4.00	NE	4.0 ^(R)
STP9	0.0 – 0.30	0.30 – 1.20	1.20 – 1.80	1.8 ^(R)
STP10	0.0 – 0.30	0.30 – 1.00	1.00 – 1.20	1.2 ^(R)
STP11	0.0 – 0.30	0.30 – 0.90	0.90 – 2.40	2.4 ^(R)
STP12	0.0 – 0.30	0.30 – 2.90	2.90 – 3.60	3.6 ^(R)

3 LABORATORY TESTING AND RESULTS

Selected soil samples were tested for geotechnical properties at Qualtest's NATA-accredited laboratory in Brisbane in accordance with relevant Australian Standards (AS). Tests outside the scope of Qualtest laboratory were outsourced.

The quantity and type of laboratory tests performed in this investigation are summarised in *Table 3*.

Table 3: Laboratory Testing Program

Laboratory Test	Material type	Quantity	Reference Standard
Particle Size Distribution	RS / XWS	4	AS1289.3.6.1
Atterberg Limits	RS / XWS	4	AS1289.3.2.1, 3.1.2, 3.3.1, 3.4.1
Emerson Class Number	RS / XWS	8	AS1289.3.8.1
RS = residual soil, XWS = extremely weathered sandstone			

The detailed laboratory test certificates for the investigation are presented in *Appendix B*.

3.1 Particle Size Distribution and Moisture Content

The behaviour of coarse-grained soils (sands and gravels) can be predicted by classifying the soil in terms of its particle size distribution (PSD). AS 1726-2017 denotes soils with fine contents ($\leq 75 \mu\text{m}$) greater than or equal to 35% will behave geomechanically as fine-grained soil and, therefore, are to be described as cohesive soils.

Four (4) samples were tested for particle size distribution. The results of the tests are summarised in *Table 4* showing clay-based residual soils and weathered sandstone (coarse-grained soils).

Table 4: Results of the Particle Size Distribution Tests

BH ID	Sample Depth (m)	Material Type	Grading (%)		
			Gravel	Sand	Fines
STP1	0.3 – 0.5	Sandy Gravel with Clay	61	31	8
STP4	0.1 – 0.3	Sandy Gravel with Clay	58	32	10
STP8	3.0 – 3.5	Sandy Clay	2	55	43
STP10	0.5 – 0.8	Sandy Clay	0	52	48
Fine = silt + clay					

3.2 Atterberg Limits

The behaviour of fine-grained soils (silts and clays) can be predicted by classifying the soil in terms of its plasticity. Plasticity is broadly described as either "High", "Medium", or "Low".

The 'Plasticity Index' of soil is the range of moisture contents where the soil exhibits plastic behaviour. Soils with a plasticity Index greater than 25% are often referred to as high plasticity.

The Atterberg limits of soil samples recovered in four test pits were tested for Atterberg limits, including linear shrinkage. *Table 5* presents the results of the Atterberg Limits tests. While *Figure 6* represents the USCS soil classification scheme in graphical form.

Both *Table 5* and *Figure 6* show the presence of low-plasticity soils in the tested samples.

Table 5: Results of the Atterberg Limits Tests

BH ID	Sample Depth, m	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)
STP1	0.3 – 0.5	24	15	9	3.5
STP4	0.1 – 0.3	29	14	15	6.0
STP8	3.0 – 3.5	27	11	16	11.5
STP10	0.5 – 0.8	34	13	21	9.5

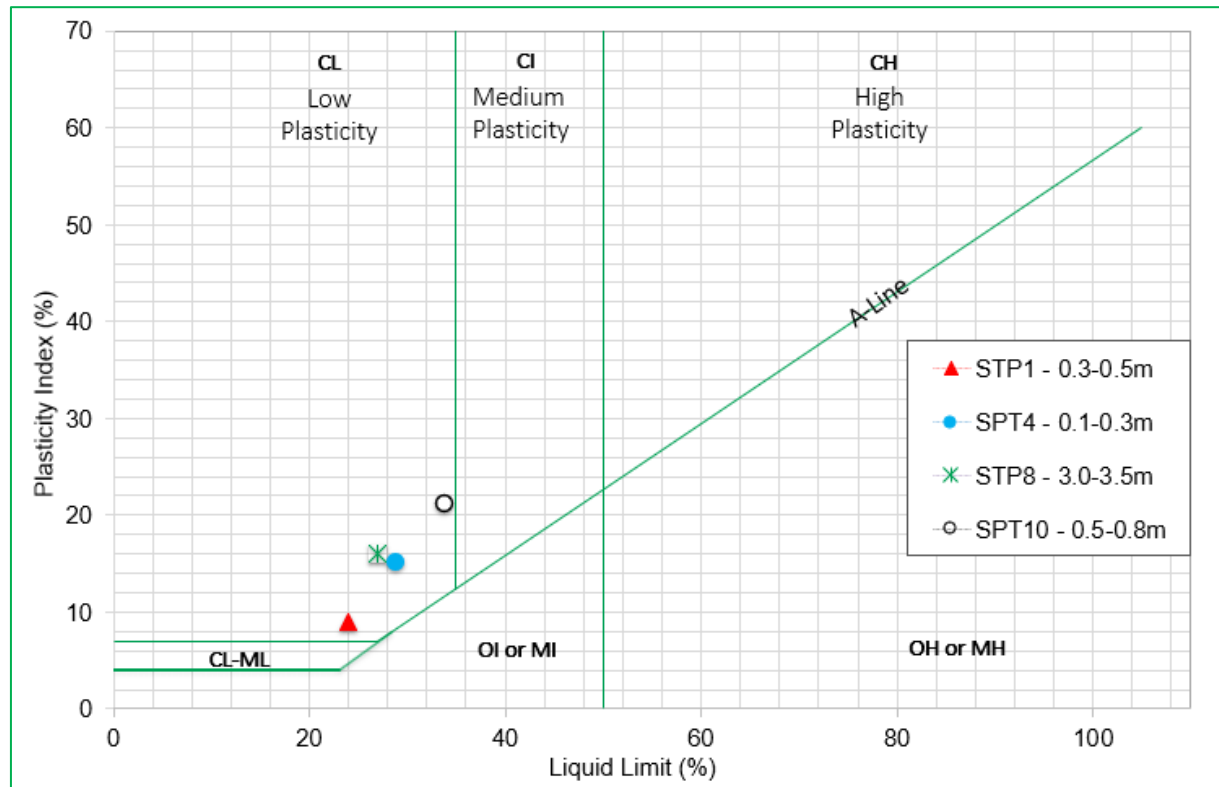


Figure 6: Soil Classification Based on the USCS Code

3.3 Emerson Class Number Test

When brought into contact with water, soil can release silt and clay particles into suspension and increase the turbidity of water. Turbid water in soils indicates susceptibility to erosion.

The Emerson Class Number can measure the potential of soil to release silt and clay particles to suspension. The values range from one (high potential) to eight (low potential). Classes 1 to 3 are considered dispersive, Class 4 indicates the presence of carbonate or gypsum and is slightly dispersive, Classes 5 and 6 are considered non-dispersive, and Classes 7 and 8 are water-stable soils (non-slaking), but if it swells (Class 7), retain its original size and shape (Class 8).

Emerson classification testing was conducted on eight (8) samples with the results summarised in Table 6. The results indicate the presence of highly dispersive soils and non-slaking soil characteristics.

Table 6: Results of Emerson Class Number Test

BH ID	Sample Depth (m)	Material Type	Emerson Class Number
STP1	0.3 – 0.5	Sandy Gravel	8
STP4	0.1 – 0.3	Sandy Gravel	1
STP8	3.0 – 3.5	Sandy Clay	8
STP10	0.5 – 0.8	Sandy Clay	8
BTP1	1.0 – 1.2	Sandy Clay	2
BTP3	0.7 – 0.9	Sandy Clay	3
BTP5	0.6 – 0.8	Sandy Clay	2
BTP7	2.0 – 2.2	Silty Sandy Gravel	1
STP = sewer test pit, BTP = basin test pit			

4 Geotechnical Engineering Assessment

Based on our understanding of the proposed development, the following sections have been provided to assist with the geotechnical aspects of the design and construction phases of the truck sewer.

4.1 Topsoil Thickness

Topsoil was encountered in all test pit locations excavated for the Trunk Sewer Line. The topsoil materials have broadly been described as:

- Silty sand - fine to medium-grained, grey, loose to medium dense, dry, low plasticity silt, with organic matter, roots and root fibres.

Within the forested areas (e.g., STP7 to STP12), the topsoil thickness was found to be relatively consistent at about 0.3m thick. In the areas of prior disturbance (e.g., STP1 – STP5), however, the topsoil thickness was assessed to be more variable ranging from 0.05m to 0.40m.

4.2 Excavation Condition

The excavation conditions along the Trunk Sewer alignment would be influenced by many factors including the depth to bedrock, as well as the bedrock strength and defects condition. Based on the test pit logs, the depth to moderately weathered sandstone rock varies between 0.05m and 3m below the existing ground level.

No specific rock testing was undertaken for materials encountered in the test pits. However, cored borehole drilling was undertaken for a rippability assessment in the vicinity of the Trunk sewer alignment. An extensive program of point load testing was undertaken on the rock cores obtained from the drilling works. In summary, the point load test results indicate that within the upper 5m of the subsurface, sandstone bedrock is typically of low to high strength.

It is, therefore, expected that excavations to 4.0m depth would require the removal of overburden soil as well as extremely to slightly weathered sandstone bedrock. The overburden materials can be excavated using an 8 to 14t+ excavator fitted with general purpose /toothed buckets. Moderately to slightly weathered sandstone rock would require at least a D6 to D9 Dozer-sized equipment fitted with rippers/hydraulic hammers to support efficient excavations. This equipment range is equivalent to a 15 to 36t excavator.

4.3 Temporary and Permanent Safe Batters

Temporary or short-term batters can be constructed to the gradients presented in *Table 7*. The short-term period is deemed to be no longer than 4 weeks, and following wet weather (rainfall), the short-term batter slopes would need to be reassessed for stability.

Temporary batters exceeding 3.0m in height will require horizontal benching at 3.0m vertical intervals. The benches should be at least 2.0m wide.

Further assessment of the batter angles may be required once the exact geometry and materials have been finalised.

Table 7: Recommendations for Cut and Fill Batters

Material	Short term	Long Term
Controlled Fill	18° (1V:3H)	14° (1V:4H)
Residual Soils/Extremely Weathered Rock (Stiff or Better)	27° (1V:2H)	18° (1V:3H)
≥ Moderately Weathered Rock	60° (1V:0.5H)	45° (1V:1H)

4.4 Native soil Modulus

The native soil modulus is an elastic soil parameter and a measure of soil stiffness. It is defined as the ratio of the stress along an axis over the strain along that axis in the range of elastic soil behaviour.

Recommended values of modulus for the encountered materials are presented in *Table 8*. These recommendations have been based on an assessment of the material types (soil/rock) encountered as well as published correlations with SPT data.

Table 8: Recommended Native Modulus for Encountered Materials

Material	Young's (Native) Modulus (MPa)
Controlled Fill	2
Residual Soils/Extremely Weathered Rock (Stiff or Better)	10
≥ Moderately Weathered Rock	50

4.5 Dispersive Soils/Emerson Class

Five (5) out of the eight (8) samples subjected to Emerson Class Number tests returned as 1 - 3, indicating the presence of highly dispersive soils. However, three (3) samples returned as 8 indicative of non-slaking soil characteristics.

Based on the results it is most likely that the truck sewer alignment lies within highly dispersive soils. It is understood that a Dispersive Soil Management Plan (DSMP) is being prepared for the site by others. It is recommended that the findings and recommendations of the DSMP be incorporated into future construction plans.

The construction plans should also include effective erosion and sedimentation control measures relevant to clearing and trenching operations.

4.6 Embedment Recommendations for Sewer

Trench foundations at this site are likely to include controlled fill, residual soils, and weathered rock. The Emerson Class testing shows the site soils are predominantly highly dispersive, though with patchy non-slaking soils.

To allow for this variability of materials onsite, the preliminary recommended trench embedment types are presented in *Table 9*.

However, the DSMP recommendations for trench embedment type should supersede the above provisions as detailed soil testing was completed in the DSMP investigation.

The actual trench foundation and embedment materials, as well as the presence of groundwater, should be verified at the time of construction.

Table 9: Recommended Trench Embedment Types

Material	Trench Embedment Type	Comments
Site Won Controlled Fill	Type 4 – Sewer,	Trench Foundation > 50 kPa
Residual Soils / XW / HW Rock	Type 4 – Sewer,	Trench Foundation > 50 kPa
Weathered Sandstone (MW or Better)	Type 3 – Sewer,	Trench Foundation > 50 kPa
XW = extremely weathered, HW = highly weathered, MW = moderately weathered		

4.7 Allowable Bearing Pressures

Based on the encountered subsurface materials, Qualtest recommends the following allowable bearing pressures:

- Engineered Fill (Site Won) = 100kPa
- Residual Soils / XW / HW Rock = 250kPa
- Moderately Weathered (MW) Rock = 500kPa
- Slight Weathered (SW) to Fresh Rock = 1500kPa

4.8 Thrust Block Design Parameters

Thrust blocks may be designed based on the allowable horizontal allowable bearing capacities provided in *Table 10*.

Table 10: Preliminary Parameters for Thrust Block Design

Material		Allowable Horizontal Bearing Pressure (kPa)
Topsoil, Uncontrolled Fill, Disturbed Soils	Soft or Loose	NR
Controlled Fill	Stiff or better	50
Residual Soil / XW / HW Rock	VSt to H or D to VD	125
MW Rock	Low to Medium Strength	250
SW to Fresh Rock	Low to Medium Strength	750
NR = not recommended, VSt = very stiff, H = Hard, D = Dense, VD = very dense, XW = extremely weathered, HW = highly weathered, MW = moderately weathered, SW = slightly weathered.		

4.9 Trench Shoring

Provided the soil horizon is cut at 45° with a 1.5m bench at the toe of this cut batter, shoring of the trunk sewer trench wall might not be required.

The above statement is only valid if the cut below the soil batter exposes at least moderately weathered sandstone bedrock.

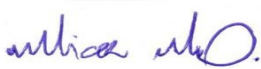
5 Disclaimer

This report has been prepared on behalf of and for the exclusive use of Mirvac and its partners per the scope of work outlined in Proposal QGQ24-152, Ref: 5560, dated February 10, 2025. This report is not intended for and should not be relied upon by any third party. In preparing this report, Qualtest relied upon information provided by Mirvac/Charlie Resolved. This report, or sections from this report, should not be used as part of a specification for a project without review and agreement by Qualtest.

Interpretations and recommendations provided in the draft report are based on the ground conditions at the site, only at the specific testing locations, and then only to the depths investigated and at the time the work was carried out. This is because ground conditions are subject to change from place to place and with time due to geological processes and/or because of human influences. The advice provided by Qualtest is based on the conditions encountered onsite at the time of the investigation. If different ground conditions are encountered following the issuance of this draft report, Qualtest should be notified so that further advice can be provided.

Should you require further information regarding the above, please do not hesitate to contact this office.

Yours faithfully,



MICHAEL MORRISON

For and on behalf of

QUALTEST LABORATORY PTY LTD

Attachment 1: Photographs of Test Pits

Appendix A: Engineering Logs

Appendix B: Laboratory Test Results



DENNIS ALAZIGHA, RPEQ 22169



Attachment 1

Test Pits Photographs



STP1



STP1



STP2



STP2



STP3



STP3



STP4



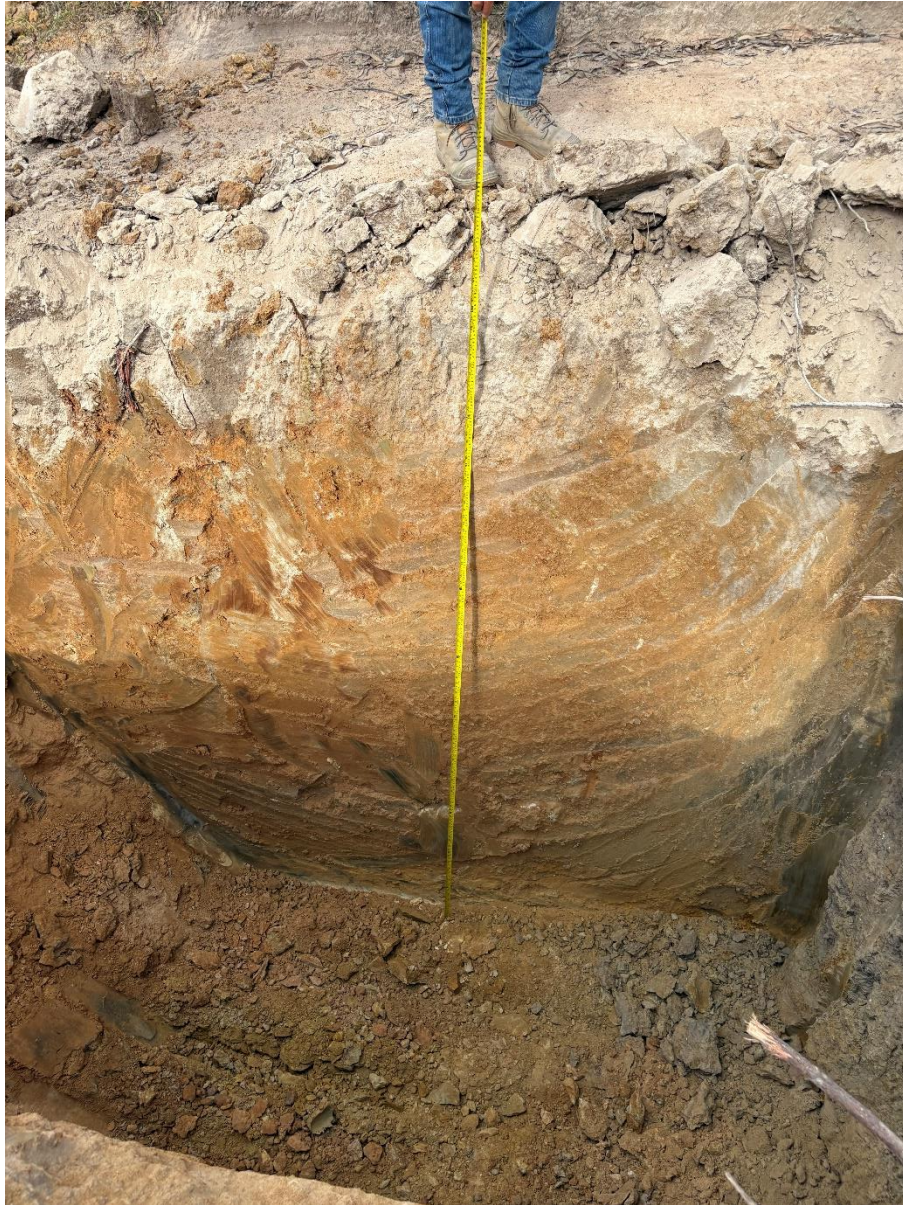
STP4



STP5



STP5



TP 6



STP 6



STP 7



TP 7



TP 8



STP 8



STP 9



STP9



STP9



STP 10



STP10



STP11



STP11



TP12



STP12



APPENDIX A

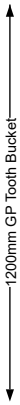
Engineering Logs

UTM : 1J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493735.00	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6925126.00	Logged By : DA	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : KD	Location : Wyatt Road, Undullah
Total Depth : 1 m BGL	Date : 19/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.3	Topsoil		ML	w < PL	Sandy SILT: low plasticity, stiff to very stiff, pale grey, fine to medium grained sand, w < pl, (with rootlets).	St-Vst			
		0.7	Rock		SST	M	Gravelly to sandy CLAY: low to medium plasticity, hard, pale brown mottled pink, fine to coarse angular gravel, fine to coarse grained sand, highly to extremely weathered (with cobbles <130mm).	H	D: DSMP		
			Rock		SST	M	SANDSTONE: fine to coarse grained, pale grey, very low to low strength, moderately to slightly weathered.	VLS-LS			
STP1 Terminated at 1m (very slow progress)											

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff Vst - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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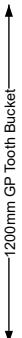
UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493671.00	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6925039.00	Logged By : DA	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : KD	Location : Wyatt Road, Undullah
Total Depth : 1.4 m BGL	Date : 19/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
			Topsoil		ML	w < PL	Sandy SILT: low plasticity, stiff to very stiff, pale grey, fine to medium grained sand, w < pl, (with rootlets).	St-VSt	D: DSMP		
		0.4	Residual		CL-CI	w < PL	Sandy CLAY: low to medium plasticity, very stiff to hard, pale brown, fine to medium grained sand, w < pl.	VSt-H	D: DSMP		
		0.8	Rock		SST	M	Gravelly to sandy CLAY: low to medium plasticity, hard, pale brown mottled pink, fine to medium grained sand, fine to coarse grained angular gravel, highly to extremely weathered, with cobbles <130mm.	H			
		1.2	Rock		SST	M	SANDSTONE: fine to coarse grained, pale grey, very low to low strength, moderately to slightly weathered.	VLS-LS	D: DSMP		
STP2 Terminated at 1.4m (slow progress)											

METHOD	PENETRATION	FIELD TESTS	SAMPLES	SOIL CONSISTENCY
EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493612.00	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924952.00	Logged By : DA	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : KD	Location : Wyatt Road, Undullah
Total Depth : 1.2 m BGL	Date : 19/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.2	Topsoil		ML	w < PL	Sandy SILT: low plasticity, stiff to very stiff, pale grey, fine to medium grained sand, w < pl, (with rootlets).	St-VSt			
		0.8	Residual		CL-CI	w < PL	Sandy CLAY: low to medium plasticity, very stiff to hard, pale brown mottled pink, fine to medium grained sand, w < pl.	VSt-H	D:		
		1	Rock		SST	M	SANDSTONE: fine to coarse grained, pale grey, very low to low strength, moderately to slightly weathered, slow ripping at 1.0m	VLS-LS			
STP3 Terminated at 1.2m (on MW-SW sandstone rock)											

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

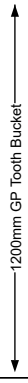
UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493564.00	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924880.00	Logged By : DA	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : KD	Location : Wyatt Road, Undullah
Total Depth : 0.9 m BGL	Date : 19/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
↑ 1200mm GP Tooth Bucket ↓		0.05 Topsoil Rock			ML SST	w < PL M	Sandy SILT: low plasticity, stiff to very stiff, pale grey, fine to medium grained sand, w < pl, (with rootlets). SANDSTONE: fine to coarse grained, dark brown, mottled brown, grey, pink, very low to low strength, highly to moderately weathered, ripping at 0.2m with slow progress.	St-VSt VLS-LS	D:		
							STP4 Terminated at 0.9m (slow ripping depth)				

METHOD	PENETRATION	FIELD TESTS	SAMPLES	SOIL CONSISTENCY
EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense

Refer to explanatory notes for details of abbreviations and basis of descriptions

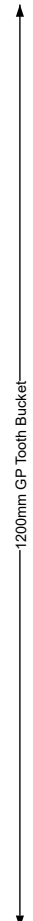
UTM : 56J Easting (m) : 493500.00 Northing (m) : 6924861.00 Ground Elevation : Not Surveyed Total Depth : 1.5 m BGL	Excavator : Zaxis 330 Excavator Supplier : ECS Civil Services Logged By : DA Reviewed By : KD Date : 19/02/2025	Job Number : 24-231 Client : Mirvac C Project : Geotechnical Investigation Monarch Glen Location : Wyatt Road, Undullah Loc Comment :
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Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
 1200mm GP Tooth Bucket		0.35	Topsoil		ML	w < PL	Sandy SILT: low plasticity, stiff to very stiff, pale grey, fine to medium grained sand, w < pl, (with rootlets).	St-VSt	D: DSMP		
		0.9	Residual		CL-CI	w < PL	Sandy CLAY: low to medium plasticity, very stiff to hard, pale brown, mottled pink, fine to medium grained sand, w < pl.	VSt-H	D: DSMP		
		1	Rock		SST	M	Gravelly to sandy CLAY: low to medium plasticity, hard, pale brown, mottled pink, fine to coarse angular gravel, fine to coarse grained sand, extremely to highly weathered (with cobbles <130mm).	H	D: DSMP		
	Ripper	1.3	Rock		SST	M	SANDSTONE: fine to coarse grained, pale grey, very low to low strength, moderately to slightly weathered. Ripping at 1.3m, slow progress	VLS-LS			
STP5 Terminated at 1.5m (refusal depth on MW-SW sandstone bedrock)											

METHOD	PENETRATION	FIELD TESTS	SAMPLES	SOIL CONSISTENCY
EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense

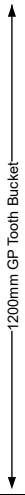
Refer to explanatory notes for details of abbreviations and basis of descriptions

UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493187.91	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924899.41	Logged By : KD	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : DA	Location : Wyatt Road, Undullah
Total Depth : 3.2 m BGL	Date : 17/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.2	Topsoil		SM	D	Silty SAND: fine to medium grained, medium dense, grey, dry.	MD			
		0.6	Residual		CI	w < PL	Sandy CLAY: medium plasticity, very stiff to hard, brown mottled grey, fine to medium grained sand, w < pl.	VSt-H			
		1	Residual		SC	D	Clayey SAND: fine to medium grained, orange brown, dry, low plasticity clay.				
		2	Rock		SST	D	Silty SAND: fine to coarse grained, very dense, brown mottled grey, with cobbles (extremely to moderately weathered sandstone).	VD			
		3									hard digging at 1.7 ripper used to loosen soil
											hard ripping from 2.8
							STP6 refusal at 3.2m				

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493185.25	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924860.07	Logged By : KD	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : 1 (m)	Reviewed By : DA	Location : Wyatt Road, Undullah
Total Depth : 1.7 m BGL	Date : 17/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.35	Topsoil		SM	D	Silty SAND: fine to medium grained, medium dense, grey, dry.	MD			
		1	Residual		CI	w < PL	Sandy CLAY: medium plasticity, hard, brown mottled grey, fine to medium grained sand, w < pl.	H	D:		
		1.2	Rock		SST	D	Silty SAND: fine to coarse grained, very dense, brown, with cobbles (extremely to moderately weathered sandstone).	VD	D:		Ripper used from 1.2
							STP7 refusal at 1.7m				

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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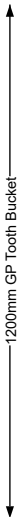
UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493103.51	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924766.74	Logged By : KD	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : DA	Location : Wyatt Road, Undullah
Total Depth : 4 m BGL	Date : 17/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.3	Topsoil		SM	D	Silty SAND: fine to medium grained, medium dense, grey, dry, with roots .	MD			
		1	Residual		CI	w < PL	Sandy CLAY: medium plasticity, very stiff to hard, brown mottled grey, medium grained sand, w < pl.	VSt-H			
		1.8	Residual		CL-CI	w < PL	Sandy CLAY: low to medium plasticity, hard, brown, fine to medium grained sand, w < pl.	H			ripper used from 1.8m.
		3	Residual		CL	w < PL	Sandy CLAY: low plasticity, hard, brown mottled grey, fine to medium grained sand, w < pl, (with zones of xw sandstone).	H	D:		
STP8 Terminated at 4m											

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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Refer to explanatory notes for details of abbreviations and basis of descriptions

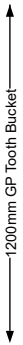
UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 493027.07	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924685.69	Logged By : KD	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : DA	Location : Wyatt Road, Undullah
Total Depth : 1.8 m BGL	Date : 17/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.3	Topsoil		SM	D	Silty SAND: fine to medium grained, medium dense, grey, dry.	MD			
		1	Residual		CI	w < PL	Sandy CLAY: medium plasticity, hard, brown grey, fine to medium grained sand, w < pl.	H			
		1.2	Rock		SST	D	Silty SAND: fine to coarse grained, very dense, brown orange, with cobbles (extremely to moderately weathered sandstone).	VD	D:		Ripper used from 1.2m

STP9 refusal at 1.8m											
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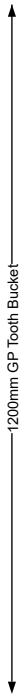
METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 492899.01	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924616.76	Logged By : KD	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : DA	Location : Wyatt Road, Undullah
Total Depth : 1.2 m BGL	Date : 17/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.3	Topsoil		SM	D	Silty SAND: fine to coarse grained, loose to medium dense, grey, dry.	L-MD			
			Residual		CI	w < PL	Sandy CLAY: medium plasticity, very stiff to hard, brown, fine to medium grained sand, w < pl.	VSt-H	D:		
		1	Rock		SST	D	SANDSTONE: fine to medium grained, brown, low strength.	LS			practical bucket refusal at 1m start ripping to 1.2 very hard ripping not much progress.
							STP10 refusal at 1.2m				

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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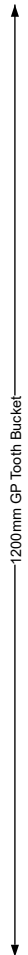
UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 492823.03	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924603.53	Logged By : KD	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : DA	Location : Wyatt Road, Undullah
Total Depth : 2.4 m BGL	Date : 17/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.3	Topsoil		SM	D	Silty SAND: fine to coarse grained, loose to medium dense, grey, dry.	L-MD			
		0.9	Residual		CL-CI	w < PL	Sandy CLAY: low to medium plasticity, hard, brown brown, fine to coarse grained sand, w < pl.	H			
		1	Rock		SST	D	Silty SAND: fine to medium grained, very dense, brown mottled grey, with cobbles (extremely to moderately weathered sandstone).	VD-WC			Bucket refusal/hard digging from 1.0m Start ripping
		2							D:		very hard ripping from 2m

SPT11 refusal at 2.4m											
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METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller			PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow			FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)			SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content			SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense		
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UTM : 56J	Excavator : Zaxis 330	Job Number : 24-231
Easting (m) : 492728.58	Excavator Supplier : ECS Civil Services	Client : Mirvac C
Northing (m) : 6924561.78	Logged By : KD	Project : Geotechnical Investigation Monarch Glen
Ground Elevation : Not Surveyed	Reviewed By : DA	Location : Wyatt Road, Undullah
Total Depth : 3.6 m BGL	Date : 17/02/2025	Loc Comment :

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Moisture	Material Description	Consistency/Density	Samples	Testing	Remarks
		0.3	Topsoil		SM	D	Silty SAND: fine to medium grained, loose, grey, dry.	L			
		1	Residual		CI	w < PL	Sandy CLAY: medium plasticity, very stiff to hard, brown mottled grey, dark grey, fine to coarse grained sand, w < pl.	VSt-H	D:		
		1.5	Residual		SC	D	Clayey SAND: fine to medium grained, dense, brown, dry, low plasticity clay.	D			
		2.9	Rock		SST	D	Silty SAND: fine to coarse grained, dense to very dense, brown.	D-VD	D:		
							STP12 refusal at 3.6m				

METHOD EX Excavator bucket R Ripper HA Hand auger PT Push tube SON Sonic drilling AH Air hammer PS Percussion sampler AS Short spiral auger AD/V Solid flight auger:V-Bit AD/T Solid flight auger:TC-Bit HFA Hollow flight auger WB Washbore drilling RR Rock roller	PENETRATION VE Very Easy(No Resistance) E Easy F Firm H Hard VH Very Hard(Refusal) WATER  Water Level on Date  Water inflow  Water outflow	FIELD TESTS SPT - Standard Penetration Test PP - Hand/Pocket Penetrometer DCP - Dynamic Cone Penetrometer PSP - Perth Sand Penetrometer MC - Moisture Content PBT - Plate Bearing Test IMP - Borehole Impression Test PID - Photo Ionisation Detector VS - Vane Shear; P=Peak, R=residual (unconnected kPa)	SAMPLES B - Bulk disturbed sample D - Disturbed sample ES - Environmental sample U - Thin wall tube "undisturbed" MOISTURE D - Dry M - Moist W - Wet PL - plastic limit LL - liquid limit W - Moisture content	SOIL CONSISTENCY VS - Very soft S - Soft F - Firm St - Stiff VSt - Very stiff H - Hard RELATIVE DENSITY VL - Very loose L - Loose MD - Medium dense D - Dense VD - Very dense
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APPENDIX B

Laboratory Test Certificates

Material Test Report

Report Number: 24-231-1
Issue Number: 1
Date Issued: 21/03/2025
Client: CHARLIE RESOLVED
 37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
 UNDULLAH
Work Request: 2366
Sample Number: S2366A
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 17/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: SEWER TESTING SEWER TESTING
Site Selection: Selected by Client
Sample Location: STP1, Depth: 0.3-0.5M



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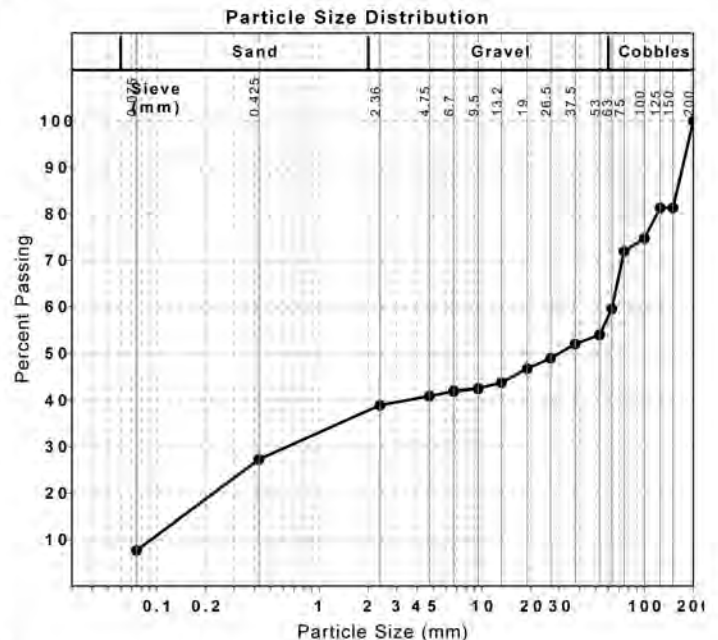
Approved Signatory: Mark Bauer
 Field Technician
 NATA Accredited Laboratory Number: 2316

Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits	Retained %	Retained Limits	
200 mm	100		0		
150 mm	81		19		
125 mm	81		0		
100 mm	75		7		
75 mm	72		3		
63 mm	60		12		
53 mm	54		6		
37.5 mm	52		2		
26.5 mm	49		3		
19 mm	47		2		
13.2 mm	44		3		
9.5 mm	42		1		
6.7 mm	42		1		
4.75 mm	41		1		
2.36 mm	39		2		
0.425 mm	27		12		
0.075 mm	8		20		

Atterberg Limit (AS1289 3.9.2 & 3.2.1 & 3.3.2 & Q252)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Passing 0.425 (%)	27		
Retained 0.425 (%)	12		
Liquid Limit (%)	24		
Plastic Limit (%)	15		
Plasticity Index (%)	9		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.9.2		
Linear Shrinkage (%)	3.5		
Cracking Crumbling Curling	None		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	8		
Soil Description			
Nature of Water	distilled		
Temperature of Water (°C)	24		



Material Test Report

Report Number: 24-231-1
Issue Number: 1
Date Issued: 21/03/2025
Client: CHARLIE RESOLVED
 37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
 UNDULLAH
Work Request: 2366
Sample Number: S2366B
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 20/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: SEWER TESTING SEWER TESTING
Site Selection: Selected by Client
Sample Location: STP4, Depth: 0.1-0.3M



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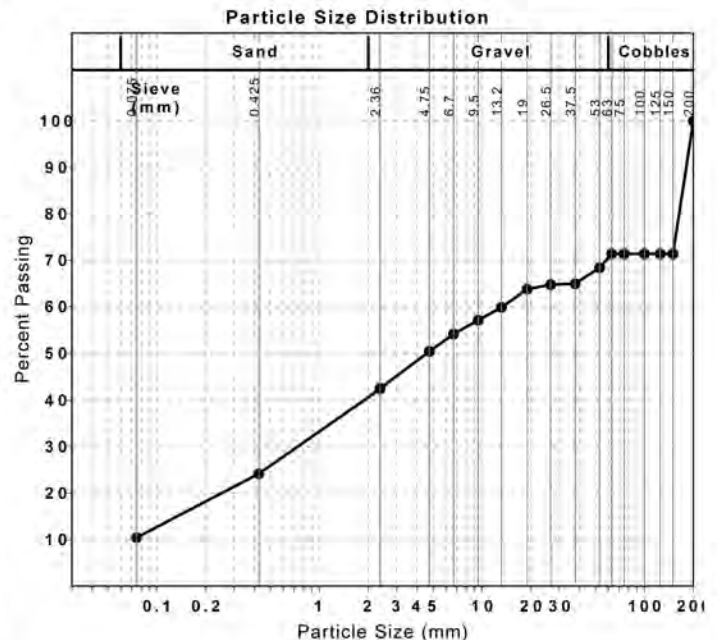
Approved Signatory: Mark Bauer
 Field Technician
 NATA Accredited Laboratory Number: 2316

Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits	Retained %	Retained Limits	
200 mm	100		0		
150 mm	71		29		
125 mm	71		0		
100 mm	71		0		
75 mm	71		0		
63 mm	71		0		
53 mm	68		3		
37.5 mm	65		3		
26.5 mm	65		0		
19 mm	64		1		
13.2 mm	60		4		
9.5 mm	57		3		
6.7 mm	54		3		
4.75 mm	50		4		
2.36 mm	42		8		
0.425 mm	24		18		
0.075 mm	10		14		

Atterberg Limit (AS1289 3.9.2 & 3.2.1 & 3.3.2 & Q252)		Min	Max
Sample History	Air Dried		
Preparation Method	Dry Sieve		
Passing 0.425 (%)	24		
Retained 0.425 (%)	18		
Liquid Limit (%)	29		
Plastic Limit (%)	14		
Plasticity Index (%)	15		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.9.2		
Linear Shrinkage (%)	6.0		
Cracking Crumbling Curling	None		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	1		
Soil Description			
Nature of Water	distilled		
Temperature of Water (°C)	24		



Material Test Report

Report Number: 24-231-1
Issue Number: 1
Date Issued: 21/03/2025
Client: CHARLIE RESOLVED
 37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
 UNDULLAH
Work Request: 2366
Sample Number: S2366C
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 18/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: SEWER TESTING SEWER TESTING
Site Selection: Selected by Client
Sample Location: STP8, Depth: 3.0-3.5M



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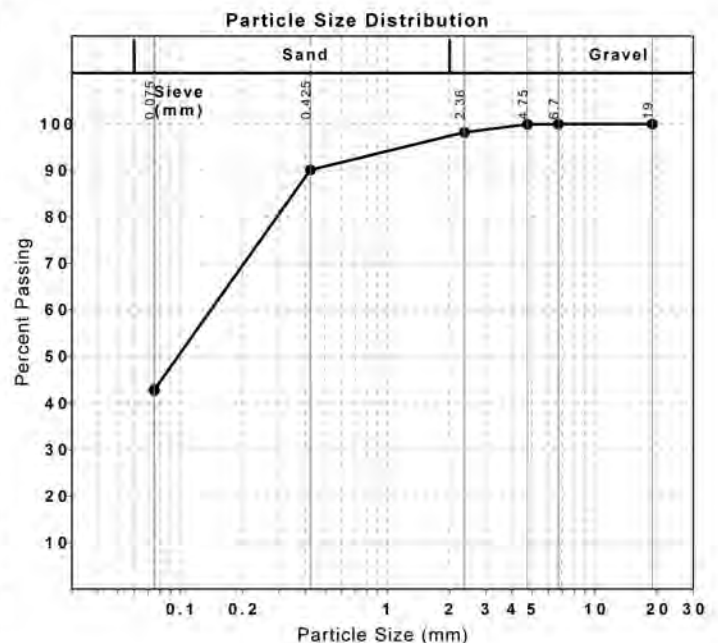
Approved Signatory: Mark Bauer
 Field Technician
 NATA Accredited Laboratory Number: 2316

Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits	Retained %	Retained Limits	
19 mm	100		0		
6.7 mm	100		0		
4.75 mm	100		0		
2.36 mm	98		2		
0.425 mm	90		8		
0.075 mm	43		47		

Atterberg Limit (AS1289 3.9.2 & 3.2.1 & 3.3.2 & Q252)			Min	Max
Sample History	Air Dried			
Preparation Method	Dry Sieve			
Passing 0.425 (%)	90			
Retained 0.425 (%)	8			
Liquid Limit (%)	27			
Plastic Limit (%)	11			
Plasticity Index (%)	16			

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.1 / AS 1289.3.1.2 / AS 1289.3.9.1 / AS 1289.3.9.2		
Linear Shrinkage (%)	11.5		
Cracking Crumbling Curling	None		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	8		
Soil Description			
Nature of Water	distilled		
Temperature of Water (°C)	24		



Material Test Report

Report Number: 24-231-1
Issue Number: 1
Date Issued: 21/03/2025
Client: CHARLIE RESOLVED
 37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
 UNDULLAH
Work Request: 2366
Sample Number: S2366D
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 18/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: SEWER TESTING SEWER TESTING
Site Selection: Selected by Client
Sample Location: STP10, Depth: 0.5-0.8M



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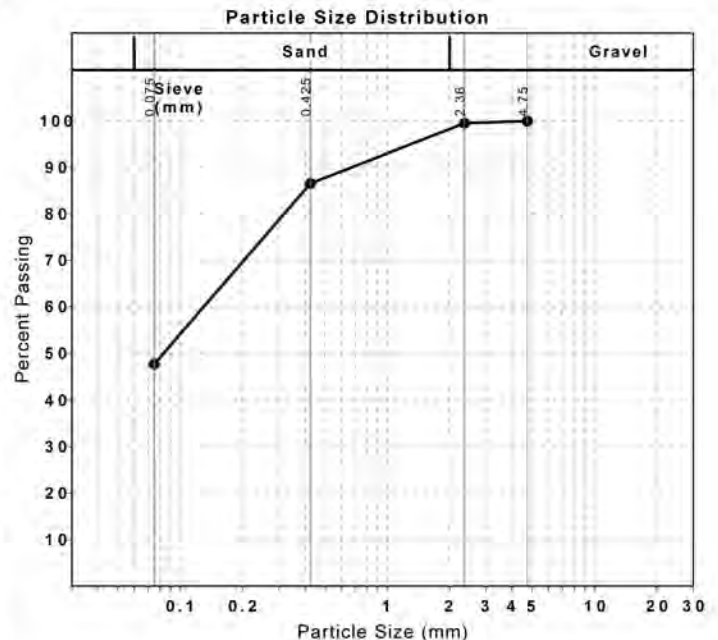
Approved Signatory: Mark Bauer
 Field Technician
 NATA Accredited Laboratory Number: 2316

Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits		Retained %	Retained Limits
4.75 mm	100			0	
2.36 mm	100			0	
0.425 mm	87			13	
0.075 mm	48			39	

Atterberg Limit (AS1289 3.9.2 & 3.2.1 & 3.3.2 & Q252)				Min	Max
Sample History		Air Dried			
Preparation Method		Dry Sieve			
Passing 0.425 (%)		87			
Retained 0.425 (%)		13			
Liquid Limit (%)		34			
Plastic Limit (%)		13			
Plasticity Index (%)		21			

Linear Shrinkage (AS1289 3.4.1)			Min	Max
Moisture Condition Determined By		AS 1289.3.1.1 / AS 1289.3.1.2 / AS 1289.3.9.1 / AS 1289.3.9.2		
Linear Shrinkage (%)		9.5		
Cracking Crumbling Curling		None		

Emerson Class Number of a Soil (AS 1289 3.8.1)			Min	Max
Emerson Class		8		
Soil Description				
Nature of Water		distilled		
Temperature of Water (°C)		24		



Material Test Report

Report Number: 24-231-2C
Issue Number: 1
Date Issued: 24/03/2025
Client: CHARLIE RESOLVED
37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
UNDULLAH
Work Request: 2367
Sample Number: S2367A
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 18/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: BASIN TESTING
Sample Location: BTP1, Depth: 1.0-1.2M



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Approved Signatory: Rhys Mitchell
Field Technician
NATA Accredited Laboratory Number: 2316

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	2		
Soil Description	Sandy Clay		
Nature of Water	Distilled		
Temperature of Water (°C)	24		

Material Test Report

Report Number: 24-231-2C
Issue Number: 1
Date Issued: 24/03/2025
Client: CHARLIE RESOLVED
37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
UNDULLAH
Work Request: 2367
Sample Number: S2367B
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 18/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: BASIN TESTING
Sample Location: BTP3, Depth: 0.7-0.9M



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Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	3		
Soil Description	Sandy Clay		
Nature of Water	Distilled		
Temperature of Water (°C)	24		

Material Test Report

Report Number: 24-231-2C
Issue Number: 1
Date Issued: 24/03/2025
Client: CHARLIE RESOLVED
37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
UNDULLAH
Work Request: 2367
Sample Number: S2367C
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 18/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: BASIN TESTING
Sample Location: BTP5, Depth: 0.6-0.8M



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Field Technician
NATA Accredited Laboratory Number: 2316

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	2		
Soil Description	Sandy Clay		
Nature of Water	Distilled		
Temperature of Water (°C)	24		

Material Test Report

Report Number: 24-231-2C
Issue Number: 1
Date Issued: 24/03/2025
Client: CHARLIE RESOLVED
37/14 ARGYLE STREET, ALBION QLD 4010
Contact: ADAM PORTER
Project Number: 24-231
Project Name: GEOTECHNICAL INVESTIGATION - INTERNAL ROHL 1
Project Location: MONARCH GLEN RESIDENTIAL, WYATT ROAD
UNDULLAH
Work Request: 2367
Sample Number: S2367D
Date Sampled: 28/02/2025
Dates Tested: 11/03/2025 - 18/03/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: BASIN TESTING
Sample Location: BTP7, Depth: 2.0-2.2M



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Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	1		
Soil Description	Sandy Gravel		
Nature of Water	Distilled		
Temperature of Water (°C)	24		