Proposed Residential Subdivision – DA1 Area Geotechnical Assessment

51 & 134 Station Lane, Lochinvar

NEW21P-0129-AC
30 March 2022

Qualtest
LABORATORY (NSW) PTY LTD

GEOTECHNICAL I LABORATORY I EARTHWORKS I QUARRY I CONSTRUCTION MATERIAL TESTING

30 March 2022

McCloy Project Management Pty Ltd
PO Box 2214
DANGAR NSW 2309

Attention: Mr James Goode

Dear Sir

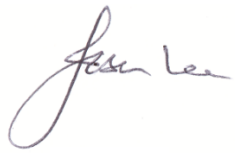
RE: PROPOSED RESIDENTIAL SUBDIVISION – DA1 Area
51 & 134, STATION LANE, LOCHINVAR
GEOTECHNICAL ASSESSMENT

Please find enclosed our Geotechnical Assessment report for the DA1 area of the proposed residential subdivision to be located at 51 & 134 Station Lane, Lochinvar.

The report includes recommendations for pavement design and construction for internal subdivision roads and Station Lane, detention basin construction, and site earthworks.

If you have any questions regarding this report, please do not hesitate to contact Ben Edwards, Shannon Kelly, or the undersigned.

For and on behalf of Qualtest Laboratory (NSW) Pty Ltd



Jason Lee
Principal Geotechnical Engineer

Table of Contents:

Attachments:

Figures: Figure AC1: Site Plan and Approximate Test Locations

Appendix A: Results of Field Investigations

Appendix B: Results of Laboratory Testing

1.0 Introduction

Qualtest Laboratory NSW Pty Ltd (Qualtest) is pleased to present this Geotechnical Assessment report to McCloy Project Management Pty Ltd (McCloy), for the DA1 area of the proposed residential subdivision, to be located at 51 and 134 Station Lane, Lochinvar.

Based on the Brief provided in an email from McCloy dated 2 February 2022, and Overall DA Master Plan (Ref: ACOR Consultants Pty Ltd, Project No. NSW212012, Drawing No. DA101-006, Issue: E, dated 24 March 2022), provided in an email from McCloy dated 9 March 2022, the proposed development within the DA1 area is understood to comprise subdivision into approximately 375 residential lots, and construction of associated infrastructure including subdivision road pavements and detention basins, as shown on Figure AC1.

The scope of work for the geotechnical investigation included providing discussion and recommendations on the following:

- Pavement design and construction to Maitland City Council (MCC) specifications;
- Detention basin design and construction recommendations, including excavation and foundation conditions, key in details, embankment construction and batter slopes;
- Excavation conditions and depth to rock;
- Site preparation;
- The suitability of the site soils for use as fill and fill construction procedures; and,
- Special requirements for construction procedures and site drainage.

This report presents the results of the field work investigations and laboratory testing, and provides recommendations for the scope outlined above.

2.0 Desktop Study

The scope of work has included a review of the following reports, with selected relevant information included to supplement current investigations where applicable.

- Preliminary Geotechnical Assessment, 'Proposed Subdivision – 51, 134 & 146 Station Lane, Lochinvar', (Report Reference: NEW21P-0129-AA, dated 20 September 2021). This report should be referred to for preliminary site classification in accordance with AS2870-2011, *"Residential Slabs and Footings";*
- Addendum Preliminary Contamination Assessment, 'Proposed Subdivision – 51, 134 & 146 Station Lane, Lochinvar', (Report Reference: NEW21P-0129-AB, dated 8 September 2021);
- Geotechnical and Salinity Investigation Report, '51, 134, 146 Station Lane, Lochinvar' (Geotesta, Report No. NE526, dated 19 September 2019).

3.0 Field Work

Field work investigations were carried out on 10 and 11 February 2022 and comprised of:

- DBYD search and visual check of proposed test locations for the presence of underground services;
- Site walkover to make observations of surface features at the property and in the immediate surrounding area;

- Excavation of 22 test pits (TP101 to TP122) using a 2.7 tonne excavator equipped with a 450mm wide bucket. Test pits were terminated at depths of between 0.80m and 2.00m;
- Bulk disturbed samples were taken for subsequent laboratory testing; and,
- Test pits were backfilled with the excavation spoil and compacted using the excavator bucket and tracks.

Investigations were carried out by an experienced Geotechnical Engineer from Qualtest who located the test pits, carried out the testing and sampling, produced field logs of the test pits, and made observations of the site surface conditions.

Engineering logs of the test pits are presented in Appendix A. Approximate test pit locations are shown on the attached Figure AC1. Test pits were located in the field by handheld GPS and relative to existing site features including topographic features, lot boundaries, existing developments and trees.

4.0 Site Description

4.1 Surface Conditions

The subject site (DA1 area) is an irregular shaped area of land with an approximate plan area of 42 hectares, and comprises nos. 51 and part of 134 Station Lane, Lochinvar, respectively known as Lot 3 DP564631, and part Lot 4 634523.

The approximate site area for DA1 area is shown on attached Figure AC1.

The site is located within a region of moderately undulating topography, on a north-south trending ridge formation that approximately bisects the site, with tributaries of Lochinvar Creek positioned near the western and eastern boundaries, draining towards the north.

Ground levels are generally in the range from roughly RL 50m (AHD) at the approximate centre of the southern boundary of the site, falling to roughly RL 35m (AHD) in the northern corners of the site. Site slopes generally vary from about 3° to 10° towards the north, east, and west (i.e. away from the crest of the ridge formation), with some locally steeper areas associated with fill stockpiles, naturally formed easements, or dam embankments.

The site is typically characterised as undeveloped rural farmland, vegetated by sparse coverage of mature trees and established grass cover. Observed developments include a dwelling and associated developments on no. 51, and farm dams on no. 134.

On the day of the investigation, the site was judged to be reasonably well drained by way of surface runoff following the natural topography towards the watercourses, which generally drain towards the north of the site. Some ponded water was present in the watercourses.

Trafficability was judged to be good by way of 4WD vehicle along the existing access tracks. Photographs of the site taken on the day of the site investigations are shown below.

Photograph 1: From near TP119, facing northeast. Showing Station Lane on right of photograph.

Photograph 2: From near TP119, facing southeast. Showing Station Lane on left of photograph.

Photograph 3: From near TP119, facing west.

Photograph 4: From near TP119, facing northwest.

Photograph 5: From near TP114, facing north.

Photograph 6: From near TP114, facing northeast.

Photograph 7: From near TP122, facing southwest.

Photograph 8: From near TP122, facing northeast.

Photograph 9: From near TP105, facing west.

Photograph 10: From near TP105, facing north. Showing Station Lane on right of photograph.

Photograph 11: From near TP107, facing north. Showing existing dwelling near the southern portion of Lot 3 DP564631.

Photograph 12: From near TP107, facing northeast.

Photograph 13: From near TP106, facing south.

Photograph 14: From near TP106, facing southwest.

Photograph 15: From near TP116, facing southeast.

Photograph 16: From near TP116, facing south.

4.2 Subsurface Conditions

Reference to the 1:100,000 Cessnock Regional Geology Series Sheet 9132 indicates the site to be underlain by the Lochinvar Formation of the Dalwood Group, which is characterised by lithic feldspathic sandstone, siltstone, shale, tuff, basalt flows and erratics.

Table 1 presents a summary of the typical soil types encountered at test pit locations during the field investigation, divided into representative geotechnical units.

Table 2 contains a summary of the distribution of the above geotechnical units at the test pit locations.

No groundwater levels or water inflows were encountered in the test pits during the limited time that they remained open on the day of the current field investigations.

It should be noted that groundwater conditions can vary due to rainfall and other influences including regional groundwater flow, temperature, permeability, recharge areas, surface condition, and subsoil drainage.

TABLE 1 – SUMMARY OF GEOTECHNICAL UNITS AND SOIL TYPES

Unit	Soil Type	Description
1A	FILL – TOPSOIL	Sandy CLAY - low plasticity, dark brown, fine to coarse grained sand, with fine to medium grained angular to sub-angular gravel, root affected.
1B	UNCONTROLLED FILL	Clayey Sandy GRAVEL - fine to coarse grained rounded to sub-angular, dark brown with dark grey, fine to coarse grained sand, fines of low plasticity.
2	TOPSOIL	Sandy CLAY – medium to high plasticity, colour combinations of brown, dark brown and dark grey, fine to medium grained (mostly fine grained) sand, root affected. Clayey Gravelly SAND – fine to coarse grained, grey-brown, fine to grained angular gravel, fines of low plasticity, root affected.
3	COLLUVIUM / ALLUVIUM	Sandy CLAY – medium to high plasticity, brown, trace orange and pale grey, fine grained sand. CLAY - medium to high plasticity, dark grey, with fine to coarse grained sand.
4	RESIDUAL SOIL	CLAY, Sandy CLAY, Silty Sandy CLAY – medium to high plasticity, colour combinations of pale brown, brown, dark brown, grey-brown, pale brown, grey, dark grey, orange and red-brown, fine grained sand in places, with some fine grained angular gravel in places, with extremely to highly weathered pockets in places. Gravelly Sandy CLAY – low to medium plasticity, colour combinations of pale brown, orange, pale grey and red-brown, fine to coarse grained sand, fine to medium grained (mostly fine grained) angular gravel, with extremely to highly weathered rock pockets in places. Clayey Gravelly SAND – fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low to medium plasticity, with clay pockets. Borderline Extremely Weathered Rock in places.
5	EXTREMELY WEATHERED (XW) ROCK with soil properties	Andesite; breaks down into Clayey Sandy GRAVEL, Clayey Gravelly SAND, Clayey SAND - fine to coarse grained, brown to pale brown, fine grained angular gravel, fines of low to medium plasticity, with Clay pockets in places, with highly weathered pockets in places.
6	HIGHLY WEATHERED (HW) ROCK	ANDESITE – grey to dark grey and brown to dark brown, estimated extremely low to medium (mostly very low to low) strength, with extremely weathered pockets. BASALT – dark grey to black, estimated medium to high strength, highly fractured. SILTSTONE - pale brown, estimated extremely low to very low strength, fractured.

TABLE 2 – SUMMARY OF GEOTECHNICAL UNITS ENCOUNTERED AT TEST LOCATIONS

Location	Unit 1A Fill – Topsoil	Unit 1B Uncontrolled Fill	Unit 2 Topsoil	Unit 3 Alluvium / Colluvium	Unit 4 Residual Soil	Unit 5 XW Rock	Unit 6 HW to MW Rock
	Depth in metres (m)						
Current Investigation							
TP101	-	-	0.00 - 0.10	-	0.10 - 0.60	0.60 - 1.20^	-
TP102	-	-	0.00 - 0.10	-	0.10 - 1.30^	-	-
TP103	-	-	0.00 - 0.15	-	0.15 - 0.60	0.60 - 0.80^	-
TP104	-	-	0.00 - 0.10	-	0.10 - 1.20	1.20 - 1.90^	-
TP105	-	-	0.00 - 0.15	-	0.15 - 0.80	-	-
TP106	-	-	0.00 - 0.10	-	0.10 - 1.80^	-	-
TP107	-	-	0.00 - 0.20	-	0.20 - 1.10^	-	-
TP108	-	-	0.00 - 0.10	-	0.10 - 0.80	-	0.80 - 0.90^
TP109	0.00 - 0.10	0.10 - 0.40	-	-	0.40 - 1.80	1.80 - 1.90^	-
TP110	-	-	0.00 - 0.10	-	0.10 - 2.00^	-	-
TP111	-	-	0.00 - 0.10	-	0.10 - 1.10^	-	-
TP112	-	-	0.00 - 0.20	-	0.20 - 1.10^	-	-
TP113	-	-	0.00 - 0.20	-	0.20 - 1.40	1.40 - 1.90^	-
TP114	-	-	0.00 - 0.30	-	0.30 - 1.00	1.00 - 1.20^	-
TP115	-	-	0.00 - 0.20	-	0.20 - 1.20^	-	-

Location	Unit 1A Fill – Topsoil	Unit 1B Uncontrolled Fill	Unit 2 Topsoil	Unit 3 Alluvium / Colluvium	Unit 4 Residual Soil	Unit 5 XW Rock	Unit 6 HW to MW Rock
	Depth in metres (m)						
TP116	-	-	0.00 - 0.20	-	0.20 - 1.70^	-	-
TP117	-	-	0.00 - 0.10	-	0.10 -1.70^	-	-
TP118	-	-	0.00 - 0.20	-	0.20 - 0.80	0.80 - 1.10^	-
TP119	-	-	0.00 - 0.20	0.20 - 1.20	1.20 - 1.90	-	1.90 - 2.00^
TP120	-	-	0.00 - 0.25	-	0.25 - 1.60 1.70 - 2.00	-	1.60 - 1.70
TP121	-	-	0.00 - 0.20	-	0.20 - 1.70^	-	-
TP122	-	-	0.00 - 0.20	-	0.20 - 1.30	1.30 - 1.40^	-
Previous Investigation (Ref: NEW21P-0129-AA, dated 20 September 2021)							
TP01	-	-	0.00 - 0.10	0.10 - 1.45	-	1.45 - 1.90^	-
TP02	-	-	0.00 - 0.05	-	0.05 - 2.00	-	-
TP03	-	-	0.00 - 0.20	0.20 - 1.60	1.60 - 2.00	-	-
TP04	-	-	0.00 - 0.20	0.20 - 1.00	1.00 - 1.75	1.75 - 2.00	-
TP09	-	-	0.00 - 0.20	-	0.20 - 0.80	0.80 - 1.40	1.40 - 1.50*
TP10	-	-	0.00 - 0.30	-	0.30 - 0.80	0.80 - 0.89	0.89 - 0.90^
TP11	-	-	0.00 - 0.30	0.30 - 0.90	0.90 - 1.30	-	1.30 - 1.40*
TP12	-	-	0.00 - 0.15	-	0.15 - 2.00	-	-
TP13	-	-	0.00 - 0.15	-	0.15 - 1.30	1.30 - 1.50^	-

Location	Unit 1A Fill – Topsoil	Unit 1B Uncontrolled Fill	Unit 2 Topsoil	Unit 3 Alluvium / Colluvium	Unit 4 Residual Soil	Unit 5 XW Rock	Unit 6 HW to MW Rock
	Depth in metres (m)						
TP14	-	-	0.00 - 0.30	-	0.30 - 0.50	0.50 - 1.00	1.00 - 1.05*
TP19	-	-	0.00 - 0.25	-	0.25 - 1.15	1.15 - 1.40	1.40 - 1.50*
TP20	-	-	0.00 - 0.25	-	0.25 - 1.50	1.50 - 1.65	1.65 - 1.70*
TP21	-	-	0.00 - 0.25	-	0.25 - 0.60	0.60 - 1.10	1.10*
TP22	-	-	0.00 - 0.40	-	0.40 - 1.15	1.15 - 1.75^	-
TP23	-	-	0.00 - 0.15	-	0.15 - 2.00	-	-
TP24	-	-	0.00 - 0.30	-	0.30 - 2.00	-	-
TP25	-	0.00 - 0.30	-	-	-	-	0.30 - 0.32*
TP26	0.00 - 0.50	0.50 - 1.50	-	-	-	-	1.50 - 1.52*
TP27	0.00 - 0.30	0.30 - 1.05	-	-	-	-	1.05 - 1.10*
TP28	0.00 - 1.10	1.10 - 1.50	-	-	-	-	1.50 - 1.51*
TP29	0.00 - 0.10	0.10 - 1.30	-	-	-	1.30 - 1.50	1.50*
Note:	* = Practical refusal of 2.7 tonne excavator met on Extremely Weathered or Highly Weathered Rock. ^ = Slow progress or Very Slow progress met on Extremely Weathered or Highly Weathered rock.						

5.0 Laboratory Testing

Samples collected during the current field investigations were returned to our NATA accredited Warabrook Laboratory for testing which comprised of:

- (19 no.) California Bearing Ratio (CBR, 4 day soaked) & Standard Compaction;
- (11 no.) Particle Size Distribution;
- (11 no.) Atterberg Limits; and
- (11 no.) Emerson Crumb.

Results of the laboratory testing are presented in Appendix B, with a summary of the CBR, Particle Size Distribution, Atterberg Limits, and Emerson Crumb test results presented in Table 3 and Table 4.

TABLE 3 – SUMMARY OF CBR TESTING RESULTS

Location	Sample Depth (m)	Field Moisture Content (%)	Optimum Moisture Content (%)	Relationship of Field MC to OMC (%)	CBR (%)
TP101	0.40 – 0.60	30.6	33.1	2.5 DRY	3.5
TP102	0.40 – 0.60	24.2	29.2	5.0 DRY	3.5
TP103	0.40 – 0.60	24.2	26.7	2.5 DRY	2.5
TP104	0.40 – 0.60	25.8	28.0	2.2 DRY	4.5
TP105	0.40 – 0.60	14.2	18.5	4.3 DRY	5
TP106	0.40 – 0.60	26.9	28.0	1.1 DRY	4.5
TP107	0.40 – 0.60	23.8	26.7	2.9 DRY	4.0
TP108	0.40 – 0.60	23.4	27.6	4.2 DRY	3.0
TP109	0.40 – 0.60	22.8	26.8	4.0 DRY	5
TP110	0.40 – 0.60	20.5	22.0	1.5 DRY	5
TP111	0.40 – 0.60	27.0	30.5	3.5 DRY	6
TP112	0.40 – 0.60	28.3	30.2	1.9 DRY	5
TP113	0.40 – 0.60	32.2	31.0	1.2 WET	3.5
TP114	0.40 – 0.60	29.2	33.7	4.5 DRY	3.5
TP115	0.40 – 0.60	28.7	34.0	5.3 DRY	5
TP116	0.40 – 0.60	20.3	23.9	3.6 DRY	7
TP117	0.40 – 0.60	19.2	19.8	0.6 DRY	2.5
TP118	0.40 – 0.60	34.5	26.1	8.4 WET	3.5
TP119	0.40 – 0.60	29.7	27.2	2.5 WET	3.0

TABLE 4 – SUMMARY OF PARTICLE SIZE DISTRIBUTION, ATTERBERG LIMITS AND EMERSON CRUMB TESTING RESULTS

Location and Depth (m)	Material Description	Grading		Atterberg Limits			Emerson Class
		Sieve (mm)	% Pass	Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	
TP101 0.40 – 0.60	(CH) CLAY	37.5	100	82	52	19.5	4
		19.0	100				
		2.36	100				
		0.075	79				
TP101 1.00 – 1.20	(SC) Clayey Gravelly SAND	37.5	100	42	21	9.0	4
		19.0	93				
		2.36	53				
		0.075	20				
TP120 0.50 – 0.60	(CH) CLAY	37.5	100	71	51	17.5	2
		19.0	100				
		2.36	98				
		0.075	83				
TP120 1.00 – 1.30	(CH) CLAY	37.5	100	83	61	17.0	4
		19.0	99				
		2.36	95				
		0.075	85				
TP120 1.70 – 2.00	(CH) Silty Sandy CLAY	37.5	100	67	44	18.5	4
		19.0	99				
		2.36	93				
		0.075	69				
TP121 0.50 – 0.70	(CH) CLAY	37.5	100	60	42	18.5	4
		19.0	100				
		2.36	100				
		0.075	81				
TP121 1.00 – 1.20	(CH) CLAY	37.5	100	55	34	17.5	2
		19.0	100				
		2.36	96				
		0.075	79				
TP121 1.50 – 1.70	(CL) Gravelly Sandy CLAY	37.5	100	47	23	10.0	2
		19.0	100				
		2.36	83				
		0.075	50				

Location and Depth (m)	Material Description	Grading		Atterberg Limits			Emerson Class
		Sieve (mm)	% Pass	Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	
TP122 0.50 – 0.70	(CH) CLAY	37.5	100	76	54	21.0	4
		19.0	100				
		2.36	100				
		0.075	85				
TP122 1.00 – 1.20	(CH) CLAY	37.5	100	83	61	22.0	4
		19.0	100				
		2.36	99				
		0.075	89				
TP122 1.20 – 1.30	(SC) Clayey SAND	37.5	100	36	10	5.0	2
		19.0	100				
		2.36	100				
		0.075	33				

Results of the laboratory testing indicate that the site soils typically have Emerson Classes of 2 (Sandy CLAY) or Emerson Classes of 4 (CLAY).

A soil of Emerson Class 2 can generally be described as having the following properties:

- Is susceptible to slaking (breaking up upon absorbing water from oven-dried condition);
- Is weakly susceptible to dispersion (allow the clay fraction of the soil to dissolve) when submerged in water.

A soil of Emerson Class 4 can generally be described as having the following properties:

- Is susceptible to slaking (breaking up upon absorbing water from oven-dried condition);
- Will not disperse (allow the clay fraction of the soil to dissolve) when submerged in water;
- Contain calcite or gypsums.

6.0 Discussion and Recommendations

6.1 Pavement Design

6.1.1 Design Subgrade CBR Values

Subgrade CBR test results from the nineteen tests carried out as part of investigations at the site ranged from 2.5% to 7%.

Based on the results of the field work, laboratory testing, and previous experience in the surrounding area, the following design California Bearing Ratio (CBR) values have been adopted for pavement thickness design for the proposed subdivision roads.

TABLE 5 – DESIGN SUBGRADE CBR VALUES

Road Section	Design Subgrade	Design CBR (%)
To Be Confirmed	Residual Clay, Controlled Fill - low CBR as encountered in test pits TP103 and TP117	2.5
To Be Confirmed	Residual Clay, Controlled Fill	3.0
To Be Confirmed	Residual Clay, Controlled Fill	3.5
To Be Confirmed	Residual Clay, Controlled Fill	4.0
To Be Confirmed	Weathered Rock	8

Notes:

1) Design subgrade CBR values should be confirmed at the time of construction by the geotechnical authority for each relevant road section.
2) Fill placed at road subgrade level should be assessed by the geotechnical authority. If the fill is assessed to have CBR different to that of the design CBR, then a revised pavement design will be required for that section.

Based upon the test results from the site, it is anticipated that:

- **Design subgrade CBR of 3.0% to 4.0% will apply to the majority of road sections.** The design CBR would generally depend upon nearby CBR results, depths of cutting carried out, and CBR of material used as fill where filling is carried out;
- Design subgrade CBR of 2.5%, may apply to localised road sections in the vicinity of TP103 and TP117, and possibly limited sections of other roads dependent on subgrade conditions encountered at the time of construction;
- Design subgrade CBR of 8% may apply to some road sections in deeper cuts which expose weathered rock provided that the ripped and re-compacted weathered rock is confirmed to have a design CBR $\geq$ 8%.

If rock subgrade materials are encountered, the rock should be ripped and re-compacted for a minimum depth of 300mm to break-up any preferential drainage paths and provide a dense homogenous surface on which to construct the pavement.

As noted above, design subgrade CBR values should be confirmed at the time of construction by the geotechnical authority for each relevant road section.

Subgrade should be prepared in accordance with the site preparation requirements presented in Section 6.3.

6.1.2 Design Traffic Loadings

For the purposes of flexible pavement design, design traffic loadings have been adopted in accordance with Maitland City Council (MCC) specifications for subdivision roads in terms of equivalent standard axles (ESA's) as outlined in Table 6.

Road classifications and design traffic loadings are based upon previous advice issued by Maitland City Council (MCC) for previous stages of nearby developments. Design traffic for is based upon similar roads within the nearby development. Designs are also provided for alternative Road Classifications if required.

TABLE 6 – DESIGN TRAFFIC LOADING

Road Classification	Maximum No. Lots Serviced	Road Name	Design Traffic (ESA's)
Local – Access or Place	20	Road 11, TBC	1×10^5
Local - Secondary	50	TBC	2×10^5
Local - Primary	100	TBC	5×10^5
Collector - Secondary	200	TBC	1×10^6
School Bus Route	-	TBC	2×10^6
Public Bus Route	-	Station Lane, TBC	5×10^6
Sub-Arterial	3500	Terriere Drive, TBC	1×10^7

Confirmation should be obtained from MCC with respect to the road classifications to be adopted. In the event that different design traffic design loadings are applicable, then the pavement thickness designs presented in this report should be reviewed.

6.1.3 Flexible Pavement Thickness Design

Flexible pavement thickness design has been based on the procedures outlined in:

- MCC – Manual of Engineering Standards 2014 – Pavement Design;
- Austroads, "Guide to Pavement Technology, Part 2: Pavement Structural Design";
- ARRB Special Report No 41;
- APRG Report No 21.

Flexible Pavement Thickness Designs are presented in Table 7 to Table 14.

Pavement Material Specification and Compaction Requirements are presented in Table 15.

A bridging layer should be allowed for beneath the pavement where road pavement crosses any areas where poor, wet or saturated subgrade conditions are encountered. The requirement (if any) for bridging layers is likely to be dependent on the prevailing weather conditions at the time of construction.

For areas where poor or wet subgrade conditions are encountered, pavement design may require a select layer prior to design pavement thickness construction.

If stabilised subgrade is adopted, then the suitability of proposed liming rates should be confirmed by laboratory testing prior to construction.

If a select layer is required for the purpose of providing additional cover over expansive soils, the select layer should comprise Select Fill rather than lime stabilised subgrade.

If rock subgrade materials are encountered, the rock should be ripped and re-compacted for a minimum depth of 300mm to break-up preferential drainage paths and provide a dense homogenous surface on which to construct the pavement.

Any areas of uncontrolled fill should be replaced as controlled fill in accordance with AS3798-2007 prior to pavement construction.

It is recommended that each construction length be boxed out to the minimum subgrade level required by the relevant pavement thickness design. Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.

Design / Construction Consideration:

With reference to the laboratory CBR test results, swells for the 19 samples tested varied from 1% to 3.5%. 15 of the 19 samples had swells of between 1.0% and 2.5%, and the two swell results of 3.5% correspond to the low CBR = 2.5% encountered at TP103 and TP117.

This indicates that the majority of subgrade soils are within the Moderate 'Expansive Nature' range, with reference to Table 5.2 in Austroads 2017 – Guide to Pavement Technology Part 2: Pavement Design (Austroads 2017), and that four samples obtained from test pits TP103, TP107, TP108 and TP117 are within the High 'Expansive Nature' range.

Austroads states that volume changes in highly expansive soils can be minimised by several options, one of which includes:

- '*Provide a low-permeability lower subbase or a select fill capping layer above the expansive soil. The minimum thickness of this layer should be the greater of 150mm or two-and-a-half times the maximum particle size. This capping layer should extend at least 500mm past the edge of pavement, and if provided, past the kerb and channel, to reduce edge movement*'.

Based on recent experience for similar projects, MCC representatives have typically been directing the placement of a 300mm select layer in addition to the minimum pavement thickness design provided where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.

MCC 'Notice of Determination – Development Application (Amended)', Ref. DA/2017/1781:1, dated 27 July 2020 has been previously provided by the client for a nearby development, which included the following Condition:

- '*37.* ***Prior to the issue of Subdivision Works Certificate*** *a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays.*'

Therefore, it is recommended that for tendering / pricing of works, any Contractors allow for an additional 300mm Select Layer of '*subbase quarry product material*' as per anticipated MCC Conditions, in addition to the pavement thickness designs provided below in accordance with Austroads and MCC design standards.

Additional pavement design options have been included with the incorporation of a Select Layer as an alternative in Table 14. However, it is noted that if the Select Option is to be adopted, confirmation should be obtained in advance from MCC with respect to whether they would still require an extra 300mm Select Layer due to the presence of 'high swell clays', in addition to the 300mm Select Layer included in the pavement design.

Based upon experience with nearby subdivision developments, it is expected that MCC will require wearing course to be asphaltic concrete.

Qualtest could provide designs based upon a two-coat seal if required in accordance with MCC specification; however, the pavement subbase and total thickness specified above would generally be increased by the asphalt depths specified in Table 7 to Table 10. MCC states, '*Asphaltic concrete thickness shall be a minimum of 30mm and may be included as pavement "depth" in determining the pavement thickness. Two coat flush bitumen seals shall not be considered part of the pavement thickness*'.

<u>Roundabout</u>

Based on recent experience for nearby projects, it is envisaged that Council may require a deep lift asphalt (typically 175mm to 190mm thickness overlying unbound subbase) pavement for the Terriere Drive roundabout. Qualtest can arrange for mechanistic analysis and design of this pavement if required.

TABLE 7 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – LOCAL – ACCESS OR PLACE

Road Classification	Local – Access or Place				
Design Traffic Loading (ESA's)	1×10^5				
Design Subgrade CBR (%)	2.5	**3.0**	**3.5**	**4.0**	8.0
Wearing Course (mm)	30 AC10	**30 AC10**	**30 AC10**	**30 AC10**	30 AC10
Base Course (mm)	120	**120**	**120**	**120**	120
Subbase (mm)	280	**230**	**210**	**190**	150
Select Fill (mm)	-	**-**	**-**	**-**	-
Total Thickness (mm)	430	**380**	**360**	**340**	300

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill comprising approved material meeting requirements of Table 15, or Stabilised Subgrade – Lime stabilised with either 3% quicklime or 4% hydrated lime.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.
6) Note MCC Notice of Determination on nearby projects. '*Prior to the issue of Subdivision Works Certificate a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays*'.
7) Due to construction practicalities when tying in with depth of kerb and gutter construction, the basecourse layer depth may be increased from 120mm to 150mm. The subbase thickness may be reduced accordingly, by up to 30mm, provided that this does not result in a minimum subbase thickness of less than 125mm.

TABLE 8 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – LOCAL – SECONDARY

Road Classification	Local – Secondary				
Design Traffic Loading (ESA's)	2×10^5				
Design Subgrade CBR (%)	2.5	**3.0**	**3.5**	**4.0**	8.0
Wearing Course (mm)	30 AC10	**30 AC10**	**30 AC10**	**30 AC10**	30 AC10
Base Course (mm)	120	**120**	**120**	**120**	120
Subbase (mm)	320	**280**	**250**	**220**	150
Select Fill (mm)	-	**-**	**-**	**-**	-
Total Thickness (mm)	470	**430**	**400**	**370**	300

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill comprising approved material meeting requirements of Table 15, or Stabilised Subgrade – Lime stabilised with either 3% quicklime or 4% hydrated lime.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.
6) Note MCC Notice of Determination on nearby projects. '*Prior to the issue of Subdivision Works Certificate a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays*'.
7) Due to construction practicalities when tying in with depth of kerb and gutter construction, the basecourse layer depth may be increased from 120mm to 150mm. The subbase thickness may be reduced accordingly, by up to 30mm, provided that this does not result in a minimum subbase thickness of less than 125mm.

TABLE 9 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – LOCAL – PRIMARY

Road Classification	Local – Primary				
Design Traffic Loading (ESA's)	5×10^5				
Design Subgrade CBR (%)	2.5	**3.0**	**3.5**	**4.0**	8.0
Wearing Course (mm)	30 AC10	**30 AC10**	**30 AC10**	**30 AC10**	30 AC10
Base Course (mm)	120	**120**	**120**	**120**	120
Subbase (mm)	380	**320**	**290**	**270**	150
Select Fill (mm)	-	**-**	**-**	**-**	-
Total Thickness (mm)	530	**470**	**440**	**420**	300

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill comprising approved material meeting requirements of Table 15, or Stabilised Subgrade – Lime stabilised with either 3% quicklime or 4% hydrated lime.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.
6) Note MCC Notice of Determination on nearby projects. '*Prior to the issue of Subdivision Works Certificate a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays*'.
7) Due to construction practicalities when tying in with depth of kerb and gutter construction, the basecourse layer depth may be increased from 120mm to 150mm. The subbase thickness may be reduced accordingly, by up to 30mm, provided that this does not result in a minimum subbase thickness of less than 125mm.

TABLE 10 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – COLLECTOR - SECONDARY

Road Classification	Collector – Secondary				
Design Traffic Loading (ESA's)	1×10^6				
Design Subgrade CBR (%)	2.5	**3.0**	**3.5**	**4.0**	8.0
Wearing Course (mm)	40 AC10	**40 AC10**	**40 AC10**	**40 AC10**	40 AC10
Base Course (mm)	150	**150**	**150**	**150**	150
Subbase (mm)	380	**330**	**290**	**250**	150
Select Fill (mm)	-	**-**	**-**	**-**	-
Total Thickness (mm)	570	**520**	**480**	**440**	340

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill comprising approved material meeting requirements of Table 15, or Stabilised Subgrade – Lime stabilised with either 3% quicklime or 4% hydrated lime.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.
6) Note MCC Notice of Determination on nearby projects. '*Prior to the issue of Subdivision Works Certificate a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays*'.

TABLE 11 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – SCHOOL BUS ROUTE

Road Classification	School Bus Route				
Design Traffic Loading (ESA's)	2×10^6				
Design Subgrade CBR (%)	2.5	**3.0**	**3.5**	**4.0**	8.0
Wearing Course (mm)	40 AC10	**40 AC10**	**40 AC10**	**40 AC10**	40 AC10
Base Course (mm)	150	**150**	**150**	**150**	150
Subbase (mm)	430	**370**	**330**	**290**	150
Select Fill (mm)	-	**-**	**-**	**-**	-
Total Thickness (mm)	620	**560**	**520**	**480**	340

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill comprising approved material meeting requirements of Table 15, or Stabilised Subgrade – Lime stabilised with either 3% quicklime or 4% hydrated lime.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.
6) Note MCC Notice of Determination on nearby projects. '*Prior to the issue of Subdivision Works Certificate a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays*'.

TABLE 12 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – PUBLIC BUS ROUTE

Road Classification	Public Bus Route				
Design Traffic Loading (ESA's)	5×10^6				
Design Subgrade CBR (%)	2.5	**3.0**	**3.5**	**4.0**	8.0
Wearing Course (mm)	40 AC10	**40 AC10**	**40 AC10**	**40 AC10**	40 AC10
Base Course (mm)	150	**150**	**150**	**150**	150
Subbase (mm)	480	**420**	**380**	**340**	160
Select Fill (mm)	-	**-**	**-**	**-**	-
Total Thickness (mm)	670	**610**	**570**	**530**	350

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill comprising approved material meeting requirements of Table 15, or Stabilised Subgrade – Lime stabilised with either 3% quicklime or 4% hydrated lime.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.
6) Note MCC Notice of Determination on nearby projects. '*Prior to the issue of Subdivision Works Certificate a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays*'.

TABLE 13 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – SUB ARTERIAL

Road Classification	Sub Arterial				
Design Traffic Loading (ESA's)	1×10^7				
Design Subgrade CBR (%)	2.5	**3.0**	**3.5**	**4.0**	8.0
Wearing Course (mm)	50 AC14	**50 AC14**	**50 AC14**	**50 AC14**	50 AC14
Base Course (mm)	160	**160**	**160**	**160**	160
Subbase (mm)	500	**430**	**390**	**350**	170
Select Fill (mm)	-	**-**	**-**	**-**	-
Total Thickness (mm)	710	**640**	**600**	**560**	380

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill comprising approved material meeting requirements of Table 15, or Stabilised Subgrade – Lime stabilised with either 3% quicklime or 4% hydrated lime.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell, moisture condition, density or consistency.
6) Note MCC Notice of Determination on nearby projects. '*Prior to the issue of Subdivision Works Certificate a minimum 300mm select layer of subbase quarry product material shall be added to the pavement design due to the presence of high swell clays*'.

TABLE 14 – FLEXIBLE PAVEMENT THICKNESS DESIGN SUMMARY – 300MM SELECT LAYER

Road Classification	Local – Secondary	Local – Primary	Collector – Secondary	School Bus Route	Public Bus Route	Sub Arterial
Design Traffic Loading (ESA's)	2×10^5	5×10^5	1×10^6	2×10^6	5×10^6	1×10^7
Design Subgrade CBR (%)	2.5	2.5	2.5	2.5	2.5	2.5
Wearing Course (mm)	30 AC10	30 AC10	40 AC10	40 AC10	40 AC10	50 AC14
Base Course (mm)	120	120	150	150	150	160
Subbase (mm)	200	250	240	270	320	330
Select Fill (mm) *	300	300	300	300	300	300
Total Thickness (mm)	650	700	730	760	810	840

Notes:

1) A 10mm primer seal should be placed over the base course prior to placement of the asphaltic concrete wearing course.
2) * Select Fill to comprise approved material meeting requirements of Table 15. Not to comprise cemented subbase or lime stabilised subgrade unless approved by MCC and the geotechnical authority.
3) An allowance for additional subgrade replacement should be anticipated in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement for, and depth and extent of any subgrade replacement / select filling, should be confirmed by the geotechnical authority at the time of construction.
4) Prior to pavement construction, the exposed subgrade should be assessed by the geotechnical authority to confirm the pavement thickness requirement for that section.
5) MCC may direct the placement of a 300mm select layer in addition to minimum pavement thickness designs provided above, where clay subgrade soils are considered to be expansive soils, irrespective of subgrade CBR, swell moisture condition, density or consistency.

   Confirmation should be obtained from MCC whether an additional 300mm select layer is required in addition to the select layer included in the Select Option pavement designs provided above.
6) Due to construction practicalities when tying in with depth of kerb and gutter construction, the basecourse layer depth may be increased from 120mm to 150mm. The subbase thickness may be reduced accordingly, by up to 30mm, provided that this does not result in a minimum subbase thickness of less than 125mm.

TABLE 15 – PAVEMENT MATERIAL SPECIFICATION AND COMPACTION REQUIREMENTS

Pavement Course	Material Specification	Compaction Requirements
Wearing Course (AC)	Maitland City Council Spec.	Maitland City Council Spec.
Base Course	CBR ≥ 80%, PI ≤ 6%	98% Modified (AS1289 5.2.1)
Subbase	CBR ≥ 30%, PI ≤ 12%	95% Modified (AS1289 5.2.1)
Select Fill / Stabilised Subgrade	Select Fill, CBR ≥ 15%, PI ≤ 15%, max particle size 75mm Or 2% cement stabilised subbase material Or Stabilised Subgrade - lime stabilised with either 3% quicklime or 4% hydrated lime to achieve CBR ≥ 10%	95% Modified (AS1289 5.2.1)
Subgrade (top 300mm)	Minimum CBR = Design CBR	100% Standard (AS1289 5.1.1)
Subgrade / Fill Below	Minimum CBR = Design CBR	95% Standard (AS1289 5.1.1)

Notes:

1) Pavement materials for base course and subbase shall also comply with Maitland City Council (MCC) Manual of Engineering Standards Appendix D – Pavement Material Properties
2) CBR = California Bearing Ratio, PI = Plasticity Index.
3) Select Fill / Stabilised Subgrade option adopted will be dependent on subgrade moisture conditions. If the select layer is required for the purpose of providing additional cover over expansive soils, the select layer should comprise Select Fill rather than lime stabilised subgrade.

6.1.4 Construction Considerations

Care should also be taken to follow recommended construction practices when constructing new pavement adjacent to existing, including:

- A clean, vertical perpendicular surface at full depth should be cut for both transverse and longitudinal jointing. This will reduce the risk of plating and heaving effects on the pavement;
- Ensuring joints are not in wheel paths;
- Ensuring joints in sub-base / select layers are offset to joints in the base layer;
- Ramping between layers, and at the entry and exit points to the pavement, must be removed at all times. During construction, any temporary access ramps to properties or driveways must also be removed.

A bridging layer should be allowed for beneath the pavement where road pavements cross gullies and in any areas where poor, wet or saturated subgrade conditions are encountered. The requirement (if any) for bridging layers is likely to be dependent on the prevailing weather conditions at the time of construction.

6.2 Excavation Conditions

The depths of fill, topsoil, alluvium, colluvium, residual soils and weathered rock, together with depths of slow progress or refusal of the excavator where encountered, are summarised in Section 4.2.

In terms of excavation conditions, site materials can generally be divided into:

- Clayey and Granular Soils (Units 1, 2, 3, & 4). It is anticipated that these materials could be excavated by a conventional excavator or backhoe bucket;
- Extremely to Highly Weathered Rock or better (Units 5 & 6). Rippability is dependent on rock strength, degree of weathering and number of defects within the rock mass which can vary significantly.

It is anticipated that the Weathered Rock (Unit 5 & 6) material encountered could be excavated by conventional excavator at least to the depths indicated on the appended test pit logs.

It is expected that material below the depth of excavator bucket refusal will be excavatable by ripping to some greater depth, although this has not been assessed as part of the current investigation.

It is recommended that targeted investigations (e.g. cored boreholes) are carried out if significant excavations are proposed where bedrock depth or excavatability is important to design or construction.

The use of toothed buckets, ripping tines, and/or hydraulic rock hammers may be required if hard bands of weathered rock are encountered or for deep confined excavations such as for service trenches. Higher strength rock or randomly occurring hard bands within the rock mass if encountered, are likely to occur towards the base of deeper cuts. Methods including rotary heads, sawing, hydraulic breaking and/or pre-splitting may be considered to improve excavatability and geometry if higher strength rock is encountered.

Groundwater may exist at localised areas of the site such as within the topsoil and/or Alluvium profile, from water perched above the residual clay / bedrock profile, particularly in the vicinity of watercourses, dams or former drainage channels. It is possible that slow water inflow may be encountered from such layers, particularly if earthworks are carried out during or following periods of wet weather.

Excavations should be supported by properly designed and constructed retaining walls or else battered at 1V:2H or flatter and protected from erosion.

Temporary excavations should be battered at 1V:1H or flatter in cohesive soils, or 1V:1.5H or flatter in granular soils, and protected from erosion. Steeper excavations may be supported by means of temporary shoring.

Temporary excavations to depths of up to 1.2m in competent compact material with sufficient cohesion, such as clay of stiff consistency or better may be battered vertically, subject to inspection during excavation by the geotechnical authority.

The safe working procedures of Work Cover NSW Excavation work code of practice, dated January 2020 should be followed.

Care should be taken not to disturb or destabilise existing underground services or structures.

6.3 Site Preparation

Site preparation and earthworks suitable for pavement support and site re-grading should consist of:

- Following any bulk excavation to proposed subgrade level, all areas of proposed pavement construction or site re-grading should be stripped to remove all existing uncontrolled fill, vegetation, topsoil, root affected or other potentially deleterious materials;
- Stripping is generally expected to be required to depths of about 0.2m to 0.4m to remove topsoil and root affected material. Stripping of greater depths of fill material in addition to topsoil and root affected material is anticipated in areas affected by fill mounds or surface filling;
- Additional stripping may be required in any areas where poor, wet or saturated subgrade conditions are encountered;
- Following stripping, the exposed subgrade should be proof rolled (minimum 10 tonne static roller), to identify any wet or excessively deflecting material. Any such areas should be over excavated and backfilled with an approved select material;
- The moisture content of the subgrade materials and therefore the need for moisture conditioning or over-excavation and replacement, will be largely dependent on pre-existing and prevailing weather conditions at the time of construction;
- Subgrade preparation should be carried out using a tracked excavator equipped with a smooth sided ('gummy') bucket to minimise the risk of over-disturbance of soils;
- Protect the area after subgrade preparation to maintain moisture content as far as practicable. The placement of subbase gravel would normally provide adequate protection;
- Site preparation should include provision of drainage and erosion control as required, as well as sedimentation control measures.

At the time of the field investigations, moisture content for the clay subgrade material tested varied from 5.3% dry to 8.4% wet of standard Optimum Moisture Content (OMC). It should therefore be anticipated that moisture conditioning of the subgrade is likely to be necessary prior to compaction and placement of pavement materials.

The required time period to prepare the subgrade is likely to be dependent on the prevailing weather conditions at the time of construction.

If over-wet subgrades exist at the time of construction or deleterious materials are encountered at subgrade level, these materials should be over-excavated and be replaced with well graded granular select material with CBR of 15% or greater, or other material approved by the geotechnical authority as appropriate to the site conditions. The requirement for, and extent of subgrade replacement, should be confirmed by the geotechnical authority at the time of construction.

If the Lime Stabilisation option was to be considered, further testing would be required to confirm percentage of lime required and that adequate increase in CBR could be achieved following mixing. If the select layer is required for the purpose of providing additional cover over expansive soils, the select layer should comprise Select Fill rather than lime stabilised subgrade.

6.4 Fill Construction Procedures

Earthworks for pavement construction or support of foundations should consist of the following measures:

- Approved fill beneath pavements should be compacted in layers not exceeding 300mm loose thickness to the compaction requirements provided in Table 15;
- The top 300mm of natural subgrade below pavements or the final 300mm of road subgrade fill should be compacted to provide a subgrade that is within the moisture range of 60% to 90% of Optimum Moisture Content (OMC);
- Site fill beneath structures should be compacted to a minimum density ratio of 98% Standard Compaction within ±2% of OMC in cohesive soils;
- All fill should be supported by properly designed and constructed retaining walls or else battered at 1V:2H or flatter and protected against erosion;
- If fill is to be placed on slopes in excess of 1V:8H (7°), a prepared surface should be benched or stepped into the slope; and,
- Earthworks should be carried out in accordance with the recommendations outlined in AS3798-2007 'Guidelines for Earthworks for Commercial and Residential Developments'.

6.5 Suitability of Site Materials for Re-Use as Fill

The following comments are made with respect to suitability of site materials for re-use as fill:

- Unit 1A Topsoil Fill and Unit 2 Topsoil materials are expected to be suitable for landscaping purposes only;
- Unit 1B - Fill materials may be variable. Some fill material may be suitable for landscaping purposes only due to the presence of roots and organics. If fill material is not affected by roots or other deleterious material, it is generally expected to be suitable for re-use as general fill for engineering purposes. Suitability for re-use should be confirmed prior to, or at the time of construction;
- Unit 3 – Colluvium/Alluvium may be variable and suitability for re-use should be confirmed at the time of construction;
- Unit 4 - Residual Soils are generally expected to be suitable for re-use as general fill for engineering purposes;
- Unit 5 - Extremely Weathered Rock is generally expected to be suitable for re-use as general fill for engineering purposes; and,
- Unit 6 - Highly Weathered Rock (or better) are generally expected to be suitable for re-use as general fill for engineering purposes. These materials may require sorting or processing by crushing / screening depending upon excavation methods, source material characteristics and proposed uses.

Final selection of fill materials should consider properties such as reactivity which is typically high for site won Unit 3 Colluvium / Alluvium and Unit 4 Residual Soils. The deeper sandy and gravelly Residual soils and the Weathered Rock are expected to be less reactive and likely to be preferred for use as the upper layers of lot filling to reduce calculated surface movements and subsequent site classifications to AS2870-2001.

The suitability of material for re-use should be assessed and confirmed by the geotechnical authority at the time of construction. The materials may require some moisture conditioning.

6.6 Proposed Detention Basin

6.6.1 Site Materials and Suitability

TP101, TP120, TP121 and TP122 were excavated within the footprint of proposed detention basin locations, to depths between 1.2m and 1.7m.

The profile encountered in test pits generally comprise Topsoil to depths of 0.10m and 0.25m, overlying Residual CLAY / Gravelly Sandy CLAY / Sandy CLAY soils to depths between 0.60m and 2.00m.

Extremely Weathered Rock breaking down into Clayey Gravelly SAND was only encountered in TP101 and TP122 from a depth of 0.60m and 1.20m, respectively. Test pits TP101, TP121 and TP122 were terminated due to slow progress at depths between 1.20m of 1.70m.

Detention basin embankments should be constructed using approved impervious materials. As a guide, material should have:

- Greater than 30% clay content;
- Plasticity index of between 10% and 50%;
- Permeability of less than 1 x 10^{-8} metres per second;
- Emerson Class Number of 4 or greater;
- Maximum particle size of 100mm.

The soil / rock profile encountered in test pits / boreholes during the current investigation by Qualtest are summarised in Section 4.

Emerson testing on the site soils indicated Emerson Classes of 2 and 4. An Emerson Class of 2 is considered weakly susceptible to dispersion (clay fraction of the soil dissolves) when submerged in water.

It is recommended that any soil with Emerson Class ≤ 3 should be blended with other materials, or alternatively be stabilised with addition of 1% to 2% gypsum added to the soil and blended prior to usage in basin embankments. It is recommended that any blended or gypsum treated material be tested to confirm suitable Emerson Class prior to placement.

Results of laboratory testing of the Residual Clay Soil from the proposed basin footprint indicated that the material is likely to have relatively high plasticity index, with the soil logged as medium to high plasticity. These soils may be susceptible to swelling and softening when wet, and shrinking and block cracking when dry.

Where lower plasticity material is recommended, suitable site material should be selectively won and stockpiled, imported materials may be used, or treatment of the high plasticity Residual Soil may be carried out with gypsum and/or lime, and/or blending with lower plasticity material such as Extremely to Highly Weathered Rock or Clayey SAND may be suitable.

The Residual Sandy CLAY (Unit 4) materials are likely to be of relatively low permeability and suited for dam wall construction on the basis of permeability. Previous experience and literature indicates similar materials may have permeability of order of magnitude ranging from about 10^{-7} to about 10^{-10} metres per second (about 0.01 millimetres to about 100mm per day). More sandy material such as Clayey Gravelly SAND is likely to be of higher permeability, and may be more suitable if blended with Sandy CLAY material.

These materials are likely to require some moisture conditioning prior to dam embankment construction.

If fill is used to construct the basin, it should be approved by the geotechnical authority and placed under Level 1 supervision in accordance with AS3798-2007, and the general procedures outlined in Sections 6.3, 6.4 and 6.6.

6.6.2 Construction Recommendations

Earthworks for embankment construction should be in general accordance with Section 6.3 and 6.4 above, with the additional measures recommended below:

- Earthworks should be carried out in general accordance with the recommendations outlined in AS3798-2007 '*Guidelines for Earthworks for Commercial and Residential Developments*', and the general procedures outlined in Sections 6.3 and 6.4;
- Where fill is placed on slopes in excess of 1V:8H (7°), a prepared surface should be benched or stepped into the natural slope;
- Detention Basin embankments should be constructed using approved low permeability / impervious materials, with material specification as outlined in Section 6.6.1;
- Fill should be compacted in layers not exceeding 300mm loose thickness to a minimum density ratio of 98% Standard Compaction within ±2% of OMC. As a guide, this is likely to require at least 10 passes of a 10 tonne pad foot roller for each layer of fill placed;
- Embankment materials shall be uniformly watered, tined and rolled to produce homogenous layers over the full width of the embankment. Embankments shall be overfilled and trimmed back to design grades to expose materials compacted to the minimum standards specified above;
- Detention basin embankments should include a clay cut-off trench, 'keyed' a minimum depth of 0.5m into the underlying relatively impervious Colluvium / Residual Soils (Unit 3 & 4), with a minimum undrained shear strength S_U of 50kPa. The base of the cut off trench should be at least 3m in width to allow compaction by a pad foot roller;
- Material and key in requirements for the cut-off trench should be confirmed by the geotechnical authority at the time of construction.
- Fill may require treatment by gypsum, which can be done by mixing either in the stockpile area, or by adding and mixing through each layer following placing and prior to compaction. A pulvi mixer or rotary hoe should be used to achieve thorough mixing. Mixing by use of ripper tines is not recommended.
- All fill should be supported by properly designed and constructed retaining walls or else battered as recommended in Section 6.6.3 and protected against erosion;
- Fill material placed alongside pipes or other structures should be compacted using hand operated equipment or small compaction equipment to avoid damage to the structure, with care taken to ensure compaction is achieved;
- The embankment surface must be overlain by geofabric prior to placement of any rockfill such as rip rap.

Care should be taken to use materials and methods, which do not create a significant risk of leaving preferential underground drainage paths, which could result in softening of the surrounding areas, piping erosion and/or localised seepage.

The floor should be inspected for the presence of sand lenses, joints/fissures, or other potential conduits for water passage through the foundation. The geotechnical authority should provide advice on specific additional treatment requirements if such features are exposed.

6.6.3 Batter Slopes & Erosion Control

Excavations for the basins in site materials should be battered at 1V:3H or flatter, and protected from erosion.

Where the dam embankments are constructed of approved homogeneous earth fill, the embankments should be battered at maximum slopes of 1V:3.5H or flatter on the upstream side, and 1V:3H or flatter on the downstream side, and protected from erosion.

Selection of batter slopes should consider future maintenance activities such as operation of mowing equipment where necessary, typically requiring batters of 1V:4H or flatter.

Slopes should be designed for surcharge loading from slopes, retaining walls, structures, plant, and other anticipated loading in the vicinity of the slope.

Drainage measures should be implemented above and behind all temporary and permanent batter slopes to avoid concentrated water flows on the face or infiltration into the soil/rock profile behind the face. Surface water flows from upslope areas should be diverted away from the face.

Results of Emerson testing provide an indication into potential susceptibility to erosion. Where the results indicate that site materials are likely to be susceptible to dispersion, special care should be taken to prevent erosion by rainfall etc. The addition of gypsum may provide improved performance in some cases.

Erosion protection may include such measures as the addition of a topsoil horizon (minimum thickness of 200mm) and vegetation, or alternatively support by geosynthetic and nails, rock spall, gabion / terramesh walls or concrete lining.

The need for and selection of erosion protection will depend upon performance expectations (e.g. whether slumping is acceptable), and on operational factors (e.g. areas which may experience higher water velocities will require more robust protection).

A suitably designed spillway should be constructed to handle flood flows and prevent water overtopping the embankment, with scour protection of the downstream outlet channel comprising of a suitable riprap, rock fill, gabions or equivalent.

Ongoing monitoring of the performance and condition of the completed detention basin and earthworks should be carried out, particularly during and after large rainfall events. Maintenance or repair of aspects such as erosion protection measures may be required based on these observations.

Levels of soil erosion during construction should be able to be maintained within normally acceptable levels by adopting good soil erosion and sedimentation control practices, including:

- Minimise the area and duration of soil exposure by staged development and controlled clearing;
- Stockpile stripped soil for reuse and protect from erosion;
- Control storm water run-off by diverting clean run-off from denuded areas, minimising slope gradient, length and run-off velocities;
- Trap soil and water pollutants using silt traps, sediment basins, perimeter banks, silt fences and nutrient traps as appropriate;
- Re-vegetate as soon as is practicable, including the application of topsoil / hydromulch where necessary.

6.7 Special Requirements for Construction Procedures and Drainage

Care should be taken during backfilling of any dams or drainage depressions to reduce the risk of leaving a preferential underground drainage path which could result in softening of the surrounding area, piping erosion and/or localised seepage.

Potential effects of slope modifications on groundwater flowing from upslope should also be considered, with provision of subsurface drainage to intercept and redirect groundwater where assessed to be necessary.

The enclosed pavement thickness designs assume the provision of adequate surface and subsurface drainage of the pavement and adjacent areas to prevent moisture ingress into the pavement materials and subgrade. As a minimum, it is recommended that subsoil drains be installed:

- Along the high side of roads aligned across site slopes;
- Along both sides of roads aligned down slope.

It is recommended that surface and subsoil drainage be installed in line with the above advice, and in accordance with Maitland City Council specifications.

Adequate surface and subsurface drainage should be installed and connected to the stormwater disposal system.

Inspection should be carried out by a geotechnical authority during construction to confirm the conditions assumed in this report and in the design.

7.0 Limitations

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical design practices and standards. To our knowledge, they represent a reasonable interpretation of the general conditions of the site.

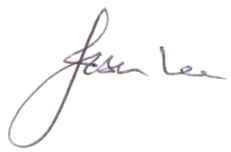
The extent of testing associated with this assessment is limited to discrete test locations. It should be noted that subsurface conditions between and away from the test locations may be different to those observed during the field work and used as the basis of the recommendations contained in this report.

If subsurface conditions encountered during construction differ from those given in this report, further advice should be sought without delay.

Data and opinions contained within the report may not be used in other contexts or for any other purposes without prior review and agreement by Qualtest. If this report is reproduced, it must be in full.

If you have any further questions regarding this report, please do not hesitate to contact Ben Edwards, Shannon Kelly, or the undersigned.

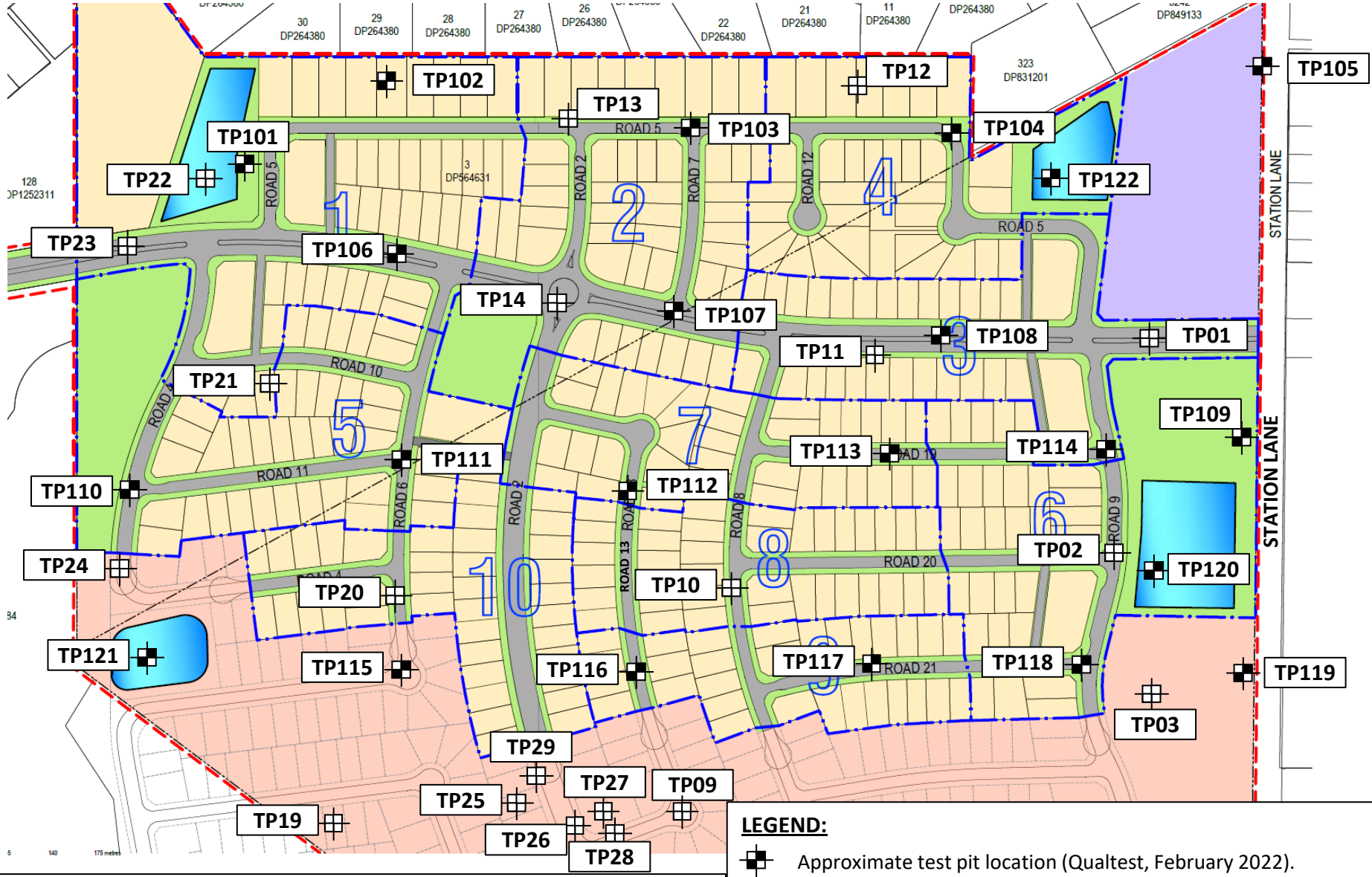
For and on behalf of Qualtest Laboratory (NSW) Pty Ltd.



Jason Lee
Principal Geotechnical Engineer

FIGURES:

Figure AC1 - Site Plan and Approximate Test Locations



Based on Site Plan prepared by ACOR Consultants Pty Ltd.
(Ref: Project No. NSW212012, Drawing No.: DA101-006, Issue: E, dated 24.03.22).

LEGEND:

- Approximate test pit location (Qualtest, February 2022).
- Approximate test pit location (Qualtest, September 2021).

Qualtest LABORATORY (NSW) PTY LTD

Client:	McCLOY PROJECT MANAGEMENT PTY LTD	Drawing No:	FIGURE AC1
Project:	PROPOSED RESIDENTIAL SUBDIVISION	Project No:	NEW21P-0129
Location:	51 & 134 STATION LANE, LOCHINVAR	Scale:	NOT TO SCALE
Title:	SITE PLAN AND APPROXIMATE TEST LOCATIONS	Date:	29/03/2022

APPENDIX A:

Results of Field Investigations

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP101

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 11/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered					CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine grained sand, root affected.					TOPSOIL
							0.10m CLAY - medium to high plasticity, dark grey to dark brown, with fine to coarse grained sand.	$M < w_P$	H	HP	>600	RESIDUAL SOIL
		0.40m B 0.60m		0.5		CH				HP	500	
							0.60m Extremely Weathered Andesite with soil properties; breaks down into Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with Clay pockets.					EXTREMELY WEATHERED ROCK
		1.00m B 1.20m		1.0		SC		D - M	D			
							1.20m Hole Terminated at 1.20 m Slow progress					
				1.5								
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP102

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 11/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
						CH	0.10m TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine grained sand, root affected.					TOPSOIL
							CLAY - medium to high plasticity, dark grey to dark brown, with fine to coarse grained sand.			HP	550	RESIDUAL SOIL
		0.40m				CH			H			
		CBR		0.5								
E	Not Encountered	0.60m					0.60m			HP	550	
							Gravelly Sandy CLAY - low to medium plasticity, pale brown to orange, with pale grey and red-brown, fine to coarse grained sand, fine grained angular gravel.	M < w_P				RESIDUAL SOIL / EXTREMELY WEATHERED ROCK
						CL			Fb / H			
				1.0			1.30m					
							Hole Terminated at 1.30 m Slow progress					
				1.5								
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP103

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 11/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
						CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine to coarse grained sand, root affected.					TOPSOIL
				0.15m								
E	Not Encountered	0.40m				CH	CLAY - medium to high plasticity, dark grey to dark brown, with fine to coarse grained sand.	M < w_P	H	HP	>600	RESIDUAL SOIL
		CBR		0.5						HP	550	
		0.60m										
				0.60m		SC	Extremely Weathered Andesite with soil properties; breaks down into Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with Clay pockets.	D - M	D			EXTREMELY WEATHERED ROCK
				0.80m			Hole Terminated at 0.80 m Slow progress					
				1.0								
				1.5								
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP104

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 11/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered	0.40m CBR 0.60m		0.5 1.0 1.5		CH CH SC	0.10m TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine to coarse grained sand, root affected. CLAY - medium to high plasticity, brown, with some fine to coarse grained sand. 1.20m Extremely Weathered Andesite with soil properties; breaks down into Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with Clay pockets. 1.90m	M < w_P D - M	H D	HP	500	TOPSOIL RESIDUAL SOIL EXTREMELY WEATHERED ROCK
				2.0			Hole Terminated at 1.90 m Slow progress					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP105

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 11/2/22

EQUIPMENT TYPE: HAND TOOLS
SURFACE RL:
TEST PIT LENGTH: 0.5 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
HT	Not Encountered	0.40m CBR 0.60m		0.5		SC CH	TOPSOIL: Clayey Gravelly SAND - fine to coarse grained, grey-brown, fine grained angular gravel, fines of low plasticity, root affected. 0.15m CLAY - medium to high plasticity, brown with dark grey, with fine to coarse grained sand. 0.80m	D - M M < w_P	H	HP HP	>600 >600	TOPSOIL RESIDUAL SOIL
				1.0 1.5 2.0			Hole Terminated at 0.80 m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP106

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 11/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered					CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine grained sand, root affected.					TOPSOIL
							0.10m CLAY - medium to high plasticity, dark grey to dark brown, with fine to coarse grained sand.					RESIDUAL SOIL
		0.40m				CH		M > w_P	VSt			
		CBR		0.5						HP	350	
		0.60m					0.60m			HP	350	
							Gravelly Sandy CLAY - low to medium plasticity, pale brown to orange, with pale grey and red-brown, fine to coarse grained sand, fine grained angular gravel.					RESIDUAL SOIL / EXTREMELY WEATHERED ROCK
				1.0		CL		M < w_P	H / Fb			
				1.5			1.80m					
							Hole Terminated at 1.80 m Slow progress					
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP107

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
						CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine to coarse grained sand, root affected.					TOPSOIL
							0.20m					
							CLAY - medium to high plasticity, brown, trace fine to coarse grained sand.					RESIDUAL SOIL
E	Not Encountered	0.40m								HP	>600	
		CBR		0.5		CH		M < w_P	H	HP	>600	
		0.60m										
				1.0			1.00m					
						SC	Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with Clay pockets.	D - M	D			RESIDUAL SOIL / EXTREMELY WEATHERED ROCK
							1.10m					
							Hole Terminated at 1.10 m Very slow progress					
				1.5								
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP108

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
E	Not Encountered	0.40m CBR 0.60m		0.5		CH	0.10m TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine to coarse grained sand, root affected.					TOPSOIL
						CH	CLAY - medium to high plasticity, brown, with fine to coarse grained sand.	M < w_P	H	HP	>600	RESIDUAL SOIL
						SC	0.60m Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with Clay pockets.	D - M	MD - D			RESIDUAL SOIL / EXTREMELY WEATHERED ROCK
							0.80m ANDESITE - grey to dark grey, brown to dark brown, estimated very low to medium strength (mostly very low to low strength), with extremely weathered pockets. 0.90m	D				EXTREMELY TO HIGHLY WEATHERED ROCK
				1.0			Hole Terminated at 0.90 m Very slow progress					
				1.5								
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP109

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered			0		CL	0.10m FILL-TOPSOIL: Sandy CLAY - low plasticity, dark brown, fine to coarse grained sand, with fine to medium grained angular to sub-angular gravel, root affected.	M < w_P				FILL: TOPSOIL
						GC	FILL: Clayey Sandy GRAVEL - fine to coarse grained, rounded to sub-angular, dark brown, with dark grey, fine to coarse grained sand, fines of low plasticity.	D - M				FILL
		0.40m					0.40m Sandy CLAY - medium to high plasticity, dark brown and dark grey, fine grained sand.	M < w_P	H	HP	>600	RESIDUAL SOIL
		CBR 0.60m		0.5						HP	410	
										HP	380	
				1.0		CH		M > w_P	VSt	HP	250	
										HP	300	
				1.5						HP	350	
										HP	380	
							1.80m					
						GC	1.90m Extremely Weathered Andesite with soil properties; breaks down into Clayey Sandy GRAVEL - fine to medium grained angular to sub-angular, dark grey and dark brown, fine to coarse grained sand, fines of medium plasticity.	D - M	D			EXTREMELY WEATHERED ROCK
				2.0			Hole Terminated at 1.90 m Slow progress					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP110

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1

PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129

LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE

DATE: 11/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:

TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
						CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine to coarse grained sand, root affected.					TOPSOIL
							0.10m CLAY - medium to high plasticity, grey and dark brown, with some fine to coarse grained sand.					RESIDUAL SOIL
										HP	320	
		0.40m										
		CBR		0.5								
		0.60m								HP	310	
						CH		M > w_P	VSt			
E	Not Encountered						red-brown and grey to brown.					
										HP	250	
				1.0								
							1.30m CLAY - medium high plasticity, grey to dark brown.					
										HP	460	
				1.5		CH		M < w_P	H			
										HP	500	
				2.0			2.00m					
							Hole Terminated at 2.00 m Slow progress					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP111

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 11/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
E	Not Encountered	0.40m CBR 0.60m		0.5 1.0		CH CH SC	0.10m TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine grained sand, root affected. CLAY - medium to high plasticity, dark grey to dark brown, trace fine to coarse grained sand, trace fine grained angular gravel. 0.60m Clayey SAND / Sandy CLAY - fine to coarse grained, pale brown, fines of low plasticity, trace fine grained angular gravel, with Clay pockets. With extremely to highly weathered rock pockets. 1.10m Hole Terminated at 1.10 m Slow progress	M < w_P D - M	H D	HP HP	450 420	TOPSOIL RESIDUAL SOIL RESIDUAL SOIL / EXTREMELY WEATHERED ROCK

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP112

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
						CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey to dark brown, fine grained sand, root affected.					TOPSOIL
							0.20m					
							CLAY - medium to high plasticity, dark brown, with some fine to coarse grained sand.					RESIDUAL SOIL
										HP	>600	
E	Not Encountered	0.40m										
		CBR		0.5						HP	>600	
		0.60m						M < w_P				
						CH	With Clayey SAND pockets.		H			
				1.0								
							Grading into extremely weathered rock.					
							1.10m					
							Hole Terminated at 1.10 m Very slow progress					
				1.5								
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP113

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered					CH	TOPSOIL: CLAY - medium to high plasticity, grey-brown, root affected.					TOPSOIL
							0.20m					
							CLAY - medium to high plasticity, pale brown to grey, with fine to coarse grained sand.					RESIDUAL SOIL
		0.40m								HP	280	
		CBR		0.5		CH		M > w_P				
		0.60m							VSt	HP	210	
							0.90m					
							Sandy CLAY - medium plasticity, orange-brown, fine grained sand.			HP	250	
				1.0		CI						
							Increasing in sand content.	M < w_P	H / Fb			
							1.40m					
							Extremely Weathered Andesite with soil properties; breaks down into Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with Clay pockets.					EXTREMELY WEATHERED ROCK / RESIDUAL SOIL
				1.5		SC		D - M	D			
							1.90m					
				2.0			Hole Terminated at 1.90 m Slow progress					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP114

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
E	Not Encountered	0.40m CBR 0.60m		0.5 1.0 1.5 2.0		CH CH SC SC	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected. 0.30m CLAY - medium to high plasticity, dark brown to dark grey, with some fine to coarse grained sand. 0.60m Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with Clay pockets. 1.00m Extremely Weathered Andesite with soil properties; breaks down into Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity, with highly weathered pockets. 1.20m Hole Terminated at 1.20 m Very slow progress	M ~ w_P D - M	H D	HP	420	TOPSOIL RESIDUAL SOIL EXTREMELY WEATHERED ROCK

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP115

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
				0		CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected.					TOPSOIL
							0.20m					RESIDUAL SOIL
E	Not Encountered	0.40m				CH	CLAY - medium to high plasticity, dark grey-brown, with some fine to coarse grained sand.			HP	550	
		CBR		0.5		CH	Brown, with some fine grained angular gravel.	M < w_P	H			
		0.60m								HP	500	
							0.70m					
						CL	Sandy CLAY / Clayey Gravelly SAND - low to medium plasticity, pale brown, fine to coarse grained sand, with fine grained angular gravel.		H / Fb			
				1.0			1.20m					
							Hole Terminated at 1.20 m Slow progress					
				1.5								
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP116

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
E	Not Encountered					CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected.					TOPSOIL
							0.20m					
							CLAY - medium to high plasticity, dark grey-brown, with some fine to coarse grained sand.	M < w_P	H	HP	>600	RESIDUAL SOIL
		0.40m								HP	380	
		CBR		0.5			Pale brown, trace fine grained angular gravel.					
		0.60m								HP	250	
							With some red-brown.					
				1.0		CH		M > w_P	VSt	HP	320	
							Pale brown to pale grey, with orange to red-brown.					
				1.5						HP	350	
							1.70m					
				2.0			Hole Terminated at 1.70 m Slow progress					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP117

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1

PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129

LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE

DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:

TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
E	Not Encountered	0.40m CBR 0.60m		0.5 1.0 1.5 2.0		CH CH CI	0.10m TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected. CLAY - medium to high plasticity, grey and brown, with some fine to coarse grained sand. Brown. 1.20m CLAY - medium plasticity, pale grey and dark brown, with orange to red-brown. With highly weathered pockets. 1.70m Hole Terminated at 1.70 m Slow progress	M < w_P M > w_P M < w_P	H VSt H	HP HP HP HP HP	>600 500 380 250 300 450	TOPSOIL RESIDUAL SOIL

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP118

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered	0.40m CBR 0.60m		0.5		CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected. 0.20m					TOPSOIL
						CH	CLAY - medium to high plasticity, dark brown to dark grey, with fine to coarse grained sand. 0.80m	M > w_P	VSt	HP	390	RESIDUAL SOIL
				1.0		GC	Extremely Weathered Andesite with soil properties; breaks down into Clayey Sandy GRAVEL - fine to medium grained angular to sub-angular, dark grey and dark brown, fine to coarse grained sand, fines of medium plasticity, with Clay pockets / bands. 1.10m	D - M	D	HP	300	EXTREMELY WEATHERED ROCK
				1.5			Hole Terminated at 1.10 m Slow progress					
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP119

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered			0		CI	TOPSOIL: Sandy CLAY - medium plasticity, brown, fine grained sand, trace fine grained angular gravel, root affected.	M ~ w_P				TOPSOIL
							0.20m					
						CH	Sandy CLAY - medium to high plasticity, brown, trace orange and pale grey, fine grained sand.		H	HP	>600	COLLUVIUM
										HP	450	
		0.40m					0.40m					
		CBR		0.5		CH	CLAY - medium to high plasticity, dark grey, with fine to coarse grained sand.		VSt	HP	350	ALLUVIUM
		0.60m										
				1.0				M > w_P		HP	250	
										HP	200	
							1.20m					
						CH	CLAY - medium to high plasticity, pale brown to grey, trace orange, with fine to coarse grained sand.			HP	180	RESIDUAL SOIL
							Trace red-brown, trace fine grained angular gravel.					
				1.5					St	HP	190	
							Pale grey, trace orange to red-brown.			HP	180	
							1.90m					
				2.0			SILTSTONE - pale brown and pale grey, estimated very low to low strength, fractured.	D				HIGHLY WEATHERED ROCK
							2.00m					
							Hole Terminated at 2.00 m Very slow progress					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
LOCATION: 51 & 134 STATION LANE, LOCHINVAR

TEST PIT NO: TP120
PAGE: 1 OF 1
JOB NO: NEW21P-0129
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
SURFACE RL:
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered					CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected.					TOPSOIL
							0.25m					
							CLAY - medium to high plasticity, dark brown to dark grey, with fine to coarse grained sand.			HP	180	RESIDUAL SOIL
		0.50m		0.5						HP	180	
		B 0.60m					Grey, with some orange, trace fine to coarse grained angular gravel.					
		1.00m		1.0		CH		M > w_P	St			
		B								HP	180	
		1.30m										
				1.5								
							1.60m			HP	180	
		1.70m					BASALT - dark grey to black, estimated medium to high strength, highly fractured.	D	MD - D			HIGHLY WEATHERED ROCK
							1.70m					
							Silty Sandy CLAY - medium to high plasticity, pale grey to pale brown, with orange to red-brown, fine to coarse grianed sand, trace fine to medium grained angular gravel.					RESIDUAL SOIL
		B				CH		M > w_P	VSt - H	HP	380 - 400	
		2.00m		2.0			2.00m					
							Hole Terminated at 2.00 m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP121

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
E	Not Encountered					CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected.					TOPSOIL
							0.20m					
							CLAY - medium to high plasticity, brown, with fine to coarse grained sand.	M < w_P	H	HP	550	RESIDUAL SOIL
		0.50m		0.5						HP	450	
		B								HP	380	
		0.70m				CH						
		1.00m		1.0				M > w_P	VSt	HP	350	
		B										
		1.20m										
							1.40m					
		1.50m		1.5		CL	Gravelly Sandy CLAY - low to medium plasticity, pale brown to brown, with pale grey and orange, fine to coarse grained sand, fine grained angular gravel.			HP	350	
		B					With extremely to highly weathered rock pockets.					
		1.70m					1.70m					
							Hole Terminated at 1.70 m Slow progress					
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - TEST PIT

TEST PIT NO: TP122

CLIENT: MCCLOY PROJECT MANAGEMENT PTY LTD
PAGE: 1 OF 1
PROJECT: PROPOSED RESIDENTIAL SUBDIVISION
JOB NO: NEW21P-0129
LOCATION: 51 & 134 STATION LANE, LOCHINVAR
LOGGED BY: BE
DATE: 10/2/22

EQUIPMENT TYPE: 2.7 TONNE EXCAVATOR
SURFACE RL:
TEST PIT LENGTH: 2.0 m **WIDTH:** 0.5 m
DATUM:

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
						CH	TOPSOIL: Sandy CLAY - medium to high plasticity, dark grey-brown, fine to medium grained sand, trace fine grained angular gravel, root affected.					TOPSOIL
							0.20m					
							CLAY - medium to high plasticity, brown, with fine to coarse grained sand.					RESIDUAL SOIL
										HP	250	
		0.50m		0.5								
E	Not Encountered	B				CH		M > w_P	VSt			
		0.70m								HP	250	
		1.00m		1.0								
		B								HP	180	
		1.20m							St			
		B					1.20m			HP	180	
		1.30m				SC	Clayey SAND - fine to coarse grained, pale brown, fines of low plasticity, trace fine grained gravel.					
							1.30m	D - M	D			
						SC	Extremely Weathered Andesite with soil properties; breaks down into Clayey Gravelly SAND - fine to coarse grained, pale brown, fine to medium grained angular gravel, fines of low plasticity.					EXTREMELY WEATHERED ROCK
							1.40m					
				1.5			Hole Terminated at 1.40 m Very slow progress					
				2.0								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample (Glass jar, sealed and chilled on site)
ASS	Acid Sulfate Soil Sample (Plastic bag, air expelled, chilled)
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

APPENDIX B:

Results of Laboratory Testing

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S01
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

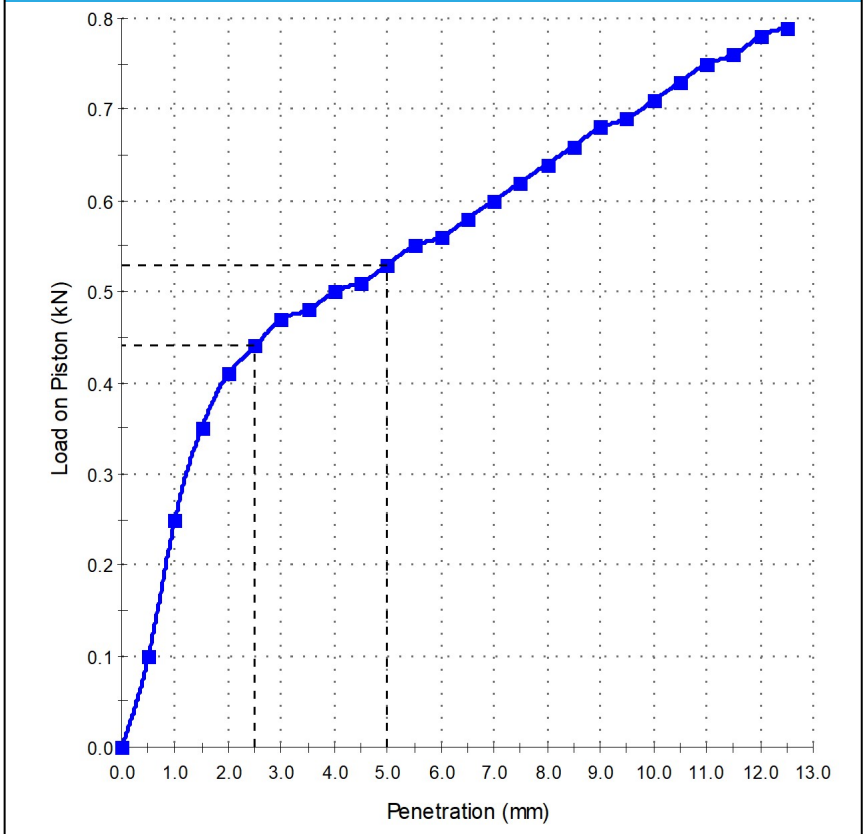
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S01	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP101 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**3.5**
Maximum Dry Density(t/m³):	1.33
Optimum Moisture Content(%):	33.1
Dry Density before Soaking (t/m³):	1.33
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	33.1
Moisture Ratio before Soaking (%):	100.0
Dry Density after Soaking (t/m³):	1.29
Density Ratio after Soaking (%):	97.0
Swell (%):	2.5
Moisture Content of Top 30mm (%):	46.1
Moisture Content of Remaining Depth (%):	36.6
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	30.6

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S02
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

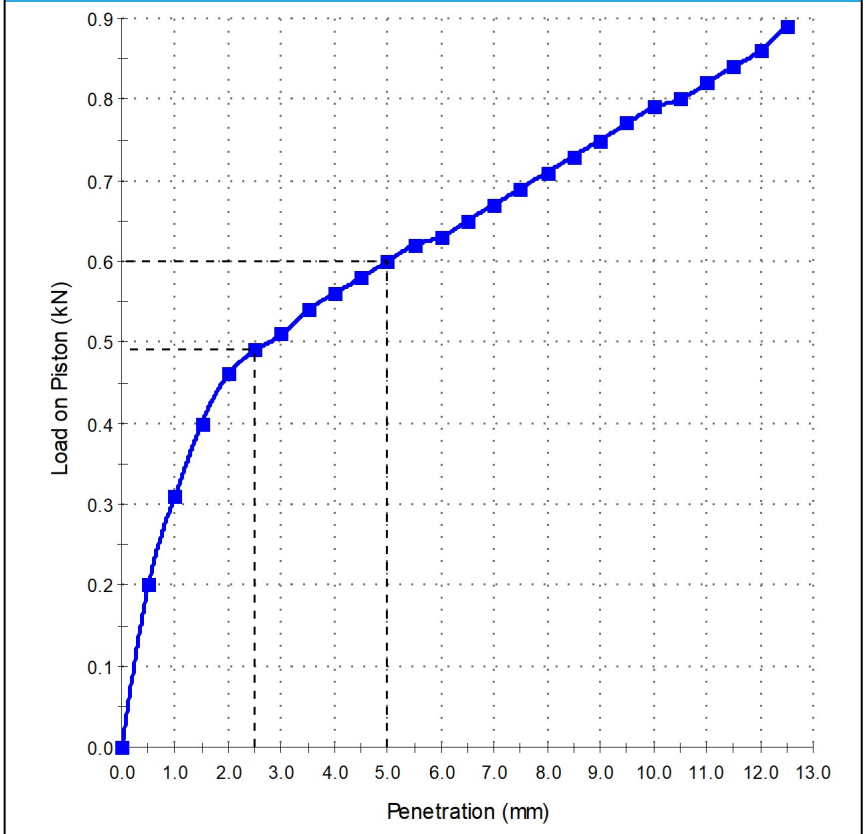
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S02	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP102 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**3.5**
Maximum Dry Density(t/m³):	1.43
Optimum Moisture Content(%):	29.2
Dry Density before Soaking (t/m³):	1.42
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	29.6
Moisture Ratio before Soaking (%):	101.5
Dry Density after Soaking (t/m³):	1.40
Density Ratio after Soaking (%):	97.5
Swell (%):	1.5
Moisture Content of Top 30mm (%):	37.9
Moisture Content of Remaining Depth (%):	30.3
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	24.2

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S03
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

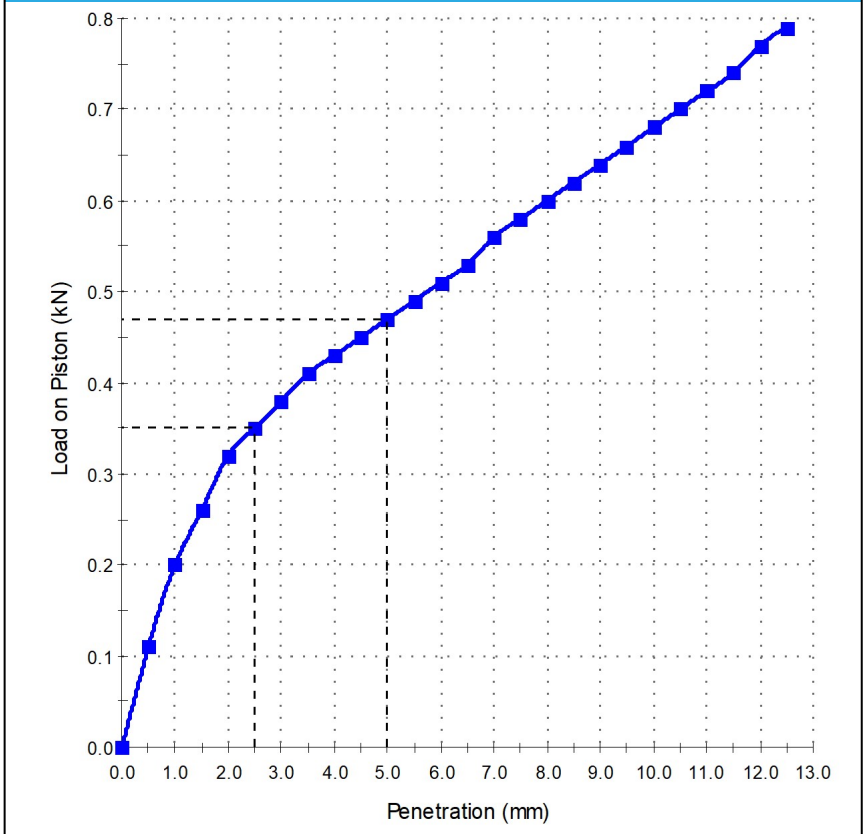
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S03	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP103 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**2.5**
Maximum Dry Density(t/m³):	1.48
Optimum Moisture Content(%):	26.7
Dry Density before Soaking (t/m³):	1.47
Density Ratio before Soaking (%):	99.0
Moisture Content before Soaking (%):	26.6
Moisture Ratio before Soaking (%):	99.5
Dry Density after Soaking (t/m³):	1.42
Density Ratio after Soaking (%):	95.5
Swell (%):	3.5
Moisture Content of Top 30mm (%):	43.7
Moisture Content of Remaining Depth (%):	27.9
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	24.2

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S04
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

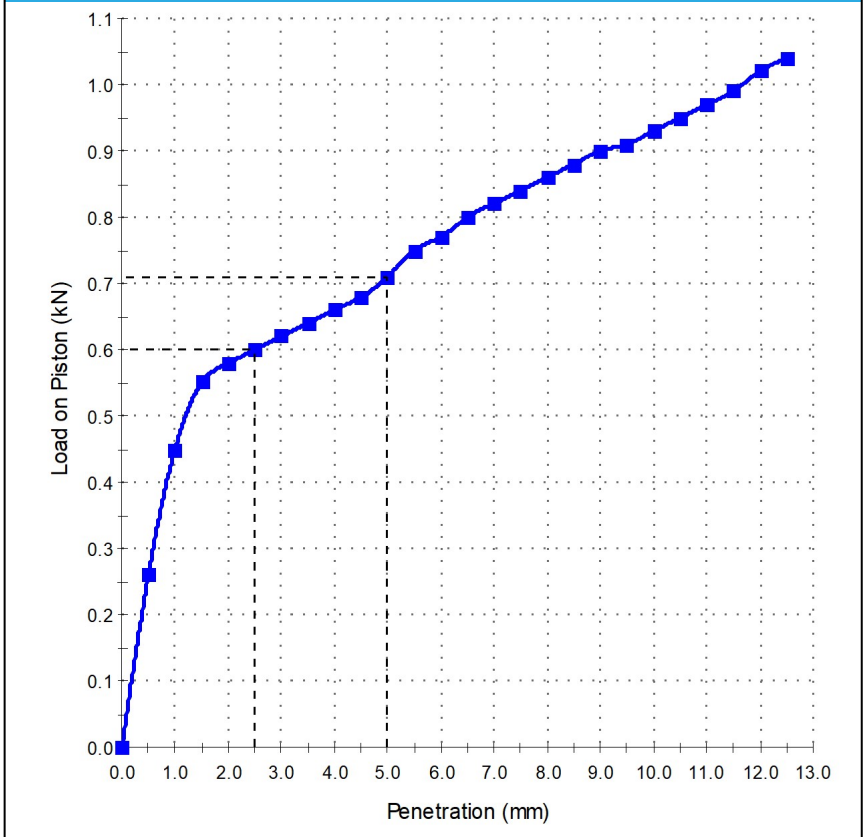
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S04	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP104 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**4.5**
Maximum Dry Density(t/m³):	1.47
Optimum Moisture Content(%):	28.0
Dry Density before Soaking (t/m³):	1.47
Density Ratio before Soaking (%):	100.0
Moisture Content before Soaking (%):	27.7
Moisture Ratio before Soaking (%):	99.0
Dry Density after Soaking (t/m³):	1.44
Density Ratio after Soaking (%):	98.0
Swell (%):	2.0
Moisture Content of Top 30mm (%):	37.7
Moisture Content of Remaining Depth (%):	28.3
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	25.8

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S05
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

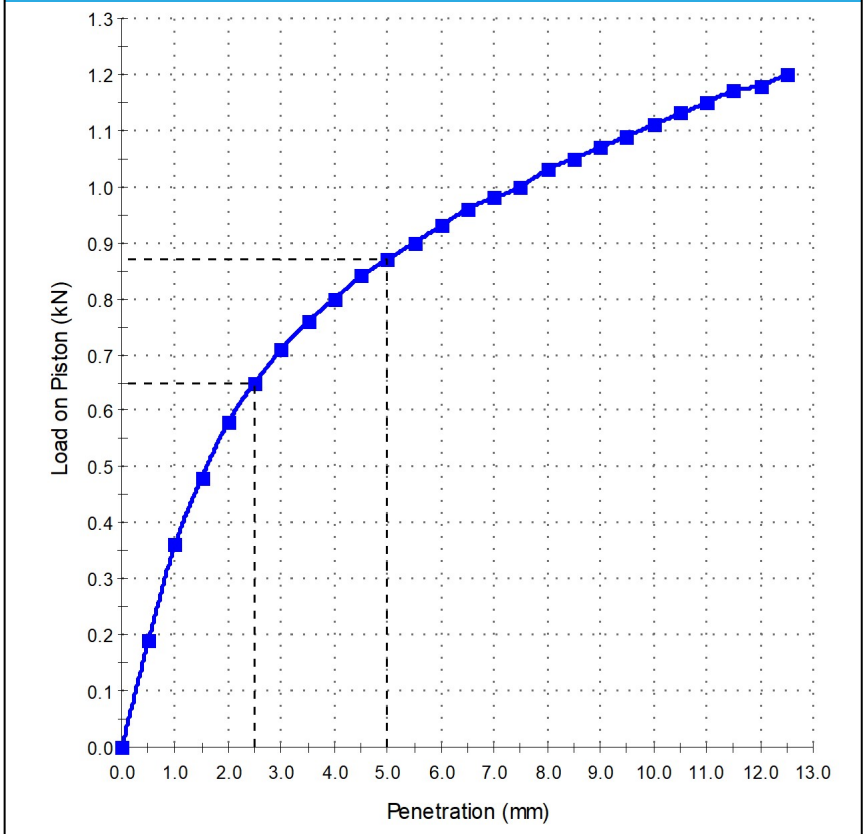
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S05	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP105 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**5.0**
Maximum Dry Density(t/m³):	1.64
Optimum Moisture Content(%):	18.5
Dry Density before Soaking (t/m³):	1.65
Density Ratio before Soaking (%):	100.5
Moisture Content before Soaking (%):	17.6
Moisture Ratio before Soaking (%):	95.0
Dry Density after Soaking (t/m³):	1.62
Density Ratio after Soaking (%):	98.5
Swell (%):	2.0
Moisture Content of Top 30mm (%):	27.0
Moisture Content of Remaining Depth (%):	23.3
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	14.2

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S06
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

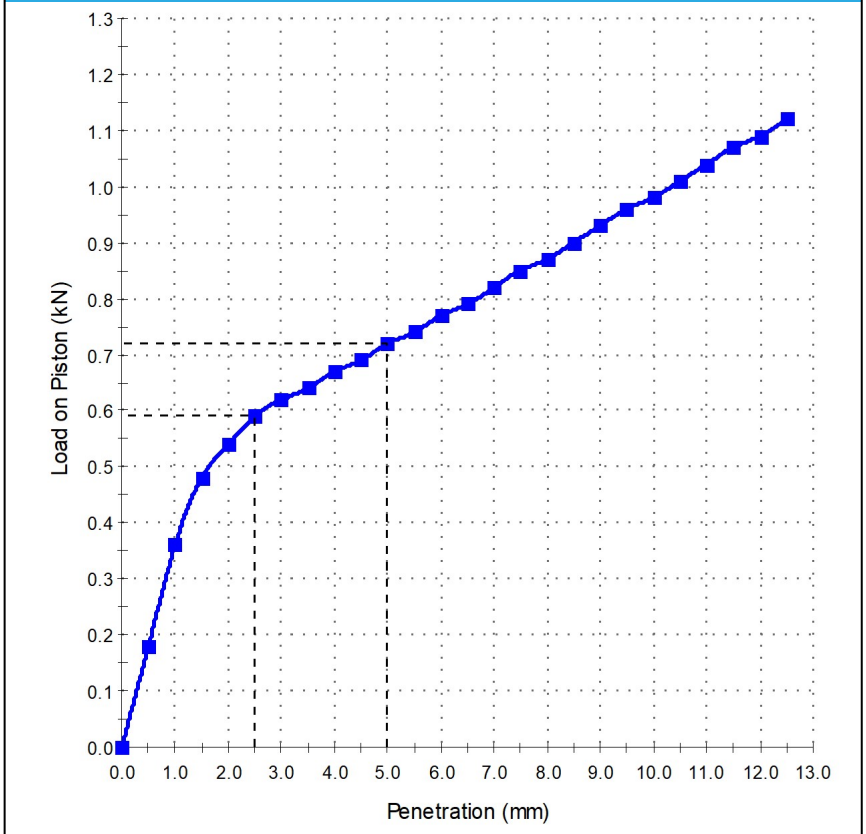
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S06	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP106 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**4.5**
Maximum Dry Density(t/m³):	1.42
Optimum Moisture Content(%):	28.0
Dry Density before Soaking (t/m³):	1.41
Density Ratio before Soaking (%):	99.0
Moisture Content before Soaking (%):	28.4
Moisture Ratio before Soaking (%):	101.5
Dry Density after Soaking (t/m³):	1.37
Density Ratio after Soaking (%):	97.0
Swell (%):	2.5
Moisture Content of Top 30mm (%):	34.7
Moisture Content of Remaining Depth (%):	30.0
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	26.9

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S07
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

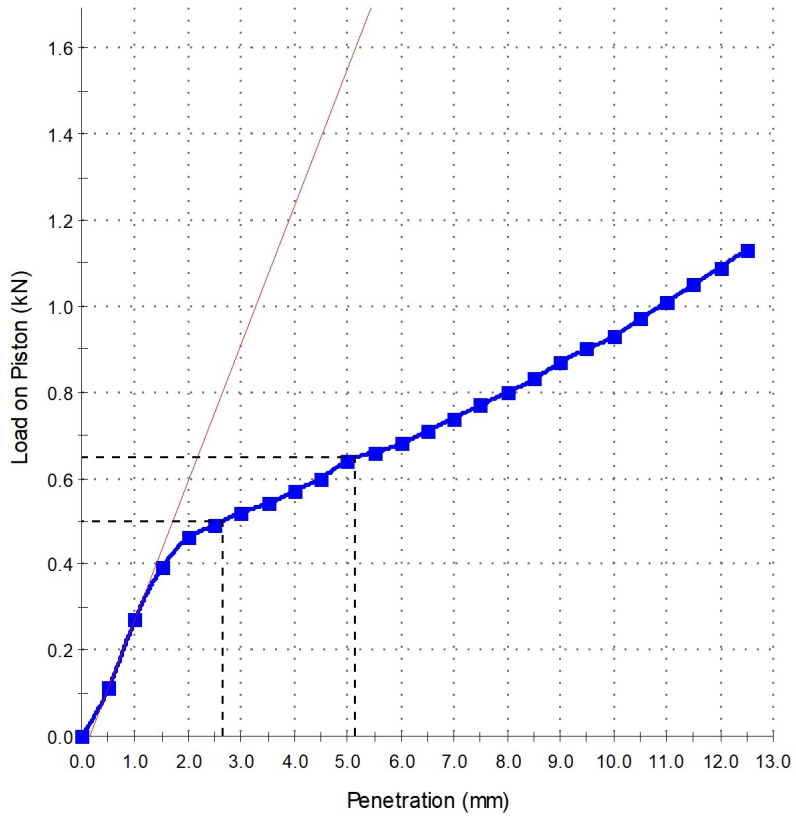
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S07	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP107 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**4.0**
Maximum Dry Density(t/m³):	1.43
Optimum Moisture Content(%):	26.7
Dry Density before Soaking (t/m³):	1.45
Density Ratio before Soaking (%):	101.0
Moisture Content before Soaking (%):	26.5
Moisture Ratio before Soaking (%):	99.0
Dry Density after Soaking (t/m³):	1.41
Density Ratio after Soaking (%):	98.0
Swell (%):	3.0
Moisture Content of Top 30mm (%):	39.4
Moisture Content of Remaining Depth (%):	28.5
Compaction Hammer Used:	Standard AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	23.8

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S08
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

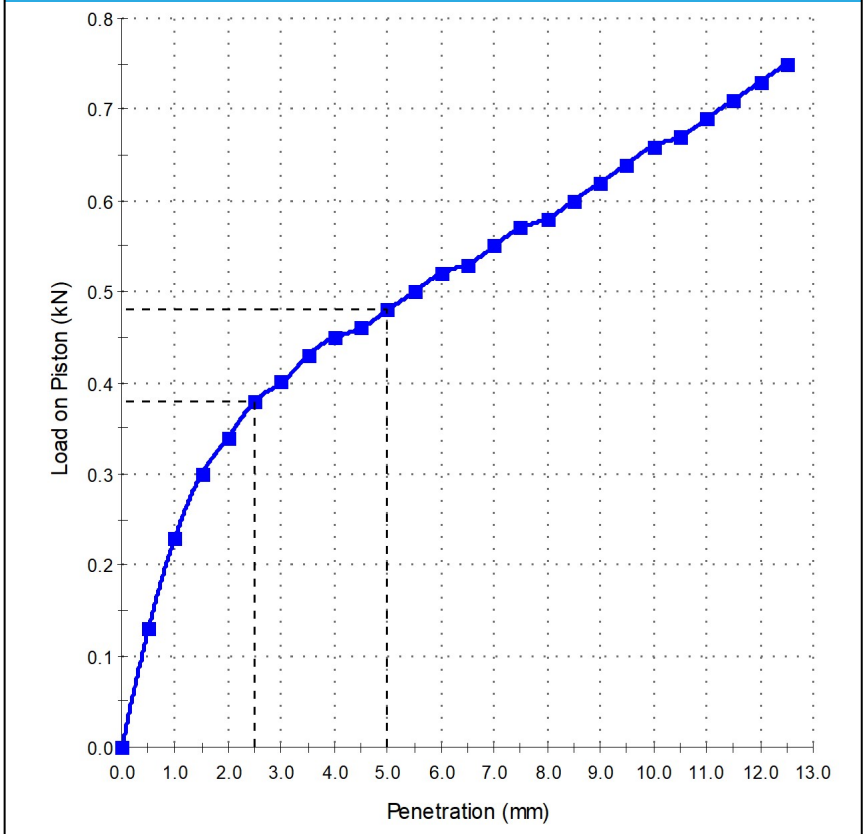
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S08	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP108 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**3.0**
Maximum Dry Density(t/m³):	1.43
Optimum Moisture Content(%):	27.6
Dry Density before Soaking (t/m³):	1.43
Density Ratio before Soaking (%):	100.0
Moisture Content before Soaking (%):	27.4
Moisture Ratio before Soaking (%):	99.5
Dry Density after Soaking (t/m³):	1.39
Density Ratio after Soaking (%):	97.5
Swell (%):	3.0
Moisture Content of Top 30mm (%):	39.5
Moisture Content of Remaining Depth (%):	31.4
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	23.4

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S09
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

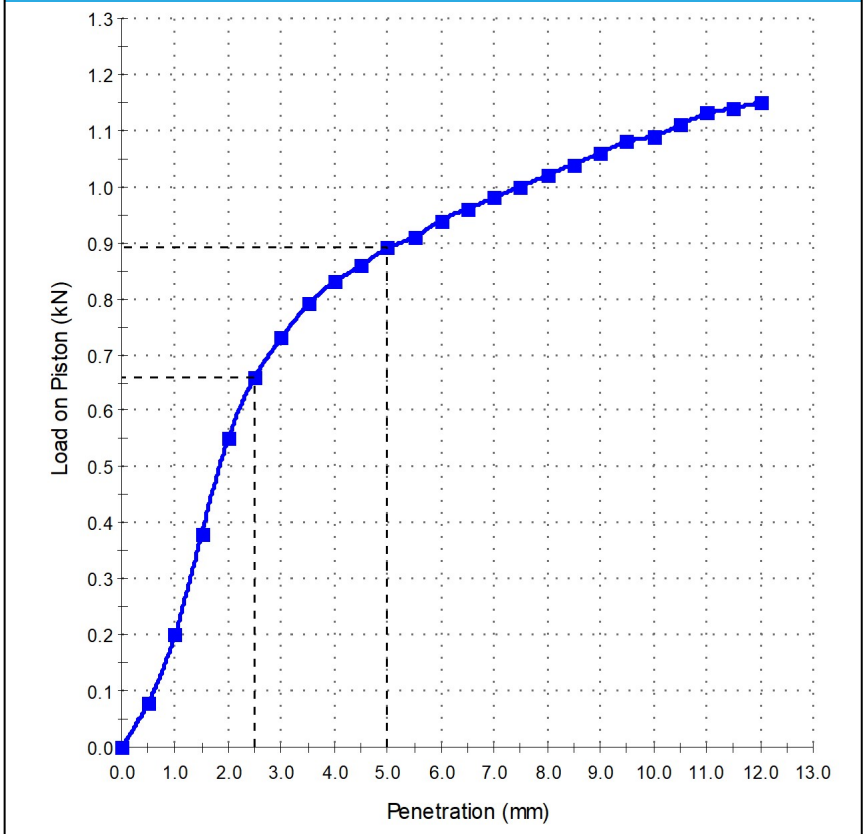
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S09	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP109 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**5.0**
Maximum Dry Density(t/m³):	1.50
Optimum Moisture Content(%):	26.8
Dry Density before Soaking (t/m³):	1.50
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	27.2
Moisture Ratio before Soaking (%):	101.0
Dry Density after Soaking (t/m³):	1.47
Density Ratio after Soaking (%):	98.0
Swell (%):	1.5
Moisture Content of Top 30mm (%):	36.1
Moisture Content of Remaining Depth (%):	28.8
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	22.8

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S10
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

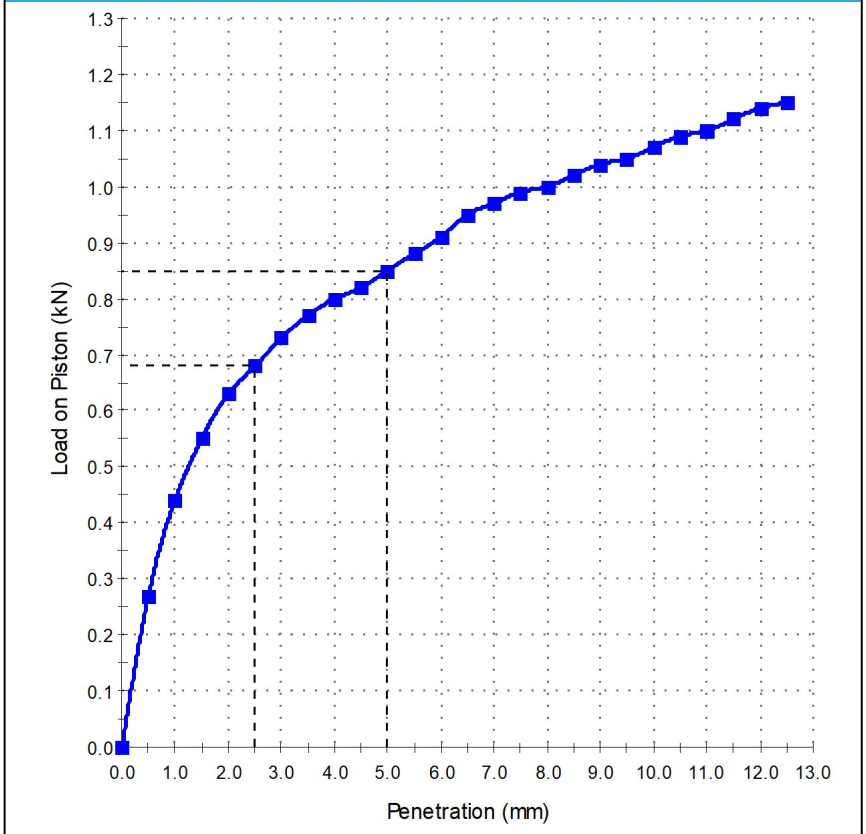
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S10	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP110 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**5**
Maximum Dry Density(t/m³):	1.51
Optimum Moisture Content(%):	22.0
Dry Density before Soaking (t/m³):	1.50
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	22.4
Moisture Ratio before Soaking (%):	102.0
Dry Density after Soaking (t/m³):	1.48
Density Ratio after Soaking (%):	98.5
Swell (%):	1.5
Moisture Content of Top 30mm (%):	28.0
Moisture Content of Remaining Depth (%):	25.1
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	20.5

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S11
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

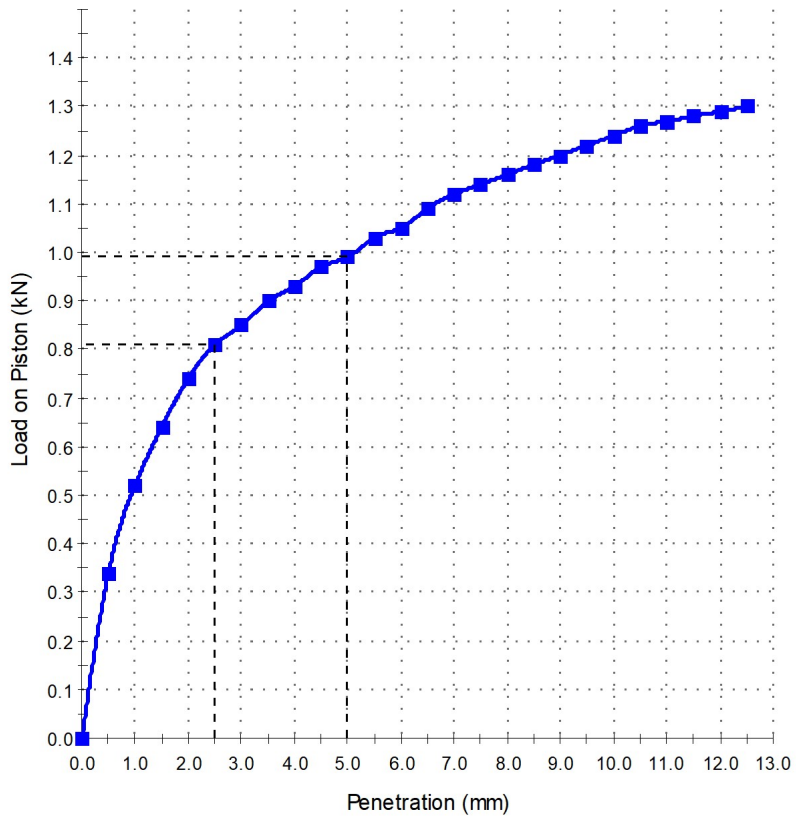
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S11	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP111 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**6**
Maximum Dry Density(t/m³):	1.39
Optimum Moisture Content(%):	30.5
Dry Density before Soaking (t/m³):	1.39
Density Ratio before Soaking (%):	100.0
Moisture Content before Soaking (%):	30.7
Moisture Ratio before Soaking (%):	101.0
Dry Density after Soaking (t/m³):	1.37
Density Ratio after Soaking (%):	98.0
Swell (%):	2.0
Moisture Content of Top 30mm (%):	38.3
Moisture Content of Remaining Depth (%):	33.4
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	27.0

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S12
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

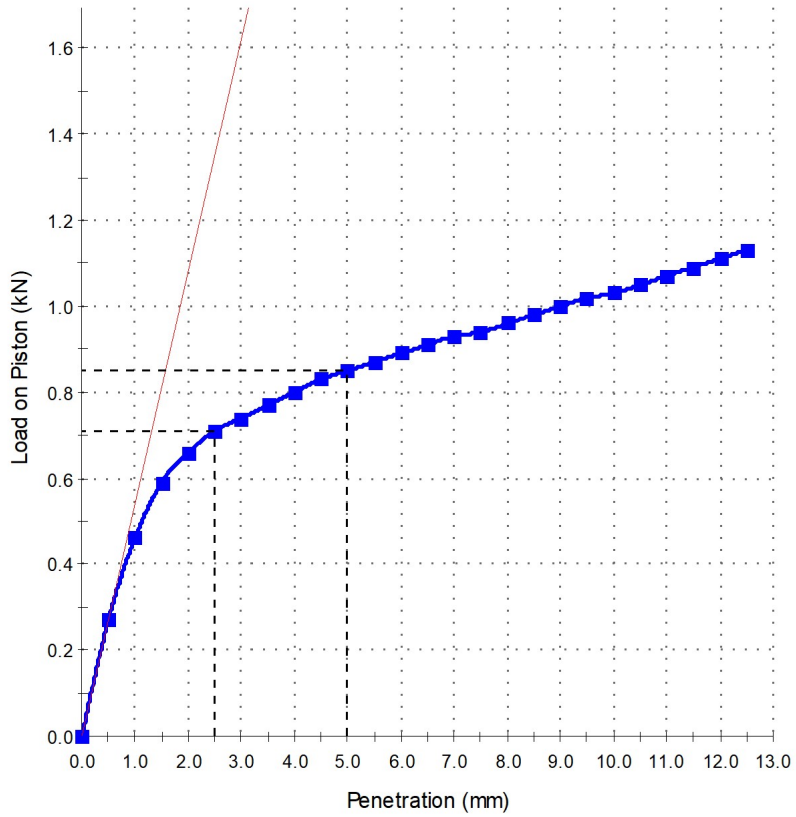
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S12	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP112 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**5**
Maximum Dry Density(t/m³):	1.43
Optimum Moisture Content(%):	30.2
Dry Density before Soaking (t/m³):	1.42
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	30.1
Moisture Ratio before Soaking (%):	100.0
Dry Density after Soaking (t/m³):	1.39
Density Ratio after Soaking (%):	97.5
Swell (%):	2.0
Moisture Content of Top 30mm (%):	38.6
Moisture Content of Remaining Depth (%):	33.6
Compaction Hammer Used:	Standard AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	28.3

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S13
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

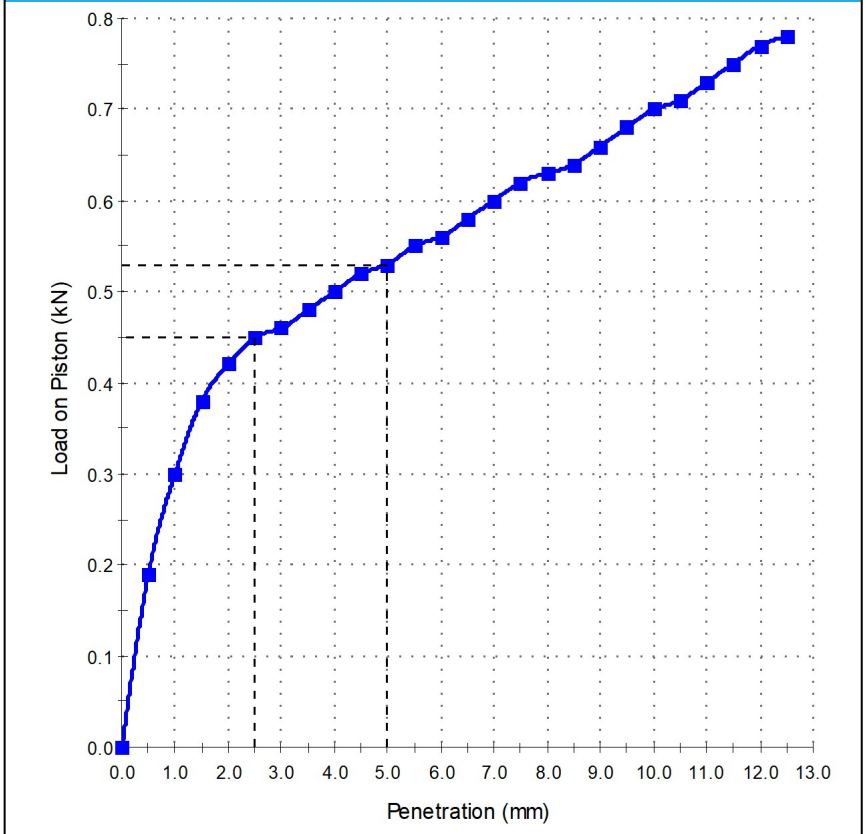
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S13	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP113 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**3.5**
Maximum Dry Density(t/m³):	1.37
Optimum Moisture Content(%):	31.0
Dry Density before Soaking (t/m³):	1.37
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	31.5
Moisture Ratio before Soaking (%):	101.5
Dry Density after Soaking (t/m³):	1.34
Density Ratio after Soaking (%):	97.5
Swell (%):	2.0
Moisture Content of Top 30mm (%):	37.0
Moisture Content of Remaining Depth (%):	32.0
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	32.2

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S14
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

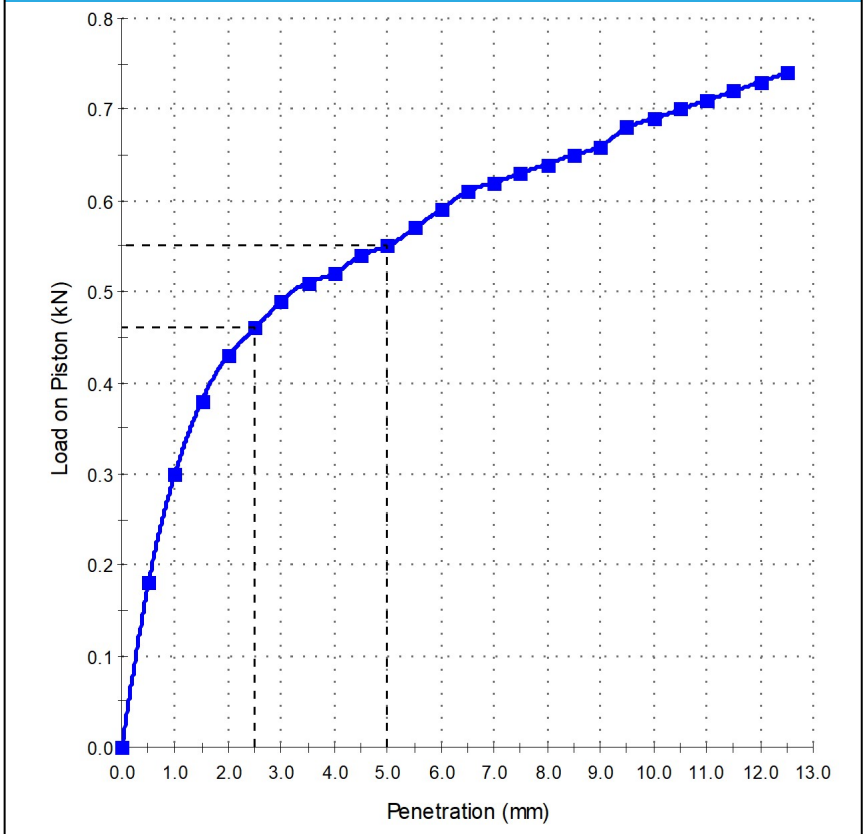
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S14	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP114 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**3.5**
Maximum Dry Density(t/m³):	1.33
Optimum Moisture Content(%):	33.7
Dry Density before Soaking (t/m³):	1.32
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	34.2
Moisture Ratio before Soaking (%):	101.5
Dry Density after Soaking (t/m³):	1.31
Density Ratio after Soaking (%):	98.5
Swell (%):	1.0
Moisture Content of Top 30mm (%):	39.9
Moisture Content of Remaining Depth (%):	34.9
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	29.2

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S15
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

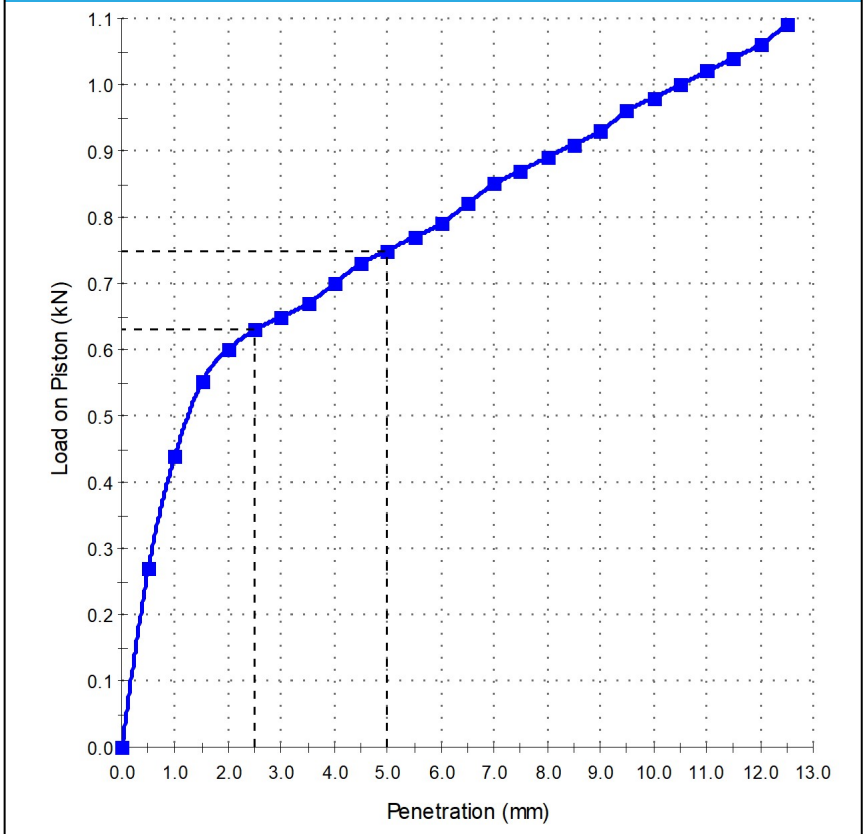
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S15	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP115 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**5.0**
Maximum Dry Density(t/m³):	1.32
Optimum Moisture Content(%):	34.0
Dry Density before Soaking (t/m³):	1.33
Density Ratio before Soaking (%):	100.5
Moisture Content before Soaking (%):	33.6
Moisture Ratio before Soaking (%):	99.0
Dry Density after Soaking (t/m³):	1.30
Density Ratio after Soaking (%):	98.0
Swell (%):	2.0
Moisture Content of Top 30mm (%):	41.8
Moisture Content of Remaining Depth (%):	35.3
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	28.7

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S16
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

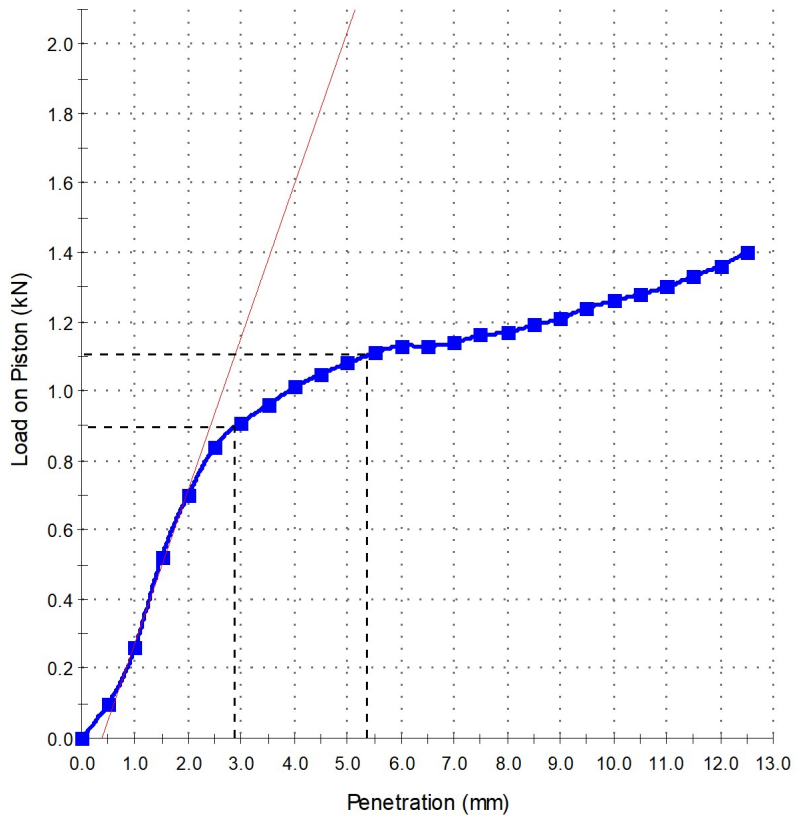
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S16	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP116 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**7**
Maximum Dry Density(t/m³):	1.55
Optimum Moisture Content(%):	23.9
Dry Density before Soaking (t/m³):	1.54
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	24.2
Moisture Ratio before Soaking (%):	101.5
Dry Density after Soaking (t/m³):	1.52
Density Ratio after Soaking (%):	98.0
Swell (%):	1.5
Moisture Content of Top 30mm (%):	31.2
Moisture Content of Remaining Depth (%):	26.7
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	20.3

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S17
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

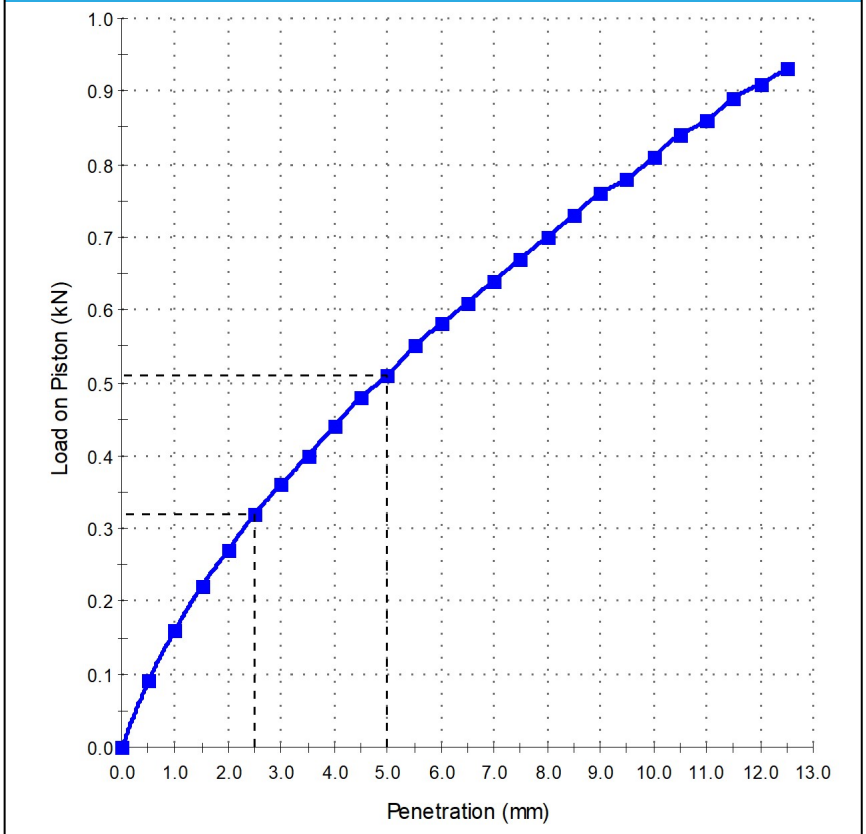
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S17	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP117 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 5.0mm (%):	**2.5**
Maximum Dry Density(t/m³):	1.67
Optimum Moisture Content(%):	19.8
Dry Density before Soaking (t/m³):	1.65
Density Ratio before Soaking (%):	99.0
Moisture Content before Soaking (%):	19.6
Moisture Ratio before Soaking (%):	99.0
Dry Density after Soaking (t/m³):	1.60
Density Ratio after Soaking (%):	95.5
Swell (%):	3.5
Moisture Content of Top 30mm (%):	31.0
Moisture Content of Remaining Depth (%):	21.4
Compaction Hammer Used:	Standard AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	19.2

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S18
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

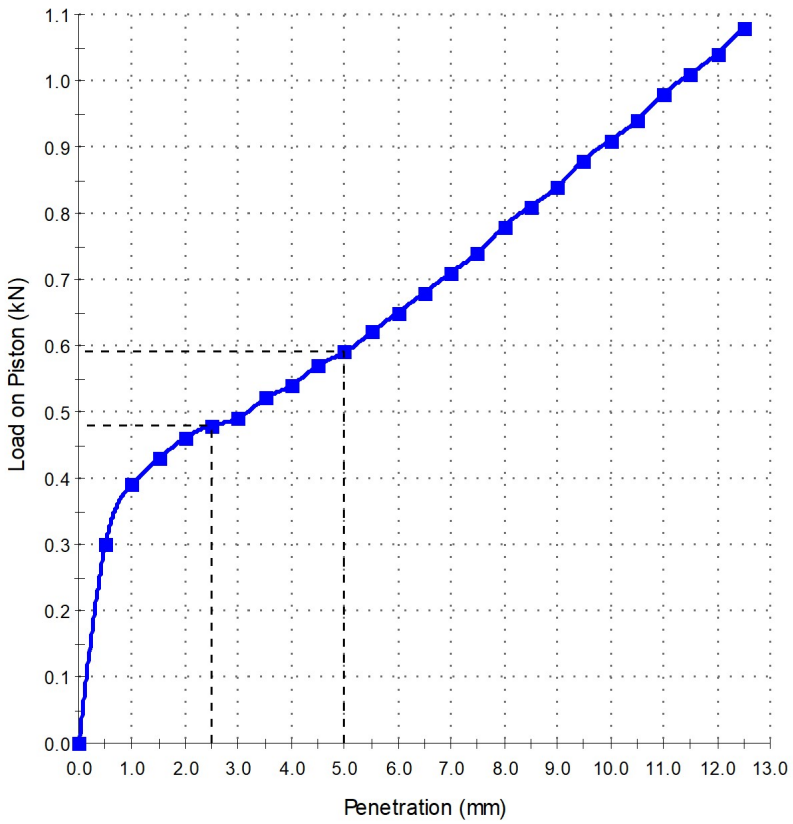
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S18	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP118 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**3.5**
Maximum Dry Density(t/m³):	1.53
Optimum Moisture Content(%):	26.1
Dry Density before Soaking (t/m³):	1.52
Density Ratio before Soaking (%):	100.0
Moisture Content before Soaking (%):	26.2
Moisture Ratio before Soaking (%):	100.5
Dry Density after Soaking (t/m³):	1.50
Density Ratio after Soaking (%):	98.5
Swell (%):	1.5
Moisture Content of Top 30mm (%):	39.0
Moisture Content of Remaining Depth (%):	27.3
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	34.5

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

California Bearing Ratio Test Report

Report No: CBR:NEW22W-0432-S19
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

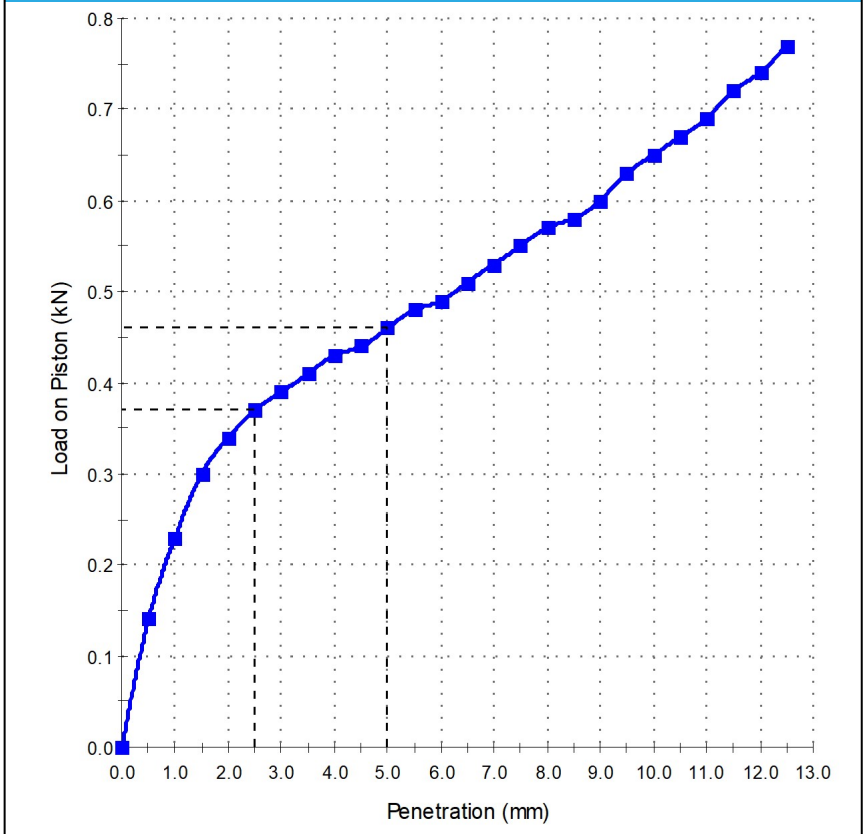
Accredited for compliance with ISO/IEC 17025-Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 22/02/2022

Sample Details

Sample ID:	NEW22W-0432-S19	**Date Sampled:**	10/02/2022
Sampling Method:	The results outlined below apply to the sample as received		
Specification:	No Specification	**Source:**	On-Site Insitu
Location:	TP119 - (0.40 - 0.60m)	**Material:**	Clay
Date Tested:	21/02/2022		

Load vs Penetration



Test Results

	AS 1289.6.1.1
CBR at 2.5mm (%):	**3.0**
Maximum Dry Density(t/m³):	1.45
Optimum Moisture Content(%):	27.2
Dry Density before Soaking (t/m³):	1.44
Density Ratio before Soaking (%):	99.5
Moisture Content before Soaking (%):	27.4
Moisture Ratio before Soaking (%):	100.5
Dry Density after Soaking (t/m³):	1.41
Density Ratio after Soaking (%):	97.5
Swell (%):	2.0
Moisture Content of Top 30mm (%):	39.9
Moisture Content of Remaining Depth (%):	30.2
Compaction Hammer Used:	Standard
	AS 1289.5.1.1
Surcharge Mass (kg):	9.00
Period of Soaking (Days):	4
Retained on 19 mm Sieve (%):	0
CBR Moisture Content Method:	AS 1289.2.1.1
Sample Curing Time (h):	48
Plasticity Determination Method:	Visual/Tactile
——— AS1289.2.1.1 ———	
In Situ (Field) Moisture Content (%):	29.7

Comments

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Material Test Report

Report No: MAT:NEW22W-0433-S01
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 1/03/2022

Sample Details

Sample ID: NEW22W-0433-S01
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP101 - (0.40 - 0.60m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	19.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	82	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	30	
Plasticity Index (%)	AS 1289.3.3.1	52	
Date Tested		25/02/2022	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

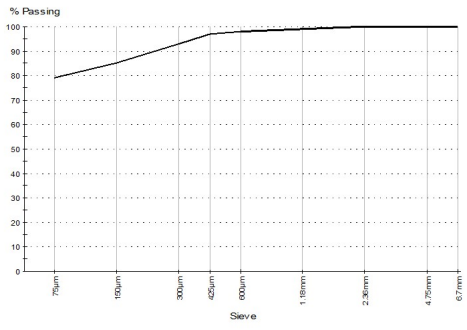
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	98	
425µm	97	
300µm	93	
150µm	85	
75µm	79	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Report No: MAT:NEW22W-0433-S02
Issue No: 1

Material Test Report

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 25/02/2022

Sample Details

Sample ID: NEW22W-0433-S02
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clayey Gravelly Sand
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP101 - (1.00 - 1.20m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	9.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.1	42	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	21	
Plasticity Index (%)	AS 1289.3.3.1	21	
Date Tested		22/02/2022	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Clayey Gravelly Sand	
Type of Water		Distilled	
Date Tested		25/02/2022	

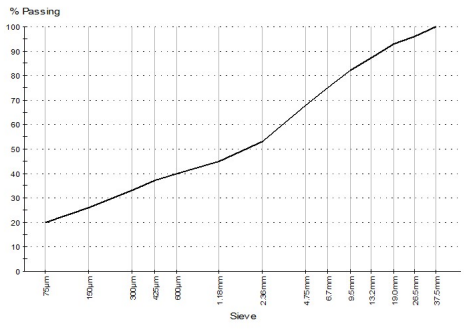
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
37.5mm	100	
26.5mm	96	
19.0mm	93	
13.2mm	87	
9.5mm	82	
6.7mm	75	
4.75mm	68	
2.36mm	53	
1.18mm	45	
600µm	40	
425µm	37	
300µm	33	
150µm	26	
75µm	20	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Material Test Report

Report No: MAT:NEW22W-0433-S03
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 25/02/2022

Sample Details

Sample ID: NEW22W-0433-S03
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP120 - (0.50 - 0.60m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	17.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	71	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	20	
Plasticity Index (%)	AS 1289.3.3.1	51	
Date Tested		24/02/2022	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

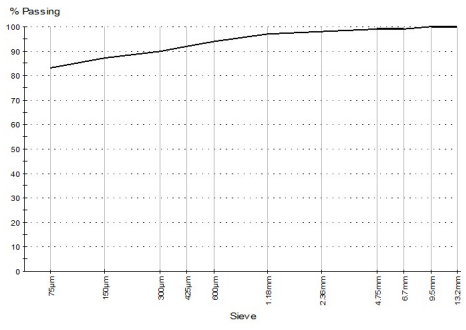
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
13.2mm	100	
9.5mm	100	
6.7mm	99	
4.75mm	99	
2.36mm	98	
1.18mm	97	
600µm	94	
425µm	92	
300µm	90	
150µm	87	
75µm	83	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Report No: MAT:NEW22W-0433-S04
Issue No: 1

Material Test Report

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 25/02/2022

Sample Details

Sample ID: NEW22W-0433-S04
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP120 - (1.00 - 1.30m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	17.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	83	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	22	
Plasticity Index (%)	AS 1289.3.3.1	61	
Date Tested		24/02/2022	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

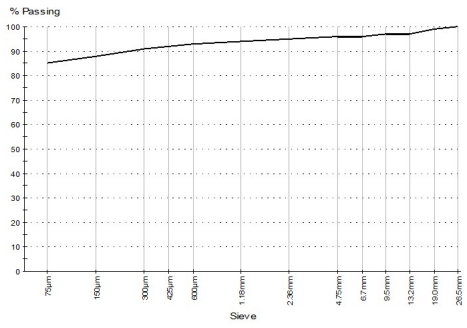
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	99	
13.2mm	97	
9.5mm	97	
6.7mm	96	
4.75mm	96	
2.36mm	95	
1.18mm	94	
600µm	93	
425µm	92	
300µm	91	
150µm	88	
75µm	85	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Report No: MAT:NEW22W-0433-S05
Issue No: 1

Material Test Report

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 1/03/2022

Sample Details

Sample ID: NEW22W-0433-S05
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Silty Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP120 - (1.70 - 2.00m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	18.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	67	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	23	
Plasticity Index (%)	AS 1289.3.3.1	44	
Date Tested		25/02/2022	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Silty Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

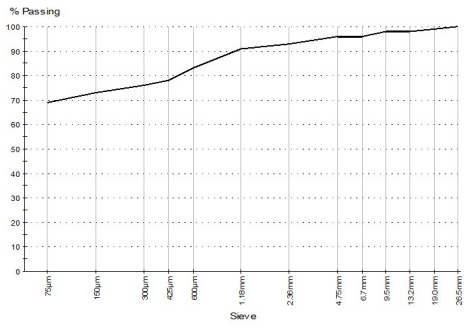
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	99	
13.2mm	98	
9.5mm	98	
6.7mm	96	
4.75mm	96	
2.36mm	93	
1.18mm	91	
600µm	83	
425µm	78	
300µm	76	
150µm	73	
75µm	69	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Report No: MAT:NEW22W-0433-S06
Issue No: 1

Material Test Report

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 25/02/2022

Sample Details

Sample ID: NEW22W-0433-S06
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP121 - (0.50 - 0.70m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	18.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	60	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	18	
Plasticity Index (%)	AS 1289.3.3.1	42	
Date Tested		23/02/2022	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

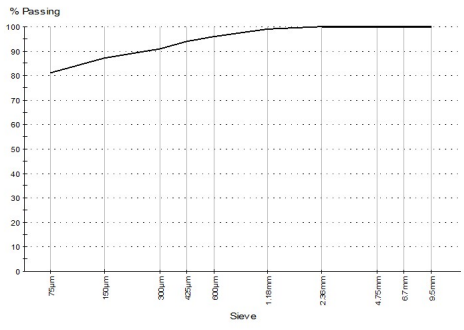
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	96	
425µm	94	
300µm	91	
150µm	87	
75µm	81	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Material Test Report

Report No: MAT:NEW22W-0433-S07
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 1/03/2022

Sample Details

Sample ID: NEW22W-0433-S07
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP121 - (1.00 - 1.20m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	17.5	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	55	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	21	
Plasticity Index (%)	AS 1289.3.3.1	34	
Date Tested		28/02/2022	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

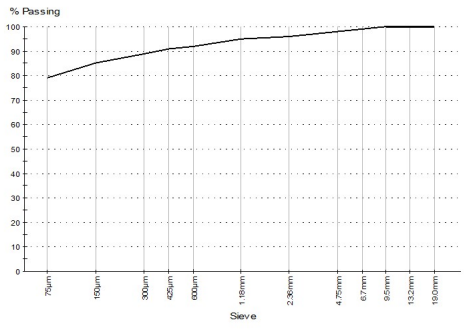
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	100	
9.5mm	100	
6.7mm	99	
4.75mm	98	
2.36mm	96	
1.18mm	95	
600µm	92	
425µm	91	
300µm	89	
150µm	85	
75µm	79	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Report No: MAT:NEW22W-0433-S08
Issue No: 1

Material Test Report

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 25/02/2022

Sample Details

Sample ID: NEW22W-0433-S08
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Gravelly Sandy Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP121 - (1.50 - 1.70m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	10.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		Yes	
Liquid Limit (%)	AS 1289.3.1.1	47	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	24	
Plasticity Index (%)	AS 1289.3.3.1	23	
Date Tested		23/02/2022	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		Gravelly Sandy Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

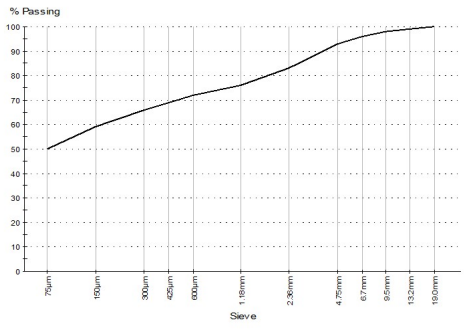
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 22/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
19.0mm	100	
13.2mm	99	
9.5mm	98	
6.7mm	96	
4.75mm	93	
2.36mm	83	
1.18mm	76	
600µm	72	
425µm	69	
300µm	66	
150µm	59	
75µm	50	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Material Test Report

Report No: MAT:NEW22W-0433-S09
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 1/03/2022

Sample Details

Sample ID: NEW22W-0433-S09
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP122 - (0.50 - 0.70m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	21.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	76	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	22	
Plasticity Index (%)	AS 1289.3.3.1	54	
Date Tested		25/02/2022	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

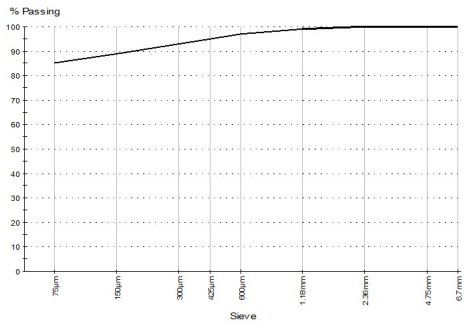
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 23/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	99	
600µm	97	
425µm	95	
300µm	93	
150µm	89	
75µm	85	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Material Test Report

Report No: MAT:NEW22W-0433-S10
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 1/03/2022

Sample Details

Sample ID: NEW22W-0433-S10
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP122 - (1.00 - 1.20m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	22.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		Yes	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	83	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	22	
Plasticity Index (%)	AS 1289.3.3.1	61	
Date Tested		25/02/2022	
Emerson Class Number	AS 1289.3.8.1	4	
Soil Description		Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

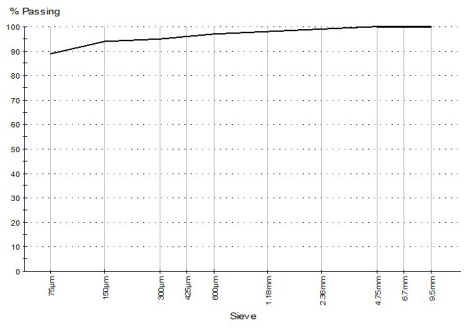
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 23/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	99	
1.18mm	98	
600µm	97	
425µm	96	
300µm	95	
150µm	94	
75µm	89	

Chart



Comments

N/A

QUALTEST Laboratory (NSW) Pty Ltd (20708)
2 Murray Dwyer Circuit, Mayfield West, NSW 2304
T: 02 4968 4468
F: 02 4960 9775
E: admin@qualtest.com.au
W: www.qualtest.com.au
ABN: 98 153 268 896

Material Test Report

Report No: MAT:NEW22W-0433-S11
Issue No: 1

Client: McCloy Project Management Pty Ltd
PO Box 2214
Dangar NSW 2309

Project No.: NEW21P-0129
Project Name: Proposed Subdivision - Station St, Lochinvar
Project Location: No. 51, 134 & 146 Station Street, Lochinvar

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.
Results provided relate only to the items tested or sampled.

Approved Signatory: Brent Cullen
(Senior Geotechnician)
NATA Accredited Laboratory Number: 18686
Date of Issue: 25/02/2022

Sample Details

Sample ID: NEW22W-0433-S11
Date Sampled: 10/02/2022
Date Received: 15/02/2022
Source: On-Site Insitu
Material: Gravelly Sandy Clay
Specification: No Specification
The results outlined below apply to the sample as received
Sample Location: TP122 - (1.20 - 1.30m)

Other Test Results

Description	Method	Result	Limits
Sample History	AS 1289.1.1	Oven-dried	
Preparation	AS 1289.1.1	Dry Sieved	
Linear Shrinkage (%)	AS 1289.3.4.1	5.0	
Mould Length (mm)		250	
Crumbling		No	
Curling		No	
Cracking		No	
Liquid Limit (%)	AS 1289.3.1.1	36	
Method		Four Point	
Plastic Limit (%)	AS 1289.3.2.1	26	
Plasticity Index (%)	AS 1289.3.3.1	10	
Date Tested		24/02/2022	
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		Gravelly Sandy Clay	
Type of Water		Distilled	
Date Tested		25/02/2022	

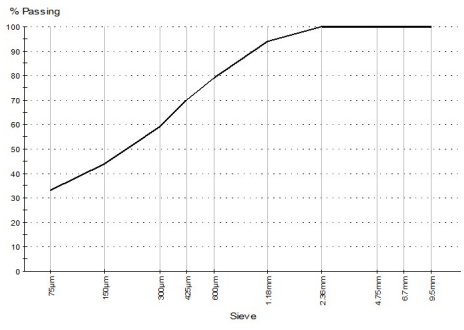
Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven
Date Tested: 23/02/2022

Note: Sample Washed

Sieve Size	% Passing	Limits
9.5mm	100	
6.7mm	100	
4.75mm	100	
2.36mm	100	
1.18mm	94	
600µm	79	
425µm	70	
300µm	59	
150µm	44	
75µm	33	

Chart



Comments

N/A