



LANDCOM

**PROPOSED SUBDIVISION DEVELOPMENT (BPA 16642)
REDMOND PLACE, ORANGE
REPORT ON GEOTECHNICAL INVESTIGATION**

**REPORT 9812/1-AA-R3
03 July 2025**

9812/1-AA-R3
Proposed Residential Subdivision
Redmond Place, Orange

Document Prepared by

Geotech Testing Pty Ltd
1 Lemko Place, Penrith NSW 2750
PO Box 880, Penrith NSW 2751
Email: geotech@geotech.com.au
Tel: +61 2 4722 2700
www.geotech.com.au

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Client Contact	Stephanie Wang

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Author		Reviewer Signature	
Name	Diana Perera	Name	Emged Rizkalla
Title	Geotechnical Engineer	Title	Director

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9812/1-AA-R3
Proposed Residential Subdivision
Redmond Place, Orange

Executive Summary

This report presents the results of a geotechnical investigation for the proposed residential subdivision site at Redmond Place, Orange. The field investigation works included drilling for four (4) deep boreholes to depths ranging from 9.0m to 9.45m, drilling of five (5) shallow boreholes to depths of 0.2m to 0.6m, and excavation of fifty-six (56) test pits to depths of 0.2m to 2.5m. Laboratory tests were conducted on the samples recovered from the boreholes and test pits. The following summarises our findings:

- Subsurface materials generally consist of topsoil/fill underlain by natural soils (including clays, sands and gravels). Bedrock was not encountered within the investigated depths.
- While standing groundwater was not encountered, seepage was observed in some boreholes at depths ranging from 4.9m to 6.2m.
- Visual inspection and laboratory tests indicate the natural clays are of medium to high plasticity clays.
- Chemical tests show the soils are non-saline and non-aggressive. However, the soils range from non-sodic to sodic (with ESP up to 11.1%) indicating soils are generally non-dispersive.
- Topsoil can be reused for landscaping purposes. Fill and natural soils can be selectively reused for 'controlled fill' after removing deleterious materials, if present, and undergoing environmental validation.
- Excavation can be carried out using conventional equipment, and with proper management, vibrations are expected to be low and unlikely to impact the stability of neighbouring structures at the site.
- The risk of slope instability across the site is very low to low and acceptable for the proposed development.
- The site is located outside of mine subsidence district; therefore, site is unlikely to be impacted from mine subsidence.

Based on these findings, it is our assessment that the site is suitable for the proposed residential subdivision development. The report provides recommendations for earthworks, batter slopes, retaining structures, footings, and preliminary pavement design to support the project.

9812/1-AA-R3
Proposed Residential Subdivision
Redmond Place, Orange

Table of Contents

	Page
1. Introduction-----	1
1.1. General -----	1
1.2. Proposed Development-----	1
1.3. Assessment Objectives-----	2
1.4. Field Work-----	3
2. The Site -----	4
2.1. Geology-----	4
2.2. Soil Landscape -----	4
2.3. Salinity -----	5
2.4. Acid Sulphate Soil-----	5
2.5. Mine Subsidence -----	5
2.6. Review of Previous Reports -----	5
3. Site Conditions -----	6
3.1. Site Description -----	6
3.2. Subsurface Condition -----	6
3.3. Groundwater Conditions-----	8
4. Laboratory Testing -----	9
4.1. Physical Tests-----	9
4.1.1. Emerson Crumb Test.....	9
4.1.2. California Bearing Ratio (CBR).....	10
4.1.3. Atterberg Limits.....	10
4.1.4. Particle Size Distribution.....	12
4.2. Chemical Testing-----	12
5. Discussion and Recommendations-----	14
5.1. Salinity Assessment -----	14
5.2. Aggressivity Assessment-----	15
5.3. Erodibility Assessment-----	17
5.4. Soil Management Plan-----	18
5.5. Excavation Conditions -----	19
5.6. Discussion of Existing Fill -----	20
5.7. Subgrade Preparation and Fill Placement -----	20
5.8. Ground Vibrations and Construction Noise -----	21
5.9. Batter Slopes and Retaining Structures -----	21
5.10. Preliminary Site Classification-----	22
5.11. Floors Slab and Footings-----	23
5.12. Slope Stability (Slip and Subsidence)-----	24
6. Pavement Thickness Design-----	25
6.1. Proposed Roads and Design Traffic Loading -----	25
6.2. Design CBR Value-----	25
6.3. Recommended Pavement Thickness -----	26
7. Limitations -----	27
8. References -----	28

9812/1-AA-R3
Proposed Residential Subdivision
Redmond Place, Orange

Appendices

APPENDIX A	Drawing No 9812/1-AA1 (Test Pit Location Plan)
APPENDIX B	Borehole & Test Pit Logs & Explanatory Notes
APPENDIX C	Laboratory Test Results

List Of Tables

Table 1: Summary of Subsurface Conditions	6
Table 2: Summary of Emerson Crumb Test	9
Table 3: CBR Test Results	10
Table 4: Atterberg Limits	11
Table 5: Particle Size Distribution	12
Table 6: Chemical Test Results	12
Table 7: Salinity Classification	14
Table 8: Calculated ECe Values and Salinity Assessment	14
Table 9: Aggressivity Assessment	16
Table 10: Dispersive Assessment	18
Table 11: Recommended Batter Slopes for Cut and Fill Slopes	21
Table 12: Recommended Earth Pressure Parameters	22
Table 13: Recommended Allowable Bearing Pressures	24
Table 14: Definitions of Landslide Risk	25
Table 15: Road Category & Design Traffic Loading Values	25
Table 16: Recommended Pavement Thickness	26

List Of Figures

Figure 1: Locality of the Proposed Development	2
Figure 2: Approximate Geological Site Map	4

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

1. Introduction

1.1. General

This report presents the results of a geotechnical investigation at the proposed residential subdivision site at Redmond Place, Orange, hereafter referred to as the site.

This geotechnical investigation report aims to provide an assessment of the proposed development site (Figure 1), comprising Lot 1 in DP 153167, Lot 6 in DP1031236, and Lot 200 in DP1288388 located on the southern side of Redmond Place and Mitchell Highway. As Landcom progresses with the formulation of a concept masterplan, a geotechnical investigation is required to determine existing subsurface conditions and provide preliminary geotechnical recommendations for the design of the proposed development.

1.2. Proposed Development

To assist us with the preparation of this geotechnical report, the following documents were provided.

- Preliminary Site Investigation Report by GHD (ref:12627900_RPT01; dated: 14 May 2024)
- Geotechnical Investigation Report by GHD (ref:12627900_RPT02; dated: 15 May 2024)
- Preliminary Contamination Investigation by Envirowest Consulting Pty Ltd (ref: R15854c; dated: 18 August 2023)

The site is located on the southeast fringe of Orange, adjacent to the Glenroi suburb and is the largest city in the Central West Region. It is 4.4km from Orange City Centre and approx. 3.2km from the Orange train station.

The site is approximately 24.4Ha in size and is currently vacant, with the exception of a structure that previously housed an emergency services helicopter hangar.

The site has been rezoned for residential purposes and the Master Plan will include approximately 330 dwellings across 264 lots for a diverse range of housing including single detached, medium density dwellings and low-rise apartment/s. The Master Plan will also include parks, a wetland and a sewer pump station. Figure 1 shows the locality of the proposed development.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange



Figure 1: Locality of the Proposed Development

1.3. Assessment Objectives

A geotechnical investigation is required for the proposed development to determine existing subsurface conditions, identifying likely geotechnical constraints and provide geotechnical recommendations and assessments on:

- Excavation conditions.
- Safe battered slope and earth pressure parameters.
- Preliminary site classification of proposed lots.
- Pavement design thickness.
- Preliminary allowable bearing capacity values for footing design (both shallow and deep footings).
- Suitability of existing soils for reuse.

Additionally, assessments of soil salinity, aggressivity, and dispersivity are required, along with recommendations for soil management plan.

1.4. Field Work

To address the objectives outlined above, the following work was undertaken as part of the investigation:

- Reviewing available geological, landscape, and land and soil capability maps relevant to the site.
- Preparing Work Health and Safety (WHS) plans and relevant Safe Work Method Statements (SWMS) for the site.
- Conducting a walkover survey to assess existing site conditions.
- Obtaining and reviewing service plans from "Before You Dig Australia" to identify the locations of underground services across the site.
- Scanning borehole and test pit locations for underground services to ensure that services were not damaged during fieldwork. A specialist service locator was engaged for this purpose.
- Drilling four (4) deep boreholes (BH104, BH115, BH116, BH154) to depths ranging from 9.0m to 9.45m, using a track-mounted drilling rig (COMACCHIO GEO 205) fully equipped for geotechnical investigation.
- Conducting Standard Penetration Tests (SPT) in the deep boreholes at regular depth intervals to assess the strength characteristics of subsurface soils.
- Drilling five (5) shallow boreholes (TP117, BH134, BH135, TP163, BH164) to depths ranging from 0.2m to 0.6m or prior refusal or top of existing services, using a hand auger.
- Excavating fifty-six (56) test pits (TP101–TP103, TP105–TP114, TP118–TP133, TP136–TP153, TP155–TP162, TP165) to depths ranging from 0.2m to 2.5m from existing surface levels, using a standard 5-tonne excavator equipped with a bucket. The borehole and test pit locations are shown on the attached Drawing No 9812/1-AA1, and the engineering logs are provided in Appendix B.
- Conducting Dynamic Cone Penetrometer (DCP) tests adjacent to selected test pits to assess the strength of subsurface soils. DCP tests were terminated at a depth of approximately 1.5m or prior refusal.
- Recovering representative soil samples from the boreholes and test pits for visual assessment and laboratory testing.
- Measuring depths to groundwater or seepage levels in the boreholes and test pits where encountered.

The above fieldwork was supervised by two qualified geotechnical/environmental engineers from Geotech Testing Pty Ltd between 15 and 17 April 2025. The engineers were responsible for conducting the walkover survey, selecting borehole and test pit locations, supervising in-situ testing, sampling, and preparing field logs.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

2. The Site

2.1. Geology

Reference to the NSW Seamless Geology Map (<https://minview.geoscience.nsw.gov.au/>) indicates that the bedrock at the site belongs to the Canobolas (NMcnc_o) formation of the Canobolas Volcanics (NMcnc) group. The bedrock comprises olivine-hawaiite, mugearite, and benmoreite basalt flows and domes. The bedrock in the eastern end of the site belongs to the Oakdale Formation (Cabonne Group, Ocao Sandstone) of Late Ordovician age (458.4–446.3 Ma) and comprises mafic volcanic sandstone, basalt, basaltic andesite, latite, and intrusions emplaced as lava. Figure 2 shows the geology of the site.

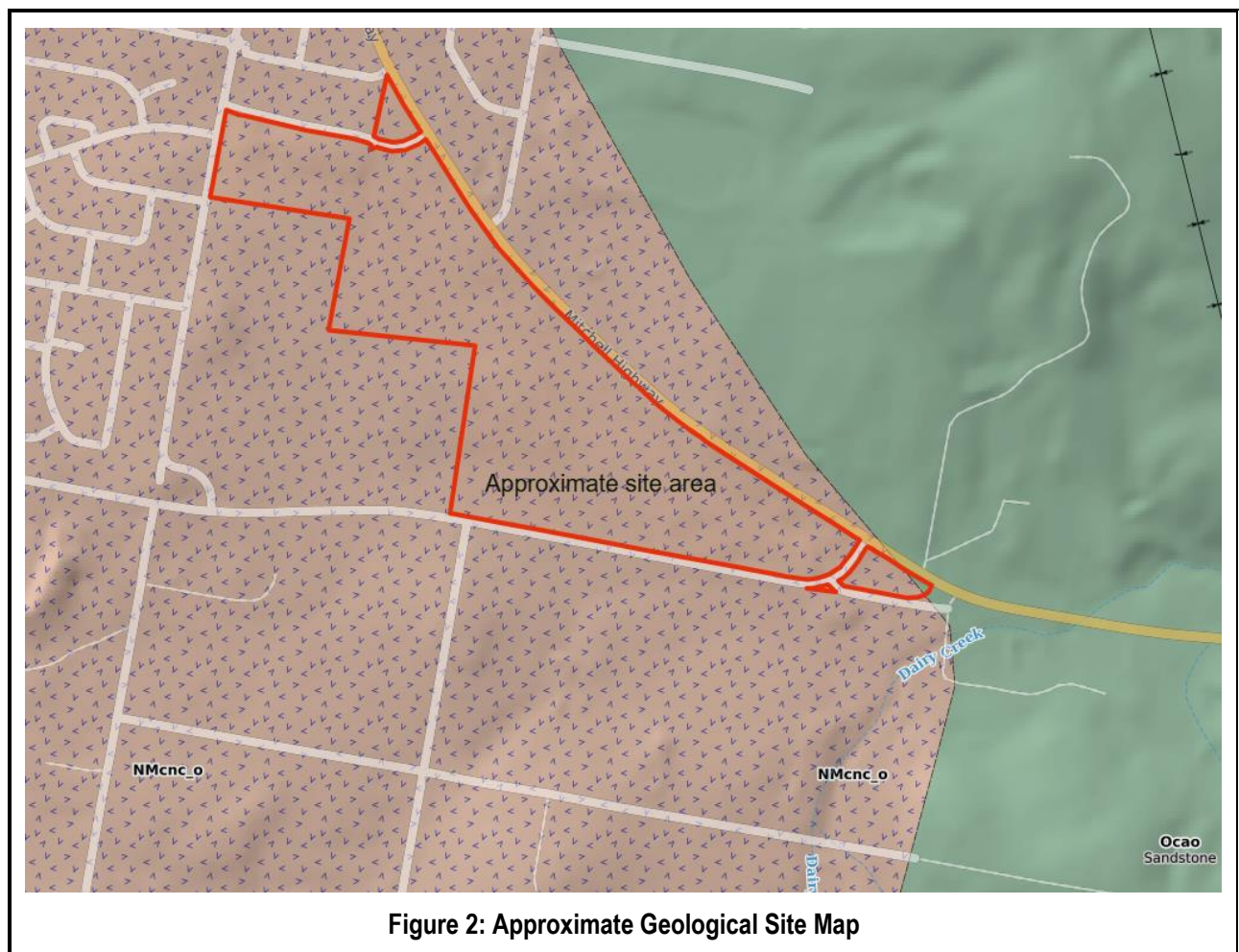


Figure 2: Approximate Geological Site Map

2.2. Soil Landscape

Reference to eSPADE portal (<https://www.environment.nsw.gov.au/eSpade2WebApp>), developed by the NSW Department of Planning, Industry and Environment, indicates that the landscape of the site belongs to the North Orange (SI5508no) landscape unit. This unit is characterised by undulating to rolling low hills north of Orange, with local relief up to 40 m and ground slopes ranging from 6–10%, occasionally to 30%. Red Earths are found on upper slopes, while shallow Lithosols occur on crests and side slopes. Yellow Earths appear on lower slopes, with Brown Solodic and Yellow Solodic soils present in drainage depressions. Other soils include Non-calcic Brown Soils, Red and Brown Podzolic soils, gravelly Earths, and Yellow Solonchic Soils.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

2.3. Salinity

Reference to eSPADE portal (<https://www.environment.nsw.gov.au/eSpade2WebApp>), developed by the NSW Department of Planning, Industry and Environment, indicates that the site area is not covered in the map.

2.4. Acid Sulphate Soil

A reference to the Acid Sulphate Soil (ASS) Risk Mapping on the eSPADE portal developed by the State of NSW and the Department of Planning, Industry, and Environment, indicates that the site area is not covered in the map.

2.5. Mine Subsidence

A reference to the NSW Planning Portal Spatial Viewer developed by the Department of Customer Service (2020), indicates that not within a mine subsidence district and does not require consideration of mine subsidence parameters.

2.6. Review of Previous Reports

GHD previously conducted a geotechnical investigation at the site and provided a report (File Name: 12627900-REP-02_Landcom Orange Geotechnical Investigation Report) on dated 15 May 2024. The field works involved the excavation of 28 test pits (TP1 to TP28) to depths ranging from 1.1m to 3.0m across the site. Dynamic Cone Penetrometer (DCP) testing was also performed to evaluate the in-situ strength of the soils. The GHD test pit locations are shown on the attached Drawing No 9812/1-AA1.

The subsurface profile revealed by the above test pits consisted of topsoil overlying uncontrolled fill in some areas, with fill depths reaching up to 2.0 metres. Beneath the fill, natural silty clay soils were encountered, characterised by low to high plasticity and moderate to high reactivity. Extremely weathered material at depths ranging from 0.7m to 2.75m. Groundwater inflow was observed in three test pits (TP20, TP21, and TP25) in the southeastern portion of the site, at depths of 1.5m, 1.7m, and 1.9m below ground level, respectively. Laboratory testing further analysed soil properties, salinity, and erosion potential, revealing that the topsoil and residual soils exhibit little dispersive potential.

For further details and relevant lab results and conclusions, please refer to the above-mentioned GHD report.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

3. Site Conditions

3.1. Site Description

The site is located on the southeast fringe of Orange, adjacent to the Glenroi suburb within the Orange City Council. The site is located approximately 2.7km southeast from Orange train station and indicated in Figure 1 above. The site is bounded by Bathurst Road / Mitchell Highway (on the northeast), Lone Pine Avenue (on the west) and Dairy Creek Road to the south. It is surrounded by a mixture of land uses with low density residential to the west, retail and large format retail to the north, rural farmland to the south and east. The Site is approximately 24.4 Ha in size is currently vacant, except for a structure that previously housed an emergency services helicopter hangar.

Topographically, the surface features comprises gently undulating surfaces with slight to gradual slopes downwards from west to east of the site. All slopes are stable with no signs of recent movement.

The vegetation is predominantly characterised by dense grass and scattered trees. Existing site features across the site includes but not limited to wired fences outlining the previous paddocks, a structure that previously housed an emergency services helicopter hangar.

Based on casual visual observations, there were no obvious signs of ground movement such as soil erosion or ground settlement within the site.

Site drainage is via overland flow following the slopes, leading into the 'middle portion' end where the lower lying portion of the site is.

3.2. Subsurface Condition

Subsurface conditions encountered in the boreholes (BH) and test pits (TP) are detailed in the attached logs and summarised below in Table 1.

Table 1: Summary of Subsurface Conditions

Test Pit ID	RL (m AHD)	Termination Depth (m)	Termination Remarks	Topsoil (m)	Fill (m)	Natural Soil (m)
BH104	900.54	9.27	SPT Refusal	0.0 – 0.1	NE	0.1 – 9.27
BH115	897.21	9.27	Target Depth	0.0 – 0.1	NE	0.1 – 9.27
BH116	896.95	9.45	Target Depth	0.0 – 0.1	NE	0.1 – 9.45
BH154	902.96	9.45	Target Depth	NE	0.0 – 0.5	0.5 – 9.45
TP101	902.987	2.5	Target Depth	0.0 – 0.1	NE	0.1 – 2.5
TP102	901.837	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP103	901.844	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP105	902.749	2.5	Target Depth	0.0 – 0.2	NE	0.2 – 2.5
TP106	901.761	0.7	Target Depth	0.0 – 0.2	NE	0.2 – 0.7
TP107	899.944	1.0	Target Depth	0.0 – 0.5	NE	0.5 – 1.0
TP108	899.598	2.5	Target Depth	0.0 – 0.2	NE	0.2 – 2.5
TP109	900.804	2.5	Target Depth	0.0 – 0.2	NE	0.2 – 2.5
TP110	901.338	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP111	900.102	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP112	898.990	0.7	Target Depth	0.0 – 0.2	NE	0.2 – 0.7

9812/1-AA-R3

Proposed Subdivision Development
Redmond Place, Orange

Test Pit ID	RL (m AHD)	Termination Depth (m)	Termination Remarks	Topsoil (m)	Fill (m)	Natural Soil (m)
TP113	898.660	0.1	Underground Services	NE	0.0 – 0.1	NE
TP114	897.903	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP117	897.587	0.2	Underground Services	0.0 – 0.2	NE	NE
TP118	896.652	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP119	897.500	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP120	895.853	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP121	896.865	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP122	899.176	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP123	896.072	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP124	896.354	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP125	895.193	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP126	894.837	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP127	893.949	2.5	Target Depth	0.0 – 0.1	NE	0.1 – 2.5
TP128	894.399	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP129	894.951	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP130	896.455	1.0	Target Depth	NE	0.0 – 0.5	0.5 – 1.0
TP131	894.867	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP132	894.439	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP133	894.093	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP134	894.530	0.2	Underground Services	0.0 – 0.2	NE	NE
TP135	893.640	0.2	Underground Services	0.0 – 0.2	NE	NE
TP136	892.969	2.5	Target Depth	0.0 – 0.1	NE	0.1 – 2.5
TP137	893.728	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP138	893.185	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP139	892.440	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP140	891.841	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP141	892.994	1.8	Refusal on Boulder	NE	0.0 – 0.5	0.5 – 1.8
TP142	892.629	2.1	Refusal on Boulder	NE	0.0 – 0.4	0.4 – 2.1
TP143	891.639	1.0	Target Depth	NE	0.0 – 0.5	0.5 – 1.0
TP144	890.424	0.2	Underground Services	0.0 – 0.2	NE	NE
TP145	891.403	0.8	Target Depth	0.0 – 0.3	NE	0.3 – 0.8
TP146	890.177	2.5	Target Depth	0.0 – 0.2	NE	0.2 – 2.5
TP147	889.141	0.2	Underground Services	0.0 – 0.2	NE	NE
TP148	889.483	0.7	Target Depth	0.0 – 0.2	NE	0.2 – 0.7
TP149	886.394	0.2	Underground Services	0.0 – 0.2	NE	NE
TP150	903.485	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP151	903.496	1.3	Target Depth	NE	0.0 – 0.8	0.8 – 1.3
TP152	903.673	1.3	Target Depth	NE	0.0 – 0.8	0.8 – 1.3
TP153	903.503	2.5	Target Depth	NE	0.0 – 1.5	1.5 – 2.5
TP155	901.458	1.0	Target Depth	0.0 – 0.2	0.2 – 0.5	0.5 – 1.0
TP156	900.220	2.5	Target Depth	0.0 – 0.2	NE	0.2 – 2.5
TP157	-	0.2	Underground Services	NE	0.0 – 0.2	NE

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Test Pit ID	RL (m AHD)	Termination Depth (m)	Termination Remarks	Topsoil (m)	Fill (m)	Natural Soil (m)
TP158	899.023	2.5	Target Depth	0.0 – 0.2	NE	0.2 – 2.5
TP159	898.648	0.7	Target Depth	0.0 – 0.2	NE	0.2 – 0.7
TP160	899.196	0.7	Target Depth	0.0 – 0.2	NE	0.2 – 0.7
TP161	899.769	0.7	Target Depth	0.0 – 0.2	NE	0.2 – 0.7
TP162	899.885	0.2	Underground Services	NE	0.0 – 0.2	NE
TP163	895.540	0.2	Underground Services	0.0 – 0.2	NE	NE
TP164	893.327	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6
TP165	893.192	0.6	Target Depth	0.0 – 0.1	NE	0.1 – 0.6

Note: NE: Not Encountered, TD: Termination Depth

Topsoil	Silty Clay, low plasticity, brown, trace rootlets and gravel Clayey Silt, low plasticity, brown / grey, with fine to coarse grained gravel, trace rootlets
Fill	Silty Clay, low to medium plasticity, brown, trace gravel and rootlets Silty Clay, low plasticity, brown/ orange brown, with gravel and cobbles, trace boulders, trace rootlets Clayey Silt, low plasticity, grey, trace gravel
Natural	Silty CLAY, medium to high plasticity, pale grey mottled yellow-brown / red-brown mottled pale grey / orange brown / yellow-brown mottled pale grey and dark grey, with fine to coarse grained sand, trace to with gravel Sandy silty CLAY, medium plasticity, yellow-brown mottled pale grey and dark grey, fine to coarse grained sand, trace gravel Clayey Silty SAND, fine to coarse grained, yellow-brown mottled pale grey and dark grey, of medium plasticity clays, with fine to coarse grained gravel Clayey Sandy SILT, medium plasticity, grey mottled yellow-brown and orange-brown and dark grey, fine to coarse grained sand, trace gravel Clayey SILT, low plasticity, grey, with fine to coarse grained gravel Silty GRAVEL, fine to medium grained, grey mottled orange and black, trace sand

Based on the above, the sub-surface profile across the site consists of 0.1m to 0.3m thick topsoil, fill depths ranging up to 1.5m which overlays natural clays extending to depths between 0.1m and 9.45m. This table provides a generalised overview of the subsurface profile encountered in the boreholes and test pits. For a more detailed examination of each borehole and test pit, please refer to the engineering logs included in Appendix B at the end of this report.

3.3. Groundwater Conditions

Seepage was observed in BH104, BH 115 and BH116 at depths of 5.8m, 4.9m and 6.2m respectively. Long-term groundwater monitoring was not part of the investigation. It is important to note that groundwater levels typically fluctuate and are influenced by various factors beyond the scope of the current investigation.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

4. Laboratory Testing

4.1. Physical Tests

During the fieldwork, several soil samples were collected from various depths of the test pits and boreholes to conduct the following tests:

- Emerson Crumb Number (ECN)
- California Bearing Ratio (CBR) Test
- Atterberg Limits
- Particle Size Distribution

The above tests were conducted in the NATA accredited laboratory of Geotech Testing Pty Ltd. Detailed results for the above tests can be found in the attached certificates in Appendix B.

4.1.1. Emerson Crumb Test

Emerson Crumb Number was performed in accordance with AS1289.3.8.1. The result of the tests is summarised in Table 2 below.

Table 2: Summary of Emerson Crumb Test

Location ID	Depth (m)	Material Description	ECN
BH116	0.5 – 0.7	(CH) Silty CLAY, high plasticity, grey mottled yellow brown, trace sand and gravel	4
TP101	0.5 – 0.7	(CI) Silty CLAY, medium plasticity, orange-brown, with gravel, trace sand	4
TP109	0.5 – 0.8	(CI) Silty CLAY, medium to high plasticity, orange-brown, with gravel, trace sand	4
TP146	0.5 – 0.8	(CH) Silty CLAY, high plasticity, grey mottled orange to black, with gravel and sand	6
TP158	0.5 – 0.7	(CH) Silty CLAY, high plasticity, orange to brown, trace gravel and sand	4

Emerson Class Number indicates that the overall samples are non-dispersive in nature.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

4.1.2. California Bearing Ratio (CBR)

Laboratory compaction for CBR was performed in accordance with AS1289.5.1.1, and CBR values were obtained as per AS 1289.6.1.1. The test results are summarised in Table 3 below.

Table 3: CBR Test Results

Location ID	Sample Depth (m)	Soil Description	MDD (t/m ³)	OMC (%)	FMC (%)	Moisture Variation	Swell (%)	CBR (%)
BH116	0.5 – 0.7	(CH) Silty CLAY, high plasticity, grey mottled yellow brown, trace sand and gravel	1.75	18.5	16.2	2.3 dry	0.0	7
TP101	0.5 – 0.7	(CI) Silty CLAY, medium plasticity, orange-brown, with gravel, trace sand	1.75	15.5	12.2	3.3 dry	0.0	15
TP109	0.5 – 0.8	(CI) Silty CLAY, medium to high plasticity, orange-brown, with gravel, trace sand	1.64	18.0	12.4	5.6 dry	0.0	8
TP127	0.5 – 0.7	(CL) Silty CLAY, low plasticity, orange-brown, trace sand and gravel	1.81	15.0	12.4	2.6 dry	0.0	6
TP146	0.5 – 0.8	(CH) Silty CLAY, high plasticity, grey mottled orange to black, with gravel and sand	1.46	30.5	30.1	0.4 dry	0.0	8
TP153	0.8 – 1.0	(CL-CI) Silty CLAY, low to medium plasticity, brown-orange, with gravel trace sand and rootlets	1.88	14.5	9.8	4.7 dry	0.0	6
TP156	1.2 – 1.4	(CL) Silty CLAY, low plasticity, brown-orange, with gravel, trace sand	1.78	16.0	12.6	3.4 dry	0.0	7
TP158	0.5 – 0.7	(CH) Silty CLAY, high plasticity, orange to brown, trace gravel and sand	1.57	23.0	19.8	3.2 dry	0.5	7

MDD: Maximum Dry Density; OMC: Optimum Moisture Content; FMC: Field Moisture Content

The above results indicate that the CBR values range from 6% to 15%, with an average of approximately 8%. The swell of the tested samples ranged from 0.0% to 0.5%, indicating no to low expansive potential for the subgrade soils. Field moisture content was generally drier than optimum, ranging from 0.4% to 5.6% below the Optimum Moisture Content (OMC). Depending on the time of construction, moisture conditioning of the subgrade will be required to achieve a moisture content within $\pm 2\%$ of OMC.

4.1.3. Atterberg Limits

Atterberg limit tests were carried out as per the standards listed below and the results are summarised in Table 4.

- Liquid Limit AS1289 3.1.1
- Plastic Limit AS1289 3.2.1
- Plasticity Index AS1289 3.3.1
- Linear Shrinkage AS1289 3.4.1

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Table 4: Atterberg Limits

Location ID	Sample Depth (m)	Material Description	LL (%)	PL (%)	PI (%)	LS (%)
BH104	1.5 – 1.95	(CI) Silty CLAY, medium plasticity, yellow-brown mottled pale grey and dark grey, with fine to coarse grained gravels and sand	42	18	24	-
BH116	0.5 – 0.7	(CH) Silty CLAY, high plasticity, grey mottled yellow brown, trace sand and gravel	59	22	37	-
BH154	2.0 – 2.5	(CI) Silty CLAY, medium plasticity, red-brown mottled pale grey and grey, trace gravel and sand	47	19	28	-
TP101	0.5 – 0.7	(CI) Silty CLAY, medium plasticity, orange-brown, with gravel, trace sand	39	17	22	10.5
TP109	0.5 – 0.7	(CI) Silty CLAY, medium to high plasticity, orange-brown, with gravel, trace sand	41	16	25	-
TP127	0.5 – 0.7	(CL) Silty CLAY, low plasticity, orange-brown, trace sand and gravel	34	15	19	-
TP136	0.7 – 0.9	(CI) Silty CLAY, medium plasticity, orange-brown	44	16	28	12
TP141	0.7 – 0.9	(CL-CI) Silty CLAY, low to medium plasticity, orange, with gravel and boulders, trace sand	35	22	13	-
TP142	0.5 – 0.7	(CH) Silty CLAY, high plasticity orange, with gravel, trace sand	53	35	18	11.5
TP146	0.5 – 0.8	(CH) Silty CLAY, high plasticity, grey mottled orange to black, with gravel and sand	60	30	30	-
TP153	0.8 – 1.0	(CL-CI) Silty CLAY, low to medium plasticity, brown-orange, with gravel trace sand and rootlets	35	16	19	-
TP156	0.5 – 0.7	(CL) Silty CLAY, low plasticity, brown-orange, with gravel, trace sand	32	17	15	8.5
TP158	0.5 – 0.7	(CH) Silty CLAY, high plasticity, orange to brown, trace gravel and sand	57	20	37	17

Note: LL: Liquid Limit; PL: Plastic Limit; PI: Plasticity Index; LS: Linear Shrinkage

The above results indicate that the soils at the site are generally of medium to high plasticity clays, prone to shrinking and swelling to moisture changes.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

4.1.4. Particle Size Distribution

Particle size distribution tests on recovered samples in accordance with AS1289.3.6.1. The results are summarised below and detailed in the attached certificates.

Table 5: Particle Size Distribution

Location ID	Sample Depth (m)	Material Description	% Gravel	% Sand	% Fines
BH116	0.5 – 0.7	(CH) Silty CLAY, high plasticity, grey mottled yellow brown, trace sand and gravel	2	3	95
TP101	0.5 – 0.7	(CI) Silty CLAY, medium plasticity, orange-brown, with gravel, trace sand	18	10	72
TP109	0.5 – 0.8	(CI) Silty CLAY, medium to high plasticity, orange-brown, with gravel, trace sand	16	5	79
TP127	0.5 – 0.7	(CL) Silty CLAY, low plasticity, orange-brown, trace sand and gravel	13	2	85
TP146	0.5 – 0.8	(CH) Silty CLAY, high plasticity, grey mottled orange to black, with gravel and sand	25	18	57
TP153	0.8 – 1.0	(CL-CI) Silty CLAY, low to medium plasticity, brown-orange, with gravel trace sand and rootlets	17	14	69
TP156	1.2 – 1.4	(CL) Silty CLAY, low plasticity, grey mottled orange black, with gravel, trace sand	28	9	63
TP158	0.5 – 0.7	(CH) Silty CLAY, high plasticity, orange to brown, trace gravel and sand	11	7	82

The above PSD test results indicate the percent fines (i.e., particles passing the 75µm sieve) range from 57% to 95%. Based on these PSD results and the Atterberg limit test results, the soils at the site are generally classified as medium to high plasticity clays.

4.2. Chemical Testing

Samples recovered from the test pits were tested to determine electrical conductivity (EC), pH, Sulphate, Chloride, and exchangeable sodium percentage (ESP), in the NATA accredited laboratory of SGS. The purpose of pH, sulphate, and chloride tests was to assess soil aggressivity, EC test was to assess soil salinity and ESP test was to assess soil sodicity/dispersivity. The tests are summarised below in Table 6 and attached in the certificates at the end of the report.

Table 6: Chemical Test Results

Location ID	Sample Depth (m)	EC (µS/cm)	pH	Sulphate ppm	Chloride ppm	ESP (%)
TP101	1.0 – 1.1	44	5.9	68	3.8	1.8
BH104	0.0-0.1	-	5.6	-	-	-
	0.5 – 0.95	47	7	-	-	-
	3.0 – 3.45	30	7.3	<5	9	-
	4.5 – 4.95	74	8.4	-	-	-
TP105	1.0 – 1.1	7	6.7	<5	3.3	-
TP106	0.25-0.35	-	5.9	-	-	-
TP108	0.25-0.35	-	6.6	-	-	-
	1.0 – 1.1	20	6.9	-	-	-

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Location ID	Sample Depth (m)	EC (µS/cm)	pH	Sulphate ppm	Chloride ppm	ESP (%)
TP109	0.0-0.15	-	5.5	-	-	-
	1.5 – 1.6	21	5.2	5.1	12	3.2
TP111	0.0-0.1	-	5.6	-	-	-
	0.15-0.25	-	6	-	-	-
TP113	0.0-0.1	-	5.5	-	-	-
TP114	0.0-0.1	-	5.2	-	-	-
BH115	0.0-0.1	-	5.6	-	-	-
	0.5 – 0.95	170	5.9	-	-	11.1
	3.0 – 3.45	190	8	280	12	-
	5.5 – 5.95	46	7.8	57	3.6	-
BH116	0.5 – 0.95	320	6	420	170	-
	3.0 – 3.45	100	8.6	-	-	-
	4.5 – 4.95	48	8.5	-	-	-
TP117	0.0-0.15	-	5.7	-	-	-
TP120	0.0-0.1	-	5.1	-	-	-
TP123	0.0-0.1	-	4.5	-	-	-
TP123	0.15-0.25	-	4.3	-	-	-
TP124	0.15-0.25	-	5.3	-	-	-
TP127	0.0-0.1	-	5.7	-	-	-
	0.4 – 0.5	21	7.3	20	7.8	-
	1.0 – 1.1	16	7.2	-	-	-
TP130	0.0-0.15	-	5.5	-	-	-
TP131	0.15-0.25	-	5.1	-	-	-
TP133	0.0-0.1	-	5.4	-	-	-
TP139	0.0-0.1	-	6.1	-	-	-
TP141	0.0-0.15	-	6.2	-	-	-
TP141	1.0 – 1.1	27	6.2	18	16	-
TP142	1.0 – 1.1	45	6.1	-	-	4.5
TP145	0.0-0.15	-	5.6	-	-	-
TP146	0.3 – 0.4	21	6.6	-	-	-
TP148	0.0-0.15	-	6	-	-	-
	0.55-0.65	-	6.9	-	-	-
TP149	0.0-0.15	-	7	-	-	-
TP150	0.0-0.1	-	5.3	-	-	-
	0.15-0.25	-	5.9	-	-	-
TP151	0.0-0.3	-	7.3	-	-	-
	0.5-0.8	-	7.5	-	-	-
	0.85-0.95	-	6.5	-	-	-
TP152	0.0-0.3	-	7.6	-	-	-
	0.5-0.8	-	6.7	-	-	-
TP153	0.0-0.15	-	6.5	-	-	-
	1.0-1.3	-	6.7	-	-	-

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Location ID	Sample Depth (m)	EC ($\mu\text{S}/\text{cm}$)	pH	Sulphate ppm	Chloride ppm	ESP (%)
TP154	0.0-0.15	-	6.8	-	-	
	0.55-0.65	-	7	-	-	-
	1.5 – 1.95	42	6.6	-	-	1.1
	4.5 – 4.95	46	5.9	51	21	-
TP155	0.0-0.15	-	6.3	-	-	-
	0.2-0.5	-	7.6	-	-	-
TP156	1.0 – 1.1	5	7.3	-	-	0.9
TP158	0.9 – 1.0	23	6.5	33	1.2	-
TP165	0.0-0.1	-	6.3	-	-	-

5. Discussion and Recommendations

5.1. Salinity Assessment

Salinity refers to the presence of excess salt in the environment, either in soil or water. Salinity is a serious problem for any development due to the many environmental, economic and social impacts. Soil salinity is generally assessed by measuring Electrical Conductivity (EC) of a soil sample made up of 1:5 soil water suspension. The measured Electrical Conductivity (EC) is then adjusted by multiplying it by a multiplication factor (MF) varying from 6 to 17, based on the texture of the soil sample, to obtain corrected Electrical Conductivity designated as EC_e (Lillicrap & McGhie, 2002). The criteria for assessment of soil salinity classes are shown below (Lillicrap & McGhie, 2002).

Table 7: Salinity Classification

Classification	EC_e (dS/m)	Comments
Non-saline	<2	Salinity effects mostly negligible
Slightly saline	2 – 4	Yields of very sensitive crops may be affected
Moderately saline	4 – 8	Yields of many crops affected
Very saline	8 – 16	Only tolerant crops yield satisfactorily
Highly saline	>16	Only a few tolerant crops yield satisfactorily

Calculated EC_e values of the tested samples are shown below in Table 8. Considering the type of subsurface materials encountered at the site MF ranging from 6 to 9 were used to calculated EC_e values.

Table 8: Calculated EC_e Values and Salinity Assessment

Test Pit	Depth (m)	pH	EC ($\mu\text{S}/\text{cm}$)	MF	EC_e (dS/m)	Salinity Assessment
TP101	1.0 – 1.1	5.9	44	8	0.35	Non-saline
BH104	0.5 – 0.95	7	47	8	0.38	Non-saline
	3.0 – 3.45	7.3	30	8	0.24	
	4.5 – 4.95	8.4	74	8	0.59	
TP105	1.0 – 1.1	6.7	7	8	0.06	Non-saline
TP108	1.0 – 1.1	6.9	20	8	0.16	Non-saline
TP109	1.5 – 1.6	5.2	21	8	0.17	Non-saline
BH115	0.5 – 0.95	5.9	170	6	1.02	Non-saline

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Test Pit	Depth (m)	pH	EC ($\mu\text{S/cm}$)	MF	ECe (dS/m)	Salinity Assessment
	3.0 – 3.45	8	190	6	1.14	
	5.5 – 5.95	7.8	46	8	0.37	
TP127	0.4 – 0.5	7.3	21	9	0.19	Non-saline
	1.0 – 1.1	7.2	16	9	0.14	
TP141	1.0 – 1.1	6.2	27	8.5	0.23	Non-saline
TP142	1.0 – 1.1	6.1	45	6	0.27	Non-saline
TP146	0.3 – 0.4	6.6	21	7	0.15	Non-saline
TP154	4.5 – 4.95	5.9	46	8	0.37	Non-saline
	1.5 – 1.95	6.6	42	8	0.34	
TP156	1.0 – 1.1	7.3	5	9	0.05	Non-saline
TP158	0.9 – 1.0	6.5	23	6	0.14	Non-saline
BH116	0.5 – 0.95	6	320	6	1.92	Non-saline
	3.0 – 3.45	8.6	100	6	0.6	
	4.5 – 4.95	8.5	48	6	0.29	

Based on the laboratory EC results and the multiplication factors of 6 to 9 used to convert EC1:5 to EC_e values, the calculated EC_e values range from 0.14dS/m to 1.92dS/m, with an average of approximately 0.42dS/m. All twenty-two (22) samples tested indicate non-saline conditions. Therefore, the overall salinity of the site is classified as non-saline.

5.2. Aggressivity Assessment

Aqueous solution of chlorides causes corrosion of iron and steel, including steel reinforcement in concrete. High acidity and soils with high sulphates affect the integrity of concrete structures buried in the soil. Concrete structures constructed in aggressive soils will require increased concrete strength proportional to the increased in soil aggressivity. In addition, the concrete cover and curing period should be increased depending on the degree of aggressivity of the soil.

The aggressivity classifications of soil and groundwater applicable to iron and steel, in accordance with AS2159 (Standards Australia, 2009), are given below:

Iron & Steel			Concrete		
pH	Chloride (ppm)	Low Permeability Soil	pH	Sulphate (ppm)	Low Permeability Soil
>5.0	<5,000	Non-aggressive	>5.5	<5,000	Non-aggressive
4.0-5.0	5,000-20,000	Non-aggressive	4.5-5.5	5,000-10,000	Mild
3.0-4.0	20,000 – 50,000	Mild	4.0-4.5	10,000 – 20,000	Moderate
<3.0	>50,000	Moderate	<4.0	>20,000	Severe

For aggressivity assessment, soil samples were tested to determine pH, sulphate and chloride contents. Based on the test results and the texture of the soil samples, aggressivity assessment of the test samples is shown below in Table 9.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Table 9: Aggressivity Assessment

Location ID	Sample Depth (m)	pH	Sulphate (ppm)	Chloride (ppm)	Assessment	
					Concrete	Iron/Steel
TP101	1.0 – 1.1	5.9	68	3.8	Non-aggressive	Non-aggressive
BH104	0.0 – 0.1	5.6	-	-	Non-aggressive	Non-aggressive
	0.5 – 0.95	7	-	-		
	3.0 – 3.45	7.3	<5	9		
	4.5 – 4.95	8.4	-	-		
TP105	1.0 – 1.1	6.7	<5	3.3	Non-aggressive	Non-aggressive
TP106	0.25 – 0.35	5.9	-	-	Non-aggressive	Non-aggressive
TP108	0.25 – 0.35	6.6	-	-	Non-aggressive	Non-aggressive
	1.0 – 1.1	6.9	-	-	Non-aggressive	Non-aggressive
TP109	0.0 – 0.15	5.5	-	-	Non-aggressive	Non-aggressive
	1.5 – 1.6	5.2	5.1	12	Mild	Non-aggressive
TP111	0.0 – 0.1	5.6	-	-	Non-aggressive	Non-aggressive
	0.15 – 0.25	6	-	-	Non-aggressive	Non-aggressive
TP113	0.0 – 0.1	5.5	-	-	Non-aggressive	Non-aggressive
TP114	0.0 – 0.1	5.2	-	-	Mild	Non-aggressive
BH115	0.0 – 0.1	5.2	-	-	Mild	Non-aggressive
	0.5 – 0.95	5.9	-	-	Non-aggressive	Non-aggressive
	3.0 – 3.45	8	280	12		
	5.5 – 5.95	7.8	57	3.6		
BH116	0.5 – 0.95	6	420	170	Non-aggressive	Non-aggressive
	3.0 – 3.45	8.6	-	-		
	4.5 – 4.95	8.5	-	-		
TP117	0.0 – 0.15	5.7	-	-	Non-aggressive	Non-aggressive
TP120	0.0 – 0.1	5.1	-	-	Mild	Non-aggressive
TP123	0.0 – 0.1	4.5	-	-	Mild	Non-aggressive
	0.15 – 0.25	4.3	-	-	Moderate	Non-aggressive
TP124	0.15 – 0.25	5.3	-	-	Mild	Non-aggressive
TP127	0.0 – 0.1	5.7	-	-	Non-aggressive	Non-aggressive
	0.4 – 0.5	7.3	20	7.8		
	1.0 – 1.1	7.2	-	-		
TP130	0.0 – 0.15	5.5	-	-	Mild	Non-aggressive
TP131	0.15 – 0.25	5.1	-	-	Mild	Non-aggressive
TP133	0.0 – 0.1	5.4	-	-	Mild	Non-aggressive
TP139	0.0 – 0.1	6.1	-	-	Non-aggressive	Non-aggressive
TP141	0.0 – 0.15	6.2	-	-	Non-aggressive	Non-aggressive
	1.0 – 1.1	6.2	18	16	Non-aggressive	Non-aggressive
TP142	1.0 – 1.1	6.1	-	-	Non-aggressive	Non-aggressive
TP145	0.0 – 0.15	5.6	-	-	Non-aggressive	Non-aggressive
TP146	0.3 – 0.4	6.6	-	-	Non-aggressive	Non-aggressive
TP148	0.0 – 0.15	6	-	-	Non-aggressive	Non-aggressive

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Location ID	Sample Depth (m)	pH	Sulphate (ppm)	Chloride (ppm)	Assessment	
					Concrete	Iron/Steel
	0.55 – 0.65	6.9	-	-	Non-aggressive	Non-aggressive
TP149	0.0 – 0.15	7	-	-	Non-aggressive	Non-aggressive
TP150	0.0 – 0.1	5.3	-	-	Mild	Non-aggressive
	0.15 – 0.25	5.9	-	-	Non-aggressive	Non-aggressive
TP151	0.0 – 0.3	7.3	-	-	Non-aggressive	Non-aggressive
	0.5 – 0.8	7.5	-	-	Non-aggressive	Non-aggressive
	0.85 – 0.95	6.5	-	-	Non-aggressive	Non-aggressive
TP152	0.0 – 0.3	7.6	-	-	Non-aggressive	Non-aggressive
	0.5 – 0.8	6.7	-	-	Non-aggressive	Non-aggressive
TP153	0.0 – 0.15	6.5	-	-	Non-aggressive	Non-aggressive
	1.0 – 1.3	6.7	-	-	Non-aggressive	Non-aggressive
TP154	0.0 – 0.15	6.8	-	-	Non-aggressive	Non-aggressive
	0.55 – 0.65	7	-	-	Non-aggressive	Non-aggressive
	1.5 – 1.95	6.6	-	-	Non-aggressive	Non-aggressive
	4.5 – 4.95	5.9	51	21	Non-aggressive	Non-aggressive
TP156	1.0 – 1.1	7.3	-	-	Non-aggressive	Non-aggressive
TP158	0.9 – 1.0	6.5	33	1.2	Non-aggressive	Non-aggressive
TP165	0.0 – 0.1	6.3	-	-	Non-aggressive	Non-aggressive

Based on the above results, the soils at the site have a pH range of 4.3 to 8.6, with sulphate levels up to 420 ppm and chloride levels up to 170 ppm. Of the sixty-two (62) samples tested, one (1) sample was classified as moderately aggressive, eight (8) samples as mildly aggressive, and fifty-three (53) samples as non-aggressive to concrete. For iron and steel, all samples were found to be non-aggressive. Therefore, the soils at site are generally non-aggressive to iron and steel, and ranges from non-aggressive to mildly aggressive to concrete, with isolated areas of moderate aggressivity. Concrete strength and reinforcement cover should be designed in accordance with this assessment.

5.3. Erodibility Assessment

Erosion is the detachment and movement of soil materials. Depending on the local landscape and weather conditions, erosion could be very slow or very rapid. Susceptibility of soils to erosion depends on dispersivity (and sodicity) of soils. Soil dispersivity is generally assessed by conducting chemical tests such as Exchangeable Sodium Percentage (ESP), Sodium Absorption Ratio (SAR) and physical tests such as Emerson Class, Dispersion Percentage. It should be noted that assessment of soil dispersibility based on these methods might differ from each other. Soils with ESP values of 5% or more are considered sodic and those with ESP more than 15% are considered highly sodic (Lillicrap & McGhie, 2002). Sodic soils are susceptible to excessive erosion.

ESP results and the assessment based on the above criteria are summarised below in Table 10 and attached at the end of this report:

Table 10: Dispersive Assessment

Location ID	Sample Depth (m)	ESP (%)	Assessment
TP101	1.0 – 1.1	1.8	Non-Sodic
TP109	1.5 – 1.6	3.2	Non-Sodic
BH115	0.5 – 0.95	11.1	Sodic
TP142	1.0 – 1.1	4.5	Non-Sodic
TP154	1.5 – 1.95	1.1	Non-Sodic
TP156	1.0 – 1.1	0.9	Non-Sodic

Based on the above results, the ESP values range from 0.9% to 11.1%, with an average of approximately 3.7%. Of the six (6) samples tested, one (1) sample (BH115) is classified as sodic (ESP > 5%), while the remaining five (5) samples are non-sodic (ESP < 5%). Although the current testing indicates that most soils are non-dispersive, a previous investigation by GHD (2024) reported low dispersive potential in some topsoil and residual soils. Given the presence of one sodic sample and the prior findings, soils at the site may exhibit low to moderate erosion potential, necessitating a Soil Management Plan to mitigate risks during earthworks.

5.4. Soil Management Plan

Although our laboratory testing indicated the soils to be generally non-dispersive, we recommend that the soil management plan should be implemented to minimise soil erosion during construction.

The following should be considered in developing a Soil Management Plan:

- Minimise erosion and sediment loss before, during and after construction.
- Minimise water pollution due to erosion, siltation and sedimentation.
- Reduce and manage salinity within the site so that impacts on future structures (including buildings, roads etc) are minimised and acceptable.

We recommended the following as part of the Soil Management Plan during earthworks to manage impacts from erosive and saline soils:

- The best use of the existing topography should be developed to minimise cut and fill operations.
- Construct V-drains behind the crest of all slopes to divert water away from the slope face.
- Ensure that earthworks and construction activities do not affect the natural flow of groundwater. Where groundwater is intercepted during earthworks, the flow should be diverted to stormwater drains or creeks by providing appropriate surface and sub-surface drainage. We do not consider that proposed earthworks will affect the natural flow of groundwater. However, NSW Office of Water should be contacted if groundwater is intercepted before any water is drained into the stormwater. The Environmental Protection Authority (EPA) might need to be contacted regarding any diversion to stormwater drains.
- Finished ground surface in each lot should be provided with adequate fall to the street to allow water run-off and prevent water ponding, waterlogging and infiltration of rainwater.
- Erosion and Sediment Control Plans must be developed and implemented by the earthwork's contractors. All sediment and erosion controls proposed by the Erosion and Sediment Control Plan are to be installed prior to the commencement of earthworks.

9812/1-AA-R3

Proposed Subdivision Development
Redmond Place, Orange

- On cut and fill batters, provide a secured turf overlay or shotcreting to guard against erosion.
- Retaining walls for cut and fill slopes, where required, should be provided with adequate and appropriate drainage.
- Utilise native and deep-rooted plants to minimise soil erosion. Where vegetation cover is not adequate to control erosion, improve soil resistance to erosion by stabilising dispersive soils with hydrated lime or gypsum. The exact proportions of lime and gypsum to be used can be determined on the basis of laboratory testing, but for preliminary planning purposes we suggest about 2% to 3% of lime and gypsum.
- Select construction materials and techniques suitable for a non-aggressive site.
- Reduce groundwater recharge through appropriate land use and land management practices. This can be achieved by minimising deep infiltration by providing well compacted impermeable liners along surfaces of waterways (drains, channels, creeks etc) and maximising vegetation cover, planting of deep-rooted trees and use of salt-tolerant plants.
- For low lying portions of the site, stormwater drains along roads can be used to control groundwater level. However, to reduce the distance between drains, subsoil drains could also be installed along the property boundaries.
- Soil importation is not allowed unless the imported soil is thoroughly tested for salinity and is assessed as VENM (Virgin Excavated Natural Material) by an Environmental Consultant in accordance with EPA Guidelines. Any imported soil should have a maximum salinity (EC_e) of 4dS/m (non to slightly saline soils) and be used in the top 1.5m to minimise the effect of saline soils on buried utilities and footings.

If required, a post site works salinity assessment to confirm the salinity and aggressivity of the completed residential lots can be carried out on completion of all site works.

5.5. Excavation Conditions

Based on the provided draft cut and fill plans ref 24-1057 rev A dated 6 June 2025 by Colliers we anticipate bulk excavation works up to 4.0m cut and up to 4.0m of fill to achieve design grades. Based on the boreholes and test pits conducted at the site, overburden soils are likely to be encountered to these depths. It is our assessment that overburden soils at the site can be excavated using conventional earthmoving equipment such as excavators and dozers.

Selection of excavation equipment should be based on site access, strength of sub-surface materials and the likely impact of vibration to structures in the vicinity of the excavation. Acceptable vibration is based on the nature and state of neighbouring structures, which will have to be established by a dilapidation survey. As a general guide, the acceptable maximum peak particle velocity (PPV) in a residential area would range from about 5mm/s to 10mm/s. Contractors should make their own judgement when tendering for excavation works, using the engineering logs attached to this report and experience in such circumstances.

Seepage was encountered in in BH104, BH 115 and BH116 at 5.8m, 4.9m and 6.2m respectively. We do not anticipate significant groundwater inflow during excavation except at some low-lying areas. Groundwater inflow during excavation, if any, could be adequately managed using a conventional pump and sump system. However, trafficability problems might arise locally during wet weather or if water is allowed to pond at the site. We recommend water to be diverted where required prior to earthworks if groundwater or heavy rainfalls are encountered. A layer of recycled gravel can be used to provide a working platform.

5.6. Discussion of Existing Fill

Fill was encountered at BH154, TP113, TP130, TP141, TP142, TP143, TP151, TP152, TP153, TP155, TP157, and TP162 to depths ranging from 0.1m to 1.5m. Test pits excavated by GHD also encountered fill to depths up to 2.0m. It is our assessment that the existing fill at the site is uncontrolled and not suitable for supporting grade-raise fill and load bearing structures. Therefore, it is recommended that the fill encountered at the site is removed, moisture conditioned and backfilled in a controlled manner and compacted as recommended in the following Section 5.7.

5.7. Subgrade Preparation and Fill Placement

Prior to subgrade preparation and fill placement at the site we recommend removing existing dwellings/structures, underground assets and trees which are not part of the proposed subdivision. We recommend the following for subgrade preparation and fill placement:

- Strip existing fill and topsoil and stockpile separately for possible future use. Topsoil may be used in landscaping. Some of the existing fill may be used in controlled fill after moisture conditioning, removal of unsuitable materials and environmental validation. It is to be noted that topsoil would not be suitable to be placed within 1.0m of design subgrade level. Excess materials may be disposed of the site or temporary placed in the future stages to be used at a future development.
- Undertake proof rolling (using a 12 tonne roller unless directed by Council Engineers) of the exposed surface to detect potentially weak ground (ground heave). Excavate areas of localised heaving to a depth of about 300mm and replace with controlled fill, compacted as described below.
- Undertake proof rolling of the weak ground replaced with controlled fill, as described above. If the backfilled area shows further movement during further proof rolling, this office should be contacted for additional recommendations, which may include stripping additional soft soils and replacing with granular materials with or without geogrid reinforcement. No proof rolling will be required where bedrock is exposed after the stripping.
- Place controlled fill materials on proof rolled subgrade. Fill should be placed in horizontal layers of 200mm to 250mm maximum loose thickness and compacted thickness $\leq 200\text{mm}$ to a Density Ratio of 98% Standard, at moisture content within -2% to +2.0% of Optimum Moisture Content (OMC) unless directed otherwise by Orange City Council Engineers. The final 300mm of pavement subgrade shall be compacted to a minimum density ratio of 100%.
- Controlled (imported fill should preferably comprise non-reactive fill (e.g. crushed sandstone, sands), with a maximum particle size not exceeding 75mm, or low plasticity clay. natural soils, bedrock (if encountered) and some of fill materials obtained from excavations within the site may be selectively used in controlled fill after environmental validation, moisture conditioning and removal of deleterious materials (construction materials, tools, tyres etc).
- If fill material is heaving due to moisture. Moisture conditioning can be adopted as one or more of the following methods or equivalent.
 - Aeration: naturally drying by wind and air, may require aeration overnight or stabilize with lime if process is to be speeded up.
 - Drying: transporting wet material into open areas to dry typically a thinner layer will speed up the process. May require to be dried overnight or until approved upon Geotechnical Inspection.
 - Under or over optimal moistures may undergo wetting of material or blending with wetter material to achieve optimal moisture values.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

- Fill placement should be supervised to ensure that material quality, layer thickness, testing frequency and compaction criteria conform to the specifications. We recommend "Level 1" supervision, in accordance with AS3798-2007. It should be noted that a Geotechnical Inspection and Testing Authority will generally provide certification on quality of compacted fill only if Level 1 supervision and testing is carried out.

All tests conducted within this report (prior to civil) are following NATA accredited laboratories and procedures. It should be noted that all testing conducted prior, during and post construction shall be conducted by NATA accredited laboratories.

5.8. Ground Vibrations and Construction Noise

Ground vibration during excavation is generally represented by maximum peak particle velocity. Australian Standard AS2187.1 indicates that the houses and low-rise residential buildings, similar to those present in the vicinity of the site, can generally tolerate ground vibrations of about 5.0mm/s to 10.0mm/s.

As excavation in soils is expected at the site, conventional earthmoving equipment are likely to be used. Therefore, ground vibrations are expected to be less than 10.0mm/s.

5.9. Batter Slopes and Retaining Structures

Site preparation for proposed development works may result in cut and fill slopes. Such cut and fill slopes should be battered for stability or retained by engineered retaining structures. Recommended batter slopes for stability of cut and fill slopes are presented below.

Table 11: Recommended Batter Slopes for Cut and Fill Slopes

Material	Temporary	Permanent
Residual Soil and Controlled Fill	1.5H:1.0V	2.5H:1.0V

These batter slopes are recommended under the following conditions:

- Cut and fill slopes are at sufficient distance (at least 2m) from structures in the vicinity of the site.
- The excavation faces are protected appropriately from erosion.
- Adequate surface and sub-surface drainage is provided.
- Excavation faces are monitored regularly to observe any signs of movements so that appropriate remedial actions can be taken immediately.
- Collapse of excavation faces if it occurs is unlikely to pose a threat to the safety of people and structures in the vicinity.

If the cut and fill slopes steeper than those recommended in Table are required, then the slopes should be retained by engineered retaining structures. Appropriate retaining structures for the proposed basement excavations would comprise bored pile walls or cantilever wall or gravity wall. Active earth pressure distribution on above mentioned types of retaining walls may be estimated using following equation:

$$p_h = \gamma KH$$

Where,

- p_h = Horizontal active pressure (kN/m²)
- γ = Total density of materials to be retained (kN/m³)
- K = Coefficient of earth pressure (K_a or K_0)
- H = Retained height (m)

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

For the design of flexible retaining structures where some lateral movement is acceptable, an active earth pressure coefficient (K_a) is recommended. If it is critical to limit the horizontal deformation of a retaining structure, use of an earth pressure coefficient at rest (K_0) is recommended. Recommended earth pressure coefficients for the design of retaining structures are presented below.

Table 12: Recommended Earth Pressure Parameters

Retained Material	Unit Weight, γ (kN/m ³)	Active Earth Pressure Coefficient, K_a	At Rest Earth Pressure Coefficient, K_0	Ultimate Passive Earth Coefficient / Pressure, K_p
Unit 1 – Controlled Fill	19	0.31	0.48	4.3
Unit 2 – Natural Clay (Soft to Firm)	18	0.36	0.53	3.5
Unit 3 – Natural Clay (Stiff to Hard)	19	0.31	0.48	4.3
Unit 4 – Natural Gravel/Sand (Medium Dense to Very Dense)	20	0.25	0.4	6.0

If retaining structure is anchored or strutted, the pressure distribution on the retaining structure may be assumed to be trapezoidal in shape and estimated as below:

- p_h is linearly increasing from zero at ground surface (top of retaining wall) to $K_a\gamma H$ at depth of $0.25H$
- p_h is constant at $K_a\gamma H$ from depth of $0.25H$ to $0.75H$
- p_h is decreasing from $K_a\gamma H$ at depth of $0.75H$ to zero the base of excavation

The above coefficients are based on the assumptions that the ground level behind the retaining structure is horizontal, and the retained material is effectively drained. Additional earth pressures resulting from surcharge loads (buildings, infrastructures, etc) on retained materials and groundwater pressure, if any, should also be allowed for in design of retaining structures.

The design of any retaining structure should also be checked for bearing capacity, overturning, sliding and overall stability of the slope.

5.10. Preliminary Site Classification

It is our assessment that the site is suitable for construction of residential buildings after completion of site preparation works.

At completion of earthworks (i.e. cut and fill operations) for proposed development works, when building platforms and footing subgrade are ready for construction of residences, sub-surface profiles within the residential lots are anticipated to comprise either of the following:

- Controlled fill; or
- Controlled fill overlying natural clays; or
- Controlled fill overlying, natural clays overlying bedrock; or
- Natural clays; or
- Natural clays overlying bedrock.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

The magnitude of ground surface movement due to moisture variation, which is required for site classification, depends on shrink-swell index values and thickness of soils underlying a building slab. Based on the Atterberg limits test results (Table 4), natural clayey soils are generally assessed as low to high plasticity. Hence, the natural soils and controlled fill are likely to be moderately to highly reactive. Weathered shale and sandstone bedrock would generally be non-reactive to slightly reactive.

Based on anticipated thickness of soils (including controlled fill and natural clays) and estimated shrink-swell movements, site classifications for future residential lots are expected to be Class "M" (Moderately reactive) to "H1" (Highly reactive), in accordance with AS2870-2011 (Standards Australia, 2011). In areas where weathered shale/sandstone bedrock will be exposed, the residential lots would generally be classified as Class "A" (Non-reactive) or "S" (Slightly reactive). In areas where natural clays are exposed the site classification is expected to be Class "M" (Moderately Reactive). In fill areas (clayey soils) it is expected that the residential lots will be classified as Class "M" and Class "H1".

Definitions of site classes provided in AS2870-2011 are reproduced below:

Site Classification	Foundation Condition	Ground Surface Movement (mm)
Class A	Most sand and rock sites with little or no ground movement from moisture changes	Not Applicable
Class S	Slightly reactive clay sites, which may experience with only slight ground movement from moisture changes	Less than 20
Class M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes	20 to 40
Class H1	Highly reactive clay sites, which may experience high ground movement from moisture changes	40 to 60
Class H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes	60 to 75

The above classifications should be considered preliminary only and site classification for individual building platform for final design should be confirmed by sampling and testing of foundation materials after construction of subdivisional lots is completed. It should also be noted that trees proposed or existing which are not to be removed within or adjacent to the lots are taken into consideration of the influence depth in accordance with AS2870-2011 section H2.1 to 2.6 as this may increase the final site classification.

5.11. Floors Slab and Footings

We anticipate foundation materials to be controlled fill, residual soils, or siltstone/shale bedrock. Under such circumstances, ground floor slabs for the future buildings may be designed and constructed as ground bearing slabs or suspended slabs supported by footings designed in accordance with recommendations provided in this report.

Site classification in accordance with AS2870-2011 is only applicable for the design of footing systems for a single dwelling, house, townhouse or similar structure that would be detached or separated by a party wall or common wall including buildings classified as Class 1 and Class 10a in the Building Code of Australia (BCA). Therefore, a geotechnical investigation will be required for dwellings that would be classified in accordance with the BCA.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Foundation materials across the site might vary from controlled fill to natural clayey soils to shale/siltstone bedrock, depending on the location of a building with regard to cut and fill profile. Therefore, assessment of foundation materials and allowable bearing pressure for specific buildings should be reassessed after completion of site preparation works and during footing construction. For the proposed shallow and deep footing designs, the following is recommended.

Table 13: Recommended Allowable Bearing Pressures

Founding Material	Allowable End Bearing Capacity (kPa)	Shaft Adhesion (kPa)
Unit 1 – Controlled Fill	125	-
Unit 2 – Natural (Soft to Firm clay or loose to medium dense sand)	100	-
Unit 3 – Natural Clay (Stiff to Hard)	150	15
Unit 4 – Natural Gravel/Sand (Medium Dense to Very Dense)	250	40

** Bored Piers only*

If footings are founded above the 1 Horizontal to 1 Vertical line projected from the edge at the base of any excavation, the recommended allowable bearing pressures presented in Table 13 are not applicable and appropriate allowable bearing pressure will have to be determined by reassessment of materials exposed in the excavation face.

Total settlement of shallow footings (pad or strip type) founded in overburden soils and controlled fill under the recommended allowable bearing pressures is estimated to be about 15mm to 20mm. Differential settlements of footings founded on similar material, in strength and stiffness, are estimated to be about half the estimated total settlements. Footings founded in bed are likely to settle about 1% to 2% of the minimum footing dimension or pier diameter. To reduce differential settlement, we recommend that footings are founded on similar material (strength and stiffness).

5.12. Slope Stability (Slip and Subsidence)

Site factors such as slope angles, depth of in-situ soils, strengths of sub-surface materials and concentrations of water generally govern the stability of a site. As per the guidelines (Australian Geomechanics Society, 2007) prepared by Australian Geomechanics Society (AGS) the landslide risk of a site is assessed on the basis of the likelihood of a landslide event and the consequences of that event. Using AGS guideline, assessed qualitative measures for the likelihood and consequence of landslides as well as level of risk for the Redmond Place, Orange development site is as follows:

Qualitative Measures of Likelihood - It is our assessment that the event of a landslide within the site is conceivable but only under very exceptional circumstances ($\approx 10^{-5}$), i.e.: it is **“Rare”**.

Qualitative Measures of Consequences to Property - It is our assessment that the consequences of landslides to the property would be **“Minor”**, causing limited damage to part of structure, or part of the site requiring some reinstatement/stabilisation work.

Qualitative Risk Analysis – Level of Risk to Property - Based on the above Qualitative Measures, the Redmond place, Orange site is assessed to have a **“Very Low to low”** Risk Level. The abstract of definitions of risk levels, as provided by AGS, is presented below in Table 14.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

Table 14: Definitions of Landslide Risk

Risk Level	Implication
Very High Risk (VH)	Extensive detailed investigation and research, planning and implementation of treatment options, essential to reduce risk to acceptable levels; may be too expensive and not practical.
High Risk (H)	Detailed investigation, planning and implementation of treatment options required to reduce risk to acceptable levels.
Moderate Risk (M)	Tolerable, provided a treatment plan is implemented to maintain or reduce risks. May be accepted. May require investigation and planning of treatment options.
Low Risk (L)	Usually accepted. Treatment requirements and responsibility to be defined to maintain or reduce risk.
Very Low Risk (VL)	Acceptable. Manage by normal slope maintenance procedures.

As the risk of slope instability across the site is assessed to be very low to low, it is our assessment that the site is suitable for development, from a slope stability point of view, providing good engineering and construction practices are used during construction stage. The risk level of the site, or portions of the site, could change if proposed development involves significant ground modifications, including fill placement and excavations. However, the risk level will still be low and acceptable for residential, if cut and fill slopes exceeding 900mm during proposed development works are battered or retained by retaining structures designed as recommended in this report.

6. Pavement Thickness Design

6.1. Proposed Roads and Design Traffic Loading

Based on Orange City Council Subdivision and Development Code (2024), the following design traffic loadings are considered appropriate for the proposed roads within the development.

Table 15: Road Category and Design Traffic Loading Values

Council Urban Road Category	Design Traffic Loading (ESA)
Cul-De-Sac <8 lots	6x10 ⁴
Cul-De-Sac (8 – 30 lots)	3x10 ⁵
Local Access	6x10 ⁵
Collector	2x10 ⁶
Distributor	1x10 ⁷

6.2. Design CBR Value

The soaked CBR tests conducted on the subgrade soil samples recovered from the site indicates that the approximate subgrade level CBR values range from 6.0% to 15.0% (Table) with an average of ≈8%.

Given the likelihood of cutting and filling procedures for the proposed development, the subgrade in cut areas is expected to consist of clayey soils or proposed fill. In fill sections, it is anticipated that the subgrade will consist of onsite clayey fill (on-site soils), assuming that material from cut areas will be used as controlled fill in fill areas.

Based on the above assumption, a conservative design CBR of 4% has been adopted for the pavement design.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

6.3. Recommended Pavement Thickness

The pavement design is based on the Austroads Guide (Austroads, 2017) and Orange City Council Subdivision and Development Code (2024). Based on the above design traffic loading and the design CBR values, we recommend the following pavement thicknesses for the proposed roads.

Table 16: Recommended Pavement Thickness

Council Road Category	Design CBR (%)	AC10 (mm)	Base Course (DGB20) (mm)	Sub-base (mm)	Total including AC (mm)
Cul-De-Sac <8 lots	4	40*	100	220	360
Cul-De-Sac (8 – 30 lots)	4	40*	115	280	435
Local Access	4	40*	125	305	470
Collector	4	40*	145	345	530
Distributor	4	40*	170	400	610

** primer, plus 7mm one coat flush seal, plus specified thickness AC10 Asphalt*

The above pavement options/depths are only valid if the subgrade and pavement materials are compacted to the following Minimum Dry Density Ratios (AS1289 5.4.1) or directed by council engineers.

Basecourse	98% Modified or 102% Standard
Sub-Basecourse	98% Modified or 102% Standard
Subgrade	100% Standard

It should be noted that areas where fill is proposed within the subgrade pavement, the material shall achieve a minimum CBR value of 4.0% prior to adopting the above design.

9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

7. Limitations

The conclusions and recommendations presented in this report are based on the site observation and information from four (4) boreholes, sixty-one (61) test pits and laboratory tests. Although we believe that the sub-surface profile presented in this report is indicative of the general profile across the site, it is possible that the sub-surface profile could differ from that encountered in the test pits. We recommend that this company is contacted for further advice if soils or bedrock encountered during the construction stage differ from those presented in this report. Likewise, the assessment on the depth to groundwater level should be considered as indicative and should be confirmed during construction or by continuing groundwater investigation. If deep piling is proposed for any residential developments within the proposed lots, a detailed geotechnical investigation, including coring (if rock is encountered), should be conducted to gain a better understanding of the bedrock profile.

The services performed by Geotech Testing in preparing this report were conducted in a manner consistent with the level of quality and skill generally exercised by members of the profession and consulting practice. To the best of our knowledge, all information obtained and contained in this report is factual. No further investigation has been carried out to authenticate the information.

This report has been prepared for Landcom for the purposes stated within. The Orange City Council may rely on the report in making development application determinations. Any reliance on this report by other parties shall be at such parties' sole risk as the report might not contain sufficient information for other purposes.

This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval is provided by Geotech Testing.

The information in this report is considered accurate at the time of conducting the field work, in accordance with the current conditions of the site and standards. Any variations to the site form or use beyond this date could nullify the conclusions stated.

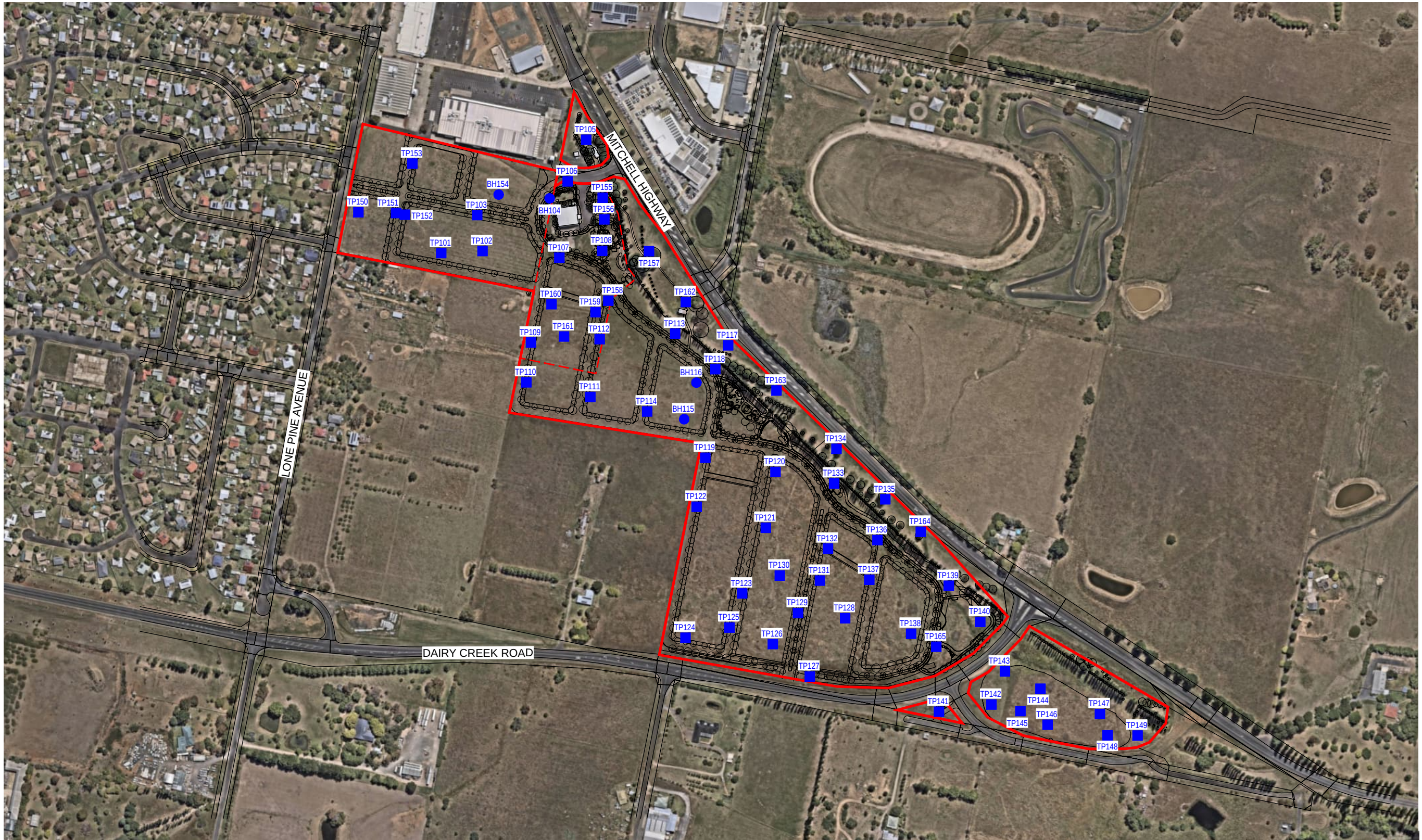
9812/1-AA-R3
Proposed Subdivision Development
Redmond Place, Orange

8. References

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APPENDIX A

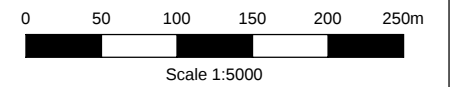
TEST PIT LOCATION PLAN (Drawing No 9812/1-AA1)



LEGEND

- Test Pit
- Borehole

Imagery © NearMap.com



34 Borec Road
Penrith
NSW 2750
ABN 71 076 676 321

Ph: 02 4722 2744
e-mail: info@geotech.com.au
www.geotech.com.au

NOTES

- This drawing has been produced using a base plan provided by others, to which additional information e.g., test pits, borehole locations or notes have been added. Some or all of the information on this plan may not be relevant at the time of producing this drawing.
- Site features are shown at approximate locations and are not to scale.

Landcom
BPA 16642
Redmond Place
Orange

Test Pit and Borehole Locations

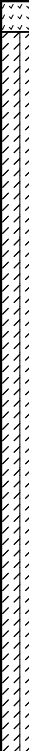
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Job No: 9812/1
Drawn By: MH
Date: 26 June 2025
Checked By: JC

File Ref: 9812-1
Layers: 0, AA1

APPENDIX B

ENGINEERING LOGS EXPLANATORY NOTES

engineering log - excavation

Client :		Landcom		Job No :		9812/1													
Project :		Proposed Subdivision Development (BPA 16642)		Pit No :		TP101													
Location :		Redmond Place, Orange		Date :		15/04/2025													
				Logged/Checked by: KB/YN															
Equipment type and model:				5t Excavator		R.L. surface :		902.987											
Excavation dimensions :				1.8 m long		0.45 m wide		datum :		AHD									
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations							
DRY	GP			C O C E N T R A L	0		CI	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets and gravel	M<PL	Vst-H		Inclusion of plastic							
	G				12														
					12														
					9														
					6														
					6														
					5														
					5														
					6														
					6														
					7														
					8														
					8														
					14														
					23														
					0.5														
					1			@1.5m, grey mottled orange											
					1.5														
					2							Resistance to excavator							
					2.5			Test Pit TP101 terminated at 2.5m Target depth reached											
					3														
					3.5														
					4														
					4.5														

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP102 Location : Redmond Place, OrangeDate : 15/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t Excavator					R.L. surface : 901.837							
Excavation dimensions : 1.8 m long 0.45 m wide					datum : AHD							
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CL-CI	TOPSOIL: Silty Clay, low plasticity, brown, trace root fibres and gravel	M<PL	St		Inclusion of plastic
	G				0.5			Silty CLAY, low to medium plasticity, orange to brown, trace gravel and sand				
								Test Pit TP102 terminated at 0.6m Target depth reached				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP103 Location : Redmond Place, OrangeDate : 15/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 901.844 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CL-CI	TOPSOIL: Clayey Silt, low plasticity, brown, trace root fibres and gravel	M<PL	St		Inclusion of tarp
	G				0.5			Silty CLAY, low to medium plasticity, orange to brown, trace gravel and sand				
								Test Pit TP103 terminated at 0.6m Target depth reached				

engineering log - excavation

Client :		Landcom		Job No : 9812/1								
Project :		Proposed Subdivision Development (BPA 16642)		Pit No : TP105								
Location :		Redmond Place, Orange		Date : 15/04/2025								
				Logged/Checked by: KB/YN								
Equipment type and model:				5t Excavator								
Excavation dimensions :				1.8 m long 0.45 m wide								
				R.L. surface : 902.749								
				datum : AHD								
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace gravel and rootlets				
	G				0.5		CI	Silty CLAY, medium plasticity, orange, trace sand	M<PL	St-Vst		
					1			@1.0m, mottled black, with gravel				
					1.5			@1.2m, grey mottled orange and black				
					2							
					2.5		CH	Silty CLAY, high plasticity, grey mottled orange and yellow, trace organics				
					3							
					3.5							
					4							
					4.5							
								Test Pit TP105 terminated at 2.5m Target depth reached				

engineering log - excavation

Client : Landcom Project : Proposed Subdivision Development (BPA 16642) Location : Redmond Place, Orange										Job No : 9812/1 Pit No : TP106 Date : 15/04/2025 Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator										R.L. surface : 901.761			
Excavation dimensions : 1.8 m long 0.45 m wide										datum : AHD			
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations	
DRY	GP				0		CI	MULCH	M>PL	St			
					TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets								
	G			0.5	Silty CLAY, medium plasticity, grey mottled orange, trace sand								
					1			Test Pit TP106 terminated at 0.7m Target depth reached					
					1.5								
					2								
					2.5								
					3								
					3.5								
					4								
					4.5								

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP107	
Location : Redmond Place, Orange		Date : 15/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 899.944	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets ----- @0.2m, no trace rootlets				
	G				0.5		CI-CH	Silty CLAY, medium to high plasticity, orange to brown, with gravel, trace sand	M<PL	St		
					1			Test Pit TP107 terminated at 1.0m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP108	
Location : Redmond Place, Orange		Date : 15/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 899.598	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
	G				0.5		CI	Silty CLAY, medium plasticity, orange to brown, trace rootlets and sand	M<PL	Vst-H		
					1							
					1.5			@1.5m, grey mottled orange				
					2							
					2.5			@2.3m, high plasticity				
					3							
					3.5							
					4							
					4.5							
					2.5			Test Pit TP108 terminated at 2.5m Target depth reached				

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP109	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 900.804	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5		CI	Silty CLAY, medium plasticity, orange to brown, with fine to coarse grained gravel, trace sand	M<PL	St-Vst		
			U ₅₀ DB		1							
					1.5			@1.3m, grey mottled orange and black, with gravel				
			DS		2							
					2.5			Test Pit TP109 terminated at 2.5m Target depth reached				
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP110	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 901.338	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP110 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom Job No : 9812/1 Project : Proposed Subdivision Development (BPA 16642) Pit No : TP111 Location : Redmond Place, Orange Date : 17/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t Excavator R.L. surface : 900.102 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
	G				Silty CLAY, medium to high plasticity, orange to brown, trace sand							
					0.5			Test Pit TP111 terminated at 0.6m Target depth reached				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP112 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 898.990 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5		CI-CH	Silty CLAY, medium to high plasticity, orange to brown, trace sand	M<PL	St		
								Test Pit TP112 terminated at 0.7m Target depth reached				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP113 Location : Redmond Place, OrangeDate : 17/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t Excavator					R.L. surface : 898.660							
Excavation dimensions : 1.8 m long 0.45 m wide					datum : AHD							
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low plasticity, brown, trace rootlets, gravel Test Pit TP113 terminated at 0.1m due to services	M<PL			
					0.5							
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom Project : Proposed Subdivision Development (BPA 16642) Location : Redmond Place, Orange										Job No : 9812/1 Pit No : TP114 Date : 17/04/2025 Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator										R.L. surface : 897.903			
Excavation dimensions : 1.8 m long 0.45 m wide										datum : AHD			
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations	
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St			
				0.5	Silty CLAY, medium to high plasticity, orange to brown, trace sand								
					1			Test Pit TP114 terminated at 0.6m Target depth reached					
					1.5								
					2								
					2.5								
					3								
					3.5								
					4								
					4.5								

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP117 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 897.587 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5			Test Pit TP117 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP118	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 896.652	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP118 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP119	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 897.500	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
	G				0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP119 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP120	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 895.853	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
	G				0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP120 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP121 Location : Redmond Place, OrangeDate : 17/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 896.865 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
				0.5	Silty CLAY, medium to high plasticity, orange to brown, trace sand							
					1			Test Pit TP121 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom Project : Proposed Subdivision Development (BPA 16642) Location : Redmond Place, Orange										Job No : 9812/1 Pit No : TP122 Date : 17/04/2025 Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator										R.L. surface : 899.176			
Excavation dimensions : 1.8 m long 0.45 m wide										datum : AHD			
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations	
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St			
				0.5	Silty CLAY, medium to high plasticity, orange to brown, trace sand								
					1			Test Pit TP122 terminated at 0.6m Target depth reached					
					1.5								
					2								
					2.5								
					3								
					3.5								
					4								
					4.5								

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP123	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 896.072	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
	G				0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP123 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP124	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 896.354	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
	G				0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP124 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom Project : Proposed Subdivision Development (BPA 16642) Location : Redmond Place, Orange										Job No : 9812/1 Pit No : TP125 Date : 17/04/2025 Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator										R.L. surface : 895.193			
Excavation dimensions : 1.8 m long 0.45 m wide										datum : AHD			
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations	
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St			
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand					
					1			Test Pit TP125 terminated at 0.6m Target depth reached					
					1.5								
					2								
					2.5								
					3								
					3.5								
					4								
					4.5								

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP126	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 894.837	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP126 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP127	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 893.949	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CL	TOPSOIL: Clayey Silt, low plasticity, brown, trace rootlets	M<PL	St-Vst		
					0.5			Silty CLAY, low plasticity, brown to orange, trace gravel and sand				
			DS		0.5							
			DB		1							
			DS		1.5			@1.5m, mottled black, trace gravel				
					2							
					2.5			Test Pit TP127 terminated at 2.5m Target depth reached				
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP128	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 894.399	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP128 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP129	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 894.951	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP129 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP130	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 896.455	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low plasticity, brown, trace rootlets, with gravel and cobbles, trace boulders	M<PL			
					0.5		CI-CH	Silty CLAY, medium to high plasticity, brown to orange, trace sand	M<PL	St		
	G				1			Test Pit TP130 terminated at 1.0m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP131	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 894.867	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
	G				0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP131 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP132	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 894.439	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP132 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP133	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 894.093	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP133 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP134 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 894.530 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5			Test Pit TP134 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP135 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 893.640 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5			Test Pit TP135 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom						Job No : 9812/1						
Project : Proposed Subdivision Development (BPA 16642)						Pit No : TP136						
Location : Redmond Place, Orange						Date : 17/04/2025						
						Logged/Checked by: KB/YN						
Equipment type and model: 5t Excavator						R.L. surface : 892.969						
Excavation dimensions : 1.8 m long 0.45 m wide						datum : AHD						
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP			COC	0		CI	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St-Vst		
					4			Silty CLAY, medium plasticity, brown to orange				
					5							
					4							
					4							
					7							
					7							
					6							
					5							
					3							
					4							
					2							
					3							
					3							
					4							
				4								
			DS		1.5			@1.5m, trace gravel				
					2							
					2.5			Test Pit TP136 terminated at 2.5m Target depth reached				
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP137	
Location : Redmond Place, Orange		Date : 17/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 893.728	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, trace sand				
					1			Test Pit TP137 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP138	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 893.185	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Clayey Silt, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, brown to orange, trace sand				
					1			Test Pit TP138 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP139	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 892.440	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Clayey Silt, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, brown to orange, trace sand				
					1			Test Pit TP139 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP140	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 891.841	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Clayey Silt, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, brown to orange				
					1			Test Pit TP140 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP141	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 892.994	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low plasticity, brown, trace gravel and rootlets	M<PL			Inclusion of stake
	G		DS		0.5		CL-CH	Silty CLAY, low to medium plasticity, orange, with gravel, trace sand	M<PL	St		
			DS		1			@0.8m, with boulders				
					1.5							
					2			Test Pit TP141 terminated at 1.8m due to refusal on suspected boulder				
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP142	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 892.629	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low plasticity, brown, trace gravel and rootlets	M<PL			
	G		U ₅₀		0.5		CH	Silty CLAY, high plasticity, orange, with gravel, trace sand	M<PL	St-Vst		
					1			@0.8m, with boulders				
			DS		1			@1.0m, mottled black				
					1.5							
					2							
					2.5			Test Pit TP142 terminated at 2.1m due to refusal on suspected boulder				
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP143	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 891.639	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low to medium plasticity, brown, with gravel, trace rootlets	M<PL			Inclusion of boulders
	G				0.5		CI-CH	Silty CLAY, medium to high plasticity, grey mottled orange to black, trace sand	M<PL	St		
					1			Test Pit TP143 terminated at 1.0m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP144 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 890.424 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5			Test Pit TP144 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP145 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 891.403 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, orange to brown, with gravel				
					0.5		CI-CH	Silty CLAY, medium to high plasticity, orange to brown, with gravel	M<PL	St		
					1			Test Pit TP145 terminated at 0.8m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom			Job No : 9812/1									
Project : Proposed Subdivision Development (BPA 16642)			Pit No : TP146									
Location : Redmond Place, Orange			Date : 16/04/2025									
			Logged/Checked by: KB/YN									
Equipment type and model: 5t Excavator			R.L. surface : 890.177									
Excavation dimensions : 1.8 m long 0.45 m wide			datum : AHD									
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G			C M Z O C	3			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					5							
	7				CI-CH		Silty CLAY, medium to high plasticity, grey mottled orange, with gravel, trace sand	M<PL	Vst-H			
	10				DS							
	16											
	18				GM		Silty GRAVEL, fine to medium grained, grey mottled orange and black, trace sand	D	D			
	18				CI-CH		Silty CLAY, high plasticity, grey mottled orange to black, with gravel and sand		H			
	18											
	17											
										2		@2.0m, with boulders
					2.5		Test Pit TP146 terminated at 2.5m Target depth reached					
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP147 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 889.141 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5			Test Pit TP147 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP148	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 889.483	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low plasticity, brown, trace rootlets	M<PL			
	G				0.5		CI	Silty CLAY, medium plasticity, orange mottled grey, black and brown, with gravel and boulders, trace boulders	M<PL	St		
					1			Test Pit TP148 terminated at 0.7m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP149 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 886.394 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5			Test Pit TP149 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP150	
Location : Redmond Place, Orange		Date : 15/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 903.485	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CL-CI	TOPSOIL: Silty Clay, low plasticity, brown, trace root fibres and gravel	M<PL	St		
	G				0.5			Silty CLAY, low to medium plasticity, orange to brown, trace gravel and sand				
					1			Test Pit TP150 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP151	
Location : Redmond Place, Orange		Date : 15/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 903.496	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			STOCKPILE: Silty Clay, low plasticity, brown, trace rootlets and gravel				Inclusion of bricks, tiles, fry, metal, concrete
					0.5			FILL: Silty Clay, low plasticity, brown, trace gravel	M<PL			
	GP											
	G											
					1		CI-CH	Silty CLAY, medium to high plasticity, orange to brown, trace sand	M<PL	St		
					1.5			Test Pit TP151 terminated at 1.3m Target depth reached				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP152	
Location : Redmond Place, Orange		Date : 15/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 903.673	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			STOCKPILE: Silty Clay, low plasticity, brown, trace rootlets and gravel				Inclusion of bricks, tiles, fry, metal, concrete, bitumen
					0.5			FILL: Silty Clay, low plasticity, brown, trace gravel	M<PL			Inclusion of bricks, tiles, fry, metal, concrete, bitumen
	GP						CI-CH	Silty CLAY, medium to high plasticity, orange to brown, trace sand	M<PL	St		
	G				1							
					1.5			Test Pit TP152 terminated at 1.3m Target depth reached				
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP153	
Location : Redmond Place, Orange		Date : 15/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 903.503	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP			26	0		CI-CH	FILL: Silty Clay, low to medium plasticity, brown-orange, with fine to coarse grained gravel, trace rootlets and sand	M<PL			Inclusion of paver, metal wire, cobble
				20								
				18								
				17								
				15								
				20								
				23								
				21								
				18								
				12								
				10								
				6								
				4								
				6								
				4								
			5									
				1.5			Silty CLAY, medium to high plasticity, brown-orange, with gravel, trace sand	M<PL	St			
				2			Silty CLAY, medium to high plasticity, grey mottled orange to black, with gravel, trace sand					
				2.5			Test Pit TP153 terminated at 2.5m Target depth reached					
				3								
				3.5								
				4								
				4.5								

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP155	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 901.458	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				Inclusion of bitumen
	GP							FILL: Silty Clay, low plasticity, orange to brown, with cobbles	M<PL			
	G				0.5		CI	Silty CLAY, medium plasticity, grey mottled orange, trace rootlets, sand	M<PL	St		
					1			Test Pit TP155 terminated at 1.0m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP156	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 900.220	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
	G				0.5		CL	Silty CLAY, low plasticity, brown to orange, with fine to coarse grained gravel, trace sand	M<PL	St		
			U ₅₀		1			@1.2m, grey mottled orange and black				
			DS		1.5							
			DB		2							
					2.5			Test Pit TP156 terminated @2.5m target depth reached				
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP157 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low plasticity, brown, trace rootlets, with gravel	M<PL			FCP
					0.5			Test Pit TP157 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP158	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 899.023	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5		CH	Silty CLAY, high plasticity, orange to brown, trace gravel and sand	M<PL	St		
			DB U ₅₀		1			@1.0m, grey mottled orange and black, with gravel				
			DS		1.5							
					2							
					2.5			Test Pit TP158 terminated @2.5m target depth reached				
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP159 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 898.648 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
						CI-CH	Silty CLAY, medium to high plasticity, orange to brown, with gravel, trace sand	M<PL	St			
						0.5						
								Test Pit TP159 terminated at 0.7m Target depth reached				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP160 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t Excavator					R.L. surface : 899.196							
Excavation dimensions : 1.8 m long 0.45 m wide					datum : AHD							
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5		CI-CH	Silty CLAY, medium to high plasticity, orange to brown, with gravel, trace sand	M<PL	St		
					1			Test Pit TP160 terminated at 0.7m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP161 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 899.769 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5		CI-CH	Silty CLAY, medium to high plasticity, orange to brown	M<PL	St		
					1			Test Pit TP161 terminated at 0.7m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP162 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t Excavator					R.L. surface : 899.885							
Excavation dimensions : 1.8 m long 0.45 m wide					datum : AHD							
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			FILL: Silty Clay, low plasticity, brown, trace rootlets, with gravel	M<PL			
					0.5			Test Pit TP162 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : LandcomJob No : 9812/1 Project : Proposed Subdivision Development (BPA 16642)Pit No : TP163 Location : Redmond Place, OrangeDate : 16/04/2025 Logged/Checked by: KB/YN												
Equipment type and model: 5t ExcavatorR.L. surface : 895.540 Excavation dimensions : 1.8 m long 0.45 m wide datum : AHD												
groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0			TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets				
					0.5			Test Pit TP163 terminated at 0.2m due to services				
					1							
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP164	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 893.327	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	G				0		CI-CH	TOPSOIL: Silty Clay, low plasticity, brown, trace rootlets and gravel	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, orange to brown, with gravel				
					1			Test Pit TP164 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - excavation

Client : Landcom		Job No : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Pit No : TP165	
Location : Redmond Place, Orange		Date : 16/04/2025	
Logged/Checked by: KB/YN			
Equipment type and model: 5t Excavator		R.L. surface : 893.192	
Excavation dimensions : 1.8 m long 0.45 m wide		datum : AHD	

groundwater	env samples	PID reading (ppm)	geo samples	field tests	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
DRY	GP				0		CI-CH	TOPSOIL: Clayey Silt, low plasticity, brown, trace rootlets	M<PL	St		
					0.5			Silty CLAY, medium to high plasticity, brown to orange				
					1			Test Pit TP145 terminated at 0.6m Target depth reached				
					1.5							
					2							
					2.5							
					3							
					3.5							
					4							
					4.5							

engineering log - borehole

Client : Landcom		Job No. : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Borehole No. : BH104	
Location : Redmond Place, Orange		Date : 15/04/25	
Logged/Checked by: YN/JC			
drill model and mounting : GEO 205 COMACCHIO		slope :	deg. R.L. surface : 900.54
hole diameter : 120 mm		bearing :	deg. datum : AHD

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
		G		DS	10,12,10 N=22	0		ML	TOPSOIL: Clayey Silt, Low plasticity, grey, with fine to coarse grained gravel, trace rootlets Clayey SILT, low plasticity, grey, with fine to coarse grained gravel	M<PL	St		
						0.5		CI	Silty CLAY, medium plasticity, yellow-brown mottled pale grey and dark grey, with fine to coarse grained gravels and sand		Vst		
						1		CH	Silty CLAY, high plasticity, pale grey mottled yellow-brown, with fine to coarse grained sand, trace gravel	M≤PL			
						1.5					DS	4,9,13 N=22	
						2							
2.5		CI	Sandy silty CLAY, medium plasticity, yellow-brown mottled pale grey and dark grey, fine to coarse grained sand, trace gravel	M<PL									
3					DS	3,6,10 N=16							
3.5													
4													
						4.5					H		

engineering log - borehole

Client :		Landcom				Job No. :		9812/1			
Project :		Proposed Subdivision Development (BPA 16642)				Borehole No. :		BH104			
Location :		Redmond Place, Orange				Date :		15/04/25			
						Logged/Checked by:		YN/JC			
drill model and mounting :						GEO 205 COMACCHIO		slope :		deg. R.L. surface : 900.54	
hole diameter : 120						mm		bearing :		deg. datum : AHD	

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Bit				DS	5,13,17 N=30	5							
						5.5							
						6							
					11,23,24 N=47	6.5		SC	Clayey Silty SAND, fine to coarse grained, yellow-brown mottled pale grey and dark grey, of medium plasticity clays, with fine to coarse grained gravel	Dry	D		Extremely Weathered Bedrock
						7							
						7.5							
					9,14,17 N=31	8							
						8.5							
						9							
					18,30R N=R								
Dry													

engineering log - borehole

[illegible]

engineering log - borehole

Client : Landcom		Job No. : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Borehole No. : BH115	
Location : Redmond Place, Orange		Date : 16/04/25	
Logged/Checked by: YN/JC			
drill model and mounting : GEO 205 COMACCHIO		slope : deg. R.L. surface : 897.21	
hole diameter : 120 mm		bearing : deg. datum : AHD	

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
To-Bit		G				0		CH	TOPSOIL: Clayey Silt, Low plasticity, grey, with fine to coarse grained gravel, trace rootlets Silty CLAY, high plasticity, grey mottled yellow-brown and orange-brown, with fine to coarse grained sand, trace gravel	M<PL	St-Vst		
				DS	6,10,11 N=21	0.5							
						1			@1m grey mottled yellow-brown	M=PL			
						1.5					F		
					1,2,3 N=5	2							
				DS	1,2,4 N=6	3							
						3.5							
				DS	8,15,28 N=43	4		CI	Clayey Sandy SILT, medium plasticity, grey mottled yellow-brown orange-brown and dark grey, fine to coarse grained sand, trace gravel	M<PL	H		
						4.5							

engineering log - borehole

Client :		Landcom			Job No. :		9812/1			
Project :		Proposed Subdivision Development (BPA 16642)			Borehole No. :		BH115			
Location :		Redmond Place, Orange			Date :		16/04/25			
					Logged/Checked by: YN/JC					
drill model and mounting :					GEO 205 COMACCHIO		slope :		deg. R.L. surface : 897.21	
hole diameter :					120 mm		bearing :		deg. datum : AHD	

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
dry						5				M>PL			
				DS	7.8,10 N=18	5.5			M≤PL	Vst			
						6							
				DS	5.7,9 N=16	7							
						7.5					H		
				DS	8.14,18 N=32	8.5							
						9			BH115 terminated @9.27m target depth reached				

engineering log - borehole

Client : Landcom		Job No. : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Borehole No. : BH116	
Location : Redmond Place, Orange		Date : 16/04/25	
Logged/Checked by: YN/JC			
drill model and mounting : GEO 205 COMACCHIO		slope : deg. R.L. surface : 896.95	
hole diameter : 120 mm		bearing : deg. datum : AHD	

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
		G				0		CH	TOPSOIL: Clayey Silt, low plasticity, grey, trace sand and rootlets Silty CLAY, high plasticity, grey mottled yellow brown, trace gravel and sand	M<PL	St-Vst		
				DB		0.5				M=PL			
				DS	8,10,8 N=18								
						1							
						1.5			@1.5m, grey mottled yellow-brown and dark grey	M=PL	F		
				DS	1,4,4 N=8								
						2							
						2.5							
						3			@3.0m, grey mottled yellow-brown, pale grey and dark grey				
				DS	2,2,5 N=7								
						3.5		SC	Clayey Silty SAND, fine to coarse grained, orange-brown mottled pale grey and dark grey	D	L-MD		
						4							
						4.5					MD-D		

engineering log - borehole

Client :		Landcom			Job No. :		9812/1			
Project :		Proposed Subdivision Development (BPA 16642)			Borehole No. :		BH116			
Location :		Redmond Place, Orange			Date :		16/04/25			
					Logged/Checked by: YN/JC					
drill model and mounting :					GEO 205 COMACCHIO		slope :		deg. R.L. surface : 896.95	
hole diameter :					120 mm		bearing :		deg. datum : AHD	

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
Tic-Cl				DS	8,12,16 N=28	5							
						5.5							
				DS	10,15,20 N=35	6			@6.0m, orange-brown mottled pale grey, dark grey and yellow-brown	M			
						6.5							
				DS	8,13,16 N=29	7.5				D			
						8							
						8.5							
				DS	12,25,30 N=55	9							

engineering log - borehole

Client : Landcom		Job No. : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Borehole No. : BH116	
Location : Redmond Place, Orange		Date : 16/04/25	
Logged/Checked by: YN/JC			

drill model and mounting : GEO 205 COMACCHIO	slope : deg.	R.L. surface : 896.95
hole diameter : 120 mm	bearing : deg.	datum : AHD

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
	✓					9.5			BH116 terminated @9.45m target depth reached				
						10							
						10.5							
						11							
						11.5							
						12							
						12.5							
						13							
						13.5							

engineering log - borehole

Client : Landcom		Job No. : 9812/1	
Project : Proposed Subdivision Development (BPA 16642)		Borehole No. : BH154	
Location : Redmond Place, Orange		Date : 16/04/25	
Logged/Checked by: YN/JC			
drill model and mounting : GEO 205 COMACCHIO		slope :	deg. R.L. surface : 902.96
hole diameter : 120 mm		bearing :	deg. datum : AHD

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
						0			FILL: Clayey Silt, low plasticity, grey, trace gravel	M<PL			
					12,12,10 N=22	0.5		CH	Silty CLAY, high plasticity, grey mottled orange-brown and dark grey, trace sand and gravel	M<PL	Vst		Possible Fill
				DS	1,1,2 N=3	1.5			@1.3m, grey mottled yellow-brown and dark grey	M≅PL	S-F		
				DS		2			@2.0m, red-brown mottled pale grey and grey, trace gravel and sand	M≤PL			
					4,5,7 N=12	3					St		
						3.5							
						4							
						4.5							

engineering log - borehole

Client :		Landcom			Job No. :		9812/1			
Project :		Proposed Subdivision Development (BPA 16642)			Borehole No. :		BH154			
Location :		Redmond Place, Orange			Date :		16/04/25			
					Logged/Checked by: YN/JC					
drill model and mounting :					GEO 205 COMACCHIO		slope :		deg. R.L. surface : 902.96	
hole diameter :					120 mm		bearing :		deg. datum : AHD	

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
TIG-01				DS	3,5,7 N=12	4.7			@ 4.7m, with fine to coarse grained sand				
						5							
						5.5							
					6,10,12 N=22	6				M<PL	Vst		
						6.5							
						7							
						7.5		SC	Silty Clayey SAND, fine to coarse grained, orange-brown mottled yellow-brown and dark grey, of medium plasticity clays, trace gravel	D	D		
					9,15,23 N=38	8							
						8.5							
						9							
					10,14,21 N=35								

engineering log - borehole

Client : Landcom										Job No. : 9812/1					
Project : Proposed Subdivision Development (BPA 16642)										Borehole No. : BH154					
Location : Redmond Place, Orange										Date : 16/04/25					
										Logged/Checked by: YN/JC					
drill model and mounting : GEO 205 COMACCHIO										slope :		deg.		R.L. surface : 902.96	
hole diameter : 120 mm										bearing :		deg.		datum : AHD	
method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations		
✓						9.5			BH154 terminated at 9.45m Target depth reached						
						10									
						10.5									
						11									
						11.5									
						12									
						12.5									
						13									
						13.5									

Log Symbols & Abbreviations (Non-cored Borehole Log)

Log Column	Symbol/Value	Description																					
Drilling Method	V-bit TC-bit RR DB BB	Hardened steel 'V' shaped bit attached to auger Tungsten Carbide bit attached to auger Tricone (Rock Roller) bit Drag bit Blade bit																					
Groundwater	Dry  	Groundwater not encountered to the drilled or auger refusal depth Groundwater level at depths shown on log Groundwater seepage at depths shown on log																					
Environment Sample	GP G P	Glass bottle and plastic bag sample over depths shown on log Glass bottle sample over depths shown on log Plastic bag sample over depths shown on log																					
PID Reading	100	PID reading in ppm																					
Geotechnical Sample	DS DB U ₅₀	Disturbed Small bag sample over depths shown on log Disturbed Bulk sample over depths shown on log Undisturbed 50mm tube sample over depths shown on log																					
Field Test	N=10 3,5,5 N=R 10,15/100	Standard Penetration Test (SPT) 'N' value. Individual numbers indicate blows per 150mm penetration. 'R' represents refusal to penetration in hard/very dense soils or in cobbles or boulders. The first number represents 10 blows for 150mm penetration whereas the second number represents 15 blows for 100mm penetration where SPT met refusal																					
	DCP/PSP	Dynamic Cone Penetration (DCP) or Perth Sand Penetrometer (PSP). Each number represents blows per 100mm penetration. 'R/10' represents refusal after 10mm penetration in hard/very dense soils or in gravels or boulders.																					
Classification	GP GW GM GC SP SW SM SC ML MI MH CL CI CH	Poorly Graded GRAVEL Well graded GRAVEL Silty GRAVEL Clayey GRAVEL Poorly graded SAND Well graded SAND Silty SAND Clayey SAND SILT / Sandy SILT / clayey SILT, low plasticity SILT / Sandy SILT / clayey SILT, medium plasticity SILT / Sandy SILT / clayey SILT, high plasticity CLAY / Silty CLAY / Sandy CLAY / Gravelly CLAY, low plasticity CLAY / Silty CLAY / Sandy CLAY / Gravelly CLAY, medium plasticity CLAY / Silty CLAY / Sandy CLAY / Gravelly CLAY, high plasticity																					
Moisture Condition Cohesive soils	M<PL M=PL M>PL	Moisture content less than Plastic Limit Moisture content equal to Plastic Limit Moisture content to be greater than Plastic Limit																					
Cohesionless soils	D M W	Dry - Runs freely through hand Moist - Tends to cohere Wet - Tends to cohere																					
Consistency Cohesive soils	VS S F St VSt H	<table> <tr> <th>Term</th><th>Undrained shear strength, C_u (kPa)</th><th>Hand Penetrometer (Q_u)</th></tr> <tr> <td>Very Soft</td><td>≤12</td><td><25</td></tr> <tr> <td>Soft</td><td>>12 & ≤25</td><td>25 – 50</td></tr> <tr> <td>Firm</td><td>>25 & ≤50</td><td>50 – 100</td></tr> <tr> <td>Stiff</td><td>>50 & ≤100</td><td>100 – 200</td></tr> <tr> <td>Very Stiff</td><td>>100 & ≤200</td><td>200 – 400</td></tr> <tr> <td>Hard</td><td>>200</td><td>>400</td></tr> </table>	Term	Undrained shear strength, C _u (kPa)	Hand Penetrometer (Q _u)	Very Soft	≤12	<25	Soft	>12 & ≤25	25 – 50	Firm	>25 & ≤50	50 – 100	Stiff	>50 & ≤100	100 – 200	Very Stiff	>100 & ≤200	200 – 400	Hard	>200	>400
Term	Undrained shear strength, C _u (kPa)	Hand Penetrometer (Q _u)																					
Very Soft	≤12	<25																					
Soft	>12 & ≤25	25 – 50																					
Firm	>25 & ≤50	50 – 100																					
Stiff	>50 & ≤100	100 – 200																					
Very Stiff	>100 & ≤200	200 – 400																					
Hard	>200	>400																					
Density Index Cohesionless soils	VL L M D VD	<table> <tr> <th>Term</th><th>Density Index, I_D (%)</th><th>SPT 'N' (blows/300mm)</th></tr> <tr> <td>Very Loose</td><td>≤15</td><td>≤5</td></tr> <tr> <td>Loose</td><td>>15 & ≤35</td><td>>5 & ≤10</td></tr> <tr> <td>Medium Dense</td><td>>35 & ≤65</td><td>>10 & ≤30</td></tr> <tr> <td>Dense</td><td>>65 & ≤85</td><td>>30 & ≤50</td></tr> <tr> <td>Very Dense</td><td>>85</td><td>>50</td></tr> </table>	Term	Density Index, I _D (%)	SPT 'N' (blows/300mm)	Very Loose	≤15	≤5	Loose	>15 & ≤35	>5 & ≤10	Medium Dense	>35 & ≤65	>10 & ≤30	Dense	>65 & ≤85	>30 & ≤50	Very Dense	>85	>50			
Term	Density Index, I _D (%)	SPT 'N' (blows/300mm)																					
Very Loose	≤15	≤5																					
Loose	>15 & ≤35	>5 & ≤10																					
Medium Dense	>35 & ≤65	>10 & ≤30																					
Dense	>65 & ≤85	>30 & ≤50																					
Very Dense	>85	>50																					
Hand Penetrometer	100 200	Unconfined compressive strength (q _u) in kPa determined using pocket penetrometer, at depths shown on log																					
Remarks	Residual Alluvium Colluvial Aeolian Marine	Geological origin of soils Residual soils above bedrock River deposited Alluvial soils Gravity deposited Colluvial soils Wind deposited Aeolian soils Marine Soils																					

AS1726 : 2017– Unified Soil Classification System

Major Divisions		Particle size (mm)	Group Symbol	Typical Names	Field Identifications Sand and Gravels			Laboratory classification				
OVERSIZE	BOULDERS	>200						% Fines (2)	Plasticity of Fine Fraction	$C_u = D_{60}/D_{10}$	$C_c = (D_{30})^2/(D_{10}D_{60})$	Notes
	COBBLES	63										
COARSE GRAINED SOIL (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm)	Coarse 19	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength			≤5	-	>4	between 1 and 3	1. Identify lines by the method given for fine grained soils
		Medium 6.7	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength			≤5	-	Fails to comply with above		
			GM	Silty gravels, gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength			≥12	Below 'A' line or $I_p<4$	-	-	2. Borderline classifications occur when the percentage of fines (fraction smaller than 0.075mm size) is greater than 5% and less than 12%. Borderline classifications require the use of dual symbols e.g. SP-SM, GW-GC
			GC	Clayey gravels, gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength			≥12	Above 'A' line or $I_p>7$	-	-	
	SAND (more than half of coarse fraction is smaller than 2.36mm)	Coarse 0.6	SW	Well-graded sands, gravelly sands, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength			≤5	-	>6	between 1 and 3	
		Medium 0.21	SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength			≤5	-	Fails to comply with above		
			SM	Silty sands, sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength			≥12	Below 'A' line or $I_p<4$	-	-	
		Fine 0.075	SC	Clayey sand, sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength			≥12	Above 'A' line of $I_p>7$	-	-	
	FINE GRAINED SOIL (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT (0.075mm to 0.002mm) & CLAY (<0.002mm) Liquid Limit<50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Dry Strength	Dilatancy	Toughness	More than 35% passing 0.075mm Below 'A' line Above 'A' line Below 'A' line Below 'A' line Above 'A' line Below 'A' line				
CL, CI			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	None to low	Slow to rapid	Low						
OL			Organic silts and organic silty clays of low plasticity	Low to medium	Slow	Low						
SILT (0.075mm to 0.002mm) & CLAY (<0.002mm) Liquid Limit>50%			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Low to medium	None to slow	Low to medium					
			CH	Inorganic clays of medium to high plasticity, fat clays	High to very high	None	High					
			OH (1)	Organic clays of medium to high plasticity, organic silts	Medium to high	None to very slow	Low to medium					
HIGHLY ORGANIC SOILS			Pt (1)	Peat and highly organic soils	Identified by colour, odour, spongy feel and generally by fibrous texture			Effervesces with H ₂ O ₂				

Use the gradation of material passing 63mm for classification of fractions according to the criteria given in 'Major Divisions'

Log Symbols & Abbreviations (Cored Borehole Log)

Log Column	Symbol / Abbreviation	Description
Core Size	NQ NMLC HQ	Nominal Core Size (mm) 47 52 63
Water Loss	 	Complete water loss Partial water loss
Weathering (AS1726:2017)	RS XW HW MW SW FR	Residual Soil Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported Extremely Weathered Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible Highly Weathered The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores. Moderately Weathered The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable, but shows little or no change of strength from fresh rock Slightly Weathered Rock is partially discoloured with staining or bleaching along joints but shows little or no change in strength from fresh rock Fresh Rock shows no sign of decomposition of individual minerals or colour changes <i>Note : Where it is not possible to distinguish between HW and MW rock the term Distinctly Weathered (DW) may be used. DW is defined as 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased by deposition of weathering products in pores'</i>
Strength (AS1726:2017)	VL L M H VH EH	Term Point Load Strength Index (I_{s50}, MPa) Very Low ≥ 0.03 ≤ 0.1 Low > 0.1 ≤ 0.3 Medium > 0.3 ≤ 1 High > 1 ≤ 3 Very High > 3 ≤ 10 Extremely High > 10
Defect Spacing		Description Spacing (mm) Extremely closely spaced < 20 Very closely spaced 20 to 60 Closely spaced 60 to 200 Medium spaced 200 to 600 Widely spaced 600 to 2000 Very widely spaced 2000 to 6000 Extremely widely spaced > 6000
Defect Description (AS1726:2017) Type	Pt Jo Sh Sz Ss Cs Is Ews	Parting Joint Sheared Surface Sheared Zone Sheared Seam Crushed Seam Infilled Seam Extremely Weathered Seam
Macro-surface geometry	St Cu Un Ir Pl	Stepped Curved Undulating Irregular Planar
Micro-surface geometry	Vro Ro Sm Po Sl	Very Rough Rough Smooth Polished Slickensided
Coating or infilling	cn sn vn cg	clean stained veneer coating

AS1726 – Identification of Sedimentary Rocks for Engineering Purposes

Grain Size mm		Bedded rocks (mostly sedimentary)										
More than 20	20	Grain Size Description		CONGLOMERATE Rounded boulders, cobbles and gravel cemented in a finer matrix Breccia Irregular rock fragments in a finer matrix		At least 50% of grains are of carbonate			At least 50% of grains are of fine-grained volcanic rock			
	6	RUDACEOUS				LIMESTONE and DOLOMITE (undifferentiated)	Calcirudite	Fragments of volcanic ejecta in a finer matrix		SALINE ROCKS		
	Rounded grains AGGLOMERATE Angular grains VOLCANIC BRECCIA							Halite				
	2									Anhydrite		
	0.6	ARENACEOUS	Coarse	SANDSTONE Angular or rounded grains, commonly cemented by clay, calcite or iron minerals Quartzite Quartz grains and siliceous cement Arkose Many feldspar grains Greywacke Many rock chips					Calcareous Mudstone		CHALK	Cemented volcanic ash
	0.2		Medium									
	0.06		Fine									
	0.002	ARGILLACEOUS		MUDSTONE	SILTSTONE Mostly silt			Calcsiltite			Fine-grained TUFF	
	Less than 0.002			SHALE Fissile	CLAYSTONE Mostly clay						Calclutite	
Amorphous or crypto-crystalline				Flint: occurs as hands of nodules in the chalk Chert: occurs as nodules and beds in limestone and calcareous sandstone								COAL LIGNITE
				Granular cemented – except amorphous rocks								
				SILICEOUS			CALCAREOUS			SILICEOUS		CARBONACEOUS
				SEDIMENTARY ROCKS Granular cemented rocks vary greatly in strength, some sandstones are stronger than many Igneous rocks. Bedding may not show in hand specimens and is best seen in outcrop. Only sedimentary rocks, and some metamorphic rocks derived from them, contain fossils Calcareous rocks contain calcite (calcium carbonate) which effervesces with dilute hydrochloric acid								

AS1726 – Identification of Metamorphic and Igneous Rocks for Engineering Purposes

Obviously foliated rocks (mostly metamorphic)			Rocks with massive structure and crystalline texture (mostly igneous)						Grain size (mm)
Grain size description	GNEISS Well developed but often widely spaced foliation sometimes with schistose bands Migmatite Irregularly foliated: mixed schists and gneisses		MARBLE QUARTZITE Granulite HORNFELS	Grain size description	Pegmatite		GABBRO	Pyrosenite	More than 20
COARSE				COARSE	GRANITE	Diorite		Peridotite	20
					These rocks are sometimes porphyritic and are then described, for example, as porphyritic granite				6
					MEDIUM	MEDIUM			Microgranite
These rocks are sometimes porphyritic and are then described as porphyries				0.2					
		0.06							
FINE	PHYLLITE Slightly undulose foliation; sometimes 'spotted'		FINE	RHYOLITE	ANDESITE	BASALT		0.002	
	SLATE Well developed plane cleavage (foliation)			These rocks are sometimes porphyritic and are then described as porphyries			Less than 0.002		
	Mylonite Found in fault zones, mainly in igneous and metamorphic areas			Obsidian	Volcanic glass			Amorphous or cryptocrystalline	
CRYSTALLINE				Pale<----->Dark					
SILICEOUS		Mainly SILICEOUS		ACID Much quartz	INTERMEDIATE Some quartz	BASIC Little or no quartz	ULTRA BASIC		
METAMORPHIC ROCKS Most metamorphic rocks are distinguished by foliation which may impart fissility. Foliation in gneisses is best observed in outcrop. Non-foliated metamorphics are difficult to recognize except by association. Any rock baked by contact metamorphism is described as 'hornfels' and is generally somewhat stronger than the parent rock Most fresh metamorphic rocks are strong although perhaps fissile			IGNEOUS ROCKS Composed of closely interlocking mineral grains. Strong when fresh; not porous Mode of occurrence : 1 Batholith; 2 Laccoliths; 3 Sills; 4 Dykes; 5 Lava Flows; 6 Veins						

APPENDIX C

LABORATORY TEST RESULTS (EMERSON CRUMB TEST, CBR, ATTERBERG LIMITS, PARTICLE SIZE DISTRIBUTION, & CHEMICAL ANALYSIS)

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704A
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell test cannot be performed
Sample Location: TP 101, Depth: 0.5 - 0.7m
Material: Silty CLAY, medium plasticity, orange-brown, with gravel and sand

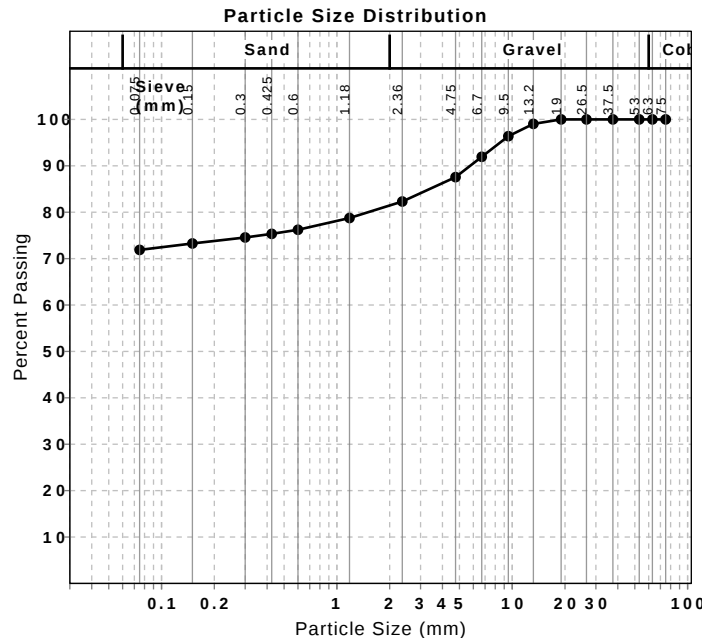
Geotech Testing Pty Ltd
Penrith Laboratory
34 Borec Road Penrith NSW 2750
Phone: (02) 4722 2744
Email: khalil@geotech.com.au

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Approved Signatory: Avilesh Nand
Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits		Retained %	Retained Limits
75 mm	100			0	
63 mm	100			0	
53 mm	100			0	
37.5 mm	100			0	
26.5 mm	100			0	
19 mm	100			0	
13.2 mm	99			1	
9.5 mm	96			3	
6.7 mm	92			4	
4.75 mm	88			4	
2.36 mm	82			5	
1.18 mm	79			4	
0.6 mm	76			3	
0.425 mm	75			1	
0.3 mm	75			1	
0.15 mm	73			1	
0.075 mm	72			1	



Material Test Report

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P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704A
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell test cannot be performed
Sample Location: TP 101, Depth: 0.5 - 0.7m
Material: Silty CLAY, medium plasticity, orange-brown, with gravel and sand

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Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	15		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.75		
Optimum Moisture Content (%)	15.5		
Laboratory Density Ratio (%)	98.0		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m ³)	1.72		
Field Moisture Content (%)	12.2		
Moisture Content at Placement (%)	15.7		
Moisture Content Top 30mm (%)	19.9		
Moisture Content Rest of Sample (%)	19.5		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	140.7		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	4 *		
Soil Description	silty sandy clay, light brown		
Nature of Water	distilled water		
Temperature of Water (°C)	25		
* Mineral Present	Gypsum		

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	39		
Plastic Limit (%)	17		
Plasticity Index (%)	22		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	10.5		
Cracking Crumbling Curling	Cracking		

Material Test Report

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P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704B
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 29/04/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH 104, Depth: 1.5 - 1.95m
Material: Silty CLAY, medium plasticity, yellow-brown mottled pale grey and dark grey, with gravel and sand

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ABN 71 076 676 321

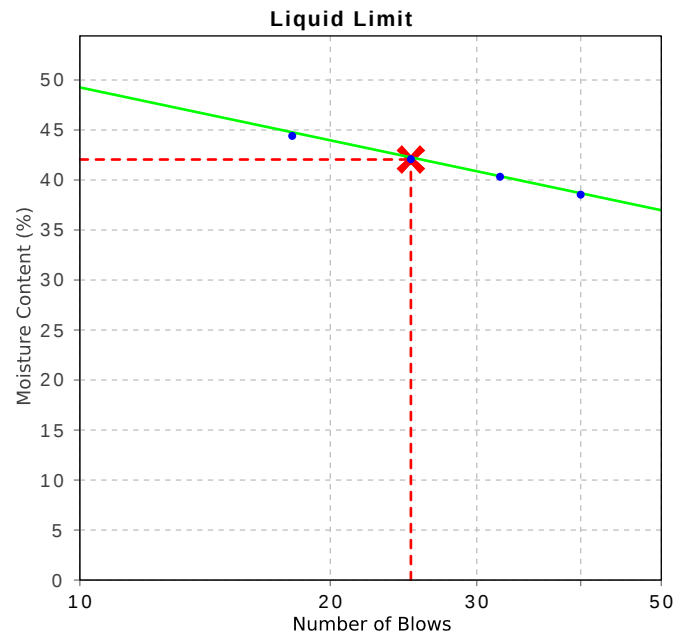
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Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	42		
Plastic Limit (%)	18		
Plasticity Index (%)	24		



Material Test Report

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Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704C
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 05/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell Test can not be performed
Sample Location: TP 109, Depth: 0.5 - 0.7m
Material: Silty CLAY, medium plasticity, orange-brown, trace sand

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ABN 71 076 676 321

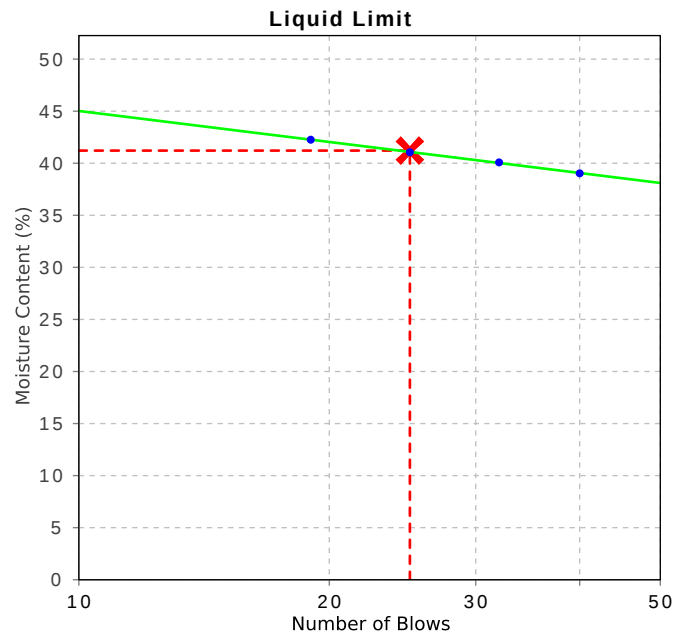
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NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	41		
Plastic Limit (%)	16		
Plasticity Index (%)	25		



Material Test Report

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Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704D
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 109, Depth: 0.5 - 0.8m
Material: Silty CLAY, medium to high plasticity, orange-brown, trace sand



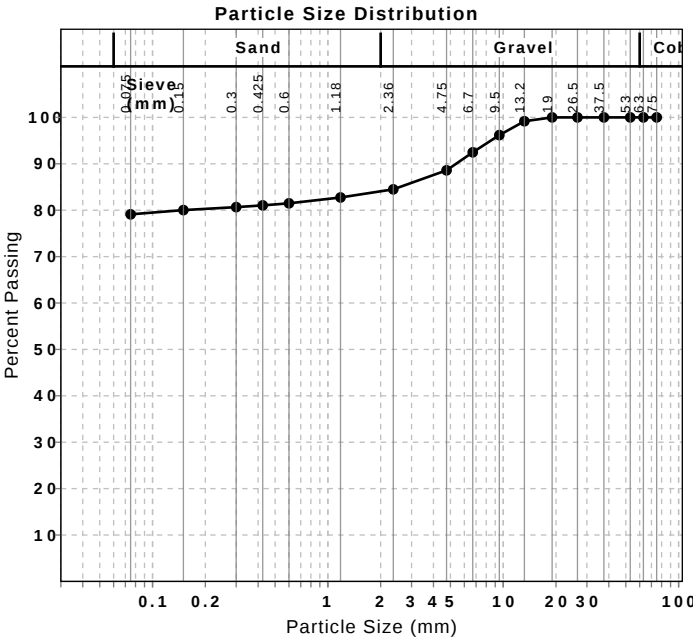
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Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits		Retained %	Retained Limits
75 mm	100			0	
63 mm	100			0	
53 mm	100			0	
37.5 mm	100			0	
26.5 mm	100			0	
19 mm	100			0	
13.2 mm	99			1	
9.5 mm	96			3	
6.7 mm	92			4	
4.75 mm	89			4	
2.36 mm	84			4	
1.18 mm	83			2	
0.6 mm	81			1	
0.425 mm	81			0	
0.3 mm	81			0	
0.15 mm	80			1	
0.075 mm	79			1	



Material Test Report

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 P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704D
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 109, Depth: 0.5 - 0.8m
Material: Silty CLAY, medium to high plasticity, orange-brown, trace sand



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 NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	8		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.64		
Optimum Moisture Content (%)	18.0		
Laboratory Density Ratio (%)	102.0		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m ³)	1.68		
Field Moisture Content (%)	12.4		
Moisture Content at Placement (%)	18.0		
Moisture Content Top 30mm (%)	20.4		
Moisture Content Rest of Sample (%)	19.1		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	143.3		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	4 *		
Soil Description	silty sandy clay, light brown some gravel		
Nature of Water	distilled water		
Temperature of Water (°C)	25		
* Mineral Present	Gypsum		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
 P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704F
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH 116, Depth: 0.5 - 0.7m
Material: Silty CLAY, high plasticity, grey mottled yellow-brown, with fine to coarse grained sand, trace gravel

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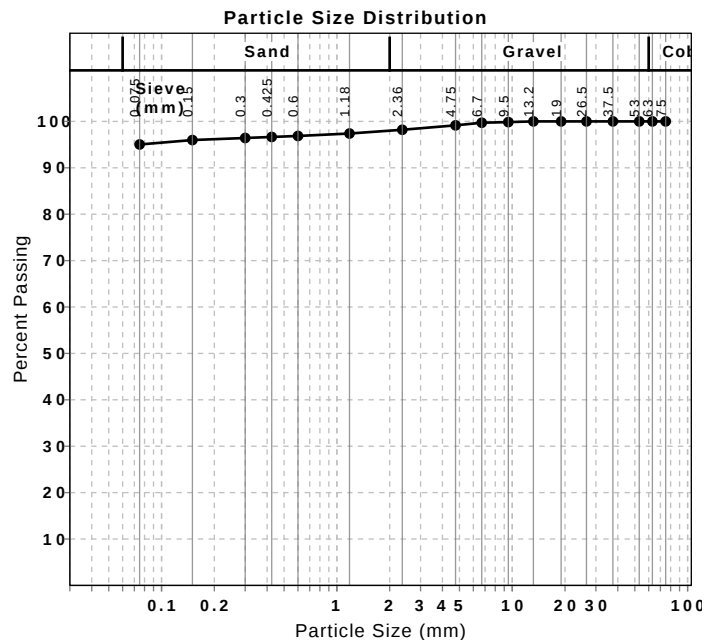
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(Signature)

Approved Signatory: Avilesh Nand
 Assistant Lab Manager
 NATA Accredited Laboratory Number: 2734

Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits	Retained %	Retained Limits	
75 mm	100		0		
63 mm	100		0		
53 mm	100		0		
37.5 mm	100		0		
26.5 mm	100		0		
19 mm	100		0		
13.2 mm	100		0		
9.5 mm	100		0		
6.7 mm	100		0		
4.75 mm	99		1		
2.36 mm	98		1		
1.18 mm	97		1		
0.6 mm	97		1		
0.425 mm	97		0		
0.3 mm	96		0		
0.15 mm	96		0		
0.075 mm	95		1		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	59		
Plastic Limit (%)	22		
Plasticity Index (%)	37		



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704F
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH 116, Depth: 0.5 - 0.7m
Material: Silty CLAY, high plasticity, grey mottled yellow-brown, with fine to coarse grained sand, trace gravel

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Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	7		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.75		
Optimum Moisture Content (%)	18.5		
Laboratory Density Ratio (%)	98.0		
Laboratory Moisture Ratio (%)	100.5		
Dry Density after Soaking (t/m ³)	1.71		
Field Moisture Content (%)	16.2		
Moisture Content at Placement (%)	18.8		
Moisture Content Top 30mm (%)	22.7		
Moisture Content Rest of Sample (%)	20.4		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	141.2		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	4 *		
Soil Description			
Nature of Water	Distilled water		
Temperature of Water (°C)	25		
* Mineral Present	Gypsum		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
 P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704G
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 127, Depth: 0.5 - 0.7m
Material: Silty CLAY, low to medium plasticity, brown-orange, trace sand



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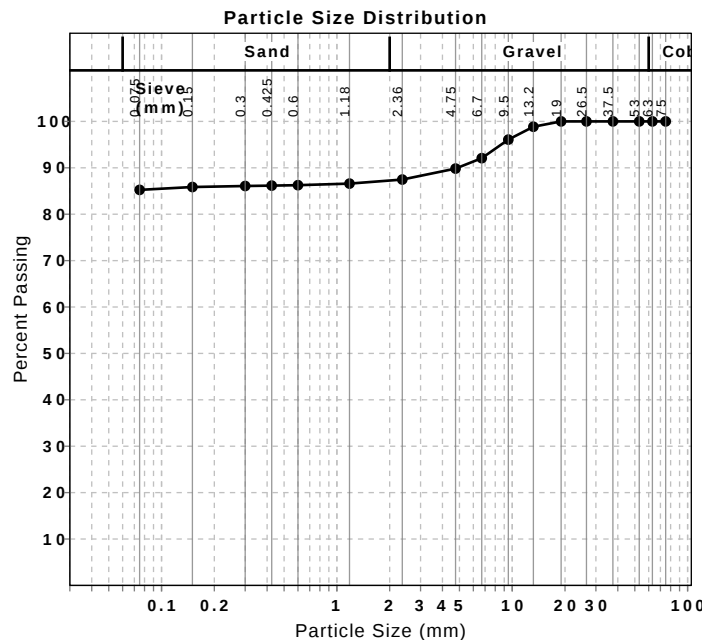
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 Assistant Lab Manager
 NATA Accredited Laboratory Number: 2734

Particle Size Distribution (AS1289 3.6.1)					
Sieve	Passed %	Passing Limits	Retained %	Retained Limits	
75 mm	100		0		
63 mm	100		0		
53 mm	100		0		
37.5 mm	100		0		
26.5 mm	100		0		
19 mm	100		0		
13.2 mm	99		1		
9.5 mm	96		3		
6.7 mm	92		4		
4.75 mm	90		2		
2.36 mm	87		2		
1.18 mm	87		1		
0.6 mm	86		0		
0.425 mm	86		0		
0.3 mm	86		0		
0.15 mm	86		0		
0.075 mm	85		1		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	34		
Plastic Limit (%)	15		
Plasticity Index (%)	19		



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704G
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 127, Depth: 0.5 - 0.7m
Material: Silty CLAY, low to medium plasticity, brown-orange, trace sand

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California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	6		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.81		
Optimum Moisture Content (%)	15.0		
Laboratory Density Ratio (%)	101.5		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m ³)	1.83		
Field Moisture Content (%)	12.4		
Moisture Content at Placement (%)	14.8		
Moisture Content Top 30mm (%)	16.2		
Moisture Content Rest of Sample (%)	15.3		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	69.2		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704H
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 05/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell test cannot be performed
Sample Location: TP 136, Depth: 0.7 - 0.9m
Material: Silty CLAY, medium plasticity, brown-orange

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NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	44		
Plastic Limit (%)	16		
Plasticity Index (%)	28		
Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	12.0		
Cracking Crumbling Curling	Curling		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704I
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 29/04/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 141, Depth: 0.7 - 0.9m
Material: Silty CLAY, low to medium Plasticity, orange, with gravel and sand, trace boulders

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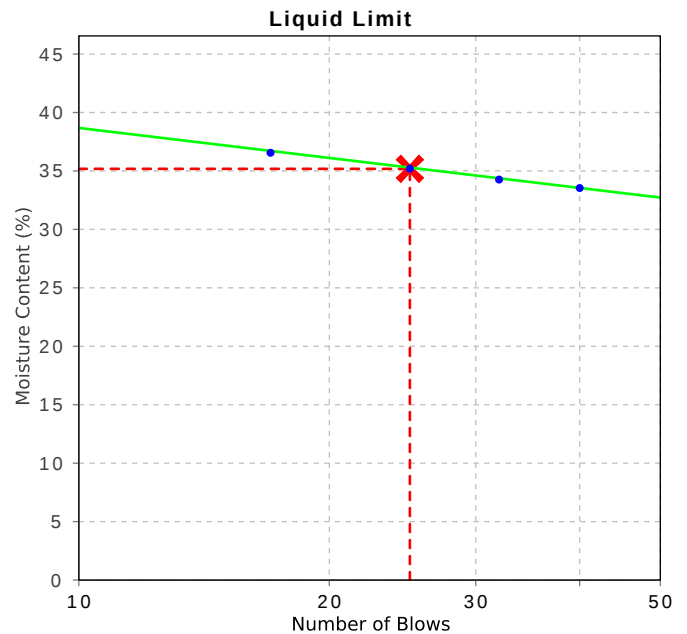
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NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	35		
Plastic Limit (%)	22		
Plasticity Index (%)	13		



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704J
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 05/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell test cannot be performed
Sample Location: TP 142, Depth: 0.5 - 0.7m
Material: Silty CLAY, high plasticity, orange, with gravel and sand, trace boulders

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Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	53		
Plastic Limit (%)	35		
Plasticity Index (%)	18		
Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	11.5		
Cracking Crumbling Curling	Cracking		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
 P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704K
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 146, Depth: 0.5 - 0.8m
Material: Silty CLAY, high plasticity, grey mottled orange-black, with gravel and sand

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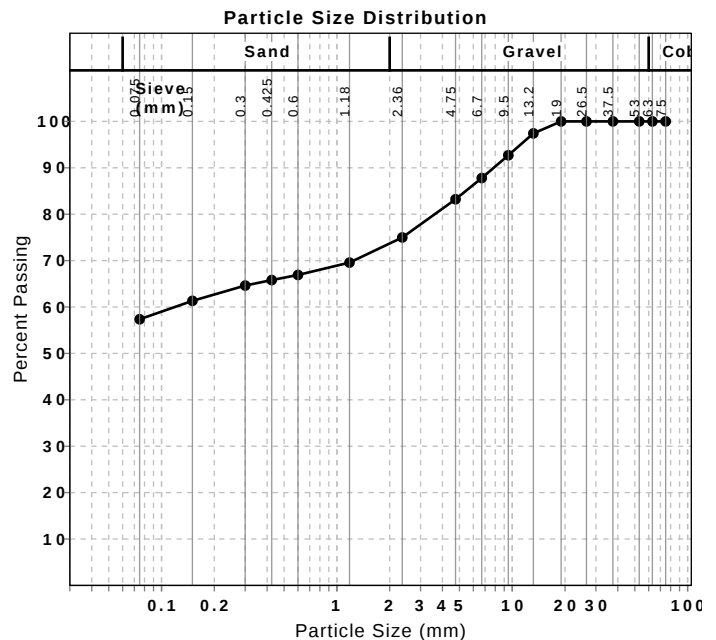
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 Assistant Lab Manager
 NATA Accredited Laboratory Number: 2734

Sieve	Passed %	Passing Limits	Retained %	Retained Limits
75 mm	100		0	
63 mm	100		0	
53 mm	100		0	
37.5 mm	100		0	
26.5 mm	100		0	
19 mm	100		0	
13.2 mm	97		3	
9.5 mm	93		5	
6.7 mm	88		5	
4.75 mm	83		5	
2.36 mm	75		8	
1.18 mm	70		5	
0.6 mm	67		3	
0.425 mm	66		1	
0.3 mm	65		1	
0.15 mm	61		3	
0.075 mm	57		4	

	Min	Max
Sample History	Oven Dried	
Preparation Method	Dry Sieve	
Liquid Limit (%)	60	
Plastic Limit (%)	30	
Plasticity Index (%)	30	



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704K
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 146, Depth: 0.5 - 0.8m
Material: Silty CLAY, high plasticity, grey mottled orange-black, with gravel and sand

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Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	8		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.46		
Optimum Moisture Content (%)	30.5		
Laboratory Density Ratio (%)	99.5		
Laboratory Moisture Ratio (%)	99.5		
Dry Density after Soaking (t/m ³)	1.45		
Field Moisture Content (%)	30.1		
Moisture Content at Placement (%)	30.6		
Moisture Content Top 30mm (%)	31.1		
Moisture Content Rest of Sample (%)	26.8		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	97.7		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	6		
Soil Description	Gravelly silty clay		
Nature of Water	Distilled water		
Temperature of Water (°C)	25		
* Mineral Present	Gypsum		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
 P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704L
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 153, Depth: 0.8 - 1.0m
Material: Silty CLAY, low to medium Plasticity, brown-orange, trace rootlets and gravel

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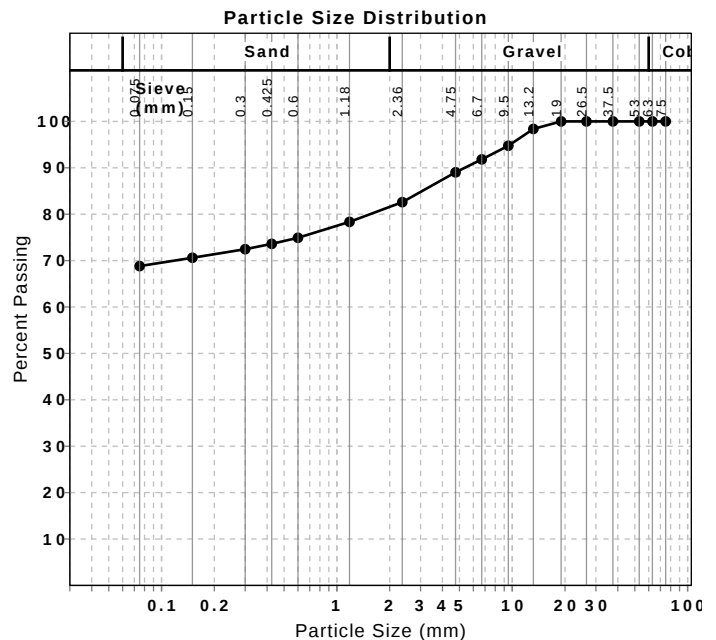
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Approved Signatory: Avilesh Nand
 Assistant Lab Manager
 NATA Accredited Laboratory Number: 2734

Sieve	Passed %	Passing Limits	Retained %	Retained Limits
75 mm	100		0	
63 mm	100		0	
53 mm	100		0	
37.5 mm	100		0	
26.5 mm	100		0	
19 mm	100		0	
13.2 mm	98		2	
9.5 mm	95		4	
6.7 mm	92		3	
4.75 mm	89		3	
2.36 mm	83		6	
1.18 mm	78		4	
0.6 mm	75		3	
0.425 mm	74		1	
0.3 mm	72		1	
0.15 mm	71		2	
0.075 mm	69		2	

	Min	Max
Sample History	Oven Dried	
Preparation Method	Dry Sieve	
Liquid Limit (%)	35	
Plastic Limit (%)	16	
Plasticity Index (%)	19	



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704L
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 153, Depth: 0.8 - 1.0m
Material: Silty CLAY, low to medium Plasticity, brown-orange, trace rootlets and gravel

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Approved Signatory: Avilesh Nand
Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	6		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.88		
Optimum Moisture Content (%)	14.5		
Laboratory Density Ratio (%)	100.5		
Laboratory Moisture Ratio (%)	97.0		
Dry Density after Soaking (t/m ³)	1.88		
Field Moisture Content (%)	9.8		
Moisture Content at Placement (%)	14.1		
Moisture Content Top 30mm (%)	15.3		
Moisture Content Rest of Sample (%)	14.5		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	137.5		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704M
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 29/04/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: BH 154, Depth: 2.0 - 2.5m
Material: Silty CLAY, medium plasticity, red-brown mottled pale grey and grey, trace gravel and sand

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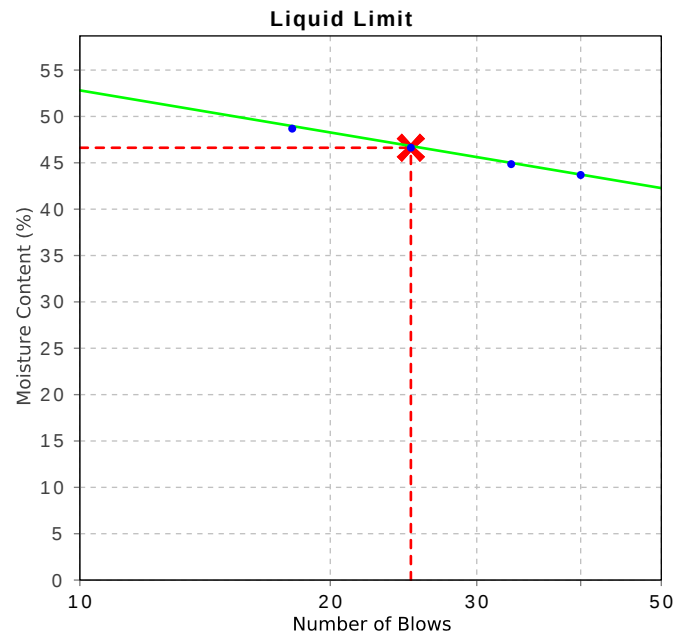
Geotech Testing Pty Ltd
Penrith Laboratory
34 Borec Road Penrith NSW 2750
Phone: (02) 4722 2744
Email: khalil@geotech.com.au



Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Avilesh Nand
Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	47		
Plastic Limit (%)	19		
Plasticity Index (%)	28		



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704N
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 05/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell test cannot be performed
Sample Location: TP 156, Depth: 0.5 - 0.7m
Material: Silty CLAY, low plasticity, brown-orange, trace sand

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Approved Signatory: Avilesh Nand
Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	32		
Plastic Limit (%)	17		
Plasticity Index (%)	15		
Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	8.5		
Cracking Crumbling Curling	Cracking		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704O
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 156, Depth: 1.2 - 1.4m
Material: Silty CLAY, medium plasticity, grey mottled orange and black

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ABN 71 076 676 321

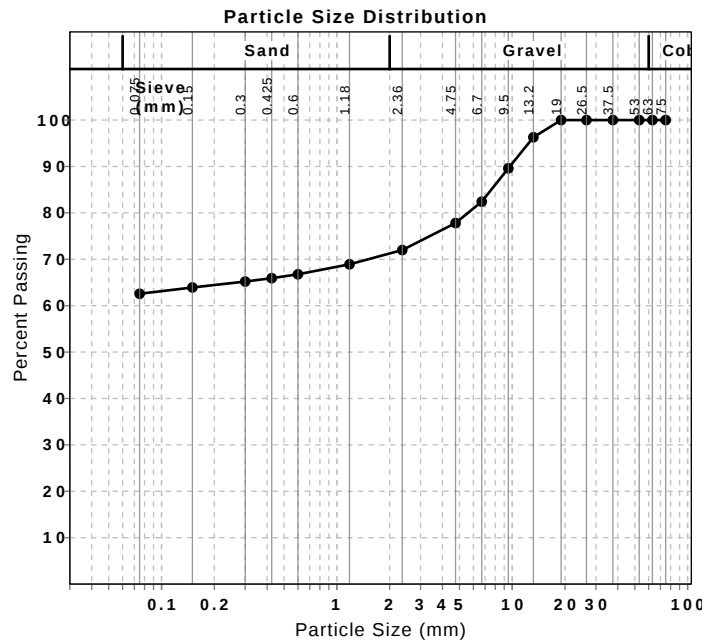
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34 Borec Road Penrith NSW 2750
Phone: (02) 4722 2744
Email: khalil@geotech.com.au



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Approved Signatory: Avilesh Nand
Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

Particle Size Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Limits	Retained %	Retained Limits
75 mm	100		0	
63 mm	100		0	
53 mm	100		0	
37.5 mm	100		0	
26.5 mm	100		0	
19 mm	100		0	
13.2 mm	96		4	
9.5 mm	90		7	
6.7 mm	82		7	
4.75 mm	78		5	
2.36 mm	72		6	
1.18 mm	69		3	
0.6 mm	67		2	
0.425 mm	66		1	
0.3 mm	65		1	
0.15 mm	64		1	
0.075 mm	63		1	



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704O
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: TP 156, Depth: 1.2 - 1.4m
Material: Silty CLAY, medium plasticity, grey mottled orange and black

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ABN 71 076 676 321

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Approved Signatory: Avilesh Nand
Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	7		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.78		
Optimum Moisture Content (%)	16.0		
Laboratory Density Ratio (%)	103.5		
Laboratory Moisture Ratio (%)	100.5		
Dry Density after Soaking (t/m ³)	1.84		
Field Moisture Content (%)	12.6		
Moisture Content at Placement (%)	16.2		
Moisture Content Top 30mm (%)	17.6		
Moisture Content Rest of Sample (%)	16.3		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	145.5		
Swell (%)	0.0		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704P
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell test cannot be preformed
Sample Location: TP 158, Depth: 0.5 - 0.7m
Material: Silty CLAY, high plasticity, orange-brown

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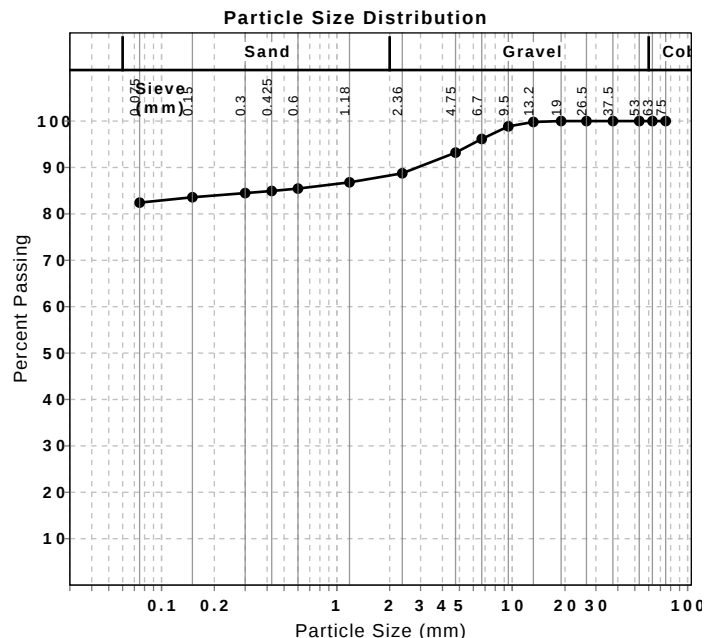
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Approved Signatory: Avilesh Nand
Assistant Lab Manager
NATA Accredited Laboratory Number: 2734

Particle Size Distribution (AS1289 3.6.1)				
Sieve	Passed %	Passing Limits	Retained %	Retained Limits
75 mm	100		0	
63 mm	100		0	
53 mm	100		0	
37.5 mm	100		0	
26.5 mm	100		0	
19 mm	100		0	
13.2 mm	100		0	
9.5 mm	99		1	
6.7 mm	96		3	
4.75 mm	93		3	
2.36 mm	89		4	
1.18 mm	87		2	
0.6 mm	85		1	
0.425 mm	85		1	
0.3 mm	84		0	
0.15 mm	84		1	
0.075 mm	82		1	



Material Test Report

Report Number: 9812/1-1
Issue Number: 3 - This version supersedes all previous issues
Reissue Reason: Updated.
Date Issued: 03/07/2025
Client: LANDCOM
 P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 9812/1
Project Name: REDLEAF
Project Location: Redmond Place, Orange
Client Reference: 9812/1
Work Request: 704
Sample Number: S-704P
Date Sampled: 24/04/2025
Dates Tested: 24/04/2025 - 12/05/2025
Sampling Method: AS 1289.1.2.1 6.5.4 - Machine excavated pit or trench
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Remarks: Shrink swell test cannot be preformed
Sample Location: TP 158, Depth: 0.5 - 0.7m
Material: Silty CLAY, high plasticity, orange-brown



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 Penrith Laboratory
 34 Borec Road Penrith NSW 2750
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Approved Signatory: Avilesh Nand
 Assistant Lab Manager
 NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	2.5 mm		
CBR %	7		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity			
Maximum Dry Density (t/m ³)	1.57		
Optimum Moisture Content (%)	23.0		
Laboratory Density Ratio (%)	101.5		
Laboratory Moisture Ratio (%)	98.5		
Dry Density after Soaking (t/m ³)	1.59		
Field Moisture Content (%)	19.8		
Moisture Content at Placement (%)	22.5		
Moisture Content Top 30mm (%)	24.8		
Moisture Content Rest of Sample (%)	22.9		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	100.3		
Swell (%)	0.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Emerson Class Number of a Soil (AS 1289 3.8.1)		Min	Max
Emerson Class	4 *		
Soil Description	Brown Gravelly Clay		
Nature of Water	Distilled water		
Temperature of Water (°C)	25		
* Mineral Present	Gypsum		

Atterberg Limit (AS1289 3.1.2 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	57		
Plastic Limit (%)	20		
Plasticity Index (%)	37		

Linear Shrinkage (AS1289 3.4.1)		Min	Max
Moisture Condition Determined By	AS 1289.3.1.2		
Linear Shrinkage (%)	17.0		
Cracking Crumbling Curling	None		

CLIENT DETAILS

Contact Joe Chen
 Client Geotech Testing Pty Ltd
 Address P.O. Box 880
 PENRITH
 NSW 2751

Telephone 02 4722 2700
 Facsimile 02 4722 6161
 Email joe@geotech.com.au

Project **9812/1 REDMOND PLACE, ORANGE**
 Order Number **9812/1**
 Samples 22

LABORATORY DETAILS

Manager Shane McDermott
 Laboratory SGS Alexandria Environmental
 Address Unit 16, 33 Maddox St
 Alexandria NSW 2015

Telephone +61 2 8594 0400
 Facsimile +61 2 8594 0499
 Email au.environmental.sydney@sgs.com

SGS Reference **SE281982 R0**
 Date Received 24/4/2025
 Date Reported 2/5/2025

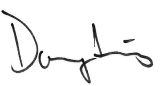
COMMENTS

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SIGNATORIES



Bennet LO
 Senior Chemist



Dong LIANG
 Metals/Inorganics Team Leader



Shane MCDERMOTT
 Laboratory Manager



ANALYTICAL RESULTS

SE281982 R0

Soluble Anions (1:5) in Soil/Solids by Ion Chromatography [AN245] Tested: 1/5/2025

			TP101	BH104	TP105	TP109	BH115
			SOIL 1.0-1.1 24/4/2025 SE281982.001	SOIL 3.0-3.45 24/4/2025 SE281982.003	SOIL 1.0-1.1 24/4/2025 SE281982.005	SOIL 1.5-1.6 24/4/2025 SE281982.007	SOIL 3.0-3.45 24/4/2025 SE281982.009
PARAMETER	UOM	LOR					
Chloride	mg/kg	0.25	3.8	9.0	3.3	12	12
Sulfate	mg/kg	5	68	<5.0	<5.0	5.1	280

			BH115	TP127	TP141	TP154	TP158
			SOIL 5.5-5.95 24/4/2025 SE281982.010	SOIL 0.4-0.5 24/4/2025 SE281982.011	SOIL 1.0-1.1 24/4/2025 SE281982.013	SOIL 4.5-4.95 24/4/2025 SE281982.016	SOIL 0.9-1.0 24/4/2025 SE281982.019
PARAMETER	UOM	LOR					
Chloride	mg/kg	0.25	3.6	7.8	16	21	1.2
Sulfate	mg/kg	5	57	20	18	51	33

			BH116
			SOIL 0.5-0.95 24/4/2025 SE281982.020
PARAMETER	UOM	LOR	
Chloride	mg/kg	0.25	170
Sulfate	mg/kg	5	420



ANALYTICAL RESULTS

SE281982 R0

pH in soil (1:5) [AN101] Tested: 1/5/2025

PARAMETER	UOM	LOR	TP101	BH104	BH104	BH104	TP105
			SOIL	SOIL	SOIL	SOIL	SOIL
			1.0-1.1	0.5-0.95	3.0-3.45	4.5-4.95	1.0-1.1
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.001	SE281982.002	SE281982.003	SE281982.004	SE281982.005
pH	pH Units	0.1	5.9	7.0	7.3	8.4	6.7

PARAMETER	UOM	LOR	TP108	TP109	BH115	BH115	BH115
			SOIL	SOIL	SOIL	SOIL	SOIL
			1.0-1.1	1.5-1.6	0.5-0.95	3.0-3.45	5.5-5.95
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.006	SE281982.007	SE281982.008	SE281982.009	SE281982.010
pH	pH Units	0.1	6.9	5.2	5.9	8.0	7.8

PARAMETER	UOM	LOR	TP127	TP127	TP141	TP142	TP146
			SOIL	SOIL	SOIL	SOIL	SOIL
			0.4-0.5	1.0-1.1	1.0-1.1	1.0-1.1	0.3-0.4
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.011	SE281982.012	SE281982.013	SE281982.014	SE281982.015
pH	pH Units	0.1	7.3	7.2	6.2	6.1	6.6

PARAMETER	UOM	LOR	TP154	TP154	TP156	TP158	BH116
			SOIL	SOIL	SOIL	SOIL	SOIL
			4.5-4.95	1.5-1.95	1.0-1.1	0.9-1.0	0.5-0.95
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.016	SE281982.017	SE281982.018	SE281982.019	SE281982.020
pH	pH Units	0.1	5.9	6.6	7.3	6.5	6.0

PARAMETER	UOM	LOR	BH116	BH116
			SOIL	SOIL
			3.0-3.45	4.5-4.95
			24/4/2025	24/4/2025
			SE281982.021	SE281982.022
pH	pH Units	0.1	8.6	8.5

Conductivity and TDS by Calculation - Soil [AN106] Tested: 1/5/2025

PARAMETER	UOM	LOR	TP101	BH104	BH104	BH104	TP105
			SOIL	SOIL	SOIL	SOIL	SOIL
			1.0-1.1	0.5-0.95	3.0-3.45	4.5-4.95	1.0-1.1
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.001	SE281982.002	SE281982.003	SE281982.004	SE281982.005
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	44	47	30	74	7

PARAMETER	UOM	LOR	TP108	TP109	BH115	BH115	BH115
			SOIL	SOIL	SOIL	SOIL	SOIL
			1.0-1.1	1.5-1.6	0.5-0.95	3.0-3.45	5.5-5.95
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.006	SE281982.007	SE281982.008	SE281982.009	SE281982.010
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	20	21	170	190	46

PARAMETER	UOM	LOR	TP127	TP127	TP141	TP142	TP146
			SOIL	SOIL	SOIL	SOIL	SOIL
			0.4-0.5	1.0-1.1	1.0-1.1	1.0-1.1	0.3-0.4
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.011	SE281982.012	SE281982.013	SE281982.014	SE281982.015
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	21	16	27	45	21

PARAMETER	UOM	LOR	TP154	TP154	TP156	TP158	BH116
			SOIL	SOIL	SOIL	SOIL	SOIL
			4.5-4.95	1.5-1.95	1.0-1.1	0.9-1.0	0.5-0.95
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.016	SE281982.017	SE281982.018	SE281982.019	SE281982.020
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	46	42	5	23	320

PARAMETER	UOM	LOR	BH116	BH116
			SOIL	SOIL
			3.0-3.45	4.5-4.95
			24/4/2025	24/4/2025
			SE281982.021	SE281982.022
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	100	48

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 1/5/2025

PARAMETER	UOM	LOR	TP101	TP109	BH115	TP142	TP154
			SOIL 1.0-1.1 24/4/2025 SE281982.001	SOIL 1.5-1.6 24/4/2025 SE281982.007	SOIL 0.5-0.95 24/4/2025 SE281982.008	SOIL 1.0-1.1 24/4/2025 SE281982.014	SOIL 1.5-1.95 24/4/2025 SE281982.017
Exchangeable Calcium, Ca	mg/kg	2	700	180	1200	1200	810
Exchangeable Calcium, Ca	meq/100g	0.01	3.5	0.88	5.9	6.2	4.1
Exchangeable Calcium Percentage*	%	0.1	59.7	34.6	49.8	63.4	76.6
Exchangeable Potassium, K	mg/kg	2	130	140	150	240	120
Exchangeable Potassium, K	meq/100g	0.01	0.33	0.37	0.38	0.61	0.31
Exchangeable Potassium Percentage*	%	0.1	5.6	14.6	3.3	6.3	5.8
Exchangeable Magnesium, Mg	mg/kg	2	230	150	520	300	110
Exchangeable Magnesium, Mg	meq/100g	0.02	1.9	1.2	4.2	2.5	0.88
Exchangeable Magnesium Percentage*	%	0.1	32.9	47.7	35.8	25.7	16.5
Exchangeable Sodium, Na	mg/kg	2	23	18	300	100	13
Exchangeable Sodium, Na	meq/100g	0.01	0.10	0.08	1.3	0.44	0.06
Exchangeable Sodium Percentage*	%	0.1	1.8	3.2	11.1	4.5	1.1
Cation Exchange Capacity	meq/100g	0.02	5.8	2.5	12	9.7	5.3

PARAMETER	UOM	LOR	TP156
			SOIL 1.0-1.1 24/4/2025 SE281982.018
Exchangeable Calcium, Ca	mg/kg	2	330
Exchangeable Calcium, Ca	meq/100g	0.01	1.7
Exchangeable Calcium Percentage*	%	0.1	57.4
Exchangeable Potassium, K	mg/kg	2	74
Exchangeable Potassium, K	meq/100g	0.01	0.19
Exchangeable Potassium Percentage*	%	0.1	6.5
Exchangeable Magnesium, Mg	mg/kg	2	130
Exchangeable Magnesium, Mg	meq/100g	0.02	1.0
Exchangeable Magnesium Percentage*	%	0.1	35.2
Exchangeable Sodium, Na	mg/kg	2	6
Exchangeable Sodium, Na	meq/100g	0.01	0.03
Exchangeable Sodium Percentage*	%	0.1	0.9
Cation Exchange Capacity	meq/100g	0.02	2.9



ANALYTICAL RESULTS

SE281982 R0

Moisture Content [AN002] Tested: 29/4/2025

PARAMETER	UOM	LOR	TP101	BH104	BH104	BH104	TP105
			SOIL	SOIL	SOIL	SOIL	SOIL
			1.0-1.1	0.5-0.95	3.0-3.45	4.5-4.95	1.0-1.1
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.001	SE281982.002	SE281982.003	SE281982.004	SE281982.005
% Moisture	%w/w	1	11.5	11.3	21.4	20.5	11.9

PARAMETER	UOM	LOR	TP108	TP109	BH115	BH115	BH115
			SOIL	SOIL	SOIL	SOIL	SOIL
			1.0-1.1	1.5-1.6	0.5-0.95	3.0-3.45	5.5-5.95
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.006	SE281982.007	SE281982.008	SE281982.009	SE281982.010
% Moisture	%w/w	1	15.2	12.4	17.7	27.5	24.2

PARAMETER	UOM	LOR	TP127	TP127	TP141	TP142	TP146
			SOIL	SOIL	SOIL	SOIL	SOIL
			0.4-0.5	1.0-1.1	1.0-1.1	1.0-1.1	0.3-0.4
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.011	SE281982.012	SE281982.013	SE281982.014	SE281982.015
% Moisture	%w/w	1	12.4	11.8	21.2	19.1	9.1

PARAMETER	UOM	LOR	TP154	TP154	TP156	TP158	BH116
			SOIL	SOIL	SOIL	SOIL	SOIL
			4.5-4.95	1.5-1.95	1.0-1.1	0.9-1.0	0.5-0.95
			24/4/2025	24/4/2025	24/4/2025	24/4/2025	24/4/2025
			SE281982.016	SE281982.017	SE281982.018	SE281982.019	SE281982.020
% Moisture	%w/w	1	31.1	16.5	11.6	21.2	15.0

PARAMETER	UOM	LOR	BH116	BH116
			SOIL	SOIL
			3.0-3.45	4.5-4.95
			24/4/2025	24/4/2025
			SE281982.021	SE281982.022
% Moisture	%w/w	1	26.1	18.6

METHOD

METHODOLOGY SUMMARY

AN002

The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.

AN101

pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl₂) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.

AN106

Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract of as received sample with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.

AN122

Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.

AN122

The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100.

ESP can be used to categorise the sodicity of the soil as below :

ESP < 6%	non-sodic
ESP 6-15%	sodic
ESP >15%	strongly sodic

Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-

AN245

Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO₂, NO₃ and SO₄ are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
***	Indicates that both * and ** apply.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- 1 Bq is equivalent to 27 pCi
- 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

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STATEMENT OF QA/QC PERFORMANCE

SE281982 R0

CLIENT DETAILS

Contact Joe Chen
Client Geotech Testing Pty Ltd
Address P.O. Box 880
PENRITH
NSW 2751

Telephone 02 4722 2700
Facsimile 02 4722 6161
Email joe@geotech.com.au

Project **9812/1 REDMOND PLACE, ORANGE**
Order Number **9812/1**
Samples 22

LABORATORY DETAILS

Manager Shane McDermott
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

SGS Reference **SE281982 R0**
Date Received 24 Apr 2025
Date Reported 02 May 2025

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document.

This QA/QC Statement must be read in conjunction with the referenced Analytical Report.

The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Sample counts by matrix	22 Soil	Type of documentation received	COC
Date documentation received	24/4/2025	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	22.2°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	None	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	



HOLDING TIME SUMMARY

SE281982 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Conductivity and TDS by Calculation - Soil

Method: ME-(AU)-ENVJAN106

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101	SE281982.001	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH104	SE281982.002	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH104	SE281982.003	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH104	SE281982.004	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP105	SE281982.005	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP108	SE281982.006	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP109	SE281982.007	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH115	SE281982.008	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH115	SE281982.009	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH115	SE281982.010	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP127	SE281982.011	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP127	SE281982.012	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP141	SE281982.013	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP142	SE281982.014	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP146	SE281982.015	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP154	SE281982.016	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP154	SE281982.017	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP156	SE281982.018	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
TP158	SE281982.019	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH116	SE281982.020	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH116	SE281982.021	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025
BH116	SE281982.022	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	01 May 2025	01 May 2025

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-ENVJAN122

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101	SE281982.001	LB345746	24 Apr 2025	24 Apr 2025	22 May 2025	01 May 2025	22 May 2025	01 May 2025
TP109	SE281982.007	LB345746	24 Apr 2025	24 Apr 2025	22 May 2025	01 May 2025	22 May 2025	01 May 2025
BH115	SE281982.008	LB345746	24 Apr 2025	24 Apr 2025	22 May 2025	01 May 2025	22 May 2025	01 May 2025
TP142	SE281982.014	LB345746	24 Apr 2025	24 Apr 2025	22 May 2025	01 May 2025	22 May 2025	01 May 2025
TP154	SE281982.017	LB345746	24 Apr 2025	24 Apr 2025	22 May 2025	01 May 2025	22 May 2025	01 May 2025
TP156	SE281982.018	LB345746	24 Apr 2025	24 Apr 2025	22 May 2025	01 May 2025	22 May 2025	01 May 2025

Moisture Content

Method: ME-(AU)-ENVJAN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101	SE281982.001	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH104	SE281982.002	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH104	SE281982.003	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH104	SE281982.004	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP105	SE281982.005	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP108	SE281982.006	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP109	SE281982.007	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH115	SE281982.008	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH115	SE281982.009	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH115	SE281982.010	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP127	SE281982.011	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP127	SE281982.012	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP141	SE281982.013	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP142	SE281982.014	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP146	SE281982.015	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP154	SE281982.016	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP154	SE281982.017	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP156	SE281982.018	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
TP158	SE281982.019	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH116	SE281982.020	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH116	SE281982.021	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025
BH116	SE281982.022	LB345608	24 Apr 2025	24 Apr 2025	08 May 2025	29 Apr 2025	04 May 2025	01 May 2025

pH in soil (1:5)

Method: ME-(AU)-ENVJAN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101	SE281982.001	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH104	SE281982.002	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

pH in soil (1:5) (continued)

Method: ME-(AU)-ENVJAN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH104	SE281982.003	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH104	SE281982.004	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP105	SE281982.005	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP108	SE281982.006	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP109	SE281982.007	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH115	SE281982.008	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH115	SE281982.009	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH115	SE281982.010	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP127	SE281982.011	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP127	SE281982.012	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP141	SE281982.013	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP142	SE281982.014	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP146	SE281982.015	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP154	SE281982.016	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP154	SE281982.017	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP156	SE281982.018	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
TP158	SE281982.019	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH116	SE281982.020	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH116	SE281982.021	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025
BH116	SE281982.022	LB345763	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	02 May 2025	01 May 2025

Soluble Anions (1:5) in Soil/Solids by Ion Chromatography

Method: ME-(AU)-ENVJAN245

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP101	SE281982.001	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
BH104	SE281982.003	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
TP105	SE281982.005	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
TP109	SE281982.007	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
BH115	SE281982.009	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
BH115	SE281982.010	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
TP127	SE281982.011	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
TP141	SE281982.013	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
TP154	SE281982.016	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
TP158	SE281982.019	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025
BH116	SE281982.020	LB345767	24 Apr 2025	24 Apr 2025	01 May 2025	01 May 2025	29 May 2025	02 May 2025

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No surrogates were required for this job.

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Conductivity and TDS by Calculation - Soil

Method: ME-(AU)-[ENV]AN106

Sample Number	Parameter	Units	LOR	Result
LB345763.001	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	1.13

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)

Method: ME-(AU)-[ENV]AN122

Sample Number	Parameter	Units	LOR	Result
LB345746.001	Exchangeable Sodium, Na	mg/kg	2	0
	Exchangeable Potassium, K	mg/kg	2	0
	Exchangeable Calcium, Ca	mg/kg	2	0
	Exchangeable Magnesium, Mg	mg/kg	2	0

Soluble Anions (1:5) in Soil/Solids by Ion Chromatography

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result
LB345767.001	Chloride	mg/kg	0.25	<0.25
	Sulfate	mg/kg	5	<5.0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Conductivity and TDS by Calculation - Soil

Method: ME-(AU)-[ENV]AN106

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281982.010	LB345763.014	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	46	48.1693430656	34	6
SE281982.020	LB345763.025	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	320	48.385611510	31	10

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281982.010	LB345608.011	% Moisture	%w/w	1	24.2	24.8	34	2
SE281982.020	LB345608.022	% Moisture	%w/w	1	15.0	15.3	37	1
SE281982.022	LB345608.025	% Moisture	%w/w	1	18.6	19.8	35	6

pH in soil (1:5)

Method: ME-(AU)-[ENV]AN101

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281982.010	LB345763.014	pH	pH Units	0,1	7,8	7,7	31	1
SE281982.020	LB345763.025	pH	pH Units	0,1	6,0	6,0	32	0

Soluble Anions (1:5) in Soil/Solids by Ion Chromatography

Method: ME-(AU)-[ENV]AN245

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE281982.010	LB345767.019	Chloride	mg/kg	0.25	3.6	4.4	36	21
		Sulfate	mg/kg	5	57	64	38	12
SE281982.020	LB345767.018	Chloride	mg/kg	0.25	170	200	30	18
		Sulfate	mg/kg	5	420	430	31	1

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Conductivity and TDS by Calculation - Soil**Method: ME-(AU)-[ENV]AN106**

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345763.002	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	NA	1015	85 - 115	98

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR)**Method: ME-(AU)-[ENV]AN122**

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345746.002	Exchangeable Sodium, Na	meq/100g	0.01	0.15	0.188	80 - 120	82
	Exchangeable Potassium, K	meq/100g	0.01	0.14	0.141	80 - 120	98
	Exchangeable Calcium, Ca	meq/100g	0.01	1.8	2.17	80 - 120	85
	Exchangeable Magnesium, Mg	meq/100g	0.02	1.3	1.53	80 - 120	85

pH in soil (1:5)**Method: ME-(AU)-[ENV]AN101**

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345763.003	pH	pH Units	0.1	7.4	7.415	98 - 102	100

Soluble Anions (1:5) in Soil/Solids by Ion Chromatography**Method: ME-(AU)-[ENV]AN245**

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB345767.002	Chloride	mg/kg	0.25	98	100	70 - 130	98
	Sulfate	mg/kg	5	110	100	70 - 130	106

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spikes were required for this job.

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here : <https://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf>

- * NATA accreditation does not cover the performance of this service .
- ** Indicative data, theoretical holding time exceeded.
- *** Indicates that both * and ** apply.
- Sample not analysed for this analyte.
- IS Insufficient sample for analysis.
- LNR Sample listed, but not received.
- LOR Limit of reporting.
- QFH QC result is above the upper tolerance.
- QFL QC result is below the lower tolerance.
- ① At least 2 of 3 surrogates are within acceptance criteria.
- ② RPD failed acceptance criteria due to sample heterogeneity.
- ③ Results less than 5 times LOR preclude acceptance criteria for RPD.
- ④ Recovery failed acceptance criteria due to matrix interference.
- ⑤ Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
- ⑥ LOR was raised due to sample matrix interference.
- ⑦ LOR was raised due to dilution of significantly high concentration of analyte in sample.
- ⑧ Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
- ⑨ Recovery failed acceptance criteria due to sample heterogeneity.
- ⑩ LOR was raised due to high conductivity of the sample (required dilution).
- † Refer to relevant report comments for further information.

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GEOTECH TESTING PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

Tel: (02) 4722 2700
Fax: (02) 4722 6161
email: info@geotech.com.au

Page

1 of 2

TO:		SGS ENVIRONMENTAL SERVICES UNIT 16 33 MADDOX STREET ALEXANDRIA NSW 2015		Sampling By:	YN	Job No	9812/1		
PH:		02 8594 0400		FAX:		02 8594 0499		Project:	PROPOSED RESIDENTIAL DEVELOPMENT
ATTN:		Ms Emily Yin		Project Manager:		JC/YN	Location:		REDMOND PLACE, ORANGE

Sampling details

Results required by:

Location	Depth	Soil	Water	EC (1:5)	pH	Sulphate	Chloride	ESP					Notes	Keep Sample
TP101	1.0-1.1	DSP		✓	✓	✓	✓	✓					ESP=Exchnageable Sodium Percentage	
BH104	0.5-0.95	DSP		✓	✓									
	3.0-3.45	DSP		✓	✓	✓	✓							
	4.5-4.95	DSP		✓	✓									
TP105	1.0-1.1	DSP		✓	✓	✓	✓							
TP108	1.0-1.1	DSP		✓	✓									
TP109	1.5-1.6	DSP		✓	✓	✓	✓	✓						
BH115	0.5-0.95	DSP		✓	✓			✓						
	3.0-3.45	DSP		✓	✓	✓	✓							
	5.5-5.95	DSP		✓	✓	✓	✓							
TP127	0.4-0.5	DSP		✓	✓	✓	✓							
	1.0-1.1	DSP		✓	✓									
TP136	1.0-1.1	DSP		✓	✓									
TP141	1.0-1.1	DSP		✓	✓	✓	✓							
TP142	1.0-1.1	DSP		✓	✓			✓						
TP146	0.3-0.4	DSP		✓	✓									
BH154	4.5-4.95	DSP		✓	✓	✓	✓							
	1.5-1.95	DSP		✓	✓			✓						
TP156	1.0-1.1	DSP		✓	✓			✓						
TP158	0.9-1.0	DSP		✓	✓	✓	✓							

SGS EHS Sydney COC
SE281982



Please Use Geotechnical Engineering Template for Reporting

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	
Yahye	YN	22/04/2025	Joel K		24/4/28 1:50

Legend:

WG	USG	Undisturbed soil sample (glass j	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap
WP	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen

GEOTECH TESTING PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

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Page

2 of 2

TO: SGS ENVIRONMENTAL SERVICES UNIT 16 33 MADDOX STREET ALEXANDRIA NSW 2015		Sampling By: YN		Job No 9812/1	
PH: 02 8594 0400 ATTN: Ms Emily Yin		FAX: 02 8594 0499		Project: PROPOSED RESIDENTIAL DEVELOPMENT	
		Project Manager: JC		Location: REDMOND PLACE, ORANGE	

Sampling details

Results required by:[illegible]

Please Use Geotechnical Engineering Template for Reporting

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	
Yahye	YN	22/04/2025	Joel SPan Kanawati		24/4/25 1:58
Legend:					
WG	USG	Undisturbed soil sample (glass j	DSP	Disturbed soil sample (small plastic bag)	* Purge & Trap
WP	DSG	Disturbed soil sample (glass jar)	✓	Test required	# Geotechnique Screen



SAMPLE RECEIPT ADVICE

SE281982

CLIENT DETAILS

Contact Joe Chen
Client Geotech Testing Pty Ltd
Address P.O. Box 880
PENRITH
NSW 2751

Telephone 02 4722 2700
Facsimile 02 4722 6161
Email joe@geotech.com.au

Project **9812/1 REDMOND PLACE, ORANGE**
Order Number **9812/1**
Samples 22

LABORATORY DETAILS

Manager Shane McDermott
Laboratory SGS Alexandria Environmental
Address Unit 16, 33 Maddox St
Alexandria NSW 2015

Telephone +61 2 8594 0400
Facsimile +61 2 8594 0499
Email au.environmental.sydney@sgs.com

Samples Received Thu 24/4/2025
Report Due Fri 2/5/2025
SGS Reference **SE281982**

SUBMISSION DETAILS

This is to confirm that 22 samples were received on Thursday 24/4/2025. Results are expected to be ready by COB Friday 2/5/2025. Please quote SGS reference SE281982 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	22 Soil	Type of documentation received	COC
Date documentation received	24/4/2025	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	22.2°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	None	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

TP136 1.0-1.1- not received.

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SAMPLE RECEIPT ADVICE

SE281982

CLIENT DETAILS

Client Geotech Testing Pty Ltd

Project 9812/1 REDMOND PLACE, ORANGE

SUMMARY OF ANALYSIS

No.	Sample ID	Conductivity and TDS by Calculation - Soil	Exchangeable Cations and Cation Exchange Capacity	Moisture Content	pH in soil (1:5)	Soluble Anions (1:5) in Soil/Solids by Ion
001	TP101 1.0-1.1	1	13	1	1	2
002	BH104 0.5-0.95	1	-	1	1	-
003	BH104 3.0-3.45	1	-	1	1	2
004	BH104 4.5-4.95	1	-	1	1	-
005	TP105 1.0-1.1	1	-	1	1	2
006	TP108 1.0-1.1	1	-	1	1	-
007	TP109 1.5-1.6	1	13	1	1	2
008	BH115 0.5-0.95	1	13	1	1	-
009	BH115 3.0-3.45	1	-	1	1	2
010	BH115 5.5-5.95	1	-	1	1	2
011	TP127 0.4-0.5	1	-	1	1	2
012	TP127 1.0-1.1	1	-	1	1	-
013	TP141 1.0-1.1	1	-	1	1	2
014	TP142 1.0-1.1	1	13	1	1	-
015	TP146 0.3-0.4	1	-	1	1	-
016	TP154 4.5-4.95	1	-	1	1	2
017	TP154 1.5-1.95	1	13	1	1	-
018	TP156 1.0-1.1	1	13	1	1	-
019	TP158 0.9-1.0	1	-	1	1	2
020	BH116 0.5-0.95	1	-	1	1	2
021	BH116 3.0-3.45	1	-	1	1	-
022	BH116 4.5-4.95	1	-	1	1	-

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.

The numbers shown in the table indicate the number of results requested in each package.

Please indicate as soon as possible should your request differ from these details .

Testing as per this table shall commence immediately unless the client intervenes with a correction .