RioTinto

CONTRACTOR DOCUMENT COVER SHEET

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☐	**B**	Accepted – Subject to Comments	☐	**D**	Reviewed for Information only (Receipt acknowledged).

Reviewed by	Name	
	Signature	
	Review Date	

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Rhodes Ridge Construction Camp – Geotechnical and Environmental Report

COPP210911-REP-G-001

Revision B

12 March 2024

Project Name:	Rhodes Ridge Construction Camp				
Project Number:	COPP210911 / P-0325003				
Client:	Rio Tinto Iron Ore				
Document No:	COPP210911-REP-G-001	**Rev:**	B	**Rev Date:**	11/03/2024

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED	AUTHORISED
A	07/03/2024	Issued for Internal Review	[redacted]			
B	12/03/2024	Issued for Client Review				

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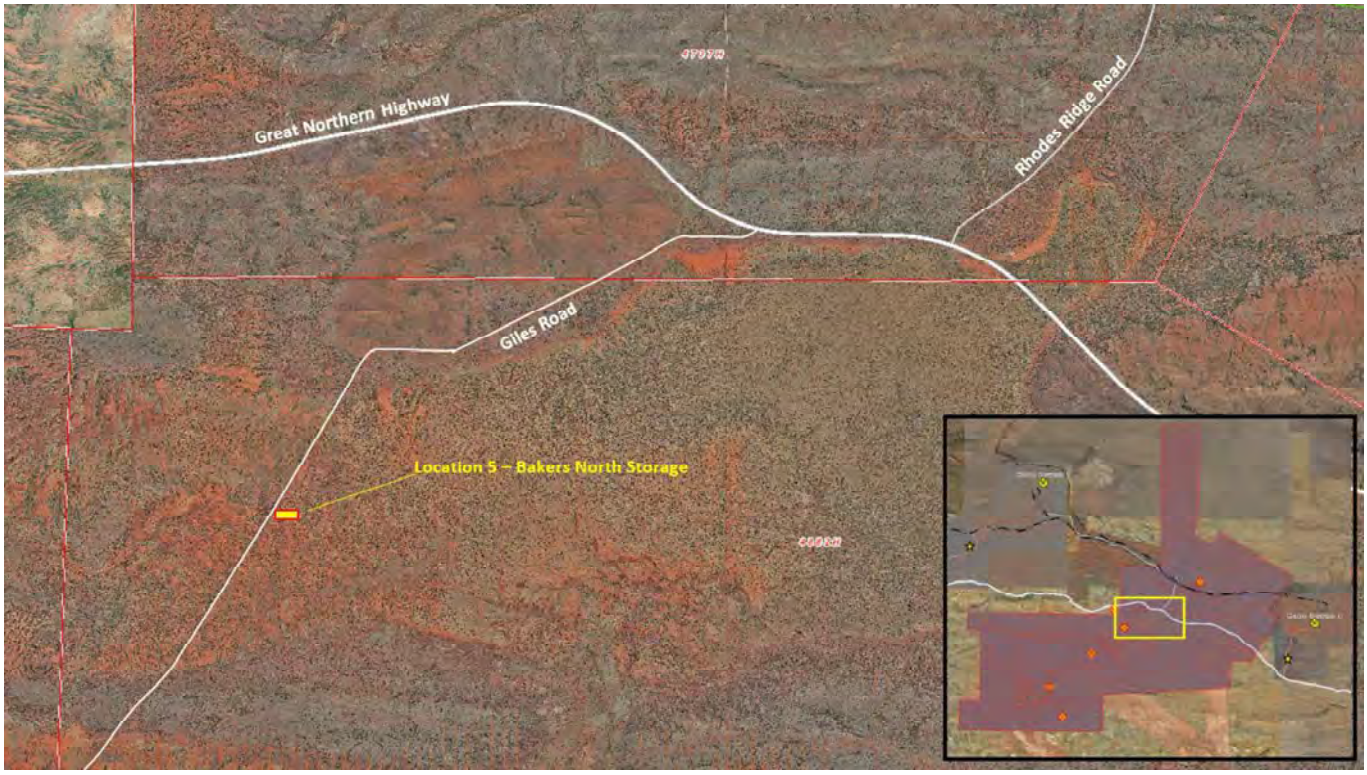
1. Introduction

This report presents the results of the geotechnical and environmental study undertaken by Calibre at the proposed site for the Rhodes Ridge Construction Camp ("the Camp").

The Camp is proposed to be located adjacent to the existing Bakers North Storage Facility (Location 5) on Giles Road, south of Great Northern Highway, as shown in Plate 1. The Camp comprises accommodation blocks, communal areas including messing and administration buildings, parking areas, and a sprayfield for effluent disposal.

The design of the camp is ongoing and may change following the completion of this report. This report is based on the proposed design and location of the camp at the time of writing.

Plate 1: Proposed Rhodes Ridge Camp Location



2. Projects Objectives

The objective of the geotechnical and environmental study as to assess the general subsurface conditions across the site, including the following:

- Topsoil depth;
- Soil type and structure for each material encountered;
- Depth to drainage impeding layers;
- Depth and flow direction of groundwater (based on Rio Tinto supplied information);
- Soil infiltration rates and water holding capacity;
- Saturated hydraulic conductivity (based on published information);
- pH, electrical conductivity, cation exchange capacity and exchangeable sodium percentage of soils; and
- Phosphorus retention and buffering index of soils.

3. Supplied Information

The following information has been supplied by Rio Tinto and is referenced in this report:

- Camp layout (Ref. P0325003-23209-C-001/F), email received 28 January 2024; and
- Groundwater data (groundwater levels and flow direction shown on figures, and groundwater bore log), email received 2 February 2024.

4. References

The following standards and specifications have been referenced in this report.

Table 1: Standards and Specifications

Document Number	Document Title
AS1726-2017	Standards Australia, (2017) Australian Standard AS1726-2017 "Geotechnical site investigations"
SS-C101	Rio Tinto, Standard Specification – Earthworks and Drainage, RTIO-AM-0017818, Rev 6, 16 December 2021
SS-C103	Rio Tinto, Standard Specification – Roads and Pavements, RTIO-AM-0017819, Rev 4, 23 June 2021

5. Fieldwork

5.1 General

The fieldwork for the geotechnical and environmental study was undertaken by Calibre on 1 February 2024 and comprised:

- site walkover and inspection of in-situ materials;
- excavation of five (5) test pits near the proposed camp location;
- Dynamic cone penetrometer (DCP) testing adjacent to each test pit; and
- Collection of representative samples for laboratory testing.

Permitting and approvals for the works was obtained by Rio Tinto prior to the works commencing. The locations of the test pits are presented in Figure 1. The proposed camp is planned directly south and adjacent to an existing laydown area on Giles Road.

Test pit locations within the proposed camp footprint were nominated by Calibre prior to mobilising to site based on the proposed camp layout.

However due to access permits / limitations, the test pit locations were relocated as directed by Rio Tinto to the adjacent laydown area. It is noted that the test pits and sampling were not undertaken on the proposed camp site or footprint of the sprayfield. This approach was discussed with various stakeholders and was confirmed by Rio Tinto after a site walkover of the proposed camp footprint, which indicated that the surficial ground conditions appeared to be similar to the revised test pit locations.

5.2 Test Locations

The test pit coordinates were recorded with a handheld GPS (typically accurate to ±5m) and are presented in Table 2.

Samples were also collected from nearby existing borrow pits, as requested by Rio Tinto during the fieldwork.

The approximate test locations are presented on Figure 1, and the approximate sampled locations from the borrow areas are shown on Figure 2.

Table 2: Test Locations

Test Location	Easting (MGA94 Zone 50)	Northing (MGA94 Zone 50)	Termination Depth (m bgl)	Reason for Termination
RR-TPE01	731,138	7,437,035	0.6	Hard digging
RR-TPE02	731,128	7,437,034	0.8	Hard digging
RR-TPE03	731,130	7,437,043	0.4	Hard digging
RR-TPG01	731,180	7,437,042	0.8	Hard digging
RR-TPG02	731,198	7,437,036	0.5	Hard digging
RR-BA1-01	N/A	N/A	Surface Sample	N/A
RR-BA2-01	N/A	N/A	Surface Sample	N/A
RR-BA2-02	N/A	N/A	Surface Sample	N/A

5.2.1 Test Pits

Five (5) test pits were excavated utilising a Bobcat E55, 5 tonne tracked mini-excavator, supplied and operated by Mobecrete (engaged by Rio Tinto).

The recovered spoil from the test pits was logged in general accordance with AS 1726 'Geotechnical Site Investigations', and the 'Australian Soil and Land Survey Handbook'. Representative samples were collected from the test pits for laboratory testing.

The test pit logs and photographs are presented in Appendix A.

DCP testing was conducted adjacent to each test pit location in accordance with AS1289.6.3.2. The testing was conducted to a maximum of depth of 0.8m or shallower refusal. The DCP results are presented in Appendix B.

5.2.2 Borrow Samples

Three (3) samples were collected from nearby existing borrow areas, located approximately 5 km east, south-east of the proposed construction camp site. The samples were collected via hand sampling of the available material, including one (1) sample from the stockpile present on the southern end of BA1, and two (2) samples from the surficial disturbed material at BA2.

6. Laboratory Testing

Geotechnical and geochemical laboratory testing on samples recovered from the test pits was undertaken at the following NATA accredited laboratories:

- Western Geotechnical & Laboratory Services; and
- Envirolab Services (WA) Pty Ltd trading as MPL Laboratories.

Table 3 summarises the geotechnical laboratory testing undertaken. A summary of the laboratory results and test certificates are presented in Appendix C.

Table 3: Summary of Geotechnical Laboratory Testing

Laboratory Test	Test Method	Number of Tests
Particle Size Distribution (PSD)	AS1289.3.6.1	7
Atterberg Limits with Linear Shrinkage	AS1289.3.1.1, 3.2.1, 3.3.1 and 3.4.1	7
Modified Maximum Dry Density and Optimum Moisture Content	AS1289.5.1.2	5
California Bearing Ratio	AS1289.6.1.1	5
Permeability	AS1289.6.7.1	4
Emerson Class Number	AS1289.3.8.1	1

Table 4 summarises the geochemical laboratory testing undertaken. A summary of the laboratory results and test certificates are presented in Appendix D.

Samples were collected from the test pits at different depths to identify possible changes in the geochemical profile of the soils.

Table 4: Summary of Geochemical Laboratory Testing

Laboratory Test	Test Method	Number of Tests
Aggressivity Suite (pH, Sulphate, Chloride and Electrical Conductivity)	MPL in house	6
Cation Exchange Capacity (CEC) and Exchangeable Sodium Potential (ESP)	MPL in house	6
Phosphorous Retention Index (PRI)	MPL in house	6
Phosphorous Buffering Index (PBI)	MPL in house	6

7. Site Conditions

7.1 Location

The proposed construction camp is located about 100m south of an existing laydown alongside Giles Road, approximately 80km west of Newman.

The proposed camp location is relatively flat with small trees and bushes in the area.

The existing laydown area (to the north of the proposed camp location) is slightly elevated (~0.5m above adjacent ground) with an open drain surrounding the laydown (~1m below adjacent ground).

7.2 Regional Geology

The underlying geology at the site is presented in the Newman Sheet (SF50-16) of the Geological Survey of Western Australia 1:250,000 scale Geological Series map. The site geology is presented on Figure 3 and is described as:

- Qw: ALLUVIUM and COLLUVIUM: Red-brown sandy and clayey soil.

7.3 Subsurface Conditions

The subsurface conditions were identified according to:

- *AS1726-2017 Geotechnical Site Investigations*; and
- *Australian Soil and Land Survey Handbook*.

AS1726-2017 Geotechnical Site Investigations

The generalised subsurface conditions encountered during the investigation are summarised as:

- ALLUVIUM: Sandy CLAY (CL): red-brown, clay is low plasticity, sand is fine to coarse grained, sub-rounded, between 0.5 and 1m thick, overlying,
- CLAY Hardpan, with localised Gravelly Clayey SAND pockets.

This 'hardpan' horizon was encountered between 0.4m below ground level (bgl) and 0.8m bgl.

Australian Soil and Land Survey Handbook

In accordance with the Australian Soil Classification system, the soil profile is considered a Kandosol classification. This B Horizon soil is characterised by a lack of strong texture with limited contrast between the A (topsoil) and B horizon. Clay content is also known to increase with depth, with kandosols generally being acidic in nature.

7.4 Groundwater

Groundwater was not encountered in any of the test pits.

Groundwater data supplied by Rio Tinto (refer to Section 3) indicates that the groundwater level at the site is approximately 30 m below ground level (approximately RL 655 m AHD). The supplied data also indicates that the groundwater flows in an easterly direction, i.e. west to east.

Borelog information supplied by Rio Tinto (Bore Reference: WB21BKN0010) suggested groundwater sits within a 'clay/detrital' weathered horizon. Hydraulic conductivity for such aquifers can range between $5x10^{-6}$ m/s and $5x10^{-9}$m/s[1].

7.5 Surface Water

They are no creeks or surface water bodies within proximity to the proposed construction camp, including the proposed sprayfield location. However, surface water may pond in low lying areas across the site due to the relatively low permeability of the soils encountered.

[1] https://structx.com/Soil_Properties_007.html

7.6 Public Drinking Water Source Area

The proposed construction camp, including the sprayfield, is not located within a Public Drinking Water Source Area (PDWSA).

8. Geochemical Laboratory Test Results

The following provides a summary of the soil assessment based on the geochemical laboratory test results. Tabulated results and laboratory test certificates are presented in Appendix D.

8.1 Soil pH

The pH values were recorded to be moderately acidic, with values noted to vary between 5.2 pH units and 5.6 pH units. There was no discernible difference between the shallow and deeper samples.

8.2 Cation Exchange Capacity

Cation Exchange Capacity (CEC) is a measure of a soils capacity to retain and exchange cations. This affects the buffering capacity of soil, nutrient availability, and soil stability.

Testing showed CEC to range between 2.8meq/100g and 5.3meq/100g, which is a low CEC value for a clay soil. Again, there were no discernible difference between the shallow and deeper samples.

8.2.1 Calcium/Magnesium Ratio

If the calcium to magnesium ratio is less than 2:1, then this may indicate reduced soil stability. Results showed a Ca/Mg ratio between 1.7:1 and 2.2:1.

8.3 Salinity and Exchangeable Sodium Percentage

Salinity across the analysed samples, measured as Electrical Conductivity, ranged from 11µS/cm to 34µS/cm suggesting the soils are non-saline to slightly saline.

Exchangeable Sodium Percentage (ESP) across the soil samples ranged from 2.7% to 3.1%, suggesting the soils are non-sodic.

These results suggest the soils are ‘non-dispersive’.

8.4 Phosphorus Buffering Index and Phosphorus Retention Index

Phosphorus Buffering Index (PBI) is an indication of a soils capacity to absorb and bind phosphorus (P). If a soil has a high PBI, then it will rapidly bind applied P, making it unavailable for plants to uptake or to be leached through the soil profile. PBI ranged between 65 and 130 indicating a very low to low PBI class.

Phosphorus Retention Index (PRI) is a direct measure of a soil ability to fix P. PRI results ranged from 50 to 350 suggesting the soils have a moderate ability to fix P.

8.5 Soil Permeability

Permeability testing on recovered undisturbed samples recorded permeabilities ranging between $5.17x10^{-07}$m/s and $9.25x10^{-07}$m/s. This range of permeability is generally within the expected values for a clay soil and would not be deemed as free draining.

8.6 Water Holding Capacity

The water holding capacity, which is the ability of a soil to hold water, was calculated at 94.5mm. This was based on a root zone being within the top 63cm (average depth to restrictive layer) and based on available water of 1.5mm/cm depth for a clay soil.

9. Discussion

9.1 Geotechnical Considerations

9.1.1 Geotechnical Risks

The following geotechnical risks have been identified during the investigation:

- Drainage within and around the site must be adequately managed to prevent softening of the clayey soils;
- Earthworks considerations including moisture conditioning and compaction of the clayey soils;
- Design of foundations to consider the clayey soils and potential shrink-swell movements; and
- Presence of hard/cemented layers at shallow depth which may result in shallow refusal excavation depths with small earthmoving equipment.

9.1.2 Earthworks

The earthworks at the site should be undertaken in accordance with the following Rio Tinto specifications:

- SS-C101: Civil Earthworks and Drainage; and
- SS-C103: Roads and Pavements.

9.1.3 Borrow Material

The samples collected from the borrow areas were assessed in accordance with SS-C101, against the criteria for Type A – Select Fill, Type B – Common Fill and Unsealed Basecourse. The tabulated assessment is presented in Appendix E, with a summary of the outcomes presented in Table 5.

This borrow material assessment is only preliminary due to the limited number of samples collected across the borrow areas. Additional testing of potential borrow materials should be undertaken in accordance with SS-C101 to confirm suitability of the material prior to use.

Table 5: Borrow Material Assessment

Test Location	Type A – Select Fill	Type B – Common Fill	Unsealed Basecourse
RR-BA1-01	Compliant	Compliant	Marginal[1]
RR-BA2-01	Compliant	Compliant	Non-Compliant
RR-BA2-02	Compliant[2]	Compliant	Non-Compliant

Notes:

[1]Material considered “Marginal” as a result of the shrinkage product being lower than the specification requirements. This may increase the required maintenance if used on site.

[2]Material considered “Compliant” however one sieve size is within 1% of the grading specification requirements.

9.1.4 Permeability

Laboratory soil permeability tests recorded permeabilities ranging between 1.11×10^{-08}m/s and 2.64×10^{-09}m/s for the remoulded samples and between 5.17×10^{-07}m/s and 9.25×10^{-07}m/s for the undisturbed samples.

The low permeability of the soil may lead to water ponding around the site following major rainfall events.

9.2 Geochemical and Irrigation Considerations

Laboratory testing has shown the soils to be moderately acidic, non-sodic and non-dispersive. PBI and PRI results suggest that there is a potential for applied P to move through the soil profile, however, the underlying clayey soils would limit the vertical movement of any potential leachate/irrigation water; and movement during surface water flow events could occur.

The risk of irrigation has been assessed in general accordance with Water Quality Protection Notice 22[2] (WQPN22). In terms of the risk from irrigation, the sprayfield is not within proximity to any surface water bodies or wetlands, including creek lines. Additionally, there is a sufficient separation distance between the sprayfield and any underlying groundwater, with this distance being in excess of the required 2m separation distance. The sprayfield is also outside of any identified PDWSA. In accordance with Table 1 of WQPN22, the sprayfield would have a *Low eutrophication risk*, with a Risk Category of *D*.

[2] Irrigation with nutrient-rich wastewater, Water Quality Protection Notice 22, Department of Water, 2022

10. Limitations

The information provided in this report is based on the data available at the time of assessment.

The inherent uncertainty in the geotechnical findings presented herein must be recognised. Variations to the ground conditions are likely and allowance must be made in the design and construction work for potential vertical and lateral variability in the extent of in-situ material conditions.

As directed by Rio Tinto, the soil profile for the sprayfield was assessed from samples collected from ~50m to ~70m from the footprint of the sprayfield. Soil conditions have been extrapolated and variations may exist.

Groundwater information has been provided by Rio Tinto. No hydrogeological investigation has been completed.

It must be noted that the material conditions encountered in the geotechnical investigations represent the material conditions at the locations where the tests were undertaken and, as such, are an extremely small proportion of the proposed footprint.

It is also important to note that some information detailed in this report has been collated from other sources. Calibre cannot be responsible for the veracity of this information.

The material conditions within the project area may vary between any given assessed location. Material conditions may also change or be modified as a result of anthropogenic events (e.g. construction, site contamination) and natural events (e.g. flooding, earthquakes, landslides, significant weather events).

This report specifically excludes contaminated site assessment, acid sulfate soils, asbestiform minerals risk assessment, and detailed hydrological assessments.

Figures

Proposed Site

Test Pit Location

Map data: Google Maxar Technologies

CLIENT	RIO TINTO IRON ORE	SCALE	Not to Scale	
PROJECT	RHODES RIDGE CONSTRUCTION CAMP	DRAWN	WP	DATE 6/03/2024
		CHECKED	BL	DATE 6/03/2024
TITLE	TEST PIT LOCATIONS			
JOB No	COPP210911			

Figure 1

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Proposed Site

Map data: Google Maxar Technologies

CLIENT	RIO TINTO IRON ORE	SCALE	Not to Scale		
PROJECT	RHODES RIDGE CONSTRUCTION CAMP	DRAWN	WP	DATE	11/03/2024
		CHECKED	BL	DATE	11/03/2024
TITLE	BORROW AREA LOCATIONS				
JOB No	COPP210911				

Figure 2

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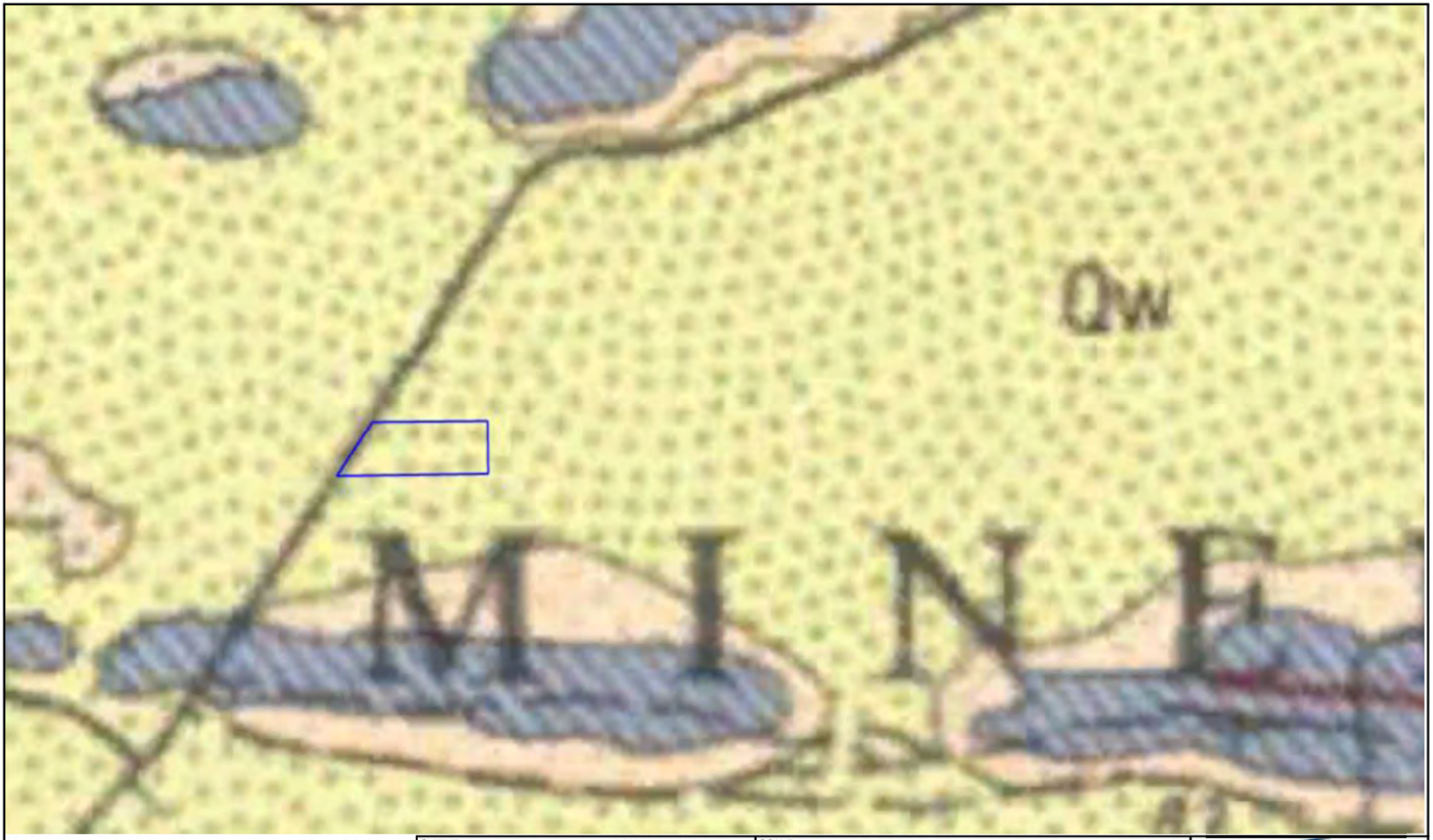

Proposed Site

Map data: GSWA

CLIENT	RIO TINTO IRON ORE	SCALE	Not to Scale	
PROJECT	RHODES RIDGE CONSTRUCTION CAMP	DRAWN	WP	DATE 6/03/2024
		CHECKED	BL	DATE 6/03/2024
TITLE	GEOLOGY OVERVIEW			
JOB No	COPP210911	Figure 3		

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Appendix A Test Pit Logs and Photographs

ENGINEERING LOG — TEST PIT No. RR-TPE01

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731138.0 m **Northing:** 7437035.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed		0.5			Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
				1.0			RR-TPE01 terminated at 0.6m Refusal due to hard excavation			

RR-TPE01 Before Disturbance

No Image

RR-TPE01 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE01 Before and After			
JOB No	COPP210911				

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RR-TPE01 Excavation

RR-TPE01 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE01 Excavation and Spoil			
JOB No	COPP210911				

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ENGINEERING LOG — TEST PIT No. RR-TPE02

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731128.0 m **Northing:** 7437034.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed		0.0			Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
				0.5				MD/St		
				0.8			RR-TPE02 terminated at 0.8m Refusal due to hard excavation			
				1.0						

RR-TPE02 Before Disturbance

RR-TPE02 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE02 Before and After			
JOB No	COPP210911				

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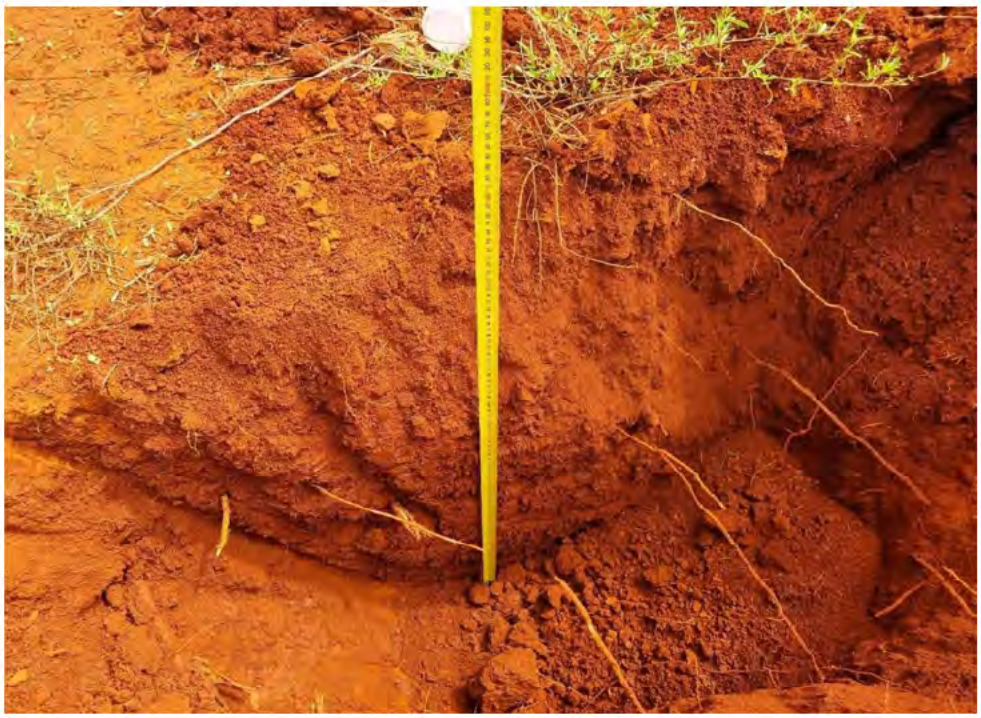

RR-TPE02 Excavation

RR-TPE02 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE02 Excavation and Spoil			
JOB No	COPP210911				

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ENGINEERING LOG — TEST PIT No. RR-TPE03

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731130.0 m **Northing:** 7437043.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed					Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
				0.5			RR-TPE03 terminated at 0.4m Refusal due to hard excavation			
				1.0						

RR-TPE03 Before Disturbance

RR-TPE03 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE03 Before and After			
JOB No	COPP210911				

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RR-TPE03 Excavation

RR-TPE03 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPE03 Excavation and Spoil			
JOB No	COPP210911				

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ENGINEERING LOG — TEST PIT No. RR-TPG01

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731180.0 m **Northing:** 7437042.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed		0.0			Gravelly SAND(SP-SC): red brown, fine to coarse grained, predominantly sub-rounded. Gravel is fine grained, sub-rounded to sub-angular. With low plasticity fines. [ALLUVIUM].			
					BULK			D	D-M	
				0.5						
				1.0			RR-TPG01 terminated at 0.8m Refusal due to hard excavation			

RR-TPG01 Before Disturbance

RR-TPG01 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG01 Before and After			
JOB No	COPP210911				

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RR-TPG01 Excavation

RR-TPG01 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG01 Excavation and Spoil			
JOB No	COPP210911				

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ENGINEERING LOG — TEST PIT No. RR-TPG02

Client: RTIO
Project: Construction Camp
Project No: COPP210911
Location: Rhodes Ridge

Easting: 731198.0 m **Northing:** 7437036.0 m
Reduced Level: m AHD
Surface:

Horizontal Datum: MGA94
Vertical Datum: AHD
Plant: Bobcat, 5T Excavator
Operator: Mobecrete

Sheet 1 of 1
Start Date: 1/02/2024
End Date: 1/02/2024
Logged: WP
Checked: BL

TEST DATA						MATERIAL DESCRIPTION		SOIL CONDTN.		OTHER
method	support	ground water	reduced level (m)	depth (m)	field tests and samples	graphic log	NAME (AS 1726 SOIL CLASSIFICATION): Colour, plasticity/ particle characteristics, structure, geological origin, other minor components	consistency/ density	moisture condition	additional observations
Excavator	No Sidewall Instability	Groundwater Not Observed			BULK		Sandy CLAY(CL): red brown, low plasticity. Sand is fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	L/S	M	Roots present
				0.5			Gravelly CLAY(CL): red brown, low plasticity. Gravel is fine to coarse grained, sub-rounded to sub-angular. With sand, fine to coarse grained, predominantly sub-rounded. [ALLUVIUM].	H/VD		
							RR-TPG02 terminated at 0.55m Refusal due to hard excavation			
				1.0						

RR-TPG02 Before Disturbance

RR-TPG02 After Reinstatement

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG02 Before and After			
JOB No	COPP210911				

calibre
A member of WSP

RR-TPG02 Excavation

RR-TPG02 Spoil

CLIENT	RTIO	SCALE	N.T.S		
PROJECT	Rhodes Ridge Construction Camp	DRAWN	WP	DATE	5/03/2024
		CHECKED	BL	DATE	6/03/2024
TITLE	Test Pit Photos	RR-TPG02 Excavation and Spoil			
JOB No	COPP210911				

calibre
A member of WSP

Appendix B DCP Results

DYNAMIC CONE PENETROMETER RECORD SHEET

Project: Rhodes Ridge Construction Camp
Location: Rhodes Ridge
Job Ref: COPP210911

Field Engineer: Wilhem Picard

Location:	RR-TPE01	RR-TPE02	RR-TPE03	RR-TPG01	RR-TPG02
Depth (mm)	**Penetrometer Blows per 100 mm Depth Interval**				
0-50	1	1	1	8	1
50-100	1	1	2	6	1
100-150	1	2	2	9	1
150-200	2	1	1	10	1
200-250	1	1	1	7	2
250-300	1	2	2	13	1
300-350	2	1	1	6	1
350-400	1	1	1	8	2
400-450	1	4	HB	10	1
450-500	2	5		11	2
500-550	1	4		12	18
550-600	1	6		10	HB
600-650	HB	4		11	
650-700		5		14	
700-750		4		10	
750-800		4		11	
800-850		HB		R	
850-900					
900-950					
950-1000					

Dynamic Cone Penetrometer tests done in accordance with AS 1289.6.3.2

R - Effective refusal of the penetrometer (more than 8 blows / 20 mm [20 blows / 50 mm])
HB - Refusal of the penetrometer due to hammer bounce

Appendix C Geotechnical Laboratory Results

Western Geotechnical and Laboratory Service
235 Bank Street, Welshpool WA 6106
08 9472 3465
www.westerngls.com.au

WESTERN GEOTECHNICAL & Laboratory Services

RESULTS SUMMARY MATRIX

Client	Calibre
Project	Rhodes Ridge Camp Investigation
Job ID	S12228

Sample Details		Classification																	Compaction			Strength
Lab Sample No.	Client Reference / Sample ID	Particle Size Distribution (% Passing)													Atterberg Limits 4 Point Casagrande with Linear Shrinkage (%)				Emerson No	Dry Density / Moisture Content Relationship		Falling Head Permeability	California Bearing Ratio (%) Soaked
		AS 1289.3.6.1													3.1.1	3.2.1	3.3.1	3.4.1		AS 1289.5.2.1			
		100	75	37.5	19	9.5	4.75	2.36	1.18	0.600	0.425	0.300	0.150	0.075	LL	PL	PI	LS	AS 1289.3.8.1	MMDD	OMC	AS 1289.6.7.2	AS 1289.6.1.1
WG24.2497	RR-TPG01 (0.3-0.6)m			100	99	97	91	70	56	38	30	23	16	10	NO	NP	NP	1.0	5	1.96	15.0	1.11E-08	25
WG24.2498	RR-TPG02 (0.0-0.4)m			100	99	99	95	86	80	71	67	63	58	49	28	15	13	7.0	5	2.11	12.0	2.64E-09	18
WG24.2499	RR-TPE01 (0.0-0.5)m				100	100	98	90	82	74	70	68	64	54	30	17	13	7.0				5.17E-07	
WG24.2500	RR-TPE03 (0.0-0.4)m				100	98	96	87	80	71	66	62	55	44	30	16	14	7.5				9.25E-07	
WG24.2501	RR-BA1-01			100	78	53	39	29	25	23	21	20	18	14	25	13	12	5.5		2.58	9.5		70
WG24.2502	RR-BA2-01			100	96	90	77	52	43	33	28	25	21	17	26	16	10	5.0		2.03	13.0		40
WG24.2503	RR-BA2-02			100	94	76	61	45	41	38	36	35	31	25	26	12	14	7.0		2.39	11.5		50
	TOTAL	7.0													7.0				2.0	5.0		4.0	5.0

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

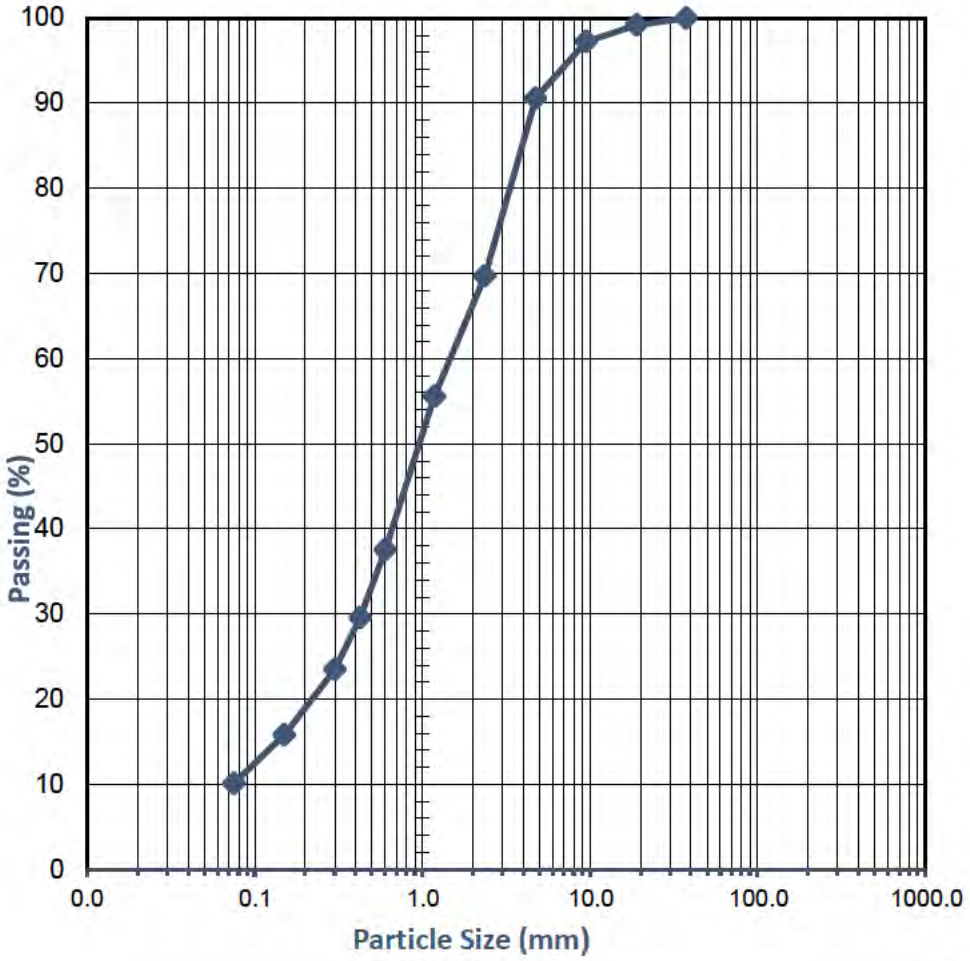
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	99
9.5	97
4.75	91
2.36	70
1.18	56
0.600	38
0.425	30
0.300	23
0.150	16
0.075	10



Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

NATA Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**Not Obtainable**
AS 1289.3.2.1	**Plastic Limit (%)**	**Non-Plastic**
AS 1289.3.3.1	**Plasticity Index (%)**	**Non-Plastic**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**1.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 19/February/2024

NATA WORLD RECOGNISED ACCREDITATION

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_ECN
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02/2024

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Silty Sand with Gravel**
Water Used:	**Distilled**

EMERSON CLASS NUMBER

5

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 28/February/2024

NATA

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

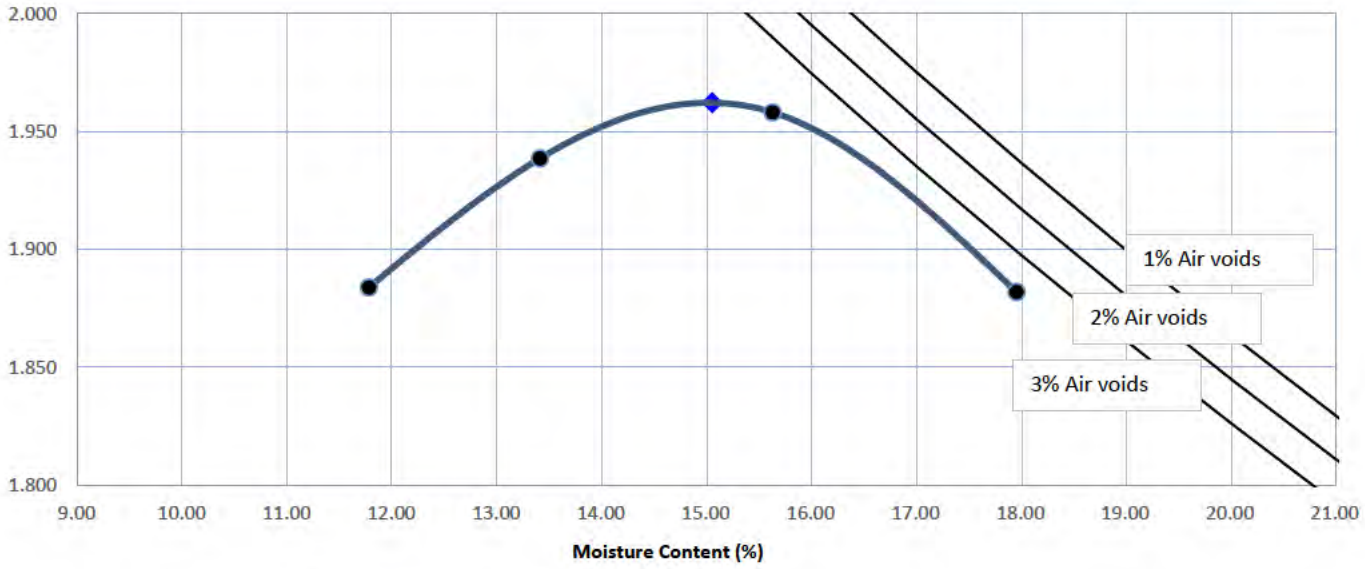
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**11.8**	**13.4**	**15.6**	**18.0**	
Dry Density (t/m³)	**1.884**	**1.939**	**1.958**	**1.882**	



Modified Maximum Dry Density (t/m³) **1.96**

Optimum Moisture Content (%) **15.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.019 t/m³*

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

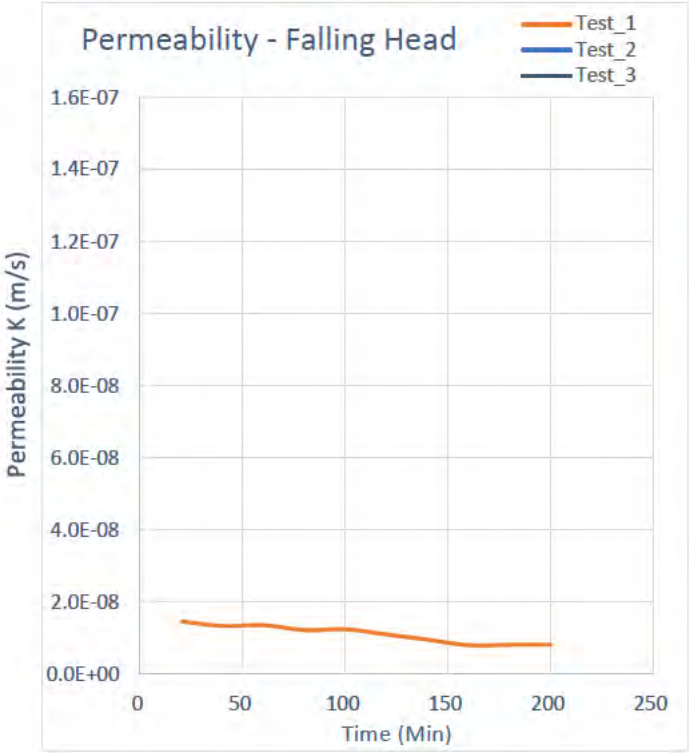
SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT AS 1289.6.7.2

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_FHPERM
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02 - 26/02/24

TEST RESULTS - FALLING HEAD PERMEABILITY

Sampling Method: Sampled by Client, Tested as Received



Compaction Details	
Compaction Method	AS 1289.5.2.1
Hammer Type	Modifed
CuringTime (Hours)	48
% Retained on 19.0mm	0
Maximum Dry Density (t/m^3)	1.96
Optimum Moisture (%)	15.0
Target Dry Density Ratio	95
Target Moisture Ratio	100

Specimen Conditions at Compaction	
Laboratory Density Ratio (%)	95.1
Laboratory Moisture Ratio (%)	99.8
Surcharge (kPa)	3

Coefficient of Permeability K_{20} (m/s) **1.11E-08**

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 28/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

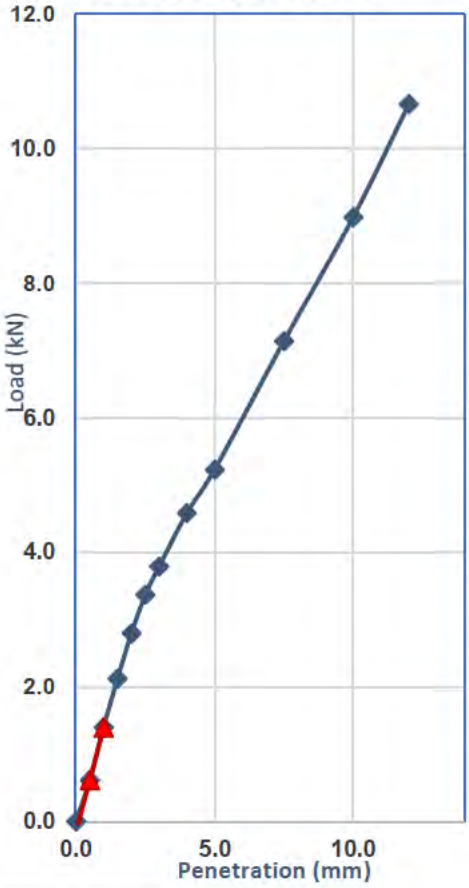
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2497_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2497
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG01 (0.3-0.6)m	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Sand with Gravel

Sampling Method: AS 1289.1.2.1-6.4b: Compacted Layers in earthworks or pavement

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.96	Optimum Moisture (%)	15.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.87	Moisture Content (%)	14.7
Density Ratio (%)	95.5	Moisture Ratio (%)	97.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.87	Dry Density Ratio (%)	95.5
Moisture Content (%)	18.0	Moisture Ratio (%)	119.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	16.1	Remaining Depth (%)	16.4

Correction applied to Penetration: 0.1mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 25%

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 22/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

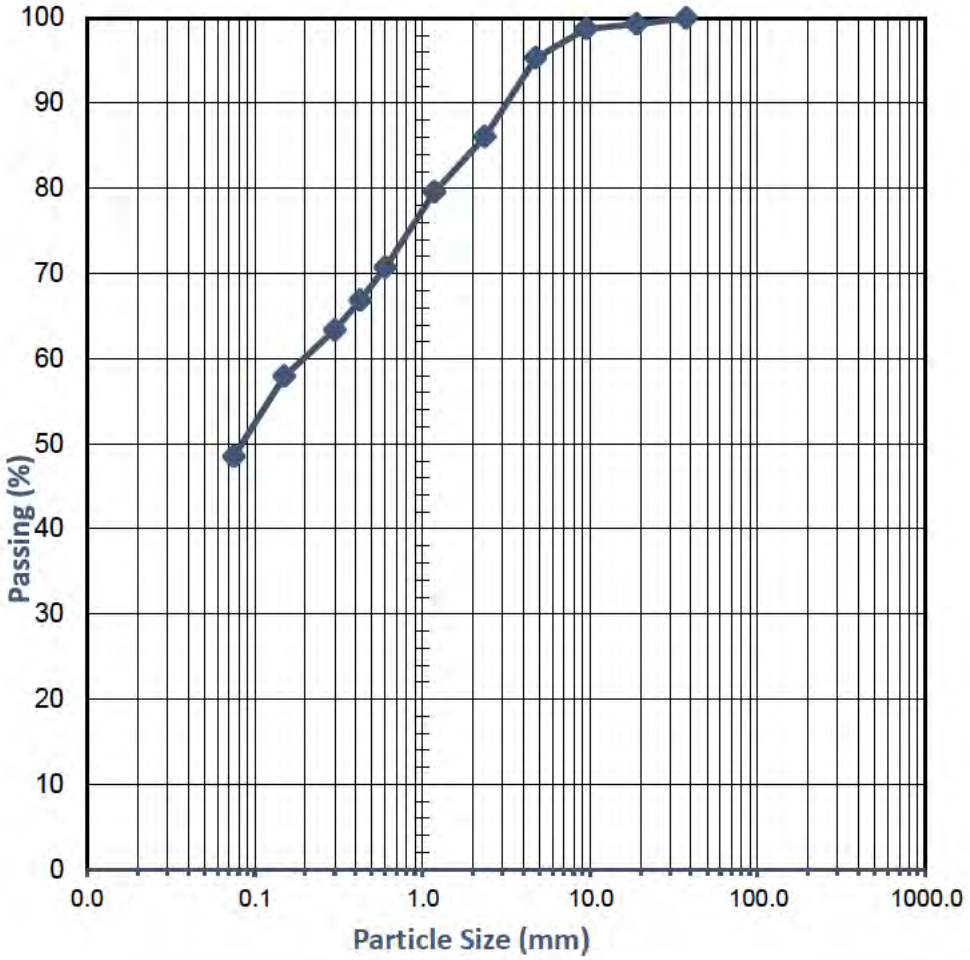
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	99
9.5	99
4.75	95
2.36	86
1.18	80
0.600	71
0.425	67
0.300	63
0.150	58
0.075	49



Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

NATA

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**28**
AS 1289.3.2.1	**Plastic Limit (%)**	**15**
AS 1289.3.3.1	**Plasticity Index (%)**	**13**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked**

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 19/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_ECN
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02/2024

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Silty Sand with Gravel**
Water Used:	**Distilled**

EMERSON CLASS NUMBER

5

Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

NATA

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

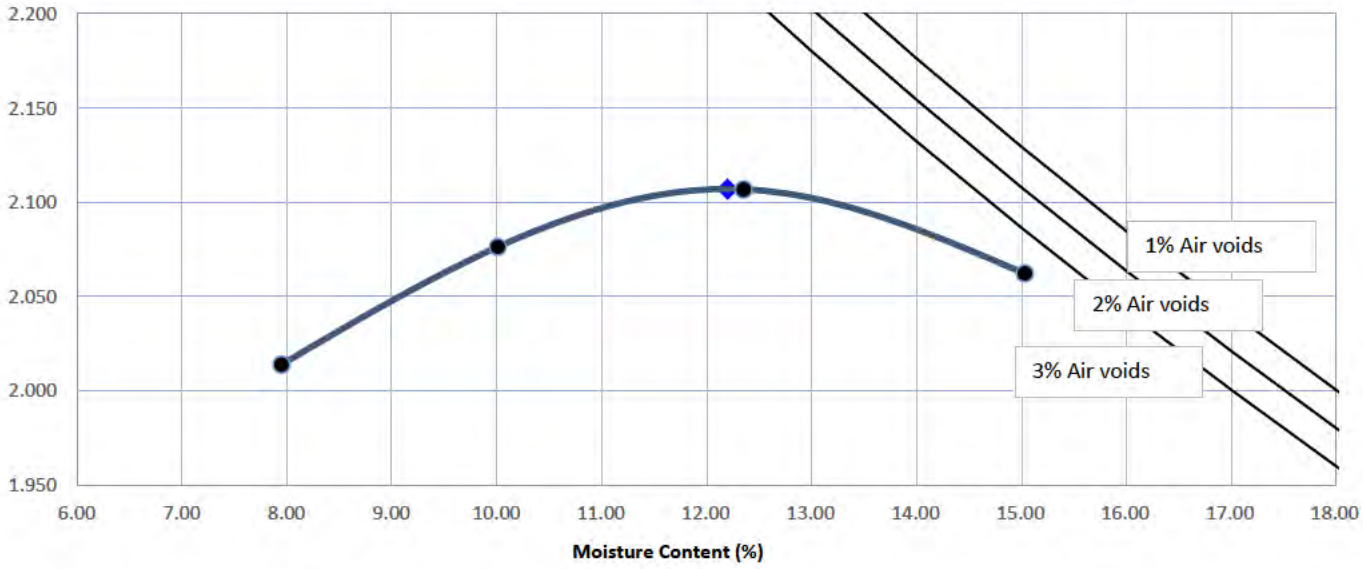
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	7.9	10.0	12.4	15.0	
Dry Density (t/m³)	2.014	2.076	2.107	2.062	



Modified Maximum Dry Density (t/m³) **2.11**

Optimum Moisture Content (%) **12.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.175 t/m³*

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

NATA Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

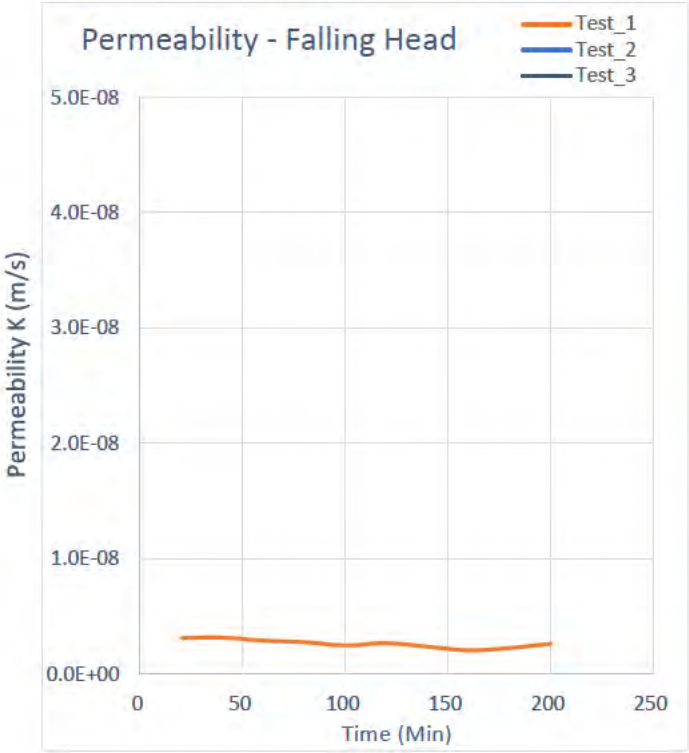
SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT AS 1289.6.7.2

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_FHPERM
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02 - 26/02/24

TEST RESULTS - FALLING HEAD PERMEABILITY

Sampling Method: Sampled by Client, Tested as Received



Compaction Details	
Compaction Method	AS 1289.5.2.1
Hammer Type	Modifed
CuringTime (Hours)	48
% Retained on 19.0mm	0
Maximum Dry Density (t/m^3)	2.11
Optimum Moisture (%)	12.0
Target Dry Density Ratio	95
Target Moisture Ratio	100

Specimen Conditions at Compaction	
Laboratory Density Ratio (%)	94.8
Laboratory Moisture Ratio (%)	101.5
Surcharge (kPa)	3

Coefficient of Permeability K_{20} (m/s) 2.64E-09

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 28/February/2024

NATA Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

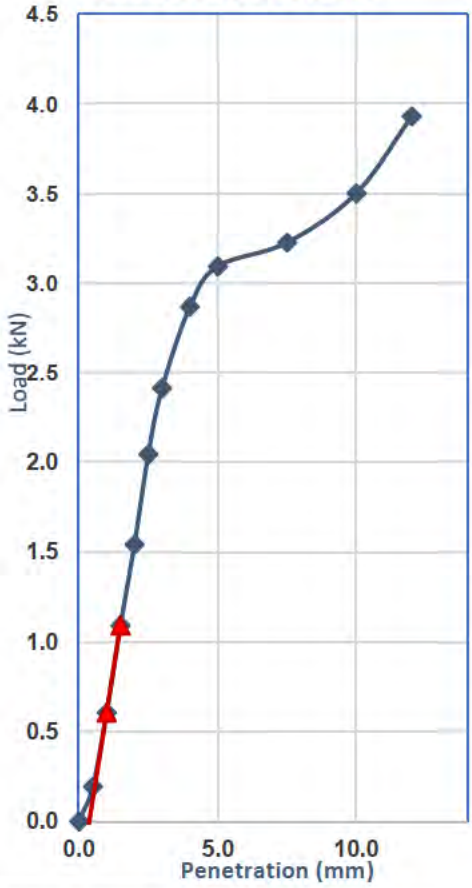
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2498_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2498
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPG02 (0.0-0.4)m	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Sand with Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.11	Optimum Moisture (%)	12.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	2.01	Moisture Content (%)	11.7
Density Ratio (%)	95.5	Moisture Ratio (%)	96.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	2.01	Dry Density Ratio (%)	95.5
Moisture Content (%)	16.8	Moisture Ratio (%)	138.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	16.6	Remaining Depth (%)	16.4

Correction applied to Penetration: 0.4mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 18%

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 22/February/2024

NATA

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

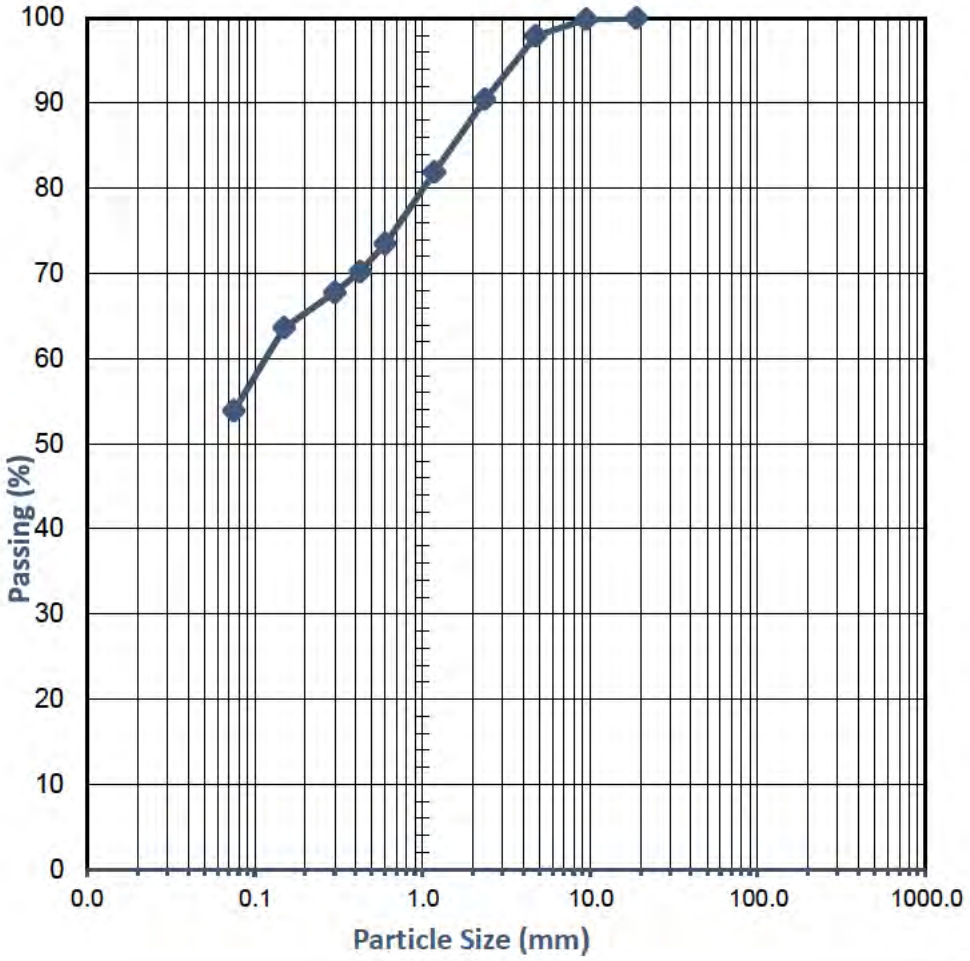
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2499_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2499
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE01 (0.0-0.5)m	*Date Tested:*	23/02 - 26/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	98
2.36	90
1.18	82
0.600	74
0.425	70
0.300	68
0.150	64
0.075	54



Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 28/February/2024

NATA

Accreditation No. 20599
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TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2499_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2499
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE01 (0.0-0.5)m	*Date Tested:*	27/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**30**
AS 1289.3.2.1	**Plastic Limit (%)**	**17**
AS 1289.3.3.1	**Plasticity Index (%)**	**13**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Curled**

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 28/February/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
E-mail: Phillip.li@eprecisionlab.com

E-Precision Laboratory

FALLING HEAD PERMEABILITY TEST REPORT

Test Method: AS1289 6.7.2

Client:	Western Geotechnical Lab Services	Date Tested:	17/02/2024
Project:	Rhodes Ridge 2024	Date Reported:	22/02/2024
Lab:	EPLAB	EP Lab Job Number:	WGEO
Tested by:	Phil		
Checked by:	Phil		

Lab ID:	WG24_2499_FH		WG24_2500_FH	
Client ID:	RR-TPE01		RR-TPE03	
Depth (m):	0.00 - 0.50		0.00 - 0.40	
Sample Conditions:	Insitu		Insitu	
Surcharge Pressure (kPa):	12.5		12.5	
Initial Bulk Density (t/m³):	2.04		2.07	
Initial Moisture Content (%):	21.24		17.55	
Dry Density (t/m³):	1.68		1.76	
Saturation (Skempton's B):	1.00		1.00	
K_{20} (m/s):	**5.17×10^{-7}**		**9.25×10^{-7}**	

Notes:
Stored and Tested the Sample as received
Samples supplied by the Client

[redacted]

Authorised Signatory (Geotechnical Engineer):

Integrity Precision Innovation

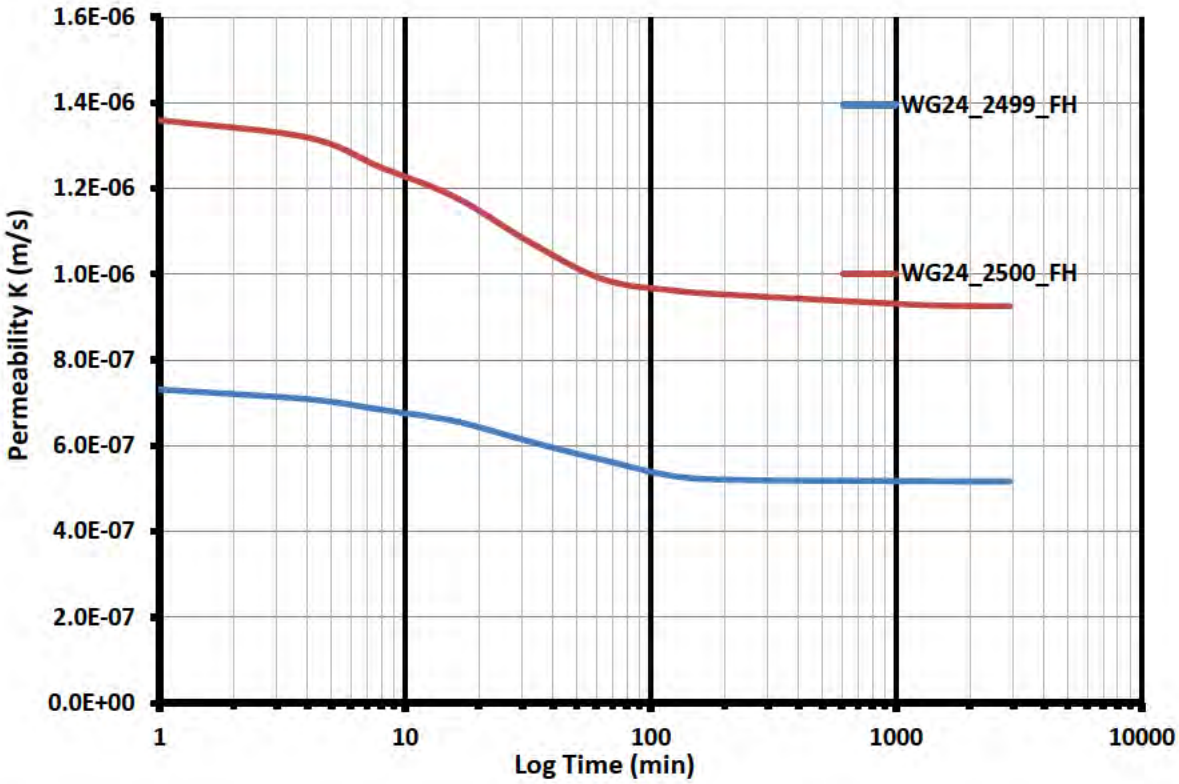
Perth
16 Gympie Way, Willetton
WA 6155
Ph: (08) 9418 8742
E-mail: Phillip.li@eprecisionlab.com

E-Precision Laboratory

FALLING HEAD PERMEABILITY TEST REPORT

Test Method: AS1289 6.7.2

Client:	Western Geotechnical Lab Services	Date Tested:	17/02/2024
Project:	Rhodes Ridge 2024	Date Reported:	22/02/2024
Lab:	EPLAB	EP Lab Job Number:	WGEO



Notes:

Stored and Tested the Sample as received

Samples supplied by the Client

Authorised Signatory (Geotechnical Engineer): [redacted]

Integrity Precision Innovation

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

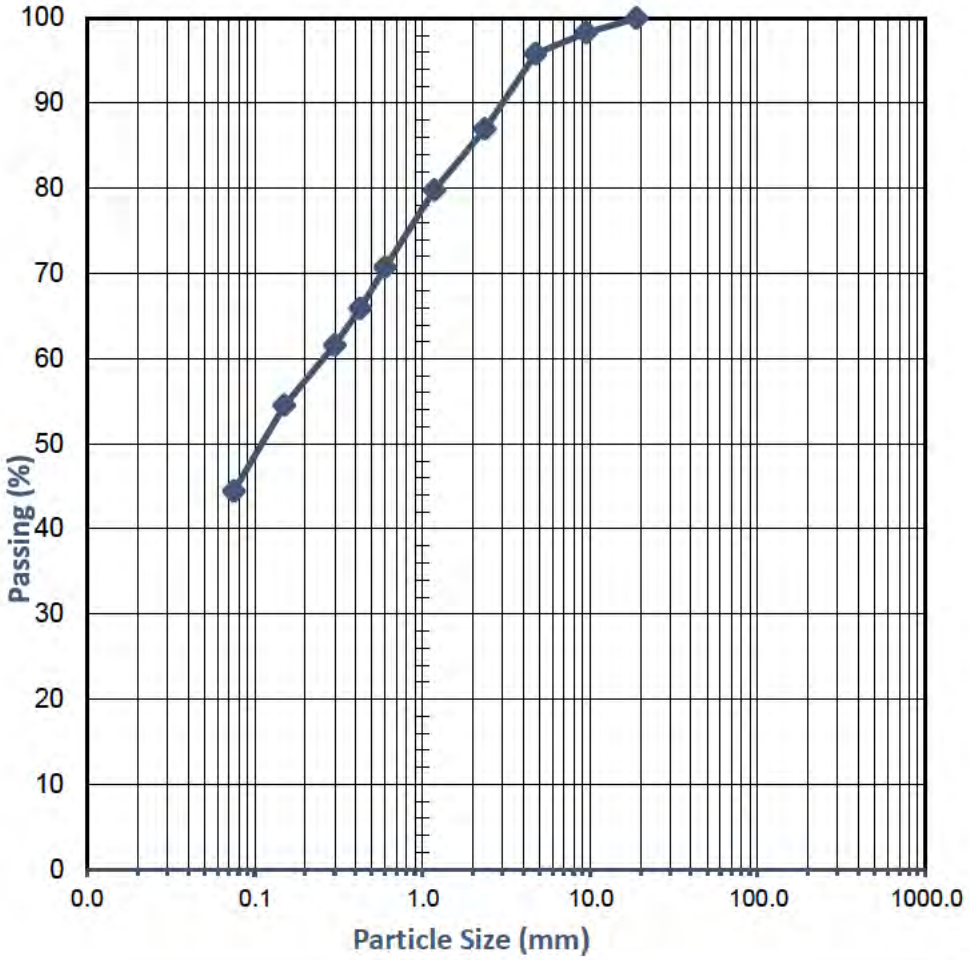
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2500_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2500
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE03 (0.0-0.4)m	*Date Tested:*	23/02 - 26/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	98
4.75	96
2.36	87
1.18	80
0.600	71
0.425	66
0.300	62
0.150	55
0.075	44



Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 28/February/2024

NATA

Accreditation No. 20599
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TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2500_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2500
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-TPE03 (0.0-0.4)m	*Date Tested:*	27/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**30**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**14**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory: [redacted]

Name:

Date: 28/February/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
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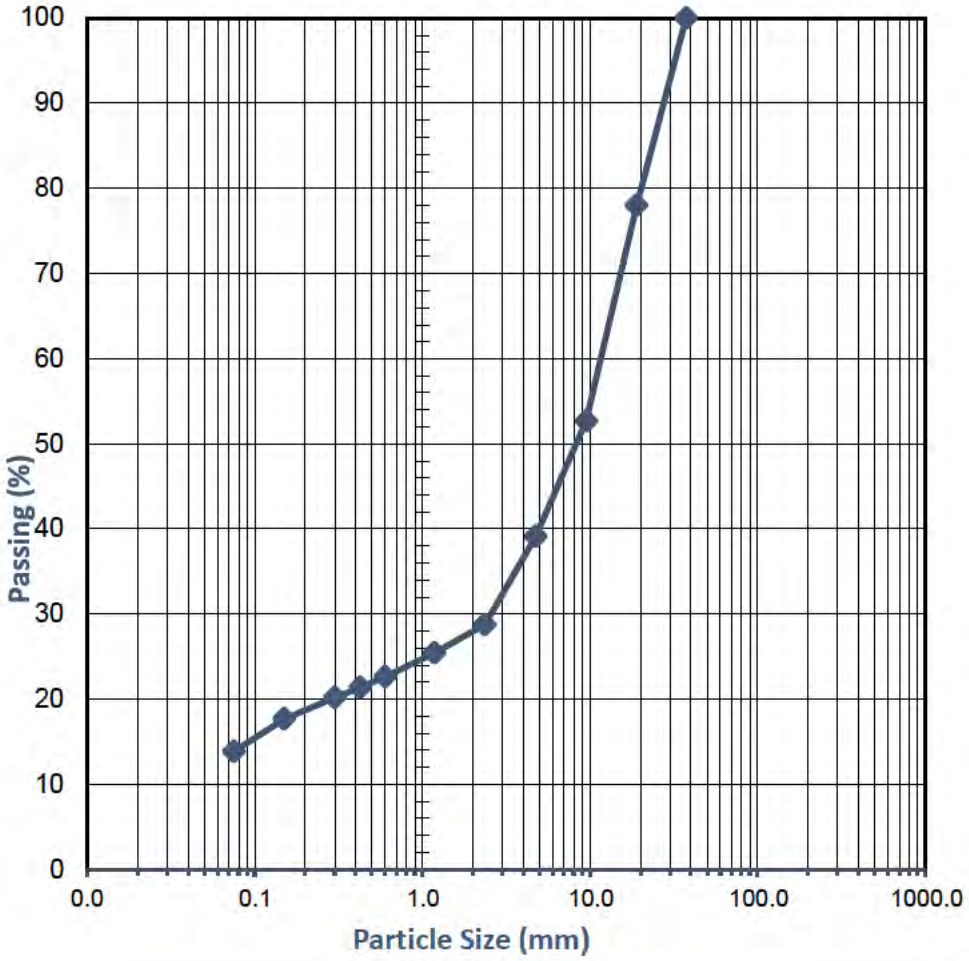
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	78
9.5	53
4.75	39
2.36	29
1.18	25
0.600	23
0.425	21
0.300	20
0.150	18
0.075	14



Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

NATA Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**25**
AS 1289.3.2.1	**Plastic Limit (%)**	**13**
AS 1289.3.3.1	**Plasticity Index (%)**	**12**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**5.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked**

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 19/February/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - *AS 1289.5.2.1, AS 1289.2.1.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

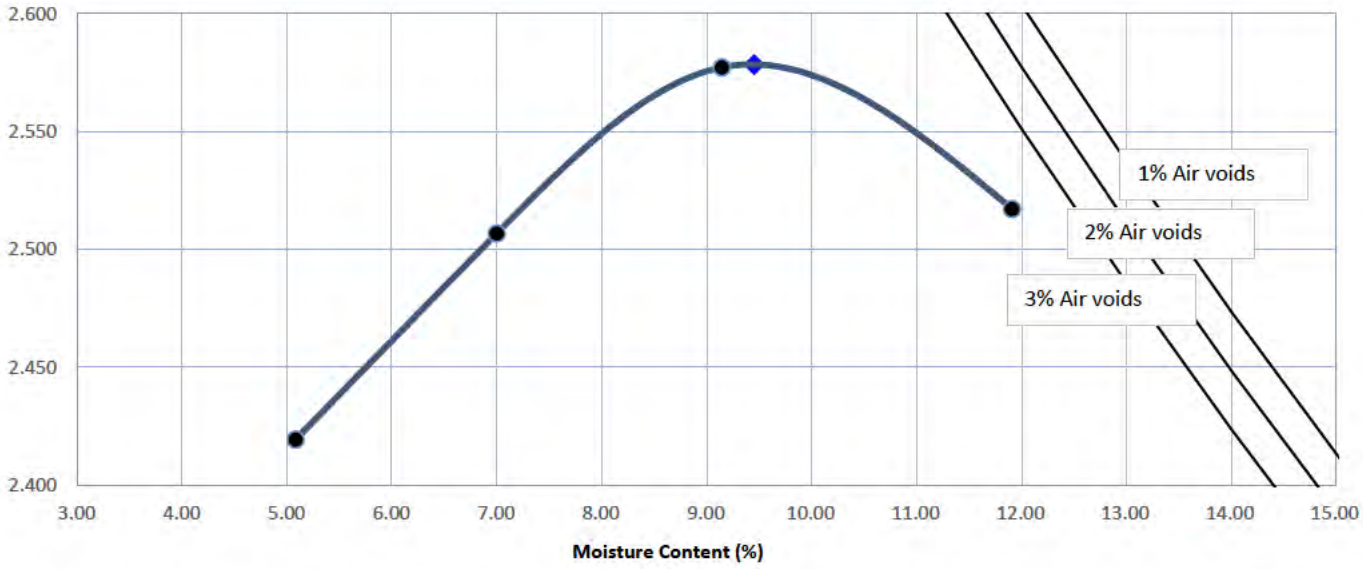
Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 21 **Material + 37.5mm (%)** -

Moisture Content (%)	5.1	7.0	9.1	11.9	
Dry Density (t/m³)	2.419	2.507	2.577	2.517	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **2.58**

Optimum Moisture Content (%) **9.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.843 t/m³*

**Deviation from test method, greater than 20% retained on the 19.00mm sieve. Tested as per clients request. NATA accreditation does not cover the performance of this service.*

Approved Signatory: [redacted]

Name:

Date: 16/February/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

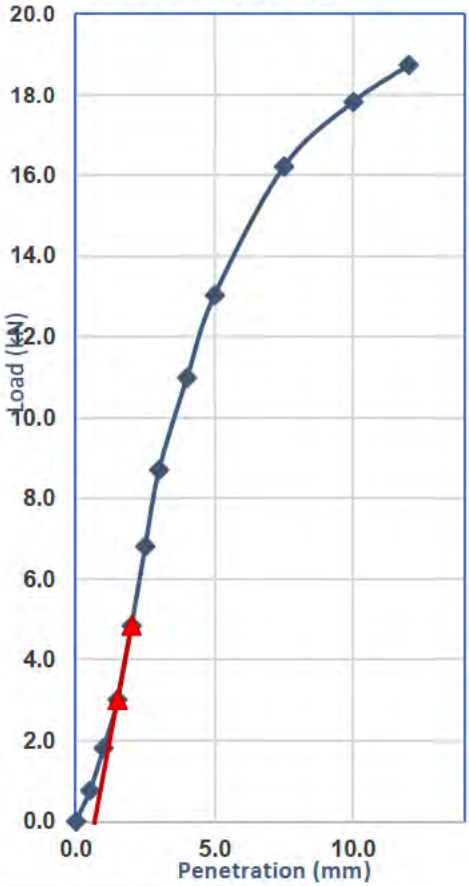
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2501_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2501
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA1-01	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	21	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.58	Optimum Moisture (%)	9.5
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	2.44	Moisture Content (%)	9.8
Density Ratio (%)	95.0	Moisture Ratio (%)	103.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	2.44	Dry Density Ratio (%)	94.5
Moisture Content (%)	11.7	Moisture Ratio (%)	123.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	10.4	Remaining Depth (%)	11.3

Correction applied to Penetration: 0.7mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 70%

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 22/February/2024

NATA Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

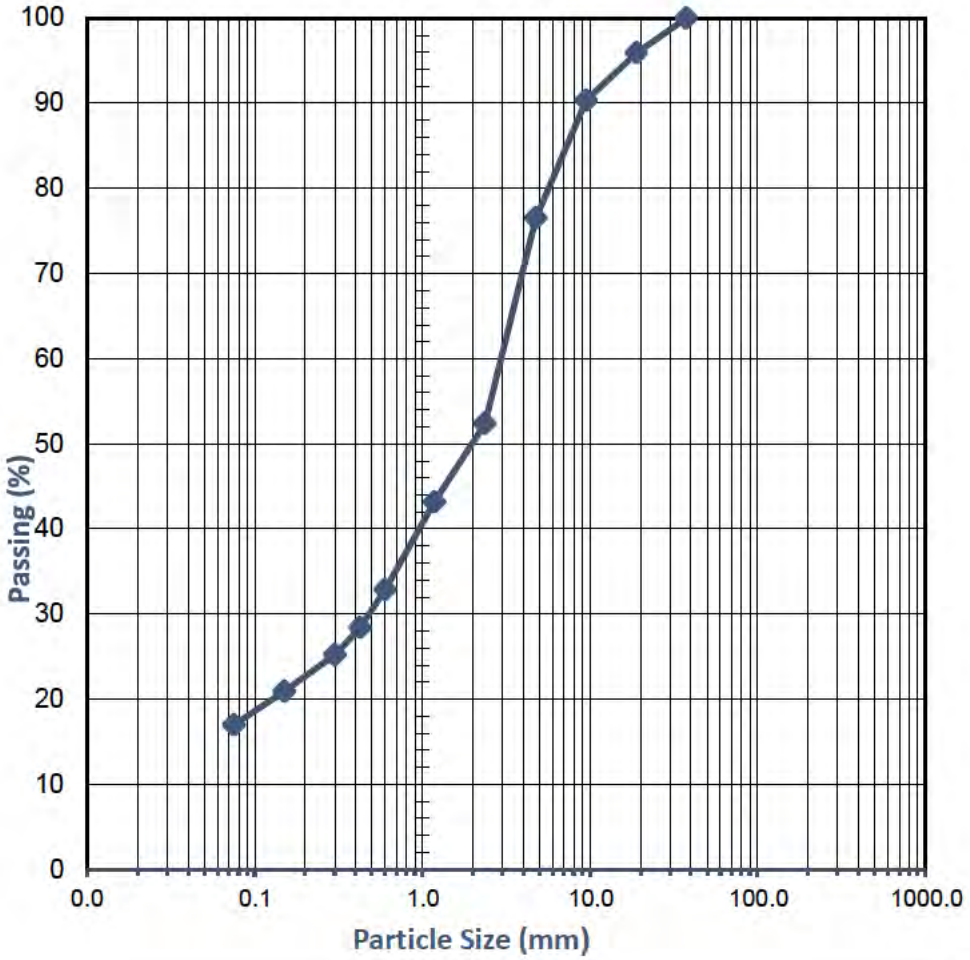
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	96
9.5	90
4.75	77
2.36	52
1.18	43
0.600	33
0.425	28
0.300	25
0.150	21
0.075	17



Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

NATA Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**26**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**10**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**5.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory: [redacted]

Name:

Date: 19/February/2024

NATA WORLD RECOGNISED ACCREDITATION

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

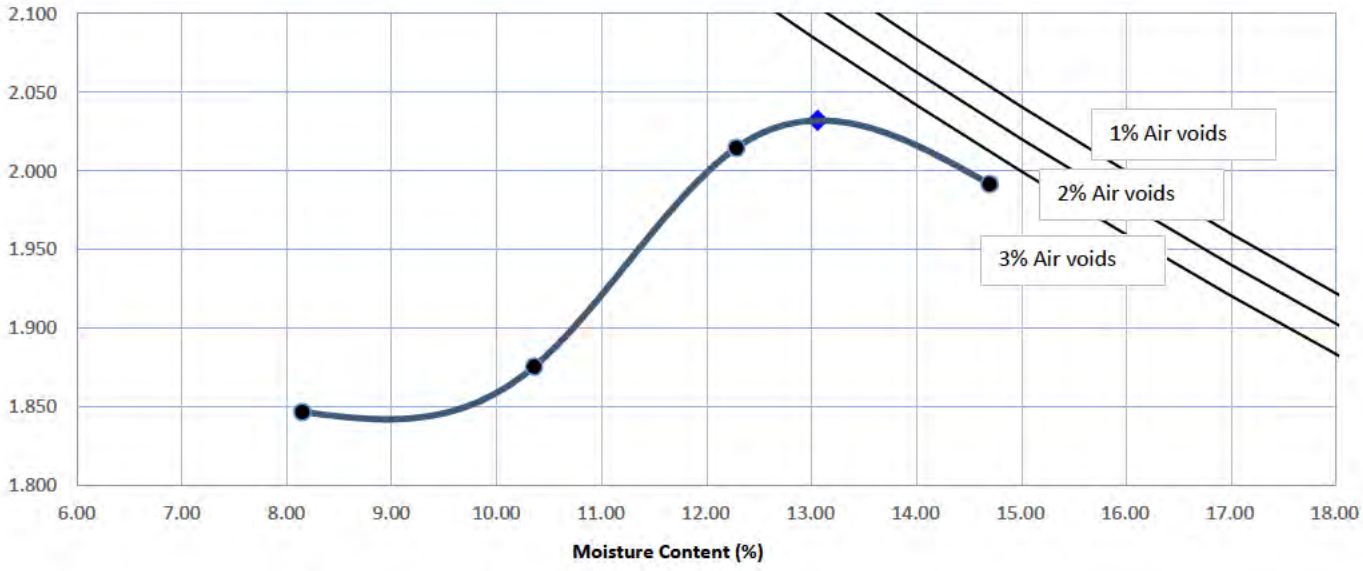
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 4 **Material + 37.5mm (%)** -

Moisture Content (%)	**8.1**	**10.4**	**12.3**	**14.7**	
Dry Density (t/m³)	**1.847**	**1.875**	**2.015**	**1.992**	



Modified Maximum Dry Density (t/m³) **2.03**

Optimum Moisture Content (%) **13.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.984 t/m³*

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

NATA Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

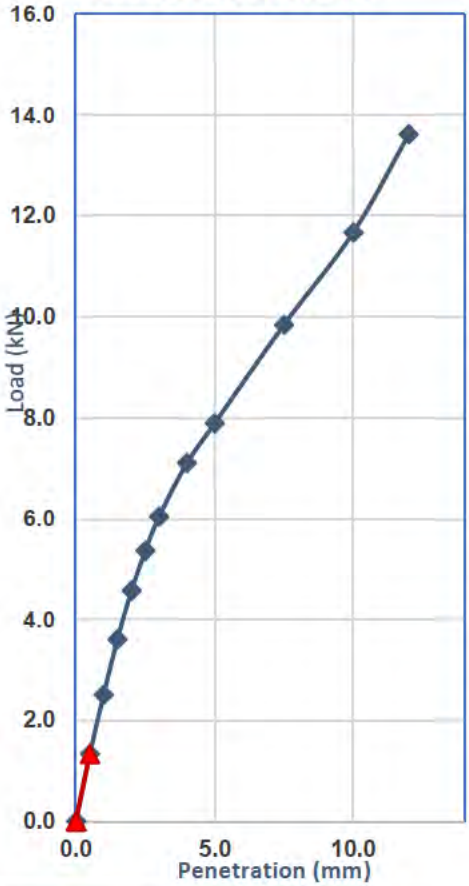
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2502_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2502
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-01	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	4	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.03	Optimum Moisture (%)	13.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.94	Moisture Content (%)	12.7
Density Ratio (%)	95.5	Moisture Ratio (%)	97.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.94	Dry Density Ratio (%)	95.0
Moisture Content (%)	15.6	Moisture Ratio (%)	119.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	14.5	Remaining Depth (%)	15.7

Correction applied to Penetration: 0mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 40%

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 22/February/2024

NATA

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

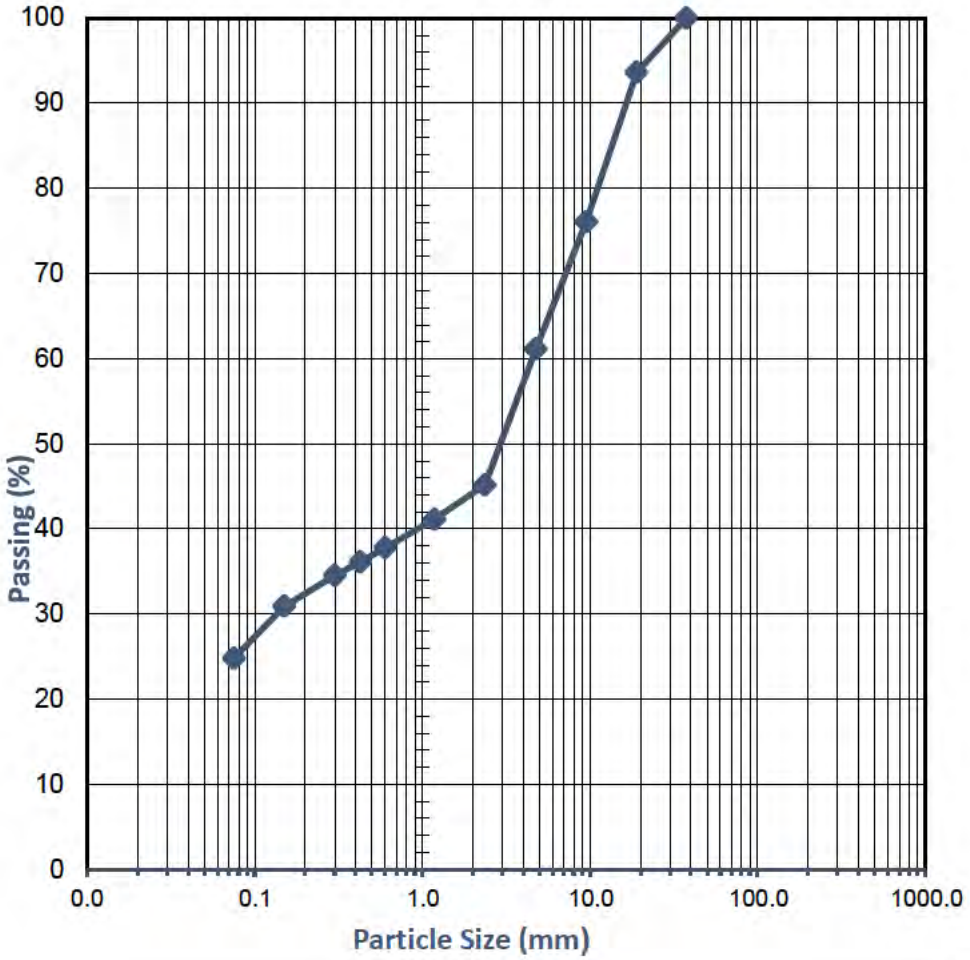
TEST REPORT - AS 1289.3.6.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_PSD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	15/02 - 16/02/2024

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	100
19.0	94
9.5	76
4.75	61
2.36	45
1.18	41
0.600	38
0.425	36
0.300	35
0.150	31
0.075	25



Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 16/February/2024

NATA Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_PI
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	16/02/2024

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**26**
AS 1289.3.2.1	**Plastic Limit (%)**	**12**
AS 1289.3.3.1	**Plasticity Index (%)**	**14**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**-**

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 19/February/2024

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_MMDD
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	15/02/2024

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

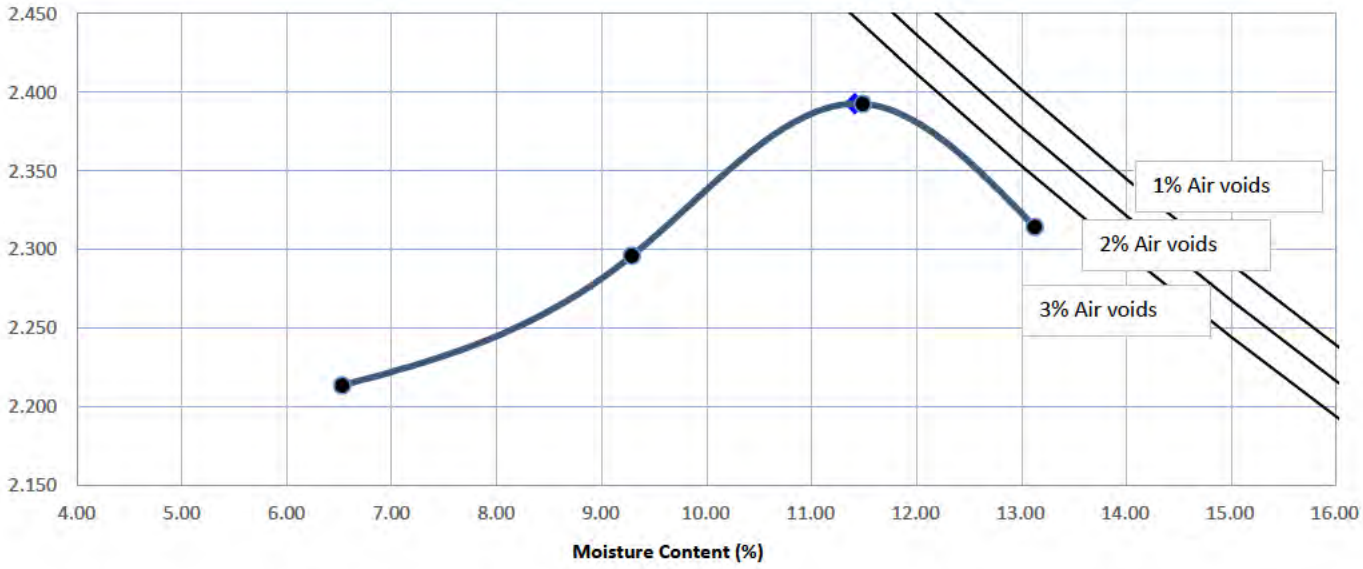
Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 15 **Material + 37.5mm (%)** -

Moisture Content (%)	6.5	9.3	11.5	13.1	
Dry Density (t/m³)	2.213	2.296	2.393	2.314	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **2.39**

Optimum Moisture Content (%) **11.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 3.543 t/m³*

Approved Signatory: [redacted]

Name:

Date: 16/February/2024

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

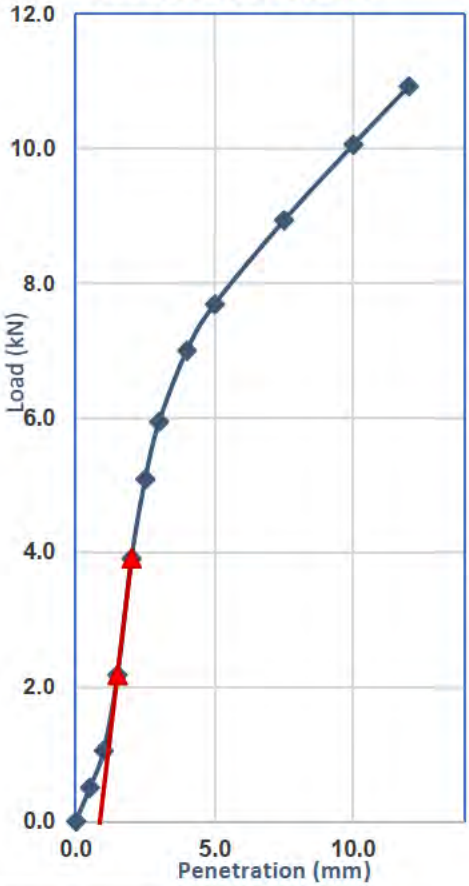
Client:	Calibre	*Ticket No.*	S12228
Client Address:	Level 2, 50 St Georges Terrace, Perth WA 6000	*Report No.*	WG24.2503_1_SCBR
Project:	Rhodes Ridge Investigation	*Sample No.*	WG24.2503
Location:	Rhodes Ridge	*Date Sampled:*	Not Specified
Sample Identification:	RR-BA2-02	*Date Tested:*	15/02 - 21/02/24

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Silty Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	24.0
% Retained 19.0mm	15	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.39	Optimum Moisture (%)	11.5
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	2.27	Moisture Content (%)	11.6
Density Ratio (%)	95.0	Moisture Ratio (%)	102.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	2.27	Dry Density Ratio (%)	95.0
Moisture Content (%)	13.5	Moisture Ratio (%)	118.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	12.9	Remaining Depth (%)	13.0

Correction applied to Penetration: 0.9mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 50%

Comments:

Approved Signatory: [redacted]

Name: [redacted]

Date: 22/February/2024

NATA

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Appendix D Geochemical Laboratory Results

						Exchangeable Cations					
						Calcium	Potassium	Magnesium	Sodium	Cation Exchange Capacity (CEC)	Exchangeable Sodium Percentage (ESP)
					RptUnits	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%
					PQL	0.10	0.10	0.10	0.10	0.10	1.0
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil
					Method	METALS-020_008A	METALS-020_008A	METALS-020_008A	METALS-020_008A	METALS-020_008A	METALS-020
Reference	Description	Sample Description	Sample Depth	Date Sampled	Type of Sample						
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPG02	0.0-0.4	01/02/2024	Soil	2.6	0.59	1.2	0.11	4.5	2.4
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.0-0.1	01/02/2024	Soil	1.6	0.42	0.77	<0.10	2.8	Not Reportable
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.1-0.5	01/02/2024	Soil	2.3	0.57	1.2	0.13	4.2	3.1
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.0-0.5	01/02/2024	Soil	2.2	0.55	1.3	<0.10	4.2	Not Reportable
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.5-0.8	01/02/2024	Soil	2.0	0.59	1.1	<0.10	3.8	Not Reportable
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE03	0.0-0.4	01/02/2024	Soil	3.0	0.72	1.4	0.14	5.3	2.7
					Count	6	6	6	6	6	6
					Maximum	3	0.72	1.4	0.14	5.3	3.1
					Minimum	1.6	0.42	0.77	<0.10	2.8	Not Reportable
					Average	2.3	0.57	1.16	0.09	4.1	2.7
					Standard Deivation	0.4	0.09	0.2	0.04	0.8	0.3
					95% Upper Confidence Limit	2.6	0.64	1.32	0.12	4.7	2.9

						Inorganics - General Physical Parameters		Inorganics - General Chemical Parameters		PBI/PRI	
						pH	Electrical Conductivity	Chloride	Sulfate	Phosphorus Buffer Index	Phosphorus Retention Index
					RptUnits	pH units	µS/cm	mg/kg	mg/kg	-	-
					PQL		2.0	10	10		
					Matrix	Soil	Soil	Soil	Soil	Soil	Soil
					Method	INORG-001	INORG-002	INORG-081	INORG-081	AGRI-003_ASPAC	AGRI-003_PRI
Reference	Description	Sample Description	Sample Depth	Date Sampled	Type of Sample						
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPG02	0.0-0.4	01/02/2024	Soil	5.4	27	<10	21	89	140
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.0-0.1	01/02/2024	Soil	5.4	11	<10	<10	130	350
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE01	0.1-0.5	01/02/2024	Soil	5.2	34	<10	27	100	160
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.0-0.5	01/02/2024	Soil	5.6	14	<10	10	93	110
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE02	0.5-0.8	01/02/2024	Soil	5.4	15	<10	11	120	200
PFB0120	PS210911 - Rhodes Ridge Camp Investigation	RR-TPE03	0.0-0.4	01/02/2024	Soil	5.4	31	<10	16	65	50
					Count	6	6	6	6	6	6
					Maximum	5.6	34	<10	27	130	350
					Minimum	5.2	11	<10	<10	65	50
					Average	5.4	22	<10	15	100	168
					Standard Deivation	0.1	9	N/A	7	21	93
					95% Upper Confidence Limit	5.5	29	N/A	21	116	243

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Certificate of Analysis PFB0120

Client Details

Client	Calibre Professional Services One Pty Ltd
Contact	Wilhem Picard
Address	L2, 50 St Georges Terrace, PERTH, WA, 6000

Sample Details

Your Reference	PS210911 - Rhodes Ridge Camp Investigation
Number of Samples	6 Soil
Date Samples Received	02/02/2024
Date Instructions Received	02/02/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	13/02/2024
Date of Issue	12/02/2024

Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Heram Halim, Operations Manager Lien Tang, Assistant Operations Manager Michael Mowle, Inorganics Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFB0120

Samples in this Report

Envirolab ID	Sample ID	Depth	Matrix	Date Sampled	Date Received
PFB0120-01	RR-TPG02	0.00-0.40	Soil	01/02/2024	02/02/2024
PFB0120-02	RR-TPE01		Soil	01/02/2024	02/02/2024
PFB0120-03	RR-TPE01	0.10-0.50	Soil	01/02/2024	02/02/2024
PFB0120-04	RR-TPE02	0.00-0.50	Soil	01/02/2024	02/02/2024
PFB0120-05	RR-TPE02	0.50-0.80	Soil	01/02/2024	02/02/2024
PFB0120-06	RR-TPE03	0.00-0.40	Soil	01/02/2024	02/02/2024

Certificate of Analysis PFB0120

Exchangeable Cations (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
Calcium	meq/100g	0.10	2.6	1.6	2.3	2.2	2.0
Potassium	meq/100g	0.10	0.59	0.42	0.57	0.55	0.59
Magnesium	meq/100g	0.10	1.2	0.77	1.2	1.3	1.1
Sodium	meq/100g	0.10	0.11	<0.10	0.13	<0.10	<0.10
Cation Exchange Capacity (CEC)	meq/100g	0.10	4.5	2.8	4.2	4.2	3.8
Exchangeable Sodium Percentage (ESP)	%	1.0	2.4	Not Reportable	3.1	Not Reportable	Not Reportable

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
Calcium	meq/100g	0.10	3.0
Potassium	meq/100g	0.10	0.72
Magnesium	meq/100g	0.10	1.4
Sodium	meq/100g	0.10	0.14
Cation Exchange Capacity (CEC)	meq/100g	0.10	5.3
Exchangeable Sodium Percentage (ESP)	%	1.0	2.7

Certificate of Analysis PFB0120

Inorganics - General Physical Parameters (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
pH	pH units		5.4	5.4	5.2	5.6	5.4
Electrical Conductivity	µS/cm	2.0	27	11	34	14	15

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
pH	pH units		5.4
Electrical Conductivity	µS/cm	2.0	31

Certificate of Analysis PFB0120

Inorganics - General Chemical Parameters (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
Chloride	mg/kg	10	<10	<10	<10	<10	<10
Sulfate	mg/kg	10	21	<10	27	10	11

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
Chloride	mg/kg	10	<10
Sulfate	mg/kg	10	16

Certificate of Analysis PFB0120

PBI/PRI (Soil)

Envirolab ID	Units	PQL	PFB0120-01	PFB0120-02	PFB0120-03	PFB0120-04	PFB0120-05
Your Reference			RR-TPG02	RR-TPE01	RR-TPE01	RR-TPE02	RR-TPE02
Date Sampled			01/02/2024	01/02/2024	01/02/2024	01/02/2024	01/02/2024
Depth			0.00-0.40		0.10-0.50	0.00-0.50	0.50-0.80
Phosphorus Buffer Index	-		89	130	100	93	120
Phosphorus Retention Index	-		140	350	160	110	200

Envirolab ID	Units	PQL	PFB0120-06
Your Reference			RR-TPE03
Date Sampled			01/02/2024
Depth			0.00-0.40
Phosphorus Buffer Index	-		65
Phosphorus Retention Index	-		50

Method Summary

Method ID	Methodology Summary
AGRI-003_ASPAC	Phosphorous Buffering index (PBI) is the equilibration of a sample in a CaCl solution at a ratio of 1:10. The leachate is then centrifuged, diluted and the resultant solution is analysed colorimetrically. As per Rayment and Lyons 912c, 913c. Analyte(s) are certified to ASPAC in 2022 (Envirolab Services (WA) t/a MPL Laboratories only).
AGRI-003_PRI	Phosphorous Retention index (PRI) is the ratio of adsorbed phosphorus to the equilibrium concentration. Phosphorus is extracted using KCl and determined colourimetrically. Result value is used to calculate PRI as per Allen and Jefferey.
INORG-001	pH - Measured using pH meter and electrode based on APHA latest edition, Method 4500-H+. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the APHA recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-002	Conductivity and Salinity - measured using a conductivity cell at 25°C based on APHA latest edition Method 2510. Soil results reported from a 1:5 Soil:Water extract unless otherwise specified. Please note Resistivity is estimated by calculation and may not correlate with results otherwise obtained using the Resistivity current method (based on AS 1289.4.4.1), depending on the nature of the soil being analysed.
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
METALS-020	Determination of various metals by ICP-OES.
METALS-020_008A	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-OES analytical finish.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFB0120

Client Details

Client	Calibre Professional Services One Pty Ltd
Your Reference	PS210911 - Rhodes Ridge Camp Investigation
Date Issued	12/02/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFB0120

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
CEC | Soil	1-6	01/02/2024	07/02/2024	07/02/2024	Yes
ESP | Soil	1-6	01/02/2024	07/02/2024	07/02/2024	Yes
Exchangeable Cations | Soil	1-6	01/02/2024	07/02/2024	07/02/2024	Yes
EC | Soil	1-6	01/02/2024	06/02/2024	07/02/2024	Yes
pH | Soil	1-6	01/02/2024	06/02/2024	07/02/2024	Yes
Chloride | Soil	1	01/02/2024	06/02/2024	07/02/2024	Yes
	2-6	01/02/2024	06/02/2024	08/02/2024	Yes
Sulfate | Soil	1	01/02/2024	06/02/2024	07/02/2024	Yes
	2-6	01/02/2024	06/02/2024	08/02/2024	Yes
PBI | Soil	1-6	01/02/2024	05/02/2024	07/02/2024	Yes
PRI | Soil	1-6	01/02/2024	05/02/2024	07/02/2024	Yes

Quality Control PFB0120

METALS-020_008A | Exchangeable Cations (Soil) | Batch BFB0614

Analyte	Units	PQL	Blank	DUP1 BFB0614-DUP1# Samp | QC | RPD %	LCS %	Spike % PFB0120-01
Calcium	meq/100g	0.10	<0.10	0.150 | 0.150 | 0.00	105	105
Potassium	meq/100g	0.10	<0.10	<0.10 | <0.10 | [NA]	104	104
Magnesium	meq/100g	0.10	<0.10	<0.10 | <0.10 | [NA]	99.7	99.1
Sodium	meq/100g	0.10	<0.10	<0.10 | <0.10 | [NA]	102	102
Cation Exchange Capacity (CEC)	meq/100g	0.10	<0.10		[NA]	[NA]
Exchangeable Sodium Percentage (ESP)	%	1.0	<1.0		[NA]	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-001 | Inorganics - General Physical Parameters (Soil) | Batch BFB0556

Analyte	Units	PQL	Blank	DUP1 BFB0556-DUP1# Samp | QC | RPD %	LCS %
pH	pH units		5.0	6.4 | 6.3 | 1.26	101
Electrical Conductivity	µS/cm	2.0	<2.0	19.3 | 21.5 | 10.8	106

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-081 | Inorganics - General Chemical Parameters (Soil) | Batch BFB0557

Analyte	Units	PQL	Blank	DUP1 PFB0120-01 Samp | QC | RPD %	LCS %	Spike % PFB0120-02
Chloride	mg/kg	10	<10	<10 | <10 | [NA]	94.5	101
Sulfate	mg/kg	10	<10	21.1 | 21.3 | 0.526	93.3	102

AGRI-003_PRI | PBI/PRI (Soil) | Batch BFB0374

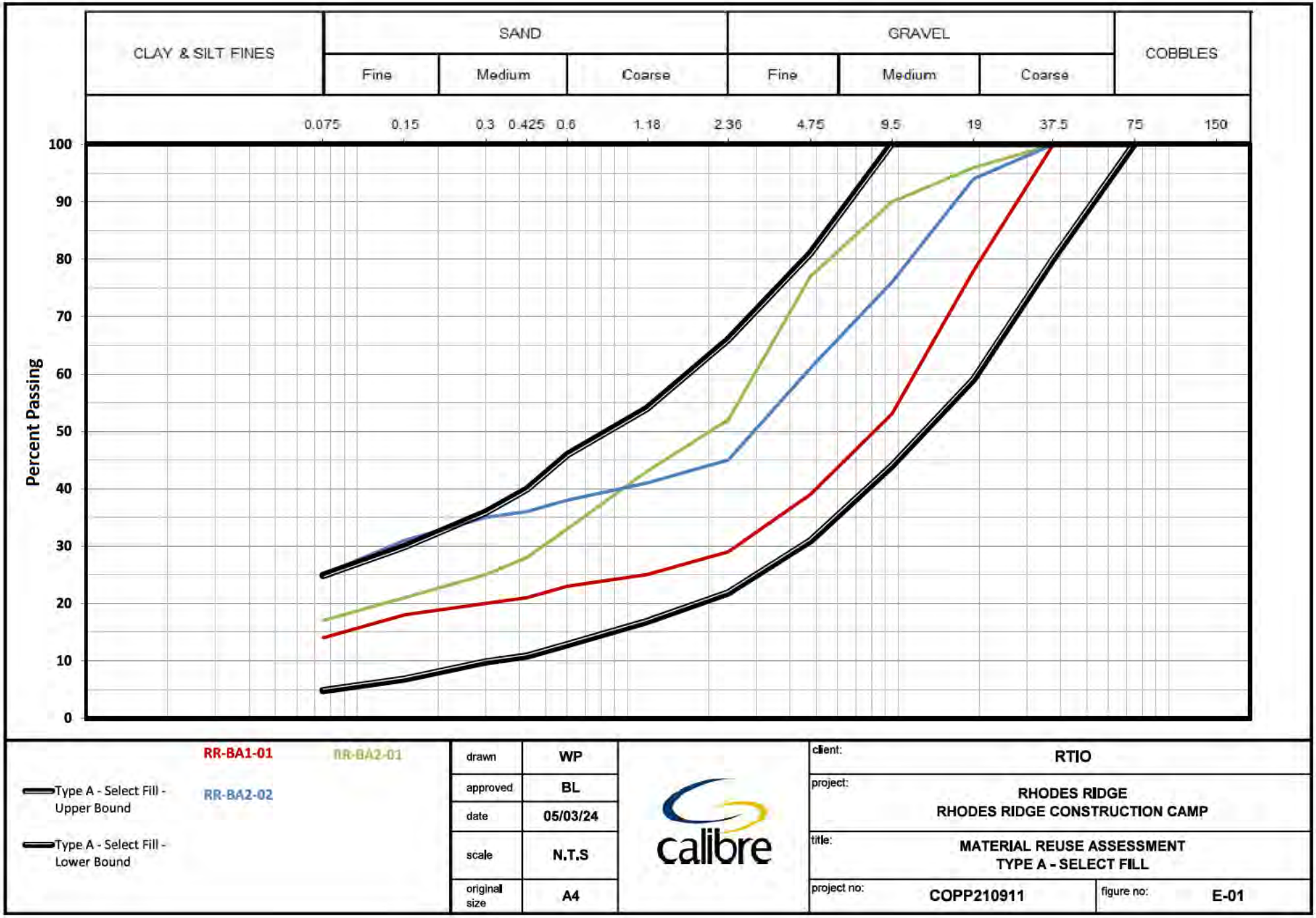
Analyte	Units	PQL	Blank	DUP1 BFB0374-DUP1# Samp | QC | RPD %	LCS %
Phosphorus Retention Index	-		0.00	198 | 192 | 3.00	104

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

AGRI-003_ASPAC | PBI/PRI (Soil) | Batch BFB0375

Analyte	Units	PQL	Blank	DUP1 PFB0120-01 Samp | QC | RPD %	LCS %
Phosphorus Buffer Index	-		0.00	89.0 | 90.4 | 1.57	83.2

Appendix E Borrow Material Assessment



drawn	WP
approved	BL
date	05/03/24
scale	N.T.S
original size	A4

calibre

client: RTIO

project: RHODES RIDGE
RHODES RIDGE CONSTRUCTION CAMP

title: MATERIAL REUSE ASSESSMENT
TYPE A - SELECT FILL

project no: COPP210911

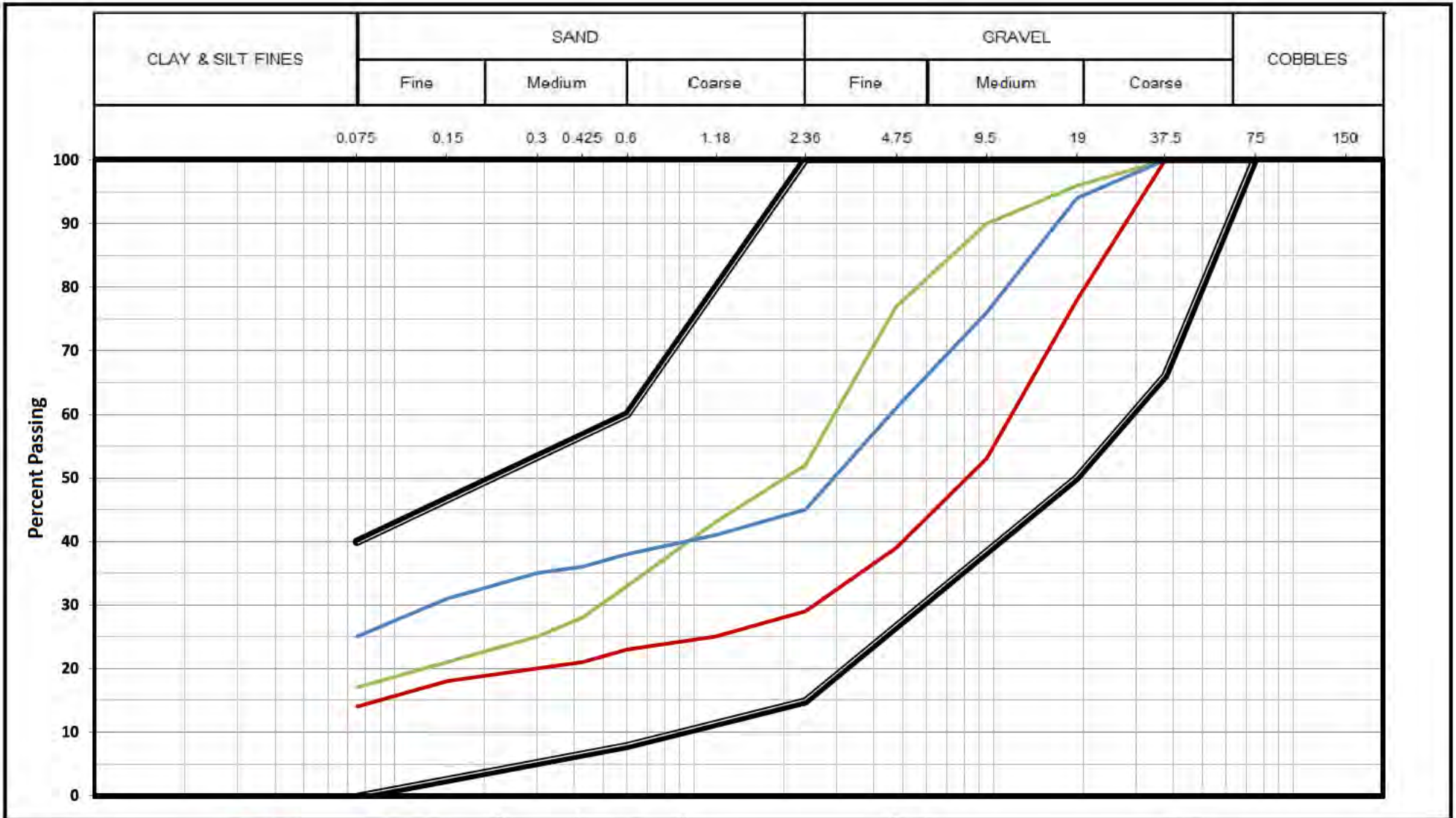
figure no: E-01

	RTIO Specification Requirements	RR-BA1-01	RR-BA2-01	RR-BA2-02					
Liquid Limit (LL)	≤35	25	26	26					
Plasticity Index (PI)	4 - 17	12	10	14					
Linear Shrinkage (LS)	≤10	6	8	7					

Meets Specification Requirements

Outside of Specification Requirements

drawn	WP	client:	RTIO
approved	BL	project:	RHODES RIDGE RHODES RIDGE CONSTRUCTION CAMP
date	05/03/24	title:	MATERIAL REUSE ASSESSMENT TYPE A - SELECT FILL
scale	N.T.S	project no:	COPP210911
original size	A4	figure no:	E-02



RR-BA1-01 RR-BA2-01

Type B - Common Fill - Upper Bound

RR-BA2-02

Type B - Common Fill - Lower Bound

drawn	WP
approved	BL
date	11/03/24
scale	N.T.S
original size	A4

calibre

client: RTIO

project: RHODES RIDGE
RHODES RIDGE CONSTRUCTION CAMP

title: MATERIAL REUSE ASSESSMENT
TYPE B - COMMON FILL

project no: COPP210911

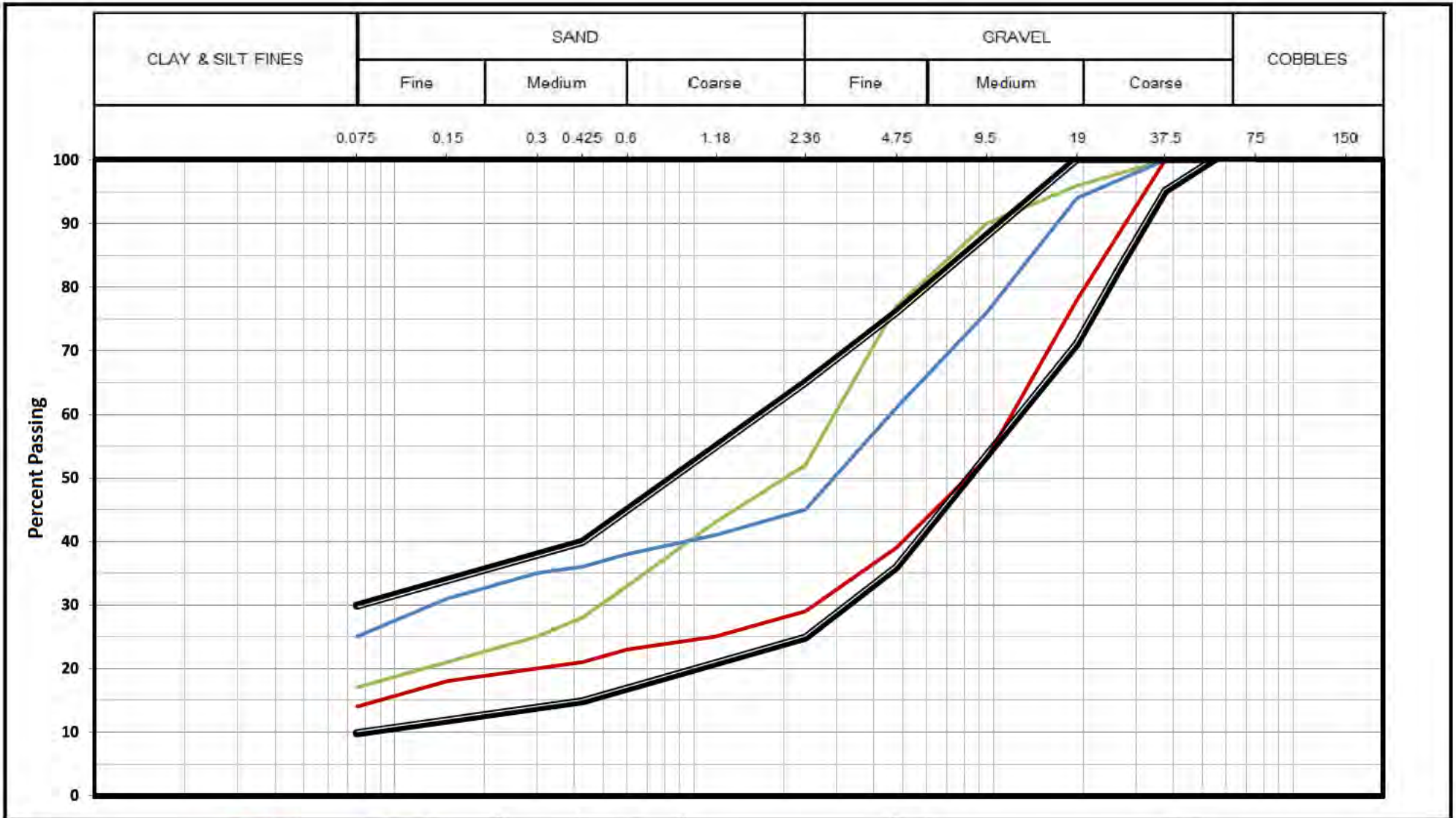
figure no: E-03

	RTIO Specification Requirements	RR-BA1-01	RR-BA2-01	RR-BA2-02					
Liquid Limit (LL)	≤40	25	26	26					
Plasticity Index (PI)	≤25	12	10	14					

Meets Specification Requirements

Outside of Specification Requirements

drawn	WP	client:	RTIO
approved	BL	project:	RHODES RIDGE RHODES RIDGE CONSTRUCTION CAMP
date	11/03/24	title:	MATERIAL REUSE ASSESSMENT TYPE B - COMMON FILL
scale	N.T.S	project no: COPP210911	figure no: E-04
original size	A4		



RR-BA1-01 RR-BA2-01 RR-BA2-02

Unsealed Basecourse - Upper Bound

Unsealed Basecourse - Lower Bound

drawn	WP
approved	BL
date	05/03/24
scale	N.T.S
original size	A4

calibre

client: RTIO

project: RHODES RIDGE
RHODES RIDGE CONSTRUCTION CAMP

title: MATERIAL REUSE ASSESSMENT
UNSEALED BASECOURSE

project no: COPP210911

figure no: E-05

	RTIO Specification Requirements	RR-BA1-01	RR-BA2-01	RR-BA2-02					
Liquid Limit (LL)	≤35	25	26	26					
Plasticity Index (PI)	4 - 15	12	10	14					
Dust Ratio (P0.075 / P0.425)	0.3 to 0.7	0.67	0.61	0.69					
Weighted PI (P0.425 * PI)	≤500	252	280	504					
CBR (%)	≥60	70	40	50					
Grading Coefficient	14 - 30	23	35	31					
Shrinkage Product	140-400	116	224	252					

Meets Specification Requirements

Outside of Specification Requirements

drawn	WP	client:	RTIO
approved	BL	project:	RHODES RIDGE RHODES RIDGE CONSTRUCTION CAMP
date	05/03/24	title:	MATERIAL REUSE ASSESSMENT UNSEALED BASECOURSE
scale	N.T.S	project no: COPP210911	figure no: E-06
original size	A4		

calibre