

**Port of Gladstone
Gatcombe and Golding Cutting
Channel Duplication Project**

Environmental Impact Statement



Gladstone Ports Corporation
Growth, Prosperity, Community.

aurecon

**Appendix E3
Geotechnical
Investigation
Factual Report Channel
Duplication (Dredger Access
Channel and Transfer Location)**



REPORT

GEOTECHNICAL INVESTIGATION FACTUAL REPORT

*Gatcombe and Golding Cutting Channel Duplication Project
(Dredger Access Channel and Transfer Location)*

Submitted to:

Gladstone Ports Corporation Limited
QLD 4680 Australia

Submitted by:

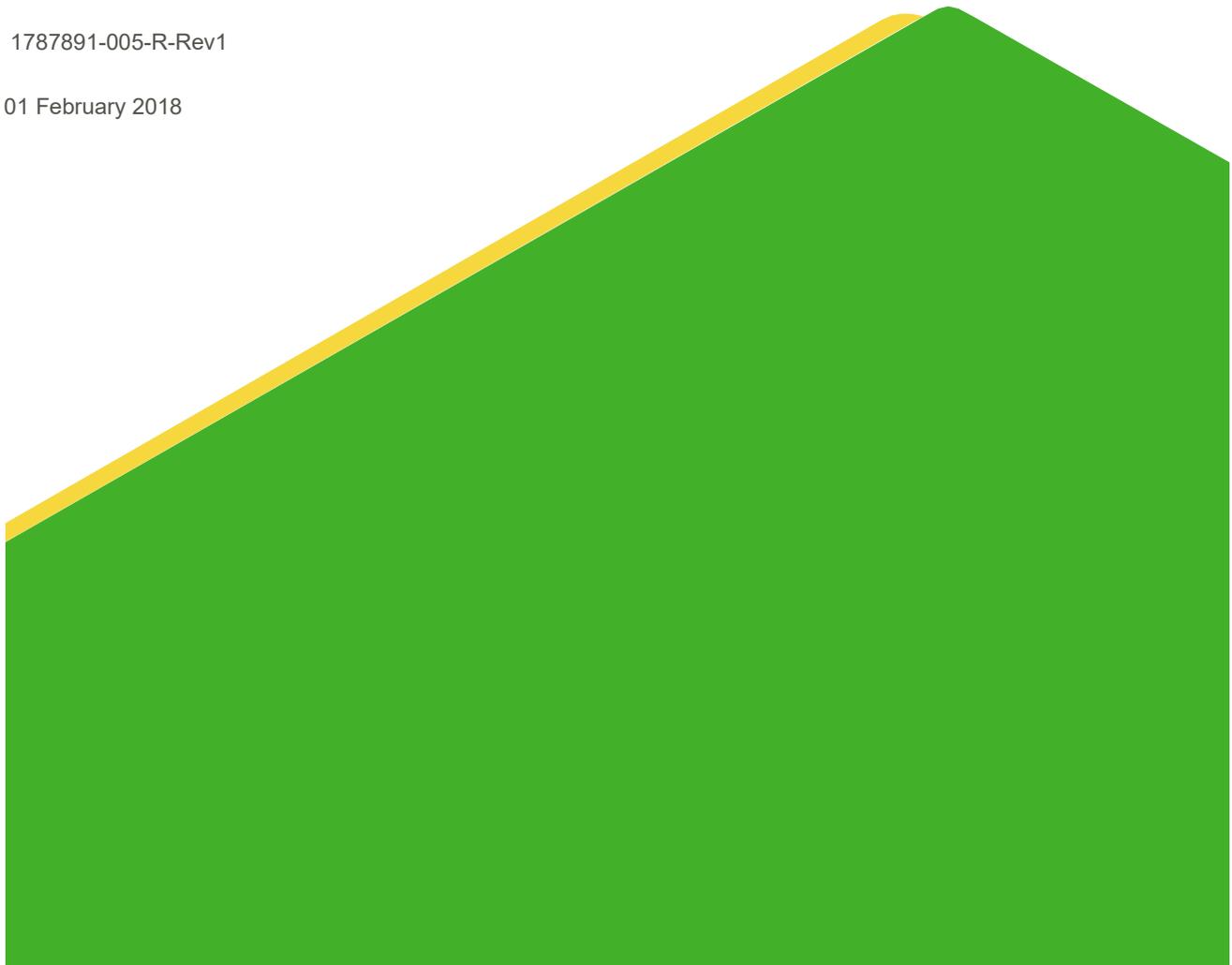
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1787891-005-R-Rev1

01 February 2018



EXPLANATORY NOTE

March 2019

This Geotechnical Investigation Factual Report was finalised in February 2018 to support the Port of Gladstone Gatcombe and Golding Cutting Channel Duplication Project Environmental Impact Statement (EIS).

This geotechnical investigation and report presents the Project dredging methodology that was relevant and in effect at that time.

Between July 2018 and December 2018, the Project dredging methodology was amended to comply with the Sustainable Ports Development Act 2015 (Qld), however the geotechnical boreholes contained in this report are located in close proximity to the proposed barge access channel (which forms part of the Project description included in the EIS).

In this regard, this report has been provided in the Gatcombe and Golding Cutting Channel Duplication Project EIS as an indication of the sediment characteristics of the material to be dredged for proposed barge access channel.

Distribution List

Gladstone Ports Corporation Limited - 1 Electronic Copy

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1.0 INTRODUCTION

Golder Associates Pty Ltd (Golder) was commissioned by Gladstone Ports Corporation Limited (GPC) to carry out a geotechnical investigation for the Gatcombe and Golding Cutting Channel Duplication Project in Gladstone. The primary purpose of the investigation was to provide advice on the characteristics of the type of material to be dredged in the dredger access channel and the transfer location. The geotechnical investigation was carried out in accordance with the Golder Proposal P1787891-001-Rev0 dated 26 September 2017. Findings of the geotechnical investigation are presented in this report.

Note that, in this report, reduced levels refer to Lowest Astronomical Tide (LAT) and coordinates relate to Map Grid of Australia 1994 (MGA94) Zone 55.

Figure 1 shows the location of the boreholes carried out.

2.0 GEOLOGY

The geology of the site is described in the "Geology of the Rockhampton and Port Clinton 1:250 000 Sheet Areas" (Kirkegaard et al., 1989) and the more recent "Gladstone Special 1:100 000 Sheet" (Donchak and Holmes, 2006). The map indicates that the site is underlain by the Early Carboniferous Wandilla Formation of the Curtis Island Group.

Depending on the level of dredging that has already occurred in the past, a varying thickness of very soft fine grained material or very loose coarse grained material can be expected to be encountered. These loosely compacted material would overlie older stiffer alluvium and residual soil in places which in turn would overlie the rock of the Wandilla Formation at depth.

Regionally, the Wandilla formation consists of mudstone, arenite (sandstone), and subordinate chert and minor limestone. The rocks were formed on the continental slope and are interpreted to be part of an accretionary wedge which resulted during a subduction of the oceanic crust beneath the Australian shield. During its formation, deposition of muds and silica rich organisms (which form cherts) were interrupted by periodic turbidity flows depositing arenaceous material.

Structurally, the Wandilla Formation is characterised by steeply dipping, north-west to north trending (geographic) fracture to slaty cleavage, which is mostly parallel to bedding. There are more localised bedding parallel disruption fabrics due to shearing forces. Tight chaotic folding is present within the chert rich units which are thought to have formed by localised slumping. Stratal disruptions by north-west faults are common within the Wandilla Formation. The faults are interpreted to be thrust related imbricated slices dipping to the east.

3.0 CURRENT (2017) OVERWATER INVESTIGATION

The current geotechnical investigation comprised four overwater boreholes at the nominated locations by GPC. The boreholes HP1, HP2, AC1 and AC2 are located in Fisherman's Landing area to the south-west of Curtis Island as shown in Figure 1.

The fieldwork was carried out from 13 to 15 December 2017.

3.1 Geotechnical Boreholes

The borehole drilling was undertaken using a Hydrapower Scout drill rig operated by Schneider Drilling welded on the Shine jack-up barge mobilised by a tug boat provided by MIPEC. The drill rig was equipped for rotary drilling, rock coring, SPT (Standard Penetration Test), undisturbed sampling (U_{50}) and field Vane Shear testing. The boreholes were drilled to either the proposed target depth or at least 2 m into rock material with inferred strength ranging from very low to low strength. All boreholes were terminated with the approval of GPC.

Boreholes locations are shown in **Figure 1** borehole logs are presented in APPENDIX A. The coordinates and as-drilled depths are summarised in Table 1.

Table 1: Summary of Completed Boreholes

| Borehole ID | Coordinates | | Seabed Elevation (RL m LAT) | Termination Depth (m) | Termination Elevation (RL m LAT) |
|-------------|-------------|--------------|-----------------------------|-----------------------|----------------------------------|
| | Easting (m) | Northing (m) | | | |
| AC1 | 313894.565 | 7368869.273 | -6.371 | 7.450 | -13.821 |
| AC2 | 313712.308 | 7369298.616 | -6.614 | 6.950 | -13.564 |
| HP1 | 313600.183 | 7369713.919 | -8.049 | 12.500 | -20.549 |
| HP2 | 313436.803 | 7369807.628 | -8.092 | 12.400 | -20.492 |

3.2 Geotechnical Laboratory Testing

Laboratory testing was specified by Golder and approved by GPC on selected soil and rock samples from the SPTs, U₅₀ tube samples and rock core and included the following:

- Moisture Content to AS1289.2.1.1
- Atterberg Limits to AS1289.3.1.2, AS1289.3.2.1, AS1289.3.3.1 and AS1289.3.4.1
- Partial Size Distribution including hydrometer to AS1289.3.6.3

The results of the completed laboratory testing are summarised in Table 2 and testing reports are included in APPENDIX B.

Table 2: Laboratory Test Results – Geotechnical Soil Properties

| BH ID | Depth of Sampling [m bgl] | Material Description | Symbol in accordance with AS1726 | Particle Size Distribution (PSD) | | | | | | Atterberg Limits | | | | |
|------------|------------------------------|-------------------------|----------------------------------------|----------------------------------|------------------------------------------------|-----------------------------------------|-------------------------------|-----|-----|------------------|------|------|--|--|
| | | | | Clay <2 μm | Silt 2 μm to 75 μm | Sand <75 μm to 2.36 mm | Gravel 2.36 mm to 63 mm | LL | PL | PI | LS | MC | | |
| | | | | [%] | [%] | [%] | [%] | [%] | [%] | [%] | [%] | [%] | | |
| AC1 | 4 | Silty CLAY | CI | 39 | 55 | 6 | 0 | 48 | 17 | 31 | 13.5 | 39.5 | | |
| | 5.5 | Sandy CLAY | CH | 38 | | 59 | 3 | - | - | - | - | - | | |
| AC2 | 4 | Silty CLAY | CH | 51 | 46 | 3 | 0 | 84 | 23 | 61 | 20 | 72.6 | | |
| | 2.5 | Silty CLAY | CH | 51 | 44 | 5 | 0 | 74 | 21 | 53 | 18.5 | 80.9 | | |
| HP1 | 7 | Silty CLAY | CH | 42 | 31 | 24 | 3 | 63 | 16 | 47 | 16.0 | 58.1 | | |
| | 8.5 | Clayey SAND | SC | 21 | | 65 | 14 | - | - | - | - | - | | |
| | 2.5 | Silty CLAY | CH | 52 | 47 | 1 | 0 | 66 | 23 | 43 | 17.5 | 26.5 | | |
| HP2 | 7 | Sandy CLAY | CI | 44 | | 56 | 0 | 35 | 13 | 22 | 10.5 | 17.4 | | |
| | 10 | Sandy CLAY | CL-CI | 50 | | 46 | 3 | 37 | 16 | 21 | 11 | 17.6 | | |
| | 11.5 | Clayey Gravelly SAND | SC | 25 | | 40 | 35 | - | - | - | - | - | | |

Notes: LL=Liquid Limit; PL=Plastic Limit; PI=Plasticity Index; LS=Linear Shrinkage; MC=Moisture Content

4.0 INVESTIGATION FINDINGS

4.1 Ground Conditions

Subsurface conditions encountered at shallow depth in the offshore boreholes comprised layers of very soft to soft silty clays interlayered in places with very loose to loose sands. Stiff to hard clays and medium dense to dense sands/gravels were then encountered, some of them being residual soil. Rock was not encountered in any of the four boreholes.

Subsurface conditions encountered in the boreholes at each of the sites are summarised in Table 3.

Table 3: Summary of Ground Conditions

| Investigation ID | Unit Thickness (m) | | |
|------------------|--------------------|------------------|------------------|
| | Alluvium Deposit | Residual Soil | Bed Rock |
| AC1 | 6.60 | 0.85 | n/e ¹ |
| AC2 | >6.95 | n/e ¹ | n/e ¹ |
| HP1 | >12.50 | n/e ¹ | n/e ¹ |
| HP2 | >12.40 | n/e ¹ | n/e ¹ |

Notes: 1. Material either not observed or not encountered in the field are noted as 'n/e' in the table above.

5.0 REFERENCES

Donchak, P.J.T., and Holmes, K.H. (2006). *Gladstone Special: Sheet 9150 & Part 9151*, Department of Resource Industries, Queensland.

Kirkegaard, A.G., Shaw, R.D., and Murray, C.G. (1989). *Geology of the Rockhampton and Port Clinton 1:250,000 Sheet Areas*, Queensland Department of Mines, Brisbane.

6.0 IMPORTANT INFORMATION

Your attention is drawn to the document – “Important Information Relating to This Report”, which is included in APPENDIX C of this document. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks associated with the services provided for this project. The document is not intended to reduce the level of responsibility accepted by Golder Associates, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

Signature Page

Golder Associates Pty Ltd



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FHH/JA/fhh/fz

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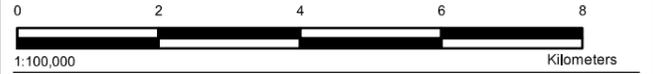
FIGURES

Figure 1: Site Plan and Geotechnical Investigation Locations



LEGEND
 Geotechnical Borehole

| BoreholeID | Easting | Northing |
|------------|------------|-------------|
| AC1 | 313894.565 | 7368869.273 |
| AC2 | 313712.308 | 7369298.616 |
| HP1 | 313600.183 | 7369713.919 |
| HP2 | 313436.803 | 7369807.628 |



NOTE(S)
 1. Projection: GDA 1994 MGA Zone 56

REFERENCE(S)
 Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), Swisstopo, GEBCO, Esri, Swisstopo, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

CLIENT
 GLADSTONE PORTS CORPORATION LTD.

PROJECT
 GATCOMBE AND GOLDING CUTTING CHANNEL DUPLICATION PROJECT
 (DREDGER ACCESS CHANNEL AND TRANSFER LOCATION)

TITLE
 SITE PLAN AND GEOTECHNICAL INVESTIGATION
 LOCATIONS

| CONSULTANT | DATE | 2018-01-31 |
|------------|----------|------------|
| | DESIGNED | MB |
| | PREPARED | MB |
| | REVIEWED | FH |
| | APPROVED | FH |

PROJECT NO. 1787891 CONTROL 005 REV. 0 FIGURE 1

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APPENDIX A

**A1 - Borehole Reports
A2 - Explanation of Notes,
Abbreviations & Terms Used On
Borehole and Test Pit Reports**



CLIENT: GPC

COORDS: 313894.6 m 7368869.3 m 55

DRILL RIG: Hydrapower Scout

PROJECT: Gatcombe and Golding Cutting Channel Duplication Project

SURFACE RL: -6.37 m DATUM: LAT

CONTRACTOR: Schneider Drilling

LOCATION: Fisherman Landing

INCLINATION: -90°

LOGGED: FHH

DATE: 13-12-17

JOB NO: 1787891

HOLE DEPTH: 7.45 m

CHECKED: MM

DATE: 15-11-18

| Drilling | | | Sampling | | | Field Material Description | | | | | | |
|----------|------------------------|--------------------|----------------|----------|--------------------------------------|----------------------------|--------------|----------------------------------------------------------------|--------------------|-------------|---------|---------------------------------------|
| METHOD | PENETRATION RESISTANCE | WATER | DEPTH (metres) | DEPTH RL | SAMPLE OR FIELD TEST | RECOVERED GRAPHIC LOG | GROUP SYMBOL | SOIL/ROCK MATERIAL DESCRIPTION | MOISTURE CONDITION | CONSISTENCY | DENSITY | STRUCTURE AND ADDITIONAL OBSERVATIONS |
| | | drilled over water | 0 | -6.61 | | | CH | Silty CLAY (ALLUVIUM) high plasticity, grey | | | | |
| | | | 1 | | SPT 1.00-1.90 m RW450mm PP=TNP | | | | | | | |
| | | | 2 | | | | | | | | | |
| | | | 3 | | SPT 2.50-3.40 m RW450mm PP=TNP | | | | | | | |
| | | | 4 | | SPT 4.00-4.90 m RW450mm PP=TNP | | | | | | | |
| | | | 5 | | | | | | | | | |
| | | | 6 | | SPT 5.50-6.40 m RW450mm PP=TNP | | | | | | | |
| | | | 7 | -13.56 | SPT 6.50-7.40 m RW450mm PP=TNP | | | | | | | |
| | | | 7 | | | | | END OF BOREHOLE @ 6.95 m TARGET DEPTH DRILLED OVER WATER | | | | |
| | | | 8 | | | | | | | | | |
| | | | 9 | | | | | | | | | |
| | | | 10 | | | | | | | | | |

GAP 8_16.4 LIB:GLB Log GAP NON-CORED FULL PAGE 1787891 CVIP - GLADSTONE.GPJ <<DrawingFile>> 29-01-2018 11:27 8.30.004 Datigel Tools

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.



SHEET: 1 OF 2

CLIENT: GPC

COORDS: 313894.6 m 7368869.3 m 55

DRILL RIG: Hydrapower Scout

PROJECT: Gatcombe and Golding Cutting Channel Duplication Project

SURFACE RL: -6.37 m DATUM: LAT

CONTRACTOR: Schneider Drilling

LOCATION: Fisherman Landing

INCLINATION: -90°

LOGGED: FZ

DATE: 15-12-17

JOB NO: 1787891

HOLE DEPTH: 7.45 m

CHECKED: FHH

DATE: 15-11-18

| Drilling | | | Sampling | | | Field Material Description | | | | | | |
|----------|------------------------|--------------------|----------------|----------------|----------------------------|----------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------|---------|---------------------------------------|
| METHOD | PENETRATION RESISTANCE | WATER | DEPTH (metres) | DEPTH RL | SAMPLE OR FIELD TEST | RECOVERED GRAPHIC LOG | GROUP SYMBOL | SOIL/ROCK MATERIAL DESCRIPTION | MOISTURE CONDITION | CONSISTENCY | DENSITY | STRUCTURE AND ADDITIONAL OBSERVATIONS |
| | | drilled over water | 0 | -8.05 | | | CH | Silty CLAY (ALLUVIUM) high plasticity, dark grey | | | | |
| | | | 1 | | SPT 1.00-1.45 m RW450mm | | | | | | | |
| | | | 2 | | | | | | | | | |
| | | | 3 | | SPT 2.50-2.95 m RW450mm | | | | | | | |
| | | | 4 | | SPT 4.00-4.45 m RW450mm | | | | | | | |
| | | | 5 | 5.00 -13.05 | | | CH | Silty CLAY high plasticity, dark grey, trace fine to coarse grained sand | | | | |
| | | | 6 | | SPT 5.50-5.95 m RW450mm | | | | | | | |
| | | | 7 | 6.60 -14.65 | | | CH | Silty CLAY high plasticity, pale grey to dark grey, with fine to coarse grained sand | | | | |
| | | | 8 | | SPT 7.00-7.45 m RW450mm | | | | | | | |
| | | | 9 | 8.30 -16.35 | | | SC | Clayey SAND fine to coarse grained, yellow brown and pale grey, high plasticity clay, trace fine to medium grained, sub-angular to sub-rounded gravel | | | | |
| | | | 10 | 9.80 -17.85 | | | SW | | | | | |

GAP 8_16.4 LIB:GLB Log GAP NON-CORED FULL PAGE 1787891 CVIP - GLADSTONE.GPJ <<DrawingFile>> 29-01-2018 11:30 8.30.004 Datigel Tools

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.



CLIENT: GPC

COORDS: 313894.6 m 7368869.3 m 55

DRILL RIG: Hydrapower Scout

PROJECT: Gatcombe and Golding Cutting Channel Duplication Project

SURFACE RL: -6.37 m DATUM: LAT

CONTRACTOR: Schneider Drilling

LOCATION: Fisherman Landing

INCLINATION: -90°

LOGGED: FHH

DATE: 14-12-17

JOB NO: 1787891

HOLE DEPTH: 7.45 m

CHECKED: FHH

DATE: 15-11-18

| Drilling | | | Sampling | | | Field Material Description | | | | | | |
|----------|------------------------|--------------------------------------|----------------|----------|-------------------------------------------------------|-------------------------------------|--------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------|--|
| METHOD | PENETRATION RESISTANCE | WATER | DEPTH (metres) | DEPTH RL | SAMPLE OR FIELD TEST | RECOVERED GRAPHIC LOG | GROUP SYMBOL | SOIL/ROCK MATERIAL DESCRIPTION | MOISTURE CONDITION | CONSISTENCY DENSITY | STRUCTURE AND ADDITIONAL OBSERVATIONS | |
| RD | | drilled over water | 0 | -8.09 | | | CH | Silty CLAY (ALLUVIUM) high plasticity, grey to dark grey | W | VS | | |
| | | | 0.50 | -8.59 | | | CH | Silty CLAY high plasticity, grey and pale orange brown | | | | |
| | | | 1 | | SPT 1.00-1.45 m 3, 7, 10 N=17 PP=250-450 kPa | | | | | | | |
| | | | 2 | | | | | | | | | |
| | | | 3 | | SPT 2.50-2.95 m 3, 6, 9 N=15 PP=250-350 kPa | | | | | | | |
| | | | 4 | | SPT 4.00-4.45 m 4, 7, 9 N=16 | | | | | | | |
| | | | 5 | 5.10 | -13.19 | | | CI | Sandy CLAY medium plasticity, grey and pale orange brown, fine to coarse grained sand, varying sand content | M | VSt | |
| | | | 6 | | SPT 5.50-5.95 m 10, 7, 7 N=14 | | | | | | | |
| | | | 7 | 7.00 | -15.09 | SPT 7.00-7.45 m 4, 6, 10 N=16 | | | | interbedded in places with medium to coarse grained sand up to 100 mm thick | | |
| | | | 8 | 7.90 | -15.99 | | | CH | Gravelly CLAY high plasticity, grey, fine grained, subangular to angular (some gravels are quartz) pale grey to dark grey gravel, grading in places to clayey gravel | | | |
| 9 | | SPT 8.50-8.95 m 10, 9, 11 N=20 | | | | | | | | | | |
| 10 | 9.70 | -17.79 | | | CL-CI | | | H | | | | |

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.



| | | |
|-------------------------------------------------------------------|-----------------------------------|--------------------------------|
| CLIENT: GPC | COORDS: 313894.6 m 7368869.3 m 55 | DRILL RIG: Hydrapower Scout |
| PROJECT: Gatcombe and Golding Cutting Channel Duplication Project | SURFACE RL: -6.37 m DATUM: LAT | CONTRACTOR: Schneider Drilling |
| LOCATION: Fisherman Landing | INCLINATION: -90° | LOGGED: FHH DATE: 14-12-17 |
| JOB NO: 1787891 | HOLE DEPTH: 7.45 m | CHECKED: FHH DATE: 15-11-18 |

| Drilling | | | Sampling | | | Field Material Description | | | | | | |
|----------|------------------------|-------|----------------|-----------------|----------------------------------------|----------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------|---------|---------------------------------------|
| METHOD | PENETRATION RESISTANCE | WATER | DEPTH (metres) | DEPTH RL | SAMPLE OR FIELD TEST | RECOVERED GRAPHIC LOG | GROUP SYMBOL | SOIL/ROCK MATERIAL DESCRIPTION | MOISTURE CONDITION | CONSISTENCY | DENSITY | STRUCTURE AND ADDITIONAL OBSERVATIONS |
| RT | L | | 10 | | SPT 10.00-10.45 m 9, 15, 15 N=30 | | CL-CI | Sandy CLAY low to medium plasticity, grey and dark orange brown, fine to coarse grained, subrounded to rounded, white sand | | | | H |
| | | | 11 | 11.30 -19.39 | SPT 11.50-11.73 m 29, 30/80mm | | SC | Clayey Gravelly SAND fine to coarse grained, grey and orange brown, fine to medium grained subrounded gravel, low plasticity clay | | | | M D-VD |
| | | | 12 | | | | | | | | | |
| | | | | -20.49 | | | | END OF BOREHOLE @ 12.40 m TARGET DEPTH DRILLED OVER WATER | | | | |
| | | | 13 | | | | | | | | | |
| | | | 14 | | | | | | | | | |
| | | | 15 | | | | | | | | | |
| | | | 16 | | | | | | | | | |
| | | | 17 | | | | | | | | | |
| | | | 18 | | | | | | | | | |
| | | | 19 | | | | | | | | | |
| | | | 20 | | | | | | | | | |

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

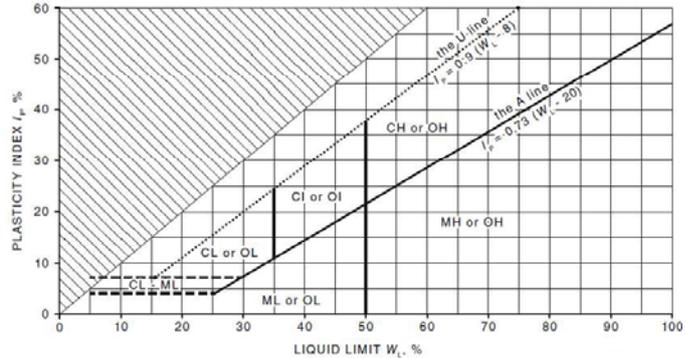
SYMBOLS

| | | | |
|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------|------------------------------|
|  | FILL |  | CLAY (CL, CI or CH) |
|  | GRAVEL (GW, GP, GM or GC) |  | ORGANIC SOILS (OL, OH or Pt) |
|  | SAND (SW, SP, SM or SC) |  | COBBLES or BOULDERS |
|  | SILT (ML or MH) | | |

Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay.

CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil and Rock is classified and described in Reports of Boreholes and Test Pits using the preferred method given in AS1726-2017. The material properties are assessed in the field by visual/tactile methods.

| Particle Size | | | Plasticity Properties |
|---------------|--------------|-------------------|-------------------------------------------------------------------------------------|
| Soil Group | Sub Division | Particle Size | |
| BOULDERS | | > 200 mm |  |
| COBBLES | | 63 to 200 mm | |
| GRAVEL | Coarse | 19 to 63 mm | |
| | Medium | 6.7 to 19 mm | |
| | Fine | 2.36 to 6.7 mm | |
| SAND | Coarse | 0.6 to 2.36 mm | |
| | Medium | 0.21 to 0.6 mm | |
| | Fine | 0.075 to 0.21 mm | |
| SILT | | 0.002 to 0.075 mm | |
| CLAY | | < 0.002 mm | |

MOISTURE CONDITION

| Symbol | Term | Description |
|--------|-------|---------------------------------------------------------------------------------------------|
| D | Dry | Sands and gravels are free flowing. Clays and silts may be brittle or friable and powdery. |
| M | Moist | Soils are darker than in dry condition and may feel cool. Sands and gravels tend to cohere. |
| W | Wet | Soils exude free water. Sand and gravels tend to cohere. |

Moisture condition for fine grained soils is described relative to the plastic limit or liquid limit as specified in AS1726-2017.

CONSISTENCY AND DENSITY

| Fine Grained Soils | | | Coarse Grained Soils | | | |
|--------------------|------------|--------------------------|----------------------|--------------|-------------------|-----------|
| Symbol | Term | Undrained Shear Strength | Symbol | Term | Density Index (%) | SPN "N" * |
| VS | Very Soft | 0 to 12 kPa | VL | Very Loose | Less than 15 | 0 to 4 |
| S | Soft | 12 to 25 kPa | L | Loose | 15 to 35 | 4 to 10 |
| F | Firm | 25 to 50 kPa | MD | Medium Dense | 35 to 65 | 10 to 30 |
| St | Stiff | 50 to 100 kPa | D | Dense | 65 to 85 | 30 to 50 |
| VSt | Very Stiff | 100 to 200 kPa | VD | Very Dense | Above 85 | Above 50 |
| H | Hard | Above 200 kPa | | | | |
| Fr | Friable | - | | | | |

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.

* SPT correlations are not stated in AS1726-2017, and may be subject to corrections for overburden pressure and equipment type.

CEMENTATION

| | |
|---------------------|----------------------------------------------------------------------|
| Weakly Cemented | The soil may be easily disaggregated by hand in air or water. |
| Moderately Cemented | Effort is required to disaggregate the soil by hand in air or water. |



DRILLING/EXCAVATION METHOD

| | | | | | |
|---------|----------------------------|------|---------------------------|-------|------------------------------|
| ADH | Hollow auger drilling | EX | Excavator | PQ3 | Diamond core - 83 mm |
| ADT | Auger drilling with tc-bit | HA | Hand auger | PT | Push tube sampling |
| ADV | Auger drilling with v-bit | HAND | Excavated by hand methods | RAB | Rotary air blast |
| AIRCORE | Aircore | HMLC | Diamond core - 63 mm | RC | Reverse circulation |
| AT | Air track | HQ3 | Diamond core - 61 mm | RT | Rock roller |
| BH | Backhoe bucket | JET | Jetting | SONIC | Sonic drilling |
| CT | Cable tool rig | MZ | Mazier tube sampling | SPT | Standard penetration testing |
| DTC | Diatube coring | NDD | Non-destructive digging | U | Undisturbed tube sampling |
| EE | Existing excavation | NMLC | Diamond core - 52 mm | WB | Washbore drilling |
| EPT | Extruded push tube | NQ3 | Diamond core - 45 mm | | |

PENETRATION/EXCAVATION RESISTANCE

| | |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| L | Low resistance. Rapid penetration possible with little effort from the equipment used. |
| M | Medium resistance. Excavation/possible at an acceptable rate with moderate effort from the equipment used. |
| H | High resistance to penetration/excavation. Further penetration is possible at a slow rate and requires significant effort from the equipment. |
| R | Refusal or Practical Refusal. No further progress possible without the risk of damage or unacceptable wear to the digging implement or machine. |

These assessments are subjective and are dependent on many factors including the equipment power, weight, condition of excavation or drilling tools, and the experience of the operator.

WATER

| | | | |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------|
|  | Water level at date shown |  | Partial water loss |
|  | Water inflow |  | Complete water loss |
| GROUNDWATER NOT OBSERVED | The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit. | | |
| GROUNDWATER NOT ENCOUNTERED | The borehole/test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/test pit been left open for a longer period. | | |

SAMPLING AND TESTING

| | |
|-------------|------------------------------------------------------------------------------------------------------|
| SPT | Standard Penetration Test to AS1289.6.3.1-2004 |
| 4,7,11 N=18 | 4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 150mm seating |
| 30/80 mm | Where practical refusal occurs, the blows and penetration for that interval are reported |
| RW | Penetration occurred under the rod weight only |
| HW | Penetration occurred under the hammer and rod weight only |
| HB | Hammer double bouncing on anvil |
| DS | Disturbed sample |
| BDS | Bulk disturbed sample |
| G | Gas Sample |
| W | Water Sample |
| FP | Field permeability test over section noted |
| FV | Field vane shear test expressed as uncorrected shear strength (sv = peak value, sr = residual value) |
| PID | Photoionisation Detector reading in ppm |
| PM | Pressuremeter test over section noted |
| PP | Pocket penetrometer test expressed as instrument reading in kPa |
| U63 | Thin walled tube sample - number indicates nominal sample diameter in millimetres |
| WPT | Water pressure test |
| DCP | Dynamic cone penetration test |
| CPT | Cone penetration test |
| CPTu | Cone penetration test with pore pressure (u) measurement |

RANKING OF VISUALLY OBSERVABLE CONTAMINATION AND ODOUR (for specific soil contamination assessment projects)

| | | | |
|-------|------------------------------------------|-------|----------------------------------------|
| R = 0 | No visible evidence of contamination | R = A | No non-natural odours identified |
| R = 1 | Slight evidence of visible contamination | R = B | Slight non-natural odours identified |
| R = 2 | Visible contamination | R = C | Moderate non-natural odours identified |
| R = 3 | Significant visible contamination | R = D | Strong non-natural odours identified |

ROCK CORE RECOVERY

| | | | |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| TCR = Total Core Recovery (%) | RQD = Rock Quality Designation (%) | SCR = Solid Core Recovery (%) | F = Fracture Frequency |
| $= \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100$ | $= \frac{\sum \text{Axial lengths of core} > 100 \text{ mm}}{\text{Length of core run}} \times 100$ | $= \frac{\sum \text{Length of cylindrical core recovered}}{\text{Length of core run}} \times 100$ | $= \frac{\text{No. of defects}}{\text{Length of zone (m)}}$ |



| STRENGTH | | | |
|-----------------|----------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symbol | Term | UCS (MPa) | Field Guide |
| VL | Very Low | 0.6 to 2 | Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30 mm can be broken by finger pressure. |
| L | Low | 2 to 6 | Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling. |
| M | Medium | 6 to 20 | Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty. |
| H | High | 20 to 60 | A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken with pick with a single firm blow; rock rings under hammer. |
| VH | Very High | 60 to 200 | Hand specimen breaks with pick after more than one blow; rock rings under hammer. |
| EH | Extremely High | >200 | Specimen requires many blows with geological pick to break through intact material; rock rings under hammer. |

Material with strength less than 'Very Low' shall be described using soil characteristics. The presence of an original rock structure, fabric or texture should be noted, if relevant.

| ROCK MATERIAL WEATHERING | | | |
|---------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Symbol | Term | Field Guide | |
| RS | Residual Soil | Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported. | |
| XW | Extremely Weathered | Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible. | |
| DW | HW | Highly Weathered | The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. |
| | MW | Moderately Weathered | The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable, but shows little or no change of strength from fresh rock. |
| SW | Slightly Weathered | Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock. | |
| FR | Fresh | Rock shows no sign of decomposition of individual minerals or colour changes. | |

| ABBREVIATIONS FOR DEFECT TYPES AND DESCRIPTIONS | | | | | |
|--------------------------------------------------------|--------------------------|-----------------------------|------------|------------------------------------------------------------------------------------------------------------------------------|--------------|
| Defect Type | | Coating or Infilling | | Roughness | |
| P | Parting | Cn | Clean | VRo | Very Rough |
| X | Foliation | Sn | Stain | Ro | Rough |
| L | Cleavage | Ve | Veneer | Sm | Smooth |
| C | Contact | Ct | Coating | Po | Polished |
| J | Joint | In | Infill | Sl | Slickensided |
| SSu | Sheared Surface | Planarity | | Vertical Boreholes – The dip (inclination from horizontal) of the defect is given. | |
| SS | Sheared Seam | | | | |
| SZ | Sheared Zone | PI | Planar | Inclined Boreholes – The inclination is measured as the acute angle between the core axis and the vertical direction. | |
| CS | Crushed Seam | Cv | Curved | | |
| IS | Infilled Seam | Un | Undulating | | |
| EWS | Extremely Weathered Seam | St | Stepped | | |
| V | Vein | Ir | Irregular | | |

APPENDIX B

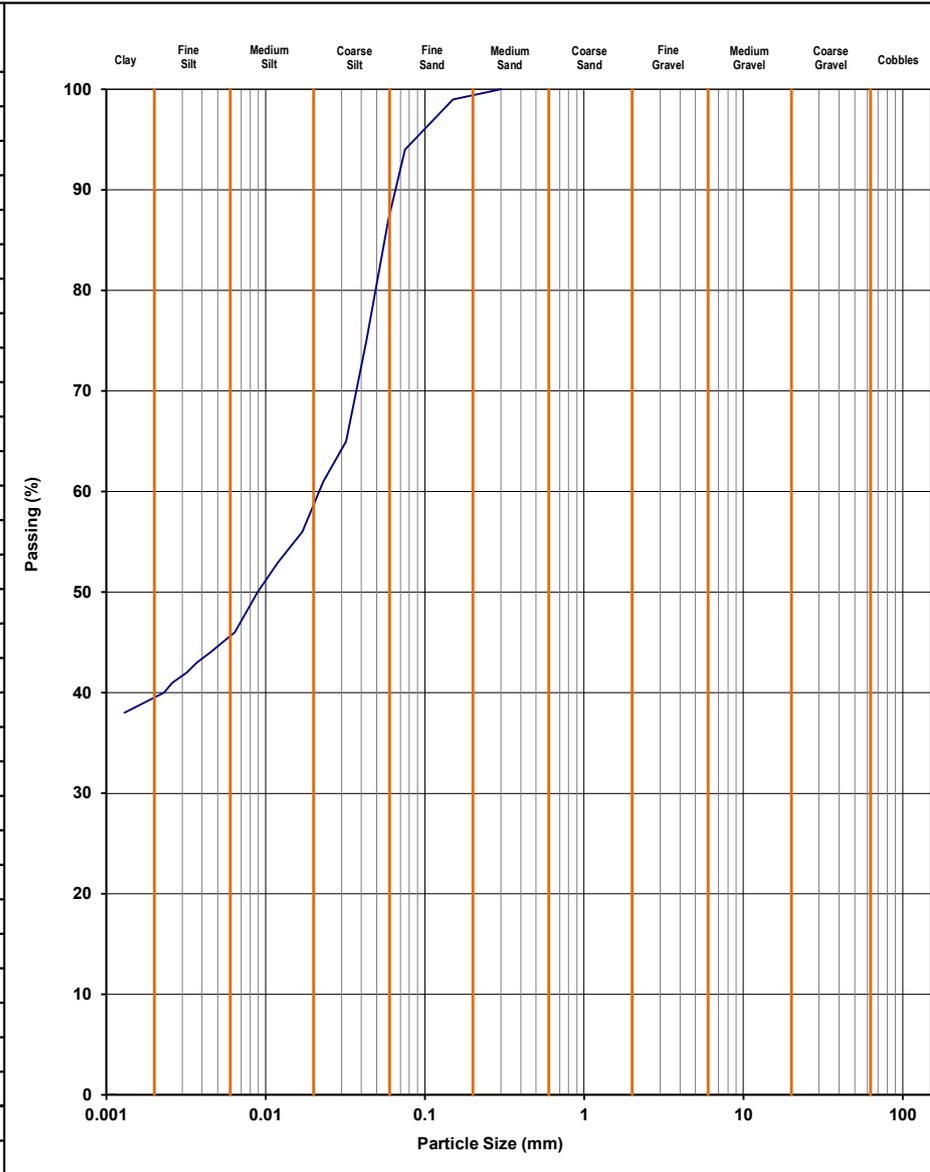
Laboratory Testing Reports

PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3, 3.5.1 & 2.1.1

| | |
|-------------------------------------------------|------------------------------|
| Client Golder Associates Pty Limited | Report No. GA100271-G |
| Address PO Box 1734 MILTON BC QLD 4064 | Request No 20122017 |
| Project GPC_CVIP Investigation_Gladstone | Test Date 18/1/2018 |
| Project No 1787891 | Report Date 24/1/2018 |
| Bore Hole AC1 | Client Sample No - |
| Description DS | Depth From (m) 4 |
| | Depth To (m) |

| Sieve Size (mm) | Passing % |
|-----------------|-----------|
| 150.0 | |
| 75.0 | |
| 63.0 | |
| 53.0 | |
| 37.5 | |
| 26.5 | |
| 19.0 | |
| 13.2 | |
| 9.5 | |
| 6.7 | |
| 4.75 | |
| 2.36 | |
| 1.18 | |
| 0.600 | 100 |
| 0.425 | 99 |
| 0.300 | 94 |
| 0.150 | 87 |
| 0.075 | 75 |
| 0.059 | 75 |
| 0.043 | 65 |
| 0.032 | 61 |
| 0.023 | 56 |
| 0.017 | 53 |
| 0.012 | 50 |
| 0.0089 | 46 |
| 0.0064 | 44 |
| 0.0045 | 43 |
| 0.0037 | 42 |
| 0.0032 | 41 |
| 0.0026 | 40 |
| 0.0023 | 40 |
| 0.0013 | 38 |



NOTES/REMARKS:

-
Moisture Content 39.5% -2.36mm Soil Particle Density(t/m³) 2.67
Sample/s supplied by the client

Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations, and/or measurements included in this document are traceable to Australian/National Standards.

Tested at Trilab Brisbane Laboratory.

Authorised Signatory



C. Channon



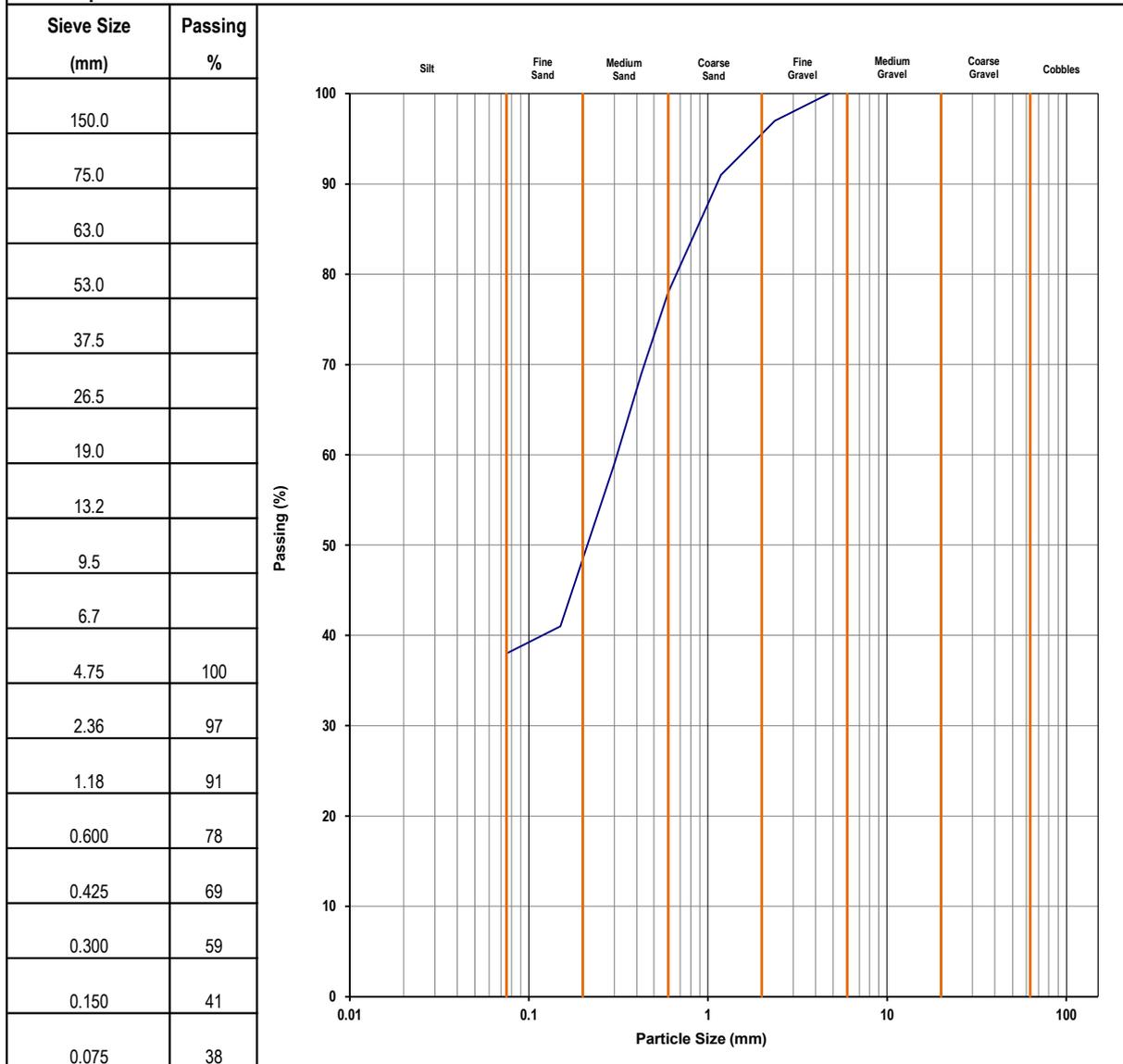
Laboratory No. 9926

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PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.1, 2.1.1

| | | | | | |
|--------------------|----------------------------------|-------------------------|-------------------|---------------------|--|
| Client | Golder Associates Pty Limited | | Report No. | GA100272-G | |
| Address | PO Box 1734 MILTON BC | QLD 4064 | Request No | 20122017 | |
| Project | GPC_CVIP Investigation_Gladstone | | | | |
| Project No | 1787891 | Client Sample No | - | | |
| Bore Hole | AC1 | Depth From (m) | 5.5 | Depth To (m) | |
| Description | DS | | | | |



NOTES/REMARKS:
-
Moisture Content 38%
Sample/s supplied by the client

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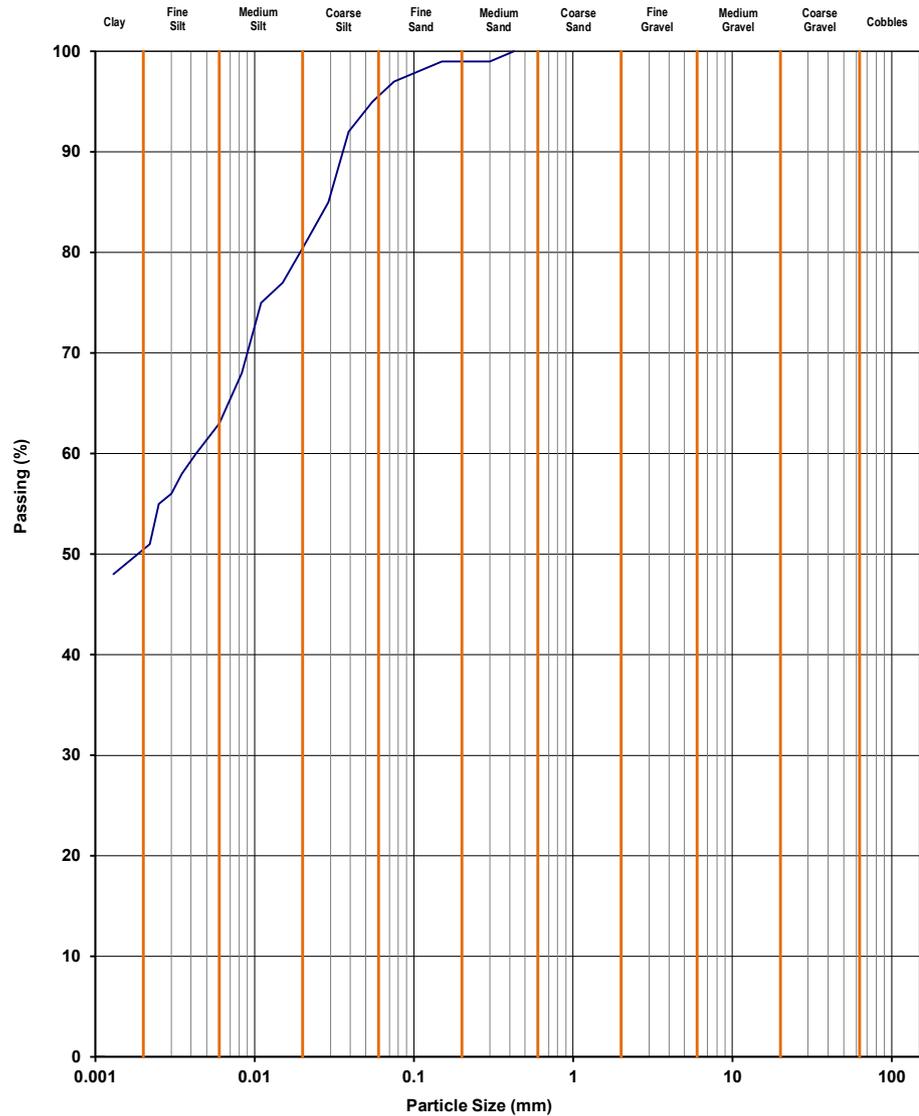
Trilab Pty Ltd ABN 25 065 630 506

PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3, 3.5.1 & 2.1.1

| | | | |
|--------------------|----------------------------------|-------------------------|------------|
| Client | Golder Associates Pty Limited | Report No. | GA100243-G |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | | |
| Project No | 1787891 | Client Sample No | - |
| Bore Hole | AC2 | Depth From (m) | 4 |
| Description | DS | Depth To (m) | |

| Sieve Size (mm) | Passing % |
|-----------------|-----------|
| 150.0 | |
| 75.0 | |
| 63.0 | |
| 53.0 | |
| 37.5 | |
| 26.5 | |
| 19.0 | |
| 13.2 | |
| 9.5 | |
| 6.7 | |
| 4.75 | |
| 2.36 | |
| 1.18 | |
| 0.600 | |
| 0.425 | 100 |
| 0.300 | 99 |
| 0.150 | 99 |
| 0.075 | 97 |
| 0.055 | 95 |
| 0.039 | 92 |
| 0.029 | 85 |
| 0.021 | 81 |
| 0.015 | 77 |
| 0.011 | 75 |
| 0.0083 | 68 |
| 0.006 | 63 |
| 0.0043 | 60 |
| 0.0035 | 58 |
| 0.003 | 56 |
| 0.0025 | 55 |
| 0.0022 | 51 |
| 0.0013 | 48 |



NOTES/REMARKS:

-
Moisture Content 72.6%
Sample/s supplied by the client

-2.36mm Soil Particle Density(t/m^3) 2.60

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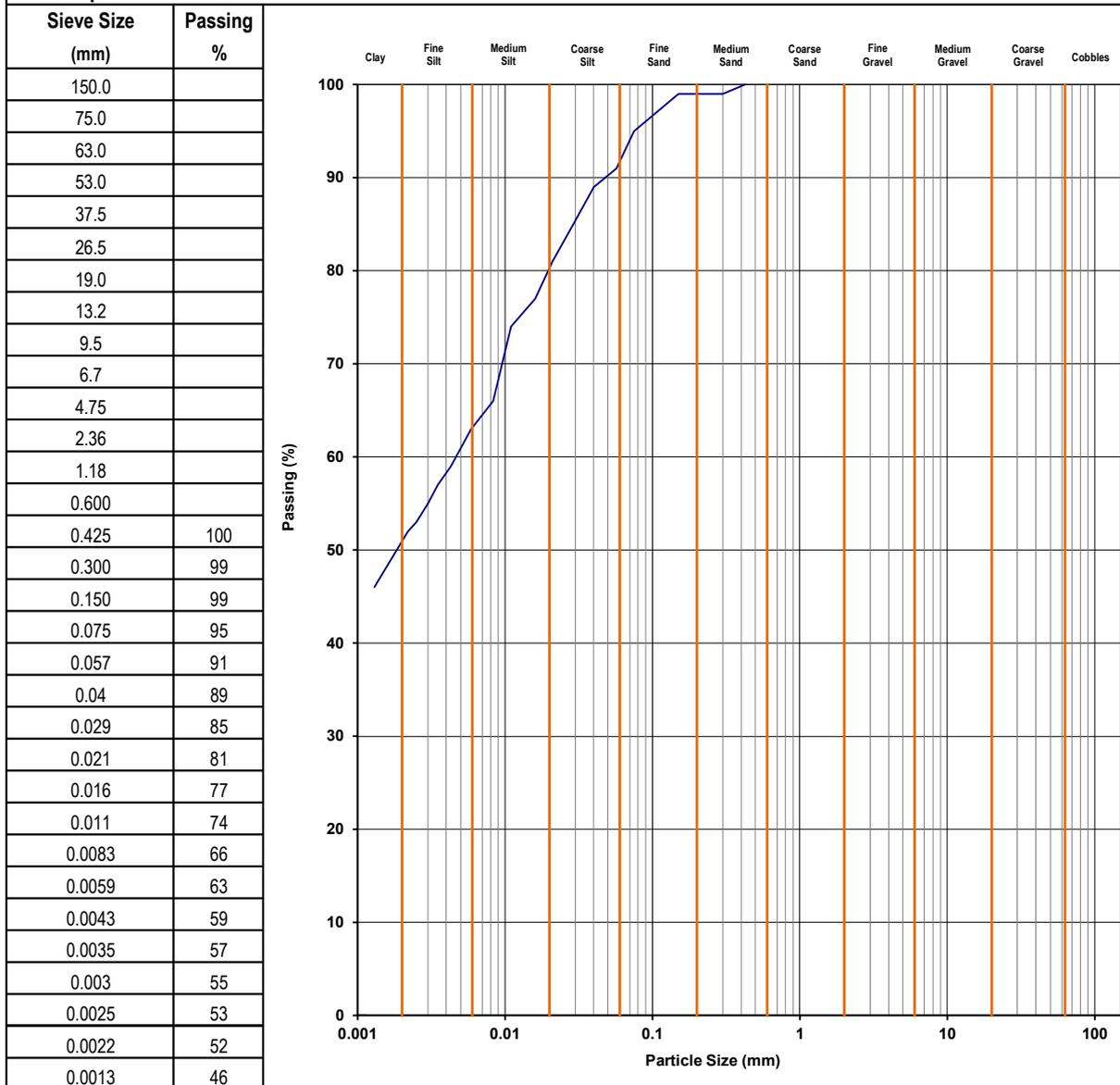
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PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3, 3.5.1 & 2.1.1

| | | | |
|--------------------|----------------------------------|-------------------------|------------|
| Client | Golder Associates Pty Limited | Report No. | GA100273-G |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | | |
| Project No | 1787891 | Client Sample No | - |
| Bore Hole | HP1 | Depth From (m) | 2.5 |
| Description | DS | Depth To (m) | |



NOTES/REMARKS:

-
Moisture Content 80.9%
Sample/s supplied by the client

-2.36mm Soil Particle Density(t/m^3) 2.63

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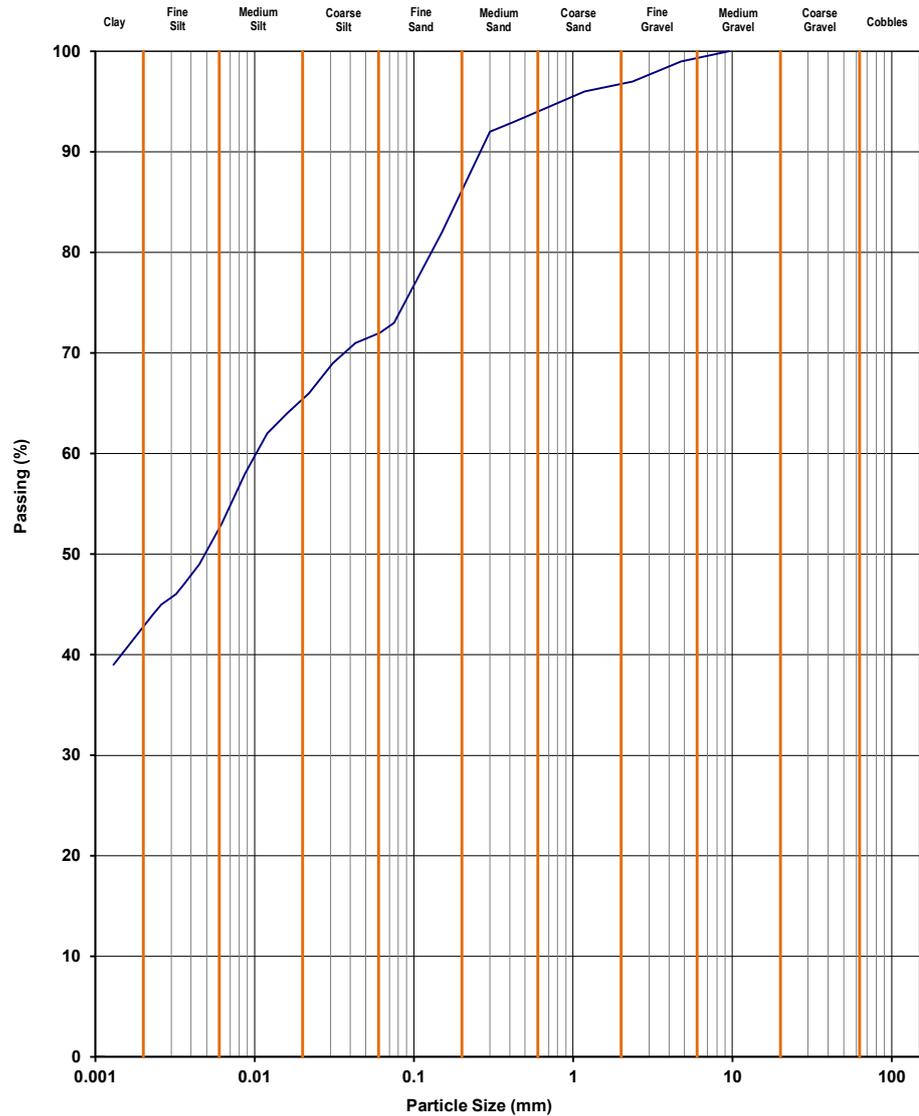


PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3, 3.5.1 & 2.1.1

| | | | |
|--------------------|----------------------------------|-------------------------|------------|
| Client | Golder Associates Pty Limited | Report No. | GA100274-G |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | | |
| Project No | 1787891 | Client Sample No | - |
| Bore Hole | HP1 | Depth From (m) | 7 |
| Description | DS | Depth To (m) | |

| Sieve Size (mm) | Passing % |
|-----------------|-----------|
| 150.0 | |
| 75.0 | |
| 63.0 | |
| 53.0 | |
| 37.5 | |
| 26.5 | |
| 19.0 | |
| 13.2 | |
| 9.5 | 100 |
| 6.7 | 99 |
| 4.75 | 99 |
| 2.36 | 97 |
| 1.18 | 96 |
| 0.600 | 94 |
| 0.425 | 93 |
| 0.300 | 92 |
| 0.150 | 82 |
| 0.075 | 73 |
| 0.061 | 72 |
| 0.043 | 71 |
| 0.031 | 69 |
| 0.022 | 66 |
| 0.016 | 64 |
| 0.012 | 62 |
| 0.0087 | 58 |
| 0.0062 | 53 |
| 0.0045 | 49 |
| 0.0036 | 47 |
| 0.0032 | 46 |
| 0.0026 | 45 |
| 0.0023 | 44 |
| 0.0013 | 39 |



NOTES/REMARKS:

-
Moisture Content 58.1%
Sample/s supplied by the client

-2.36mm Soil Particle Density(t/m^3) 2.62

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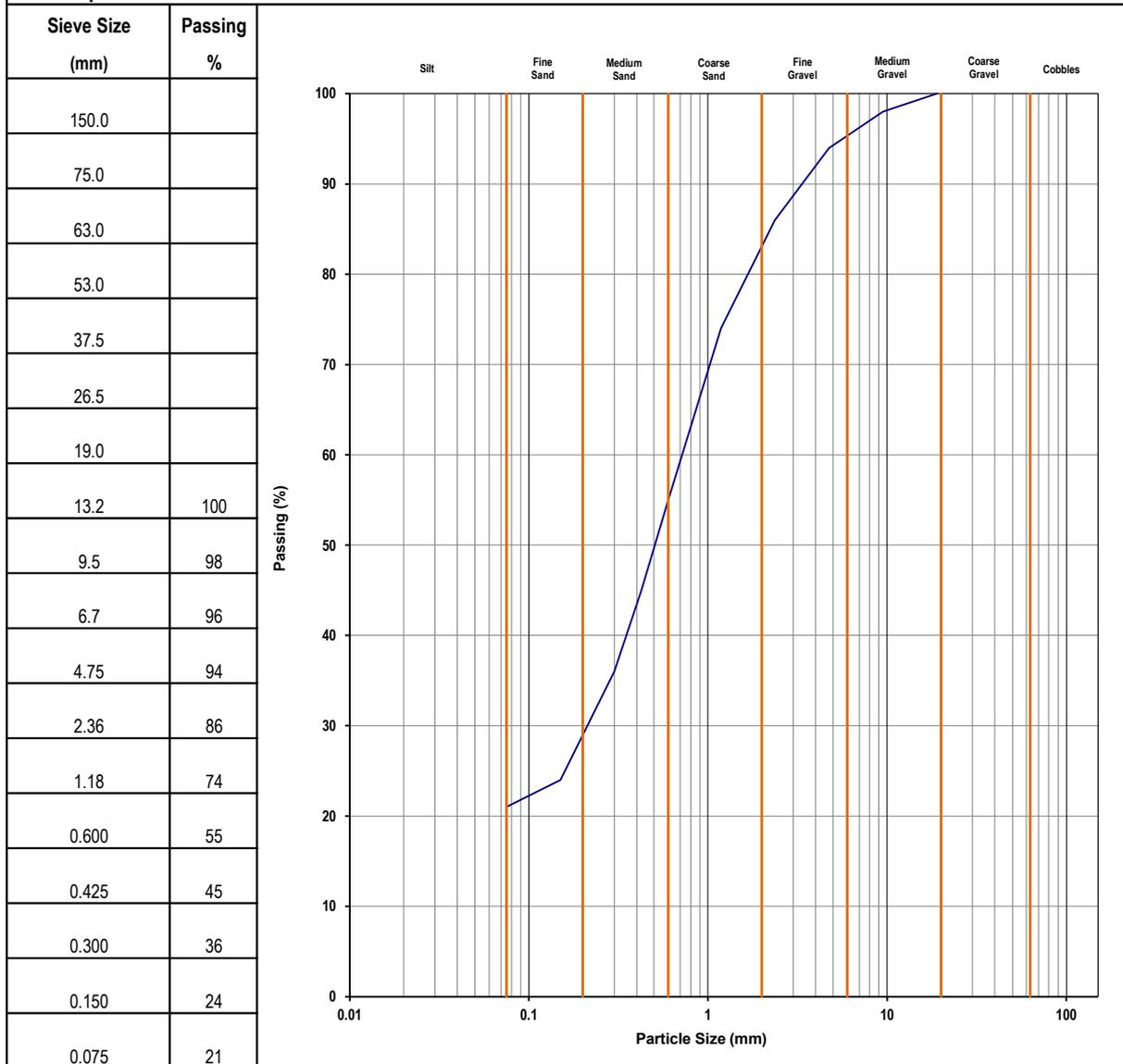
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PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.1, 2.1.1

| | | | | | |
|--------------------|----------------------------------|-------------------------|-------------------|---------------------|--|
| Client | Golder Associates Pty Limited | | Report No. | GA100275-G | |
| Address | PO Box 1734 MILTON BC | QLD 4064 | Request No | 20122017 | |
| Project | GPC_CVIP Investigation_Gladstone | | | | |
| Project No | 1787891 | Client Sample No | - | | |
| Bore Hole | HP1 | Depth From (m) | 8.5 | Depth To (m) | |
| Description | DS | | | | |



NOTES/REMARKS:
-
Moisture Content 20%
Sample/s supplied by the client

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Laboratory No. 9926

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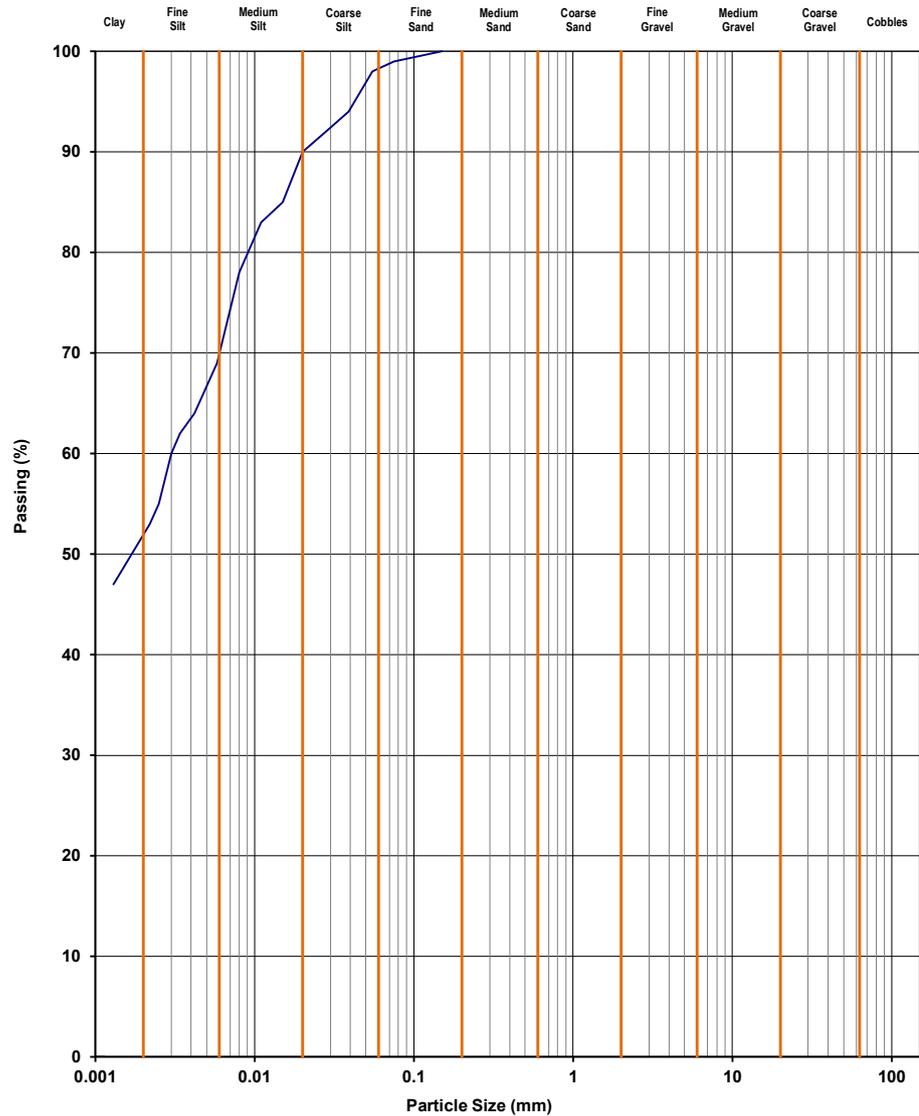
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PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.3, 3.5.1 & 2.1.1

| | | | |
|--------------------|----------------------------------|-------------------------|------------|
| Client | Golder Associates Pty Limited | Report No. | GA100276-G |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | | |
| Project No | 1787891 | Client Sample No | - |
| Bore Hole | HP2 | Depth From (m) | 2.5 |
| Description | DS | Depth To (m) | |

| Sieve Size (mm) | Passing % |
|-----------------|-----------|
| 150.0 | |
| 75.0 | |
| 63.0 | |
| 53.0 | |
| 37.5 | |
| 26.5 | |
| 19.0 | |
| 13.2 | |
| 9.5 | |
| 6.7 | |
| 4.75 | |
| 2.36 | |
| 1.18 | |
| 0.600 | |
| 0.425 | |
| 0.300 | |
| 0.150 | 100 |
| 0.075 | 99 |
| 0.055 | 98 |
| 0.039 | 94 |
| 0.028 | 92 |
| 0.02 | 90 |
| 0.015 | 85 |
| 0.011 | 83 |
| 0.008 | 78 |
| 0.0058 | 69 |
| 0.0042 | 64 |
| 0.0034 | 62 |
| 0.003 | 60 |
| 0.0025 | 55 |
| 0.0022 | 53 |
| 0.0013 | 47 |



NOTES/REMARKS:

-
Moisture Content 26.5%
Sample/s supplied by the client

-2.36mm Soil Particle Density(t/m^3) 2.64

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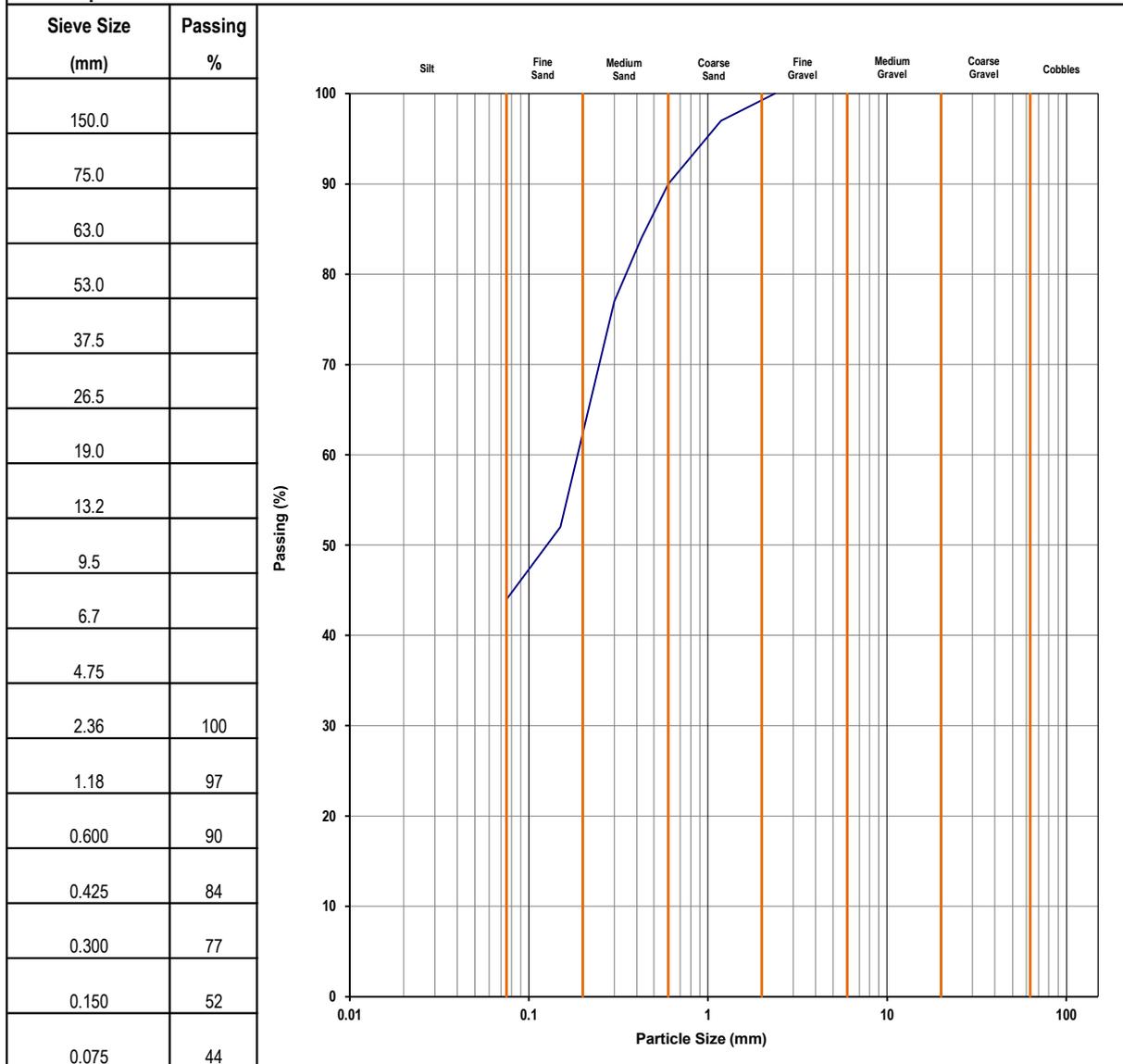
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PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.1, 2.1.1

| | | | | |
|--------------------|----------------------------------|-------------------------|-------------------|---------------------|
| Client | Golder Associates Pty Limited | | Report No. | GA100277-G |
| Address | PO Box 1734 MILTON BC | QLD 4064 | Request No | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | | | |
| Project No | 1787891 | Client Sample No | - | |
| Bore Hole | HP2 | Depth From (m) | 7 | Depth To (m) |
| Description | DS | | | |



NOTES/REMARKS:
-
Moisture Content 17.7%
Sample/s supplied by the client

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Laboratory No. 9926

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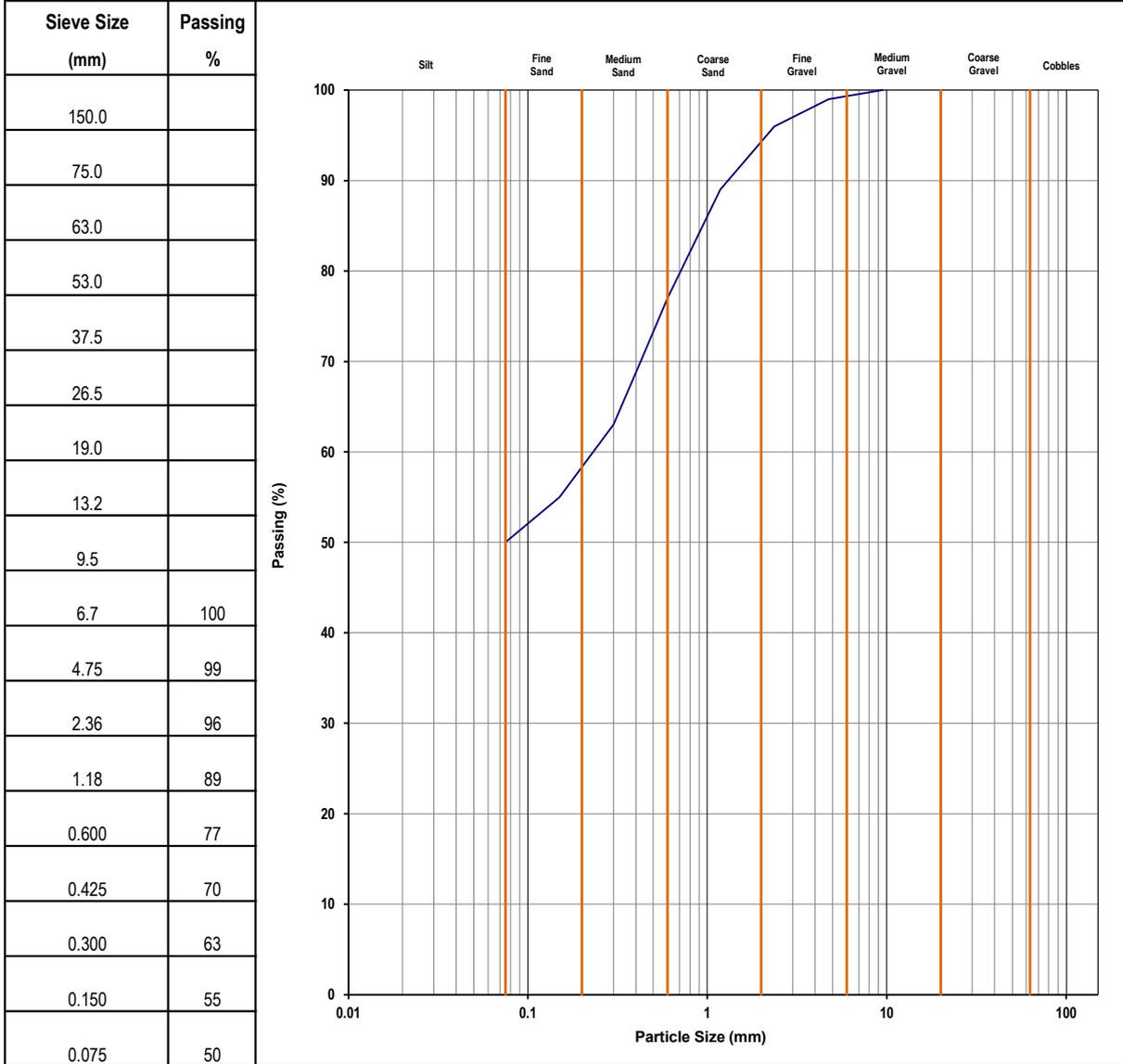
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PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.1, 2.1.1

| | | | | | |
|--------------------|----------------------------------|-------------------------|-------------------|---------------------|--|
| Client | Golder Associates Pty Limited | | Report No. | GA100278-G | |
| Address | PO Box 1734 MILTON BC | QLD 4064 | Request No | 20122017 | |
| Project | GPC_CVIP Investigation_Gladstone | | | | |
| Project No | 1787891 | Client Sample No | - | | |
| Bore Hole | HP2 | Depth From (m) | 10 | Depth To (m) | |
| Description | DS | | | | |



NOTES/REMARKS: -
Moisture Content 17.6%
Sample/s supplied by the client

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Laboratory No. 9926

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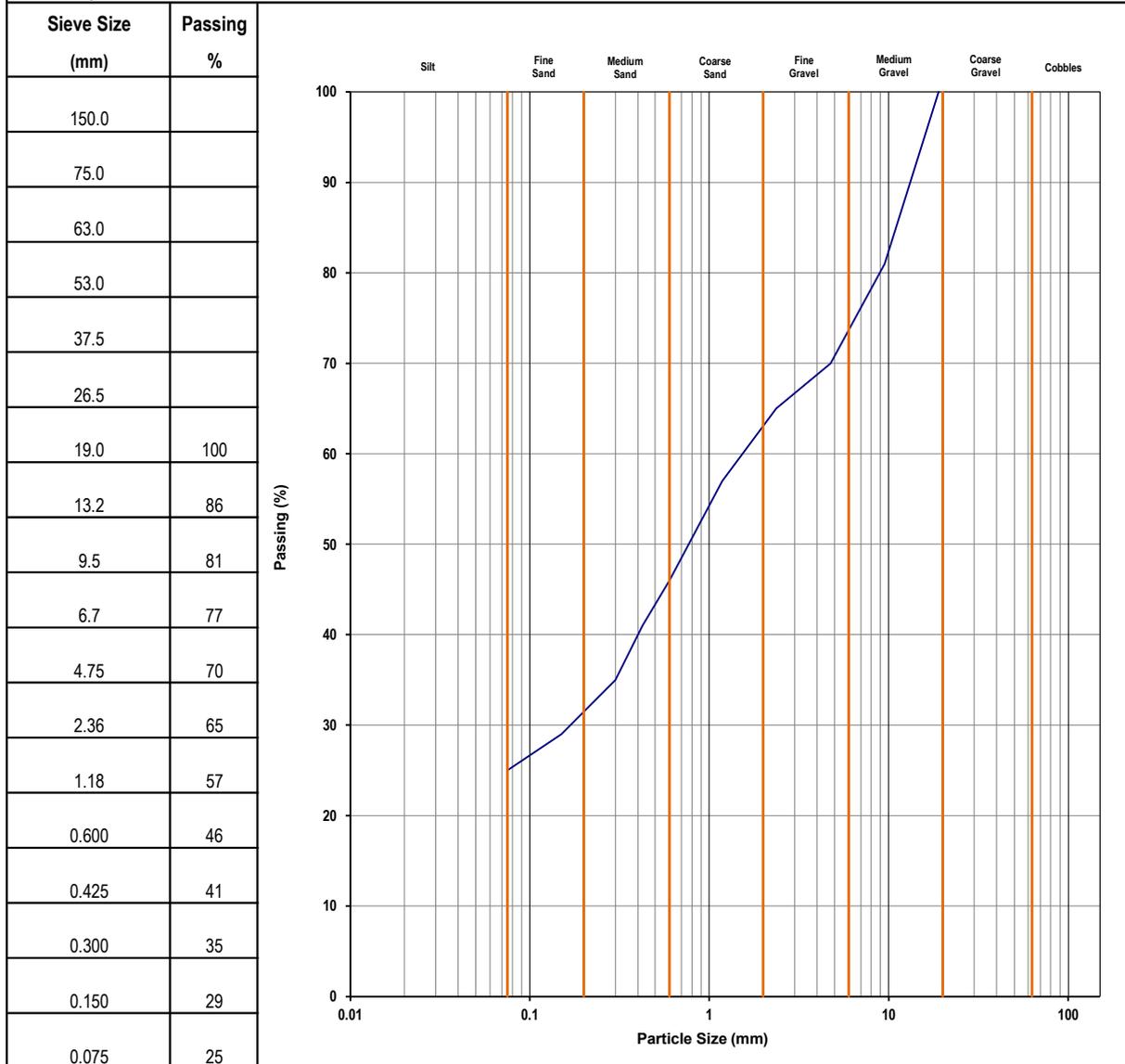
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Trilab Pty Ltd ABN 25 065 630 506

PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Method: AS 1289 3.6.1, 2.1.1

| | | | | | |
|--------------------|----------------------------------|-------------------------|-------------------|---------------------|--|
| Client | Golder Associates Pty Limited | | Report No. | GA100279-G | |
| Address | PO Box 1734 MILTON BC | QLD 4064 | Request No | 20122017 | |
| Project | GPC_CVIP Investigation_Gladstone | | | | |
| Project No | 1787891 | Client Sample No | - | | |
| Bore Hole | HP2 | Depth From (m) | 11.5 | Depth To (m) | |
| Description | DS | | | | |



NOTES/REMARKS: -
Moisture Content 16.5%
Sample/s supplied by the client

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Authorised Signatory

C. Channon



Laboratory No. 9926

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ATTERBERG LIMITS TEST REPORT

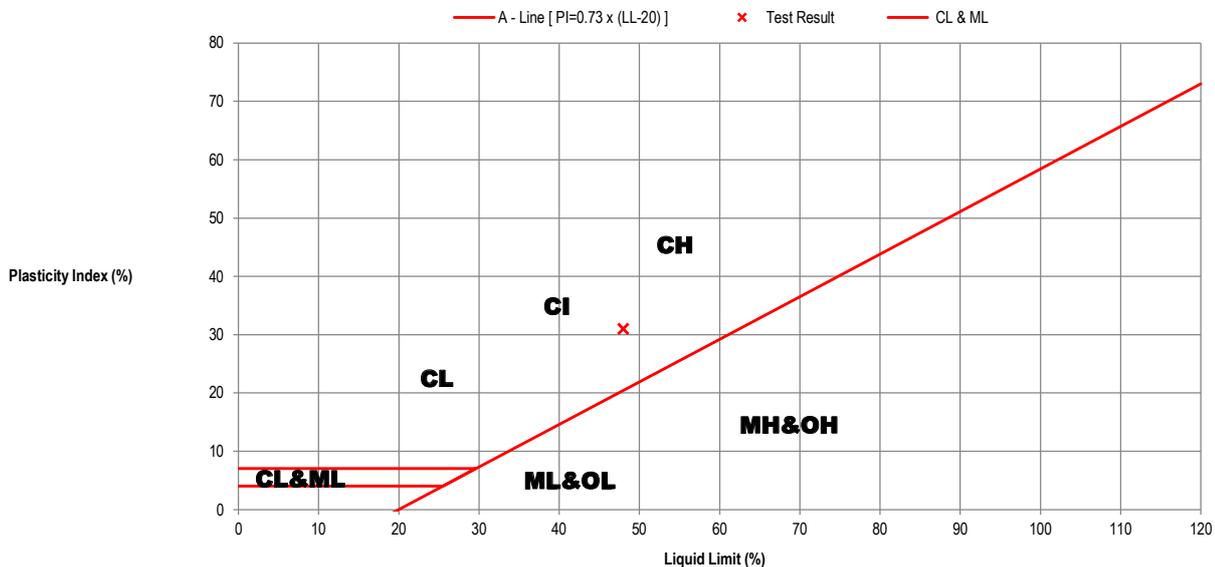
Test Method: AS 1289 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

| | | | |
|--------------------|----------------------------------|--------------------------|-------------|
| Client | Golder Associates Pty Limited | Report No. | GA100271-AL |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No. | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | Test Date | 19/01/2018 |
| Project No. | 1787891 | Report Date | 23/01/2018 |
| Bore Hole | AC1 | Client Sample No. | - |
| Description | DS | Depth From (m) | 4 |
| | | Depth To (m) | |

RESULTS OF TESTING

| | | |
|----------------------|------------------------|------------------|
| Liquid Limit (%) | 48 | |
| Plastic Limit (%) | 17 | |
| Plasticity Index (%) | 31 | |
| Linear Shrinkage (%) | 13.5 | Curling Occurred |
| Moisture Content (%) | 39.5 | |
| Preparation Method | Wet Sieved and Natural | |

Plasticity Chart



Remarks:

Sample/s supplied by client

Tested as received

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REP00102

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Tested at Trilab Brisbane Laboratory.

Authorised Signatory



C. Park



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ATTERBERG LIMITS TEST REPORT

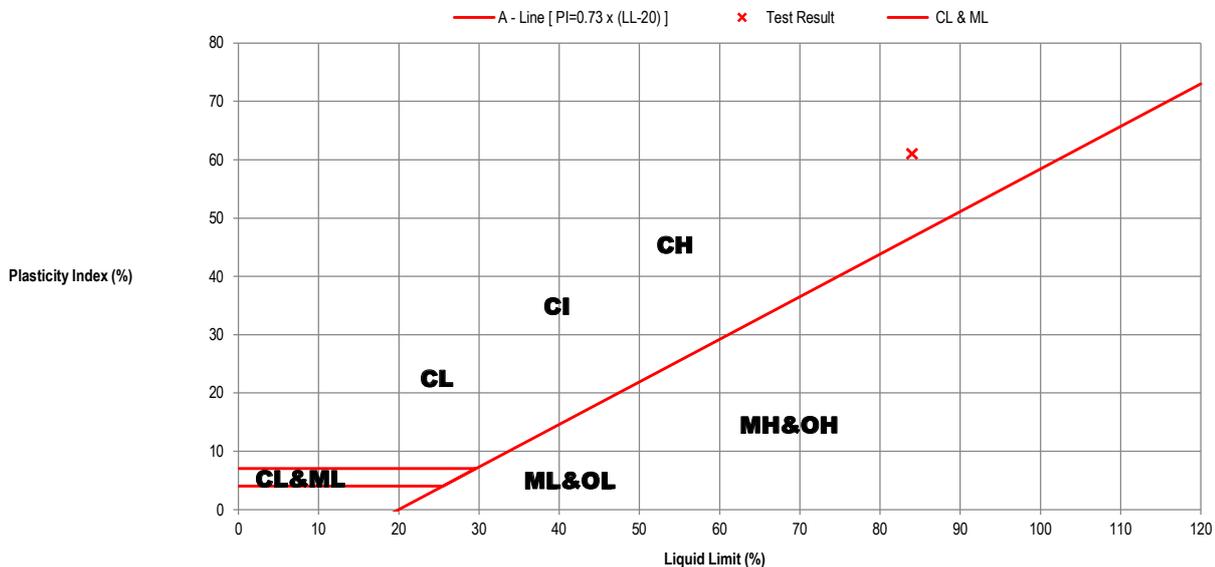
Test Method: AS 1289 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

| | | | |
|--------------------|----------------------------------|--------------------------|-------------|
| Client | Golder Associates Pty Limited | Report No. | GA100243-AL |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No. | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | Test Date | 19/01/2018 |
| Project No. | 1787891 | Report Date | 23/01/2018 |
| Project No. | 1787891 | Client Sample No. | - |
| Bore Hole | AC2 | Depth From (m) | 4 |
| Description | DS | Depth To (m) | |

RESULTS OF TESTING

| | | |
|----------------------|------------------------|------------------|
| Liquid Limit (%) | 84 | |
| Plastic Limit (%) | 23 | |
| Plasticity Index (%) | 61 | |
| Linear Shrinkage (%) | 20.0 | Curling Occurred |
| Moisture Content (%) | 72.6 | |
| Preparation Method | Wet Sieved and Natural | |

Plasticity Chart



Remarks:

Sample/s supplied by client

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ATTERBERG LIMITS TEST REPORT

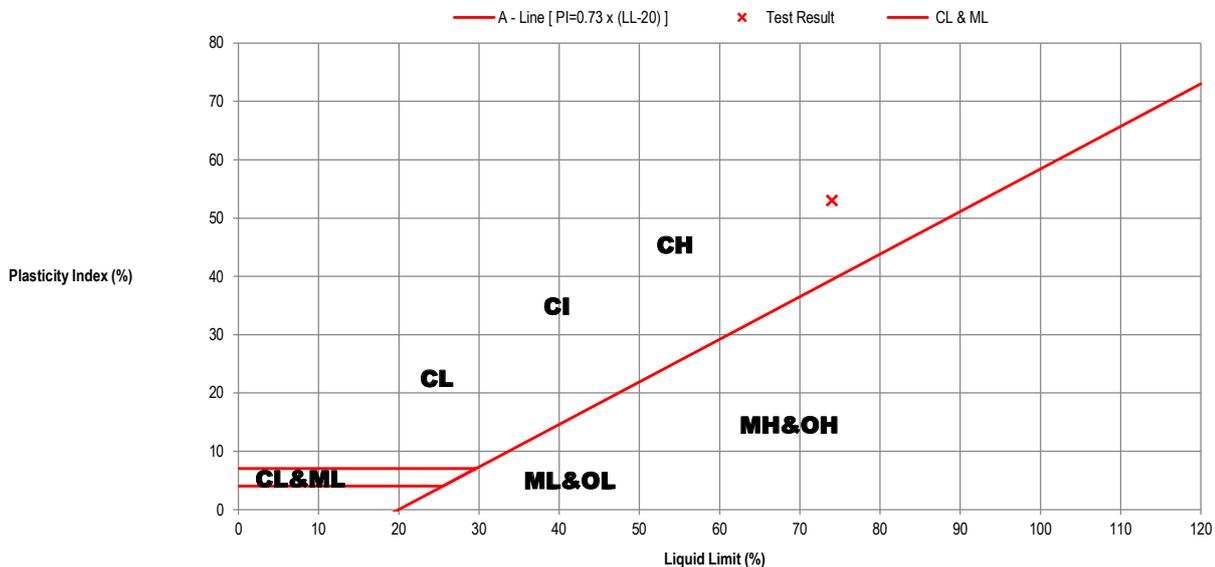
Test Method: AS 1289 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

| | | | |
|--------------------|----------------------------------|--------------------------|-------------|
| Client | Golder Associates Pty Limited | Report No. | GA100273-AL |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No. | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | Test Date | 19/01/2018 |
| Project No. | 1787891 | Report Date | 23/01/2018 |
| Project No. | 1787891 | Client Sample No. | - |
| Bore Hole | HP1 | Depth From (m) | 2.5 |
| Description | DS | Depth To (m) | |

RESULTS OF TESTING

| | | |
|----------------------|------------------------|------------------|
| Liquid Limit (%) | 74 | |
| Plastic Limit (%) | 21 | |
| Plasticity Index (%) | 53 | |
| Linear Shrinkage (%) | 18.5 | Curling Occurred |
| Moisture Content (%) | 80.9 | |
| Preparation Method | Wet Sieved and Natural | |

Plasticity Chart



Remarks:

Sample/s supplied by client

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ATTERBERG LIMITS TEST REPORT

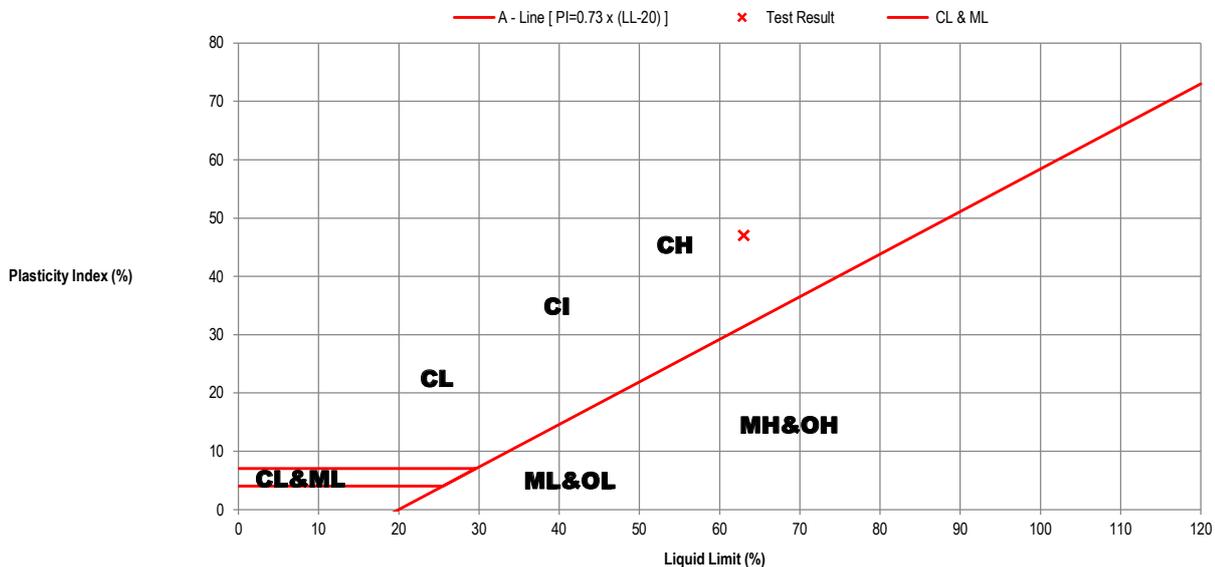
Test Method: AS 1289 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

| | | | |
|--------------------|----------------------------------|--------------------------|-------------|
| Client | Golder Associates Pty Limited | Report No. | GA100274-AL |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No. | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | Test Date | 19/01/2018 |
| Project No. | 1787891 | Report Date | 23/01/2018 |
| Project No. | 1787891 | Client Sample No. | - |
| Bore Hole | HP1 | Depth From (m) | 7 |
| Description | DS | Depth To (m) | |

RESULTS OF TESTING

| | | |
|----------------------|------------------------|------------------|
| Liquid Limit (%) | 63 | |
| Plastic Limit (%) | 16 | |
| Plasticity Index (%) | 47 | |
| Linear Shrinkage (%) | 16.0 | Curling Occurred |
| Moisture Content (%) | 58.1 | |
| Preparation Method | Wet Sieved and Natural | |

Plasticity Chart



Remarks:

Sample/s supplied by client

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ATTERBERG LIMITS TEST REPORT

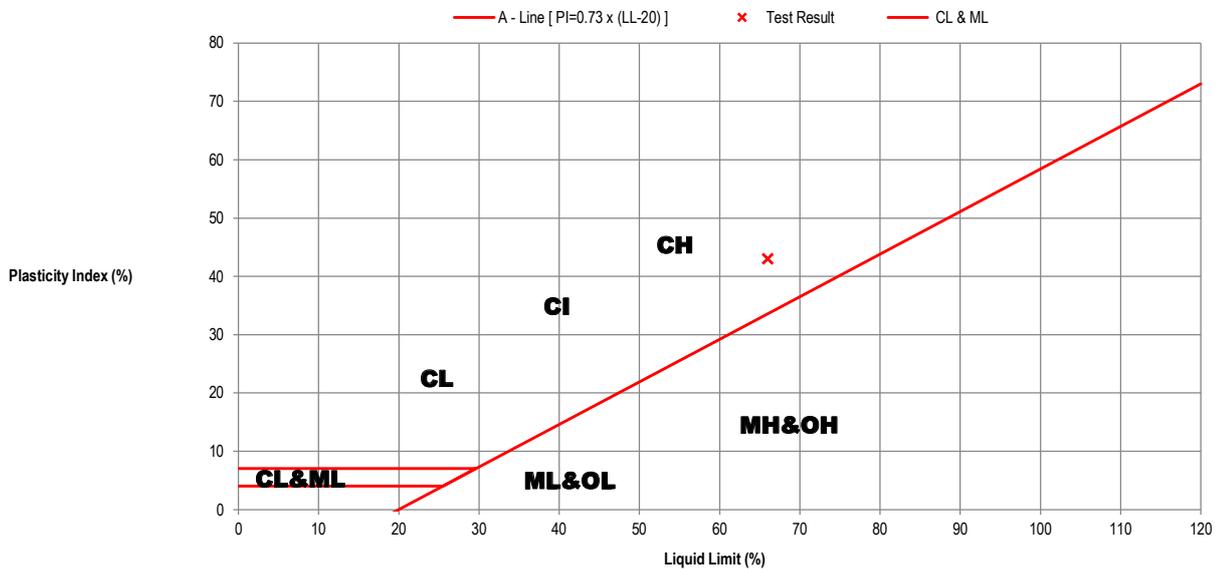
Test Method: AS 1289 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

| | | | |
|--------------------|----------------------------------|--------------------------|-------------|
| Client | Golder Associates Pty Limited | Report No. | GA100276-AL |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No. | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | Test Date | 19/01/2018 |
| Project No. | 1787891 | Report Date | 23/01/2018 |
| Project No. | 1787891 | Client Sample No. | - |
| Bore Hole | HP2 | Depth From (m) | 2.5 |
| Description | DS | Depth To (m) | |

RESULTS OF TESTING

| | | |
|----------------------|---------------------------|------------------|
| Liquid Limit (%) | 66 | |
| Plastic Limit (%) | 23 | |
| Plasticity Index (%) | 43 | |
| Linear Shrinkage (%) | 17.5 | Curling Occurred |
| Moisture Content (%) | 26.5 | |
| Preparation Method | Dry Sieved and Oven Dried | |

Plasticity Chart



Remarks:

Sample/s supplied by client

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ATTERBERG LIMITS TEST REPORT

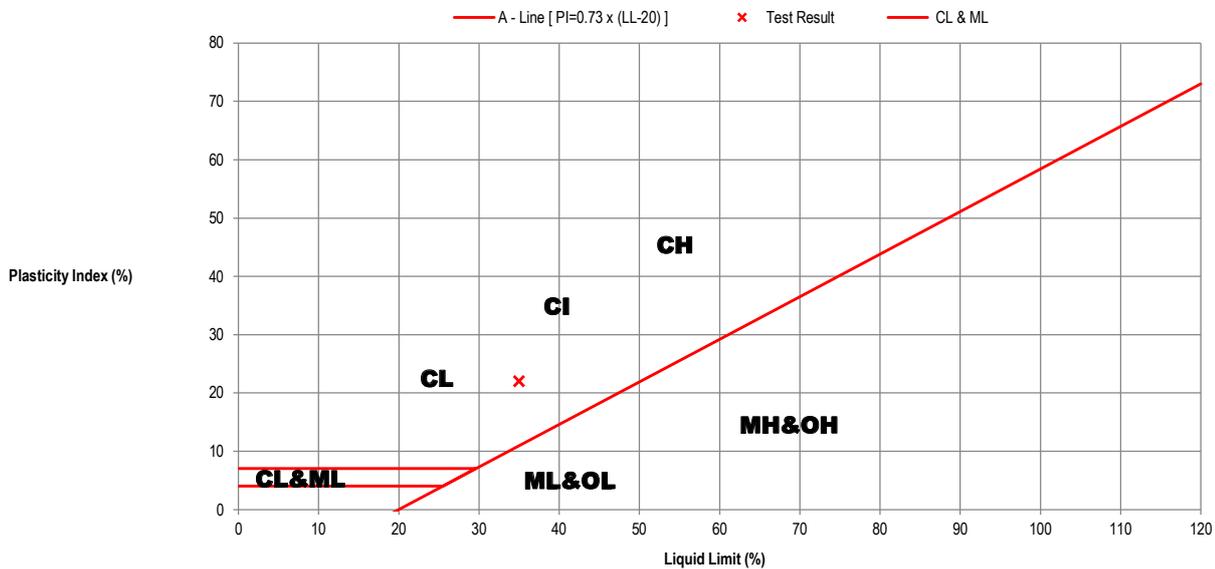
Test Method: AS 1289 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

| | | | |
|--------------------|----------------------------------|--------------------------|-------------|
| Client | Golder Associates Pty Limited | Report No. | GA100277-AL |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No. | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | Test Date | 19/01/2018 |
| Project No. | 1787891 | Report Date | 23/01/2018 |
| Project No. | 1787891 | Client Sample No. | - |
| Bore Hole | HP2 | Depth From (m) | 7 |
| Description | DS | Depth To (m) | |

RESULTS OF TESTING

| | | |
|----------------------|---------------------------|------------------|
| Liquid Limit (%) | 35 | |
| Plastic Limit (%) | 13 | |
| Plasticity Index (%) | 22 | |
| Linear Shrinkage (%) | 10.5 | Curling Occurred |
| Moisture Content (%) | 17.4 | |
| Preparation Method | Dry Sieved and Oven Dried | |

Plasticity Chart



Remarks:

Sample/s supplied by client

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ATTERBERG LIMITS TEST REPORT

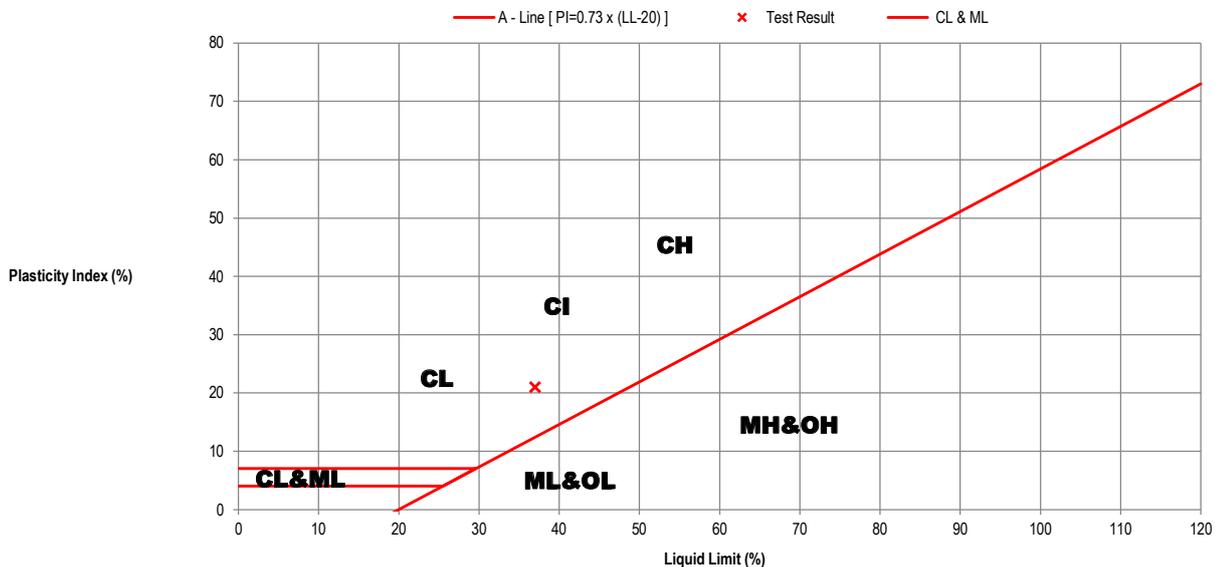
Test Method: AS 1289 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1

| | | | |
|--------------------|----------------------------------|--------------------------|-------------|
| Client | Golder Associates Pty Limited | Report No. | GA100278-AL |
| Address | PO Box 1734 MILTON BC QLD 4064 | Request No. | 20122017 |
| Project | GPC_CVIP Investigation_Gladstone | Test Date | 19/01/2018 |
| Project No. | 1787891 | Report Date | 23/01/2018 |
| Project No. | 1787891 | Client Sample No. | - |
| Bore Hole | HP2 | Depth From (m) | 10 |
| Description | DS | Depth To (m) | |

RESULTS OF TESTING

| | | |
|----------------------|---------------------------|------------------|
| Liquid Limit (%) | 37 | |
| Plastic Limit (%) | 16 | |
| Plasticity Index (%) | 21 | |
| Linear Shrinkage (%) | 11.0 | Curling Occurred |
| Moisture Content (%) | 17.6 | |
| Preparation Method | Dry Sieved and Oven Dried | |

Plasticity Chart



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APPENDIX C

**Important Information Relating to
this Report**



IMPORTANT INFORMATION RELATING TO THIS REPORT

The document (“Report”) to which this page is attached and which this page forms a part of, has been issued by Golder Associates Pty Ltd (“Golder”) subject to the important limitations and other qualifications set out below.

This Report constitutes or is part of services (“Services”) provided by Golder to its client (“Client”) under and subject to a contract between Golder and its Client (“Contract”). The contents of this page are not intended to and do not alter Golder’s obligations (including any limits on those obligations) to its Client under the Contract.

This Report is provided for use solely by Golder’s Client and persons acting on the Client’s behalf, such as its professional advisers. Golder is responsible only to its Client for this Report. Golder has no responsibility to any other person who relies or makes decisions based upon this Report or who makes any other use of this Report. Golder accepts no responsibility for any loss or damage suffered by any person other than its Client as a result of any reliance upon any part of this Report, decisions made based upon this Report or any other use of it.

This Report has been prepared in the context of the circumstances and purposes referred to in, or derived from, the Contract and Golder accepts no responsibility for use of the Report, in whole or in part, in any other context or circumstance or for any other purpose.

The scope of Golder’s Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it.

At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report.

Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

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Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification.



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