GEOTECHNICAL **REPORT**

330 – 350 Eighth Avenue, Austral NSW

Woolworths Ltd – June 2023

Geo-Logix
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GEOTECHNICAL REPORT

330 – 350 Eighth Avenue,
Austral NSW 2179

PREPARED FOR

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Woolworths Ltd

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1. INTRODUCTION

Geo-Logix Pty Ltd (Geo-Logix) was engaged by Woolworths Ltd to conduct a geotechnical investigation of the property located at 330 – 350 Eighth Avenue, Austral NSW (Figure 1). Geo-Logix understands that Woolworths intend to an on-grade retail development. Preliminary plan for the site is presented in Attachment A.

1.1 Objectives and Scope of Work

The objective of the geotechnical investigation was to provide a preliminary assessment of subsurface soil conditions on the site to assist with design and construction of the proposed development.

To satisfy the above objectives Geo-Logix completed the following scope of work:

- Visual appraisal of the site conditions and locality;
- Underground utility location and perform dial before you dig;
- Review of the geological maps for the area;
- Review of concurrently completed environmental test pit logs for the site;
- Drilling of 4 boreholes to a maximum depth of 9 m in the area of the proposed supermarket buildings and basement excavation;
- Performance of Standard Penetration Test (SPT) testing to determine the consistency/density of in situ soils in each boring;
- Excavation of 8 test pits to depths of 1.5 to 3.0 m at locations across the site using a large excavator;
- Logging of the borings in accordance with the Unified Soil Classification System (USCS);
- Collection of representative soil samples for selective geotechnical and chemical laboratory testing;
- Backfilling of test pits with onsite soils and compacted on completion; and
- Provision of this report detailing the results of the above investigation, recommendations for design and construction of the proposed extension.

The Geo-Logix field investigation was conducted on 6 to 8 March 2023.

2. SITE INFORMATION

Site Information	Details
Address	330 – 350 Eighth Avenue, Austral NSW 2179
Lot and Deposited Plan (DP)	Lot 940, DP 1265677
Approximate Area	17,986.74 m^2
Coordinates	Lat: 33.937°S Long: 150.798°E
Site Description	The site has three dwellings and a number of sheds in the northern half (Figure 2). The southern half of the site is vacant with tall grass all over. Most of the site was unsealed and grassed. The site is bound by Eighth Avenue in the north and Nemean Rd in the west. The site is surrounded by other residential properties and vacant land.
Topography and Elevation	The site topography slopes towards north-east. The regional topography also slopes towards north-east. The site elevation ranges from 75 to 80 m.
Geology	Mesozoic era, Triassic period, middle epoch, Wianamatta Group with shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, rare coal and tuff. (Penrith 1:100,000 Geological Series sheet 9030).
Regional Hydrogeology	Groundwater is expected to follow regional topography and flow northeast towards a tributary of Kemps Creek located approximately 400m northeast of the site.

3. METHOD OF INVESTIGATION

3.1 Investigation Methods

Geotechnical fieldwork was undertaken from 6 to 8 March 2023.

Prior to undertaking the borings and test pits, each location was scanned for underground services and utilities by an independent utility locator and cross-checked with the results of a 'Dial Before You Dig' (DBYD) search.

Test pits TP44, TP39, TP41, TP21, TP23, TP30, TP32 and TP39 were completed by utilising an excavator and four boreholes (BH1 to BH4) were drilled using a ute mounted drill rig. At the completion of excavation and drilling, the test pits were reinstated with soil cuttings and compacted.

In boreholes BH1 to BH4, SPTs were completed at regular intervals to provide representative samples of the subsurface and blow counts indicative of the soil/rock strength.

Encountered soils were logged in accordance with the Unified Soil Classification System (USCS). The test pit and boring logs, are presented in Attachment B.

Representative soil samples were submitted to Eurofins Environment Testing Australia Pty Ltd (Eurofins) and Macquarie Geotech for selective characterisation and chemical tests.

4. SITE GEOLOGY AND HYDROGEOLOGY

4.1 Surface and Subsurface Conditions

The following table contains a summarised account of the site surface and subsurface. For detailed descriptions of individual locations please refer to the attached boring logs.

Type	Approximate Depth (m)	Description
FILL	0 – 0.5	Northern half: Fill was identified across the area, with greater depths observed in the locations of the dwellings on the eastern side and western side. A moderate brown clayey sand with gravels was identified across the majority of the area. In some areas (generally south of the east and west dwellings) the fill appeared similar to the tilled soils in the southern portion of the site. In some areas surrounding the onsite dwellings, fill comprised sandy gravelly clays. Some anthropogenic materials (bricks, plastic, tiles, concrete pieces, plaster cement fragments) were observed, generally in an upper clayey sand layer. A fibre cement ACM fragment was found in location TP15. Southern half: A layer of fill was encountered over this area that was observed to most likely be tilled soil, likely from the former market gardening practices. The material in majority of locations investigated comprised moderate brown clayey sands with gravels and pieces of black plastic sheeting. Some locations (TP23, TP32, TP34, TP35) had a similar but lighter colour layer fill/tilled soils (clayey sands with gravels). At location TP36 a reddish orange clayey gravelly sand with charcoal wooden pieces (0.3-0.8 m) was observed underlying the upper moderate brown fill/tilled soils. No ACM was observed in the material at the locations investigated.
NATIVE CLAYs	0.5 – 3.5	Generally encountered was a layer <1.0m in thickness comprising yellowish orange and reddish orange sandy clays and sandy gravelly clays, damp, firm, low – medium plasticity; overlying grey and reddish orange lean clays, damp, stiff and medium plasticity.
BEDROCK	3.5+	Weathered shale was encountered at approximately 3.5 mbg.

Groundwater inflow was observed at 5 mbg in borehole BH03.

5. LABORATORY RESULTS

Representative samples of soil were collected during the fieldwork and submitted to Eurofins and Macquarie Geotech for laboratory testing. Tests included:

- Atterberg Limits and Linear Shrinkage tests to assess the plasticity and reactivity of specific soil samples to assist with classification and description;
- Standard Maximum Dry Density (MDD), Optimum Moisture Content (OMC) and California Bearing Ratio (CBR) testing to assist with pavement and slab design;
- Aggressivity testing (electrical conductivity, sulphate, chloride and pH) to assess the exposure classification of the soil with respect to buried structural concrete and/or exposed steel; and
- Unconfined Compressive Strength (UCS) and Point Load Strength tests to assist with the determination of rock strength and rippability.

The laboratory test results are presented in Attachment C. A summary of the results is provided in the following sections.

5.1 USCS Classification Testing

Representative soil samples were submitted for laboratory analysis to Macquarie Geotech for NATA accredited Atterberg Limits and Linear Shrinkage tests. The sample was selected to confirm the USCS field classification of fill and natural soils across the site. Linear Shrinkage testing was completed to facilitate calculation of the free surface movement of the onsite soils for site classification in accordance with AS2870-2011. A summary of the results is provided in the following table.

Location/ Depth (m)	Sample Description	Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Material Finer than 4.75 mm (%)	Material Finer than 425 µm (%)	Material Finer than 75 µm (%)
BH04/0.7-0.9	Silty CLAY, trace of Sand and Gravel	71	47	15.5	95	91	86
TP23/0.9-1.1	Silty CLAY with Sand, trace of Gravel	58	39	12.5	91	88	72
TP44/0.3-0.5	Silty CLAY, trace of Sand and Gravel	56	40	11.0	92	91	85

-- not analysed

Under the USCS material larger than 4.75 mm in size is considered Gravel, material between 4.75-75 µm in size is considered Sand and material finer than 75 µm in size is considered Silt or Clay. The Atterberg Limit test results indicate whether the fine grained component of the samples is classified as Silt or Clay as well as the reactivity of the material. The potential for surface movement based on the reactivity of the soil to changes in moisture is discussed in Section 6.6.

5.2 Californian Bearing Ratio (CBR)

Representative bulk soil samples were submitted for laboratory analysis to determine a CBR value for use in pavement design. These samples were submitted to Macquarie Geotech for NATA accredited testing of the CBR.

The CBR samples were remoulded in the laboratory and compacted to 100% standard maximum dry density (SMDD) at optimum moisture content (OMC). Prior to testing, the samples were soaked for four days under a surcharge load of 4.5 kg. The soaked CBR values are provided in the following table.

Location/ Depth (m)	Sample Description	SMDD (t/m^3)	OMC (%)	CBR Value (%)	Swell After Soaking (%)
TP32/0.4-0.9	Silty CLAY	1.587	22.3	3	2.7
TP41/0.3-0.7	Silty CLAY	1.591	21.5	3	3.0
TP44/0.3-0.8	Silty CLAY	1.737	18.1	1	4.7

Pavement design based on these CBR results is discussed in Section 6.8.

5.3 Exposure Classification Tests

Selected soil profile samples were submitted to Eurofins for NATA accredited testing of pH, sulphate, chloride and electrical conductivity to determine the exposure classification (or aggressiveness/

corrosiveness potential of the soil) with respect to buried steel and/or concrete. The samples were selected as representative of onsite soils in which foundations were expected.

To determine the aggressiveness of the soil and water environment on concrete or steel, the chemical test results are compared to Tables 6.1 and 6.3 from Section 6 of the Australian Standard AS2159 – 2009. This section provides assessment criteria to assess the 'exposure classification' for a concrete or steel pile. The Standard has two classes of soil conditions:

- Type A – high permeability soils below groundwater; and
- Type B – low permeability soils and all soils above groundwater.

Based on the chemical testing results, the Standard provides a range of 'exposure classifications' from non-aggressive to very severe. For the range of chemical conditions in the soil surrounding the structure, the condition leading to the most severe aggressive conditions is adopted. A summary of the soil results is provided in the following table.

Location/ Depth (m)	Soil Condition	Electrical Conductivity (EC) (dS/m)	Soil Texture Factor	Extract Electrical Conductivity (EC_e) (dS/m)	Electrical Resistivity (Ω·cm)	pH	Chloride (mg/kg)	Sulphate (mg/kg)
TP14/0.0-0.2	B	0.038	10	0.38	27,000	6.3	21	21
TP14/0.3-0.5	B	0.220	7	1.54	2,500	5.4	130	370
TP17/0.0-0.2	B	0.015	10	0.15	68,000	6.2	< 10	< 10
TP17/0.4-0.6	B	0.011	10	0.11	89,000	6.3	< 10	< 10
TP35/0.0-0.2	B	0.015	10	0.15	66,000	5.9	<10	20
TP35/0.3-0.5	B	0.020	10	0.20	50,000	5.8	< 10	32
TP35/0.6-0.8	B	0.260	7	1.82	3,800	6.0	320	130

The potential aggressivity of an environment towards concrete and steel is dependent on the sulphate, chloride and pH levels of the soil. Soil aggressivity is discussed in Section 6.9. Site Salinity is discussed in Section 6.10.

6. DISCUSSION

6.1 Earthworks

The subject site should be prepared in accordance with AS 3798-2009 Section 6.1 and filled in accordance with AS 3798-2009 Section 6.2.

Initial Site Preparation

Initially surface features including pavements and building foundations should be stripped from the site, in an area extending at least 1.5 m laterally beyond any planned structures or improvements.

Utilities should be located and rerouted as necessary and any abandoned pipes or utility conduits should be removed or filled with grout. Utility trench excavations must be cut to competent bearing soils and backfilled with properly compacted structural fill.

Structural Filling

Where the above site preparation procedures create excavations below the proposed final grade, the excavations should be backfilled with properly compacted structural fill. Materials selected for use as structural fill should not contain organic matter, waste construction debris, or deleterious materials. Fill materials should be granular material or should be of low or medium plasticity. Existing onsite fill meeting the above criteria may be used as structural fill. Under no circumstances should topsoil or other organic-laden soils be placed as fill beneath or within 1.5 horizontal metres of buildings, pavements or other structural areas.

Once final grade is reached in cut areas, and prior to fill placement in areas of the site that will receive new fill, the subgrade should be evaluated by a geotechnical engineer or their representative. Following subgrade evaluation, the exposed subgrade should be test-rolled in accordance with AS 3798-2009. Any unstable areas failing the evaluation or test-roll should be excavated to the depth of competent bearing material and filled in accordance with the general site fill placement methodology outlined below.

Fill materials should be placed in individual lifts of 300 mm or less loose measurement and compacted using a sheep's foot roller for cohesive soils and a smooth drum roller for cohesionless soils. Fill should be compacted to a minimum of 98% of standard compaction with a moisture content within ±2% of the optimum moisture content.

Test rolling and fill placement is to be undertaken under Level 1 Supervision or Level 2 Inspection and Testing.

6.2 Excavations

It is expected that on-site soils within the expected depth of excavation will generally be excavatable using large equipment (i.e., excavators greater than 25 tonne). Localised assistance by ripping or rock hammer may be required during excavation in weathered shale below 3.5 mbg. Groundwater management, batter and shoring of excavations are discussed in the following sections.

6.3 Groundwater Inflow

During drilling, groundwater was encountered at 5 mbg in one location, BH03. Based on the encountered depth, groundwater is not expected to significantly affect the proposed development. Regardless minor groundwater inflow may be accompany surface runoff following periods of heavy rain. It is expected that any groundwater flow to on-site excavations will be minor and may be controlled using sump and pump methods.

6.4 Batter Slopes and Shoring

Excavations must be designed and constructed in a stable manner. The sides of the excavation should be shored or battered so as to maintain stability of both the excavation sides and bottom. Assuming that excavations are undertaken prior to any other construction works, and provided all surcharge loads, including plant and stockpiled material are kept well clear of the top of the batters, minimum batter slopes are recommended as 1H:1V for temporary batters and 2H:1V for permanent batters. In shale, near vertical batter slopes may be appropriate for temporary batters, subject to inspection by a suitably qualified person.

Permanent batters should be protected from erosion by vegetation or other measures and designed with adequate surface and subsurface drainage. For batters taller than 2 m, localised assessment of batter slopes is recommended.

Stormwater runoff should be directed away from the tops of batters by use of berm drains. Where runoff must be directed down the face of a batter, the batter drains/chutes should be lined to prevent erosion. Properly installed silt fence should be used at the base of batter slopes to prevent offsite migration of sediment. Scouring of excavation faces due to runoff should be repaired prior to further works within the excavation(s). All permanent batters should be protected from erosion by vegetation or other measures and designed with adequate surface and subsurface drainage.

The contractor is solely responsible for temporary excavation design and should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench depth, exceed those specified in local, state, and national safety regulations.

The following earth pressure coefficients are recommended for use in design of temporary and permanent retaining structures:

Retained Material	Bulk Density (kN/m^3)	Earth Pressure Coefficients		
		At rest (K_0)	Active (K_a)	Passive (K_p)
Onsite Clayey Sand (SC) and Sandy Clay (CL)	21	0.80	0.40	2.5
Weathered Shale (Class IV/V)	24	0.50	0.33	3.0

The 'at rest' earth pressure coefficient (K_0) is suitable for retaining structures where anchors or other methods restrain retaining wall movement or where significant movements cannot be tolerated (rigid wall). A uniform or trapezoidal earth pressure distribution should be adopted. It should be noted that shoring which is designed for this 'at rest' coefficient will still undergo some lateral movements.

The active earth pressure coefficient (K_a) is suitable for retaining structures allowing movement of the top such as cantilevered pile walls. For these structures the pressure acting on the wall can be estimated on the basis of a triangular earth pressure distribution.

The passive earth pressure coefficient (K_p) is suitable for the calculation of resisting forces at the toe of concrete, reinforced stone, or masonry walls.

Any surcharge affecting the walls (e.g., traffic, construction loads, adjacent footings, inclined backfill surface, etc.) should be allowed in the design using the appropriate earth pressure coefficient from above.

Design of all retaining structures should be undertaken in accordance with AS4678-2002. Furthermore, the design of any retaining structures should make allowance for all applicable surcharge loadings including construction activities around the perimeter of the excavation, traffic loadings and adjacent buildings. Consideration should be given to the possibility of a hydrostatic pressure due to build-up of water behind the wall (e.g. from broken services), unless permanent subsurface drainage can be provided.

6.5 Construction Induced Vibrations

Onsite fill, native soils and weathered shale are expected to be readily excavatable using excavators or backhoes; so long as percussive piling or excavation methods are not used, construction induced vibrations are not expected to be an issue.

If percussive excavation equipment (e.g. rock hammer) is used, consideration must be given to possible construction induced ground vibration. Construction induced ground vibration is unlikely to be an issue at the site unless heavy impact tools are required for excavation. The use of other techniques which do not involve impact (e.g. rock saws), although less productive, would reduce or possibly eliminate risks of damage due to vibrations.

If adopting a rock hammer or similar, on-site guidance by a vibration specialist is recommended during the early part of excavation. This should include vibration characterisation trials that are used to define vibration levels for the selected equipment.

Peak Particle Velocity (PPV) is usually the adopted measure of ground vibration and the safe limits depend on the sensitivity of the adjoining structures and services. There are a number of Australian and overseas publications that provide vibration velocity guideline levels (or safe limits) including:

- Australian Standard AS2187.2-2006 Explosives - Storage and use - Use of explosives - Appendix J: Ground Vibrations and Airblast Overpressure;
- DIN 4150 – Part 3 – 1999. Effects if Vibration on Structures;
- Department of Environment and Conservation NSW, 2006. Assessing Vibration: a technical guideline;
- British Standard BS 7385-1:1990. Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings;
- British Standard BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.

The most appropriate guidelines levels for the proposed excavation work are provided in AS2187.2-2006, which refers to guideline values from BS7385-2 for the prevention of minor or cosmetic damage occurring in structures from ground vibration. Additionally, the guideline levels provided in DIN 4150 Part 3 is considered an appropriate source for guideline levels.

Ideally, safe limits should be determined by a specialist vibration consultant. However, as a preliminary guide, and considering the above guidelines and the type of adjoining structures present, Geo-Logix recommend a maximum PPV of 10 mm/sec (measured at the foundations of adjoining structures) to prevent cosmetic and structural damage.

The PPV limits of 10 mm/sec are expected to be achievable if rock breaker equipment or other excavation methods are restricted as indicated in the following table:

Distance from Adjoining structure (m)	Maximum Peak Particle Velocity 10 mm/sec*	
	Equipment	Operating Limit (% of Maximum Capacity)
1.5 to 2.5	300 kg rock hammer	50
2.5 to 5.0	300 kg rock hammer or 600 kg rock hammer	100 50
5.0 to 10.0	600 kg rock hammer Or 900 kg rock hammer	100 50

Geo-Logix notes human discomfort levels caused by vibration are typically less than the levels that are likely to cause cosmetic or structural damage to structures. Therefore, neighbours may lodge complaints before any cosmetic or structural damage occurs.

Regardless of excavation, retention or foundation methods, Geo-Logix recommends dilapidation surveys be carried out on neighbouring buildings prior to construction to confirm that the construction works are not causing damage. These surveys should be agreed to, and the report signed, by the owners of the adjacent building prior to work commencing.

6.6 Site Classification

Based on Linear Shrinkage testing results, for structures with foundations in the onsite natural soils, the appropriate site classification is considered to be equivalent to Class 'H1' with a characteristic free surface movement (ys) of 40–60 mm with changes in moisture (AS2870-2011).

Where foundations on shale bedrock are proposed, little or no ground movement from changes in moisture is expected.

Geo-Logix notes that this site classification has not included the effects of trees, poor site drainage, leaking plumbing, and exceptionally wet or dry moisture conditions.

6.7 Foundations

Geo-Logix recommends that footings be founded on a consistent medium to minimise any potential differential settlements. However, depending on the building loads and whether the structures are designed to be relatively flexible, this may not be significant. Existing on-site fill is not generally considered to be a suitable founding medium.

Provided new structural fill is placed in a controlled manner as advised in Section 6.1, native on-site soils and structural fill are expected to be capable of supporting shallow footings. Assuming an allowable settlement of 25 mm shallow footings in soil may be designed based on an allowable bearing capacity of 200 kPa. Shallow footings bearing on weathered shale may be designed based on 700 kPa.

Geo-Logix recommend that foundation subgrade surfaces be observed and tested by a geotechnical engineer using Dynamic Cone Penetrometer (DCP) testing equipment or other satisfactory methods prior to steel or concrete placement. Any unsatisfactory soil detected during this evaluation should be undercut as directed by the geotechnical engineer. Footing excavations should be protected from surface water run-off; if water is allowed to accumulate within a footing excavation and soften the bearing soils, the deficient soils should be removed from the excavation prior to concrete placement.

Allowable bearing pressure and adhesion for deep foundations including bored piers founded on rock are summarised in the following table.

Bearing Stratum	Allowable Bearing Pressure (kPa)	Allowable Adhesion (kPa)*	Young's Modulus, Es (MPa)	Estimated Settlement
Class IV-V Shale	700	35	50	1% of Footing Width or Pier Base

*For pier foundations only, not applicable for footings. Assumes a clean socket of roughness R2 or better.

The bearing stratum should be verified prior to the placement of rebar or concrete. Pier borings should be filled on the same day as drilling. Pier borings should be dewatered immediately prior to placement of concrete. If required dewatering for pier borings may be accomplished by sump pump.

All footing systems should be designed and constructed in accordance with the recommendations contained in AS 2870-2011 and/or AS 2159-2009 by a suitably qualified and experienced structural engineer.

6.8 Ground Slabs and Pavements

Slab and pavement designs are based on the California Bearing Ratio (CBR) and modulus of the subgrade materials encountered after any excavation or re-grading has taken place. The principal aim of the subgrade preparation is to provide a uniform foundation over the entire slab/pavement formation which will not give rise to unevenness in the slab/pavement surface under the design loads.

The final subgrade, following the earthworks recommended in Section 6.1, and must perform satisfactorily under test-rolling as detailed in AS3798-2007. The subgrade should comprise natural soil or well compacted structural fill, existing on-site fill is not considered suitable for use as pavement subgrade unless excavated and reinstated as new structural fill. Where pavement or slab subgrade is comprised of natural on-site soils or site won fill material, the highly expansive nature of on-site soils will need to be considered.

To minimise volume changes due to highly expansive soils, some or all of the following strategies are recommended:

- Construct the subgrade or fill material at a time when its soil suction (the ability of a soil to attract moisture) is likely to be near the long-term equilibrium value;
- Compact soil at its Equilibrium Moisture Content (EMC);
- Provide a low-permeability lower subbase or a select fill capping layer above the expansive soil. The minimum thickness of this layer should be the greater of 150 mm or two-and-a-half times the maximum particle size. This capping layer should extend at least 500 mm past the edge of pavement, and if provided, past the kerb and channel, to reduce edge movement;
- Provide a minimum cover of material over the expansive soil for all pavement types. Material used to provide this layer should have swells of less than 1.5% for the top 300 mm and less than 2.5% for the remaining thickness and be placed at an appropriate moisture content to remain within this limit;
- Ensure that the location of pavement drains is confined to the impermeable subbase/select fill capping layer and does not extend into the expansive soils. Drains located within expansive soils will cause fluctuations in the moisture content of the soil;
- Restrict the planting of shrubs and trees close to the pavement; and
- Incorporate lime stabilisation to reduce the plasticity and increase the volume stability of the upper layer of the expansive clay subgrade.

Based on Laboratory results and Geo-Logix's experience with similar soil and provided the final subgrade performs under test-rolling and is compacted to at least 98% standard compaction, design of pavements and slabs-on-grade placed on onsite residual soils may be based on a CBR of 3%.

In order to provide uniform support beneath any proposed floor slab-on-grade, Geo-Logix recommends that floor slabs be underlain by a minimum of 100 mm of free-draining (a maximum particle size of 19 mm with less than 5 percent material passing the 75 µm sieve), well graded gravel or crushed rock base course.

Exterior slabs and pavements should be isolated from the building. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.

6.9 Aggressivity/Exposure Classification

Based on the preliminary exposure classification test results, and in accordance with AS3600-2009 and AS2159-2009, steel and concrete structures in contact with fill, natural soils and rock above the water table should be designed based on no less than non-aggressive, A1, exposure.

6.10 Salinity Risk

Soil salinity risk is based on extract electrical conductivity (EC_e). Based on laboratory testing of the selected samples, on-site soils do not appear to be saline (Department of Land and Water Conservation NSW, 2002).

6.11 Earthquake Design

Structural design for earthquake loads should be carried out in accordance with the relevant provisions in AS1170.4–2007. Based on the subsurface profile encountered at the base elevation of the proposed excavation, and with reference to Tables 3.2 and 4.1 of AS1170.4, the site subsoil class is considered to be C_e (shallow soil site) with a hazard factor (Z) of 0.08.

7. LIMITATIONS

This report should be read in full, and no executive summary, conclusion or other section of the report may be used or relied on in isolation or taken as representative of the report as a whole. No responsibility is accepted by Geo-Logix, and any duty of care that may arise but for this statement is excluded, in relation to any use of any part of this report other than on this basis.

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This report is based on the available project information and the subsurface information obtained by Geo-Logix. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, Geo-Logix should be notified immediately to determine if there are consequences to the recommendations provided in this report. If Geo-Logix is not retained to perform these functions, Geo-Logix cannot be responsible for the impact of those conditions on the performance of the project.

Unless otherwise expressly stated, Geo-Logix has assumed that the information and data contained in previous reports carried out by others and reviewed in preparation of this report are completely accurate and has not sought independently to verify the accuracy of the information or data.

Where laboratory tests have been carried out by others on Geo-Logix' behalf, the tests are reproduced in this report on the assumption that the tests are accurate. Geo-Logix has not sought independently to verify the accuracy of those tests and assumes no responsibility in respect of them.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area at the time of this report. No other warranties are implied or expressed.

This report has been prepared for the specific application to the proposed development as described in the report. After the plans and specifications for the project are more complete the geotechnical engineer should be provided with the opportunity to review the final design plans and specifications to assess whether our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations.

8. REFERENCES

Australian Standard (2002) AS4678–2002 Earth-retaining structures, Standards Australia.

Australian Standard (2006) AS2187.2-2006 Explosives - Storage and use, Part 2: Use of explosives, Standards Australia.

Australian Standard (2007) AS1170.4–2007 Structural design actions – Earthquake actions in Australia, Standards Australia.

Australian Standard (2007) AS3798–2007 Guidelines on earthworks for commercial and residential developments, Standards Australia.

Australian Standard (2009) AS2159–2009 Piling Design and Installation, Standards Australia.

Australian Standard (2009) AS3600–2009 Concrete Structures, Standards Australia.

Australian Standard (2011) AS2870–2011 Residential slabs and footings, Standards Australia.

Bowles, J. E. (1996) Foundation Analysis and Design, 5th Edition, Mc-Graw Hill, Inc. New York.

British Standard (1990) BS 7385-1:1990. Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings;

British Standard (1993) BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration.

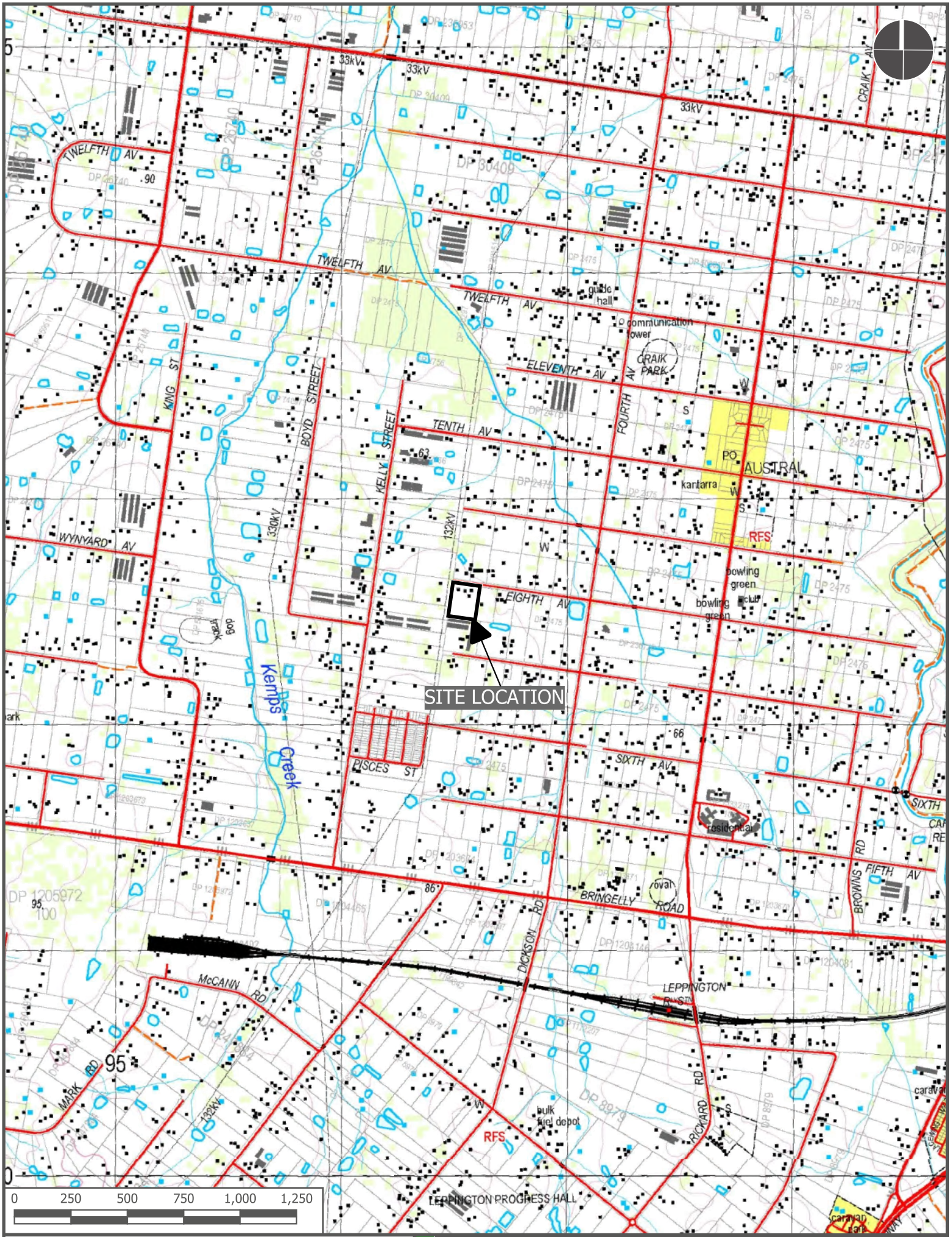
Department of Environment and Conservation NSW (2006) Assessing Vibration: a technical guideline, DEC 2006/43, February 2006.

Department of Land and Water Conservation NSW (2002) Site Investigations for Urban Salinity.

DIN (1999) DIN 4150-3: 1999-02 Vibration in buildings – Part 3: Effects on Structures, German Institute for Standardisation.

Pells et al (1998) Foundations on Sandstone and Shale in the Sydney Region, Australian Geomechanics Society, 1998.

FIGURES



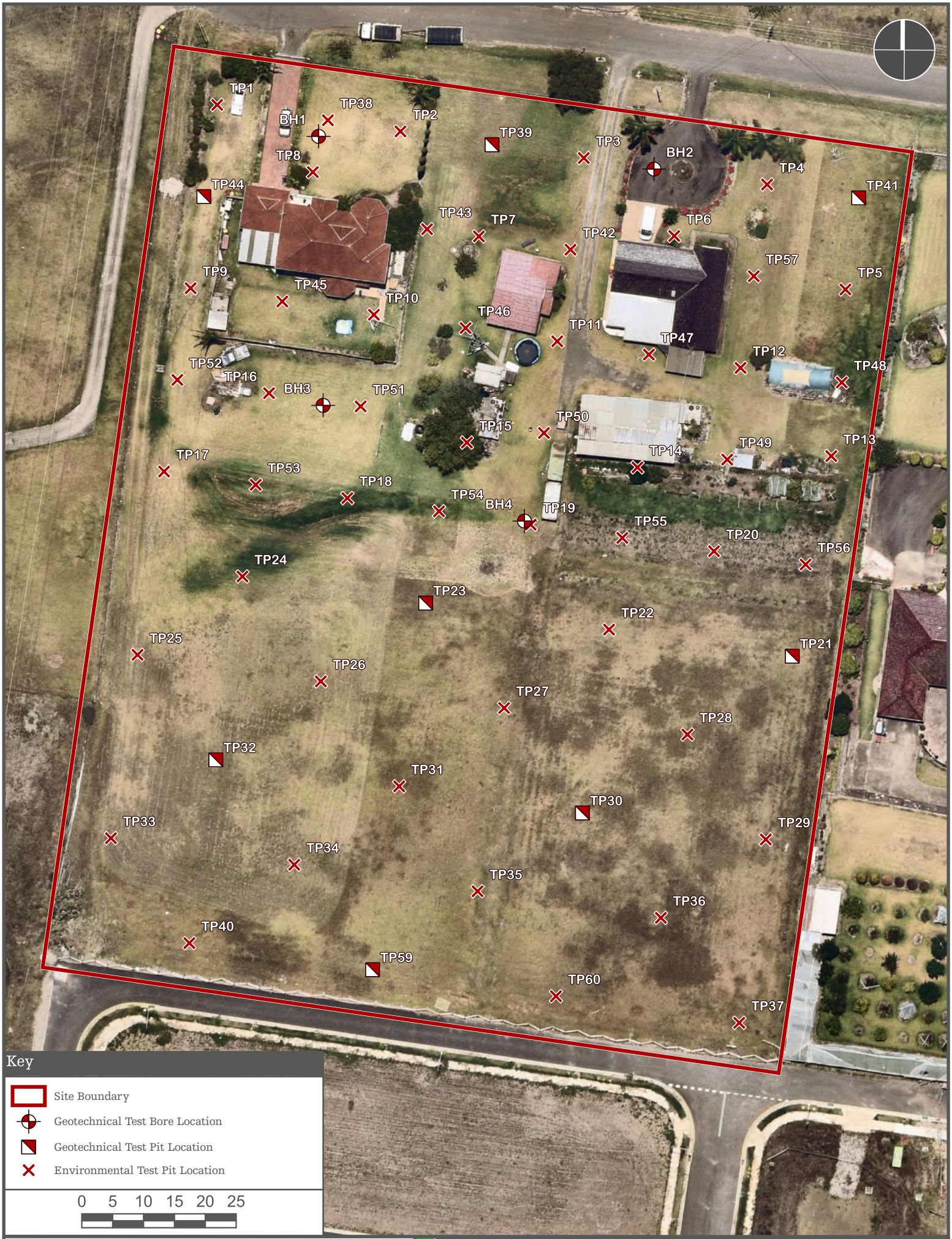
Geo-Logix

SITE LOCATION

Geotechnical Investigation
330 Eighth Avenue, Austral NSW

Project No. 2301008

Figure 1



Key

- Site Boundary
- Geotechnical Test Bore Location
- Geotechnical Test Pit Location
- Environmental Test Pit Location

0 5 10 15 20 25

Geo-Logix

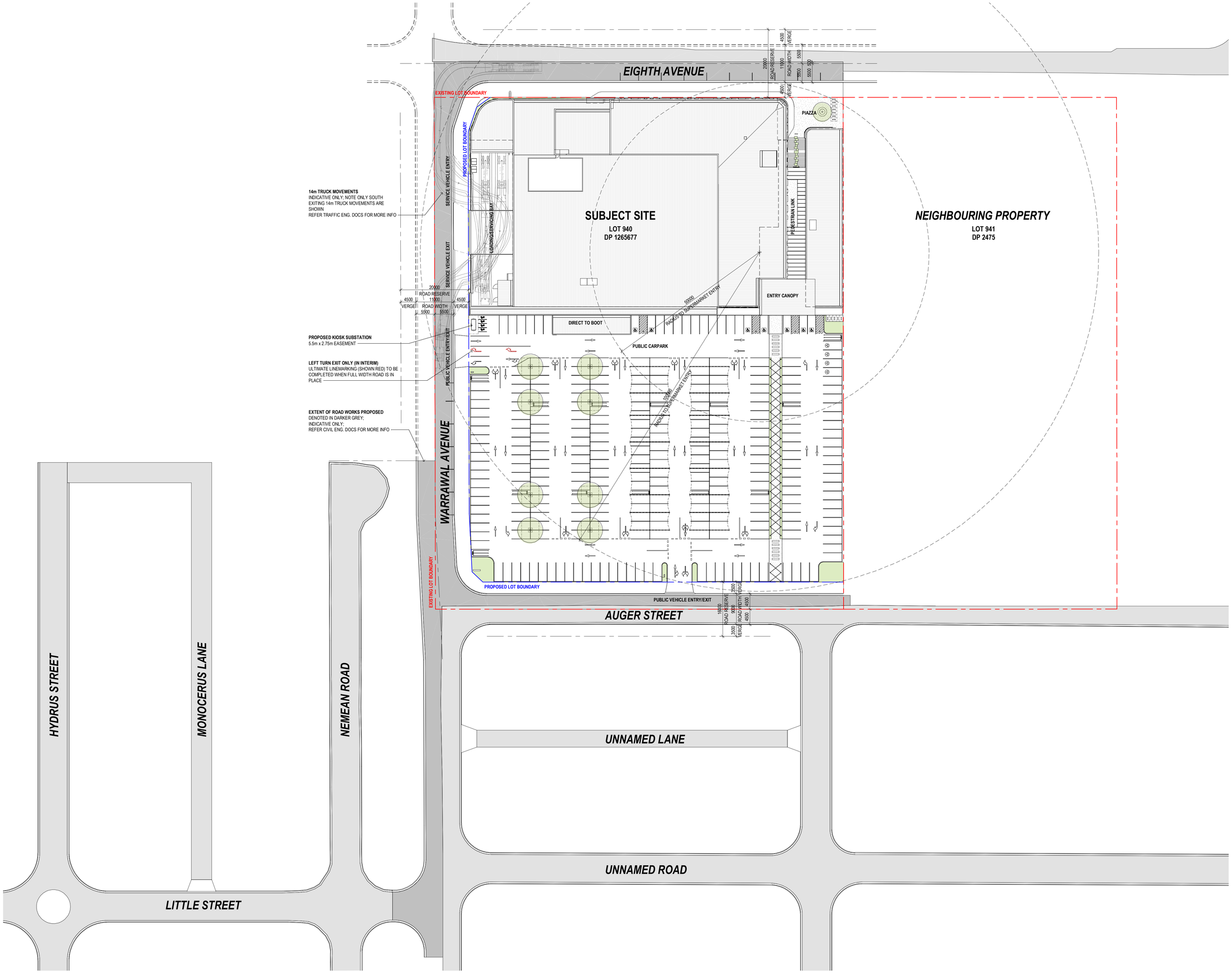
SITE MAP

Geotechnical Investigation
330 Eight Avenue, Austral NSW 2179

Project No. 2301008

Figure 2

ATTACHMENT A



Legend - Site

- NEW ROAD WORKS
- EXISTING ROADS
- GARDEN BEDS
- EXISTING TREE
- PROPOSED TREE REFER TO LANDSCAPE ARCHITECTS DRAWINGS
- EX 79.40 EXISTING LEVEL
- RL 79.40 RELATIVE LEVEL
- FFL 79.40 FLOOR LEVEL
- DENOTES DEMOLISHED ITEMS
- EXISTING LOT BOUNDARY
- PROPOSED NEW LOT BOUNDARY

Keynote Legend

Parking Summary

Category	Carparks Provided
Accessible	7
Direct to Boot (DTB)	6
Electric Vehicle	4
On-Grade	286
On-Street Parking	16
Grand total	319

DCP Parking Summary
Total Parking Demand: **284 spaces**
Total Parking Provided: 319 spaces

Area Summary_Lettable		Area Summary_Non-Lettable	
Function	Area	Function	Area
COMMERCIAL	1858 m²	ADMIN	13 m²
LIQUOR	200 m²	AMENITIES	139 m²
SPECIALTY RETAIL	1521 m²	CIRCULATION	63 m²
SUPERMARKET	3881 m²	LIFTSTAIR	189 m²
Grand total	7460 m²	LOBBY	100 m²
		SERVICES	436 m²
		Grand total	940 m²

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Austral Square

330-350 Eighth Avenue AUSTRAL NSW 2179

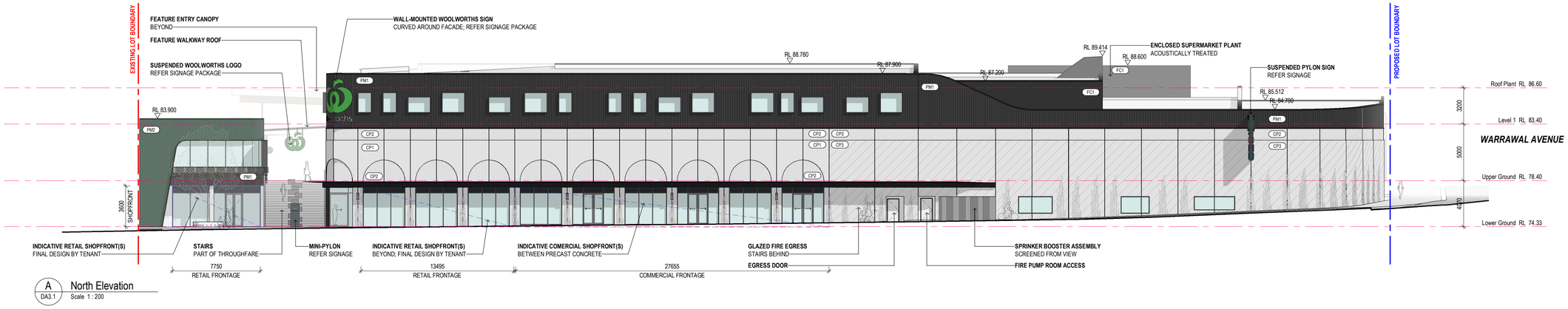
Scale 1:500 @ A1
0 15m

PRELIMINARY

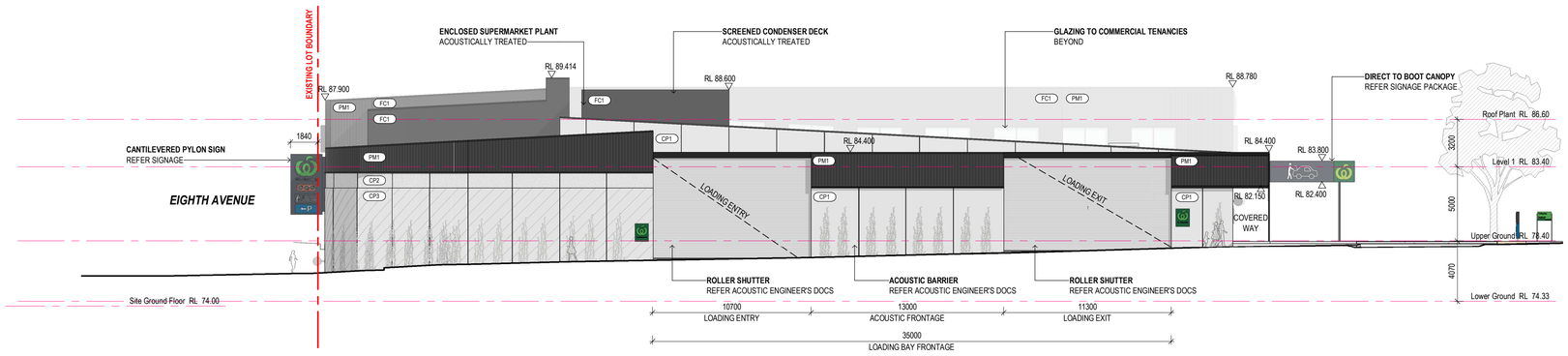
Site Plan - Overall Works

14.06.2023

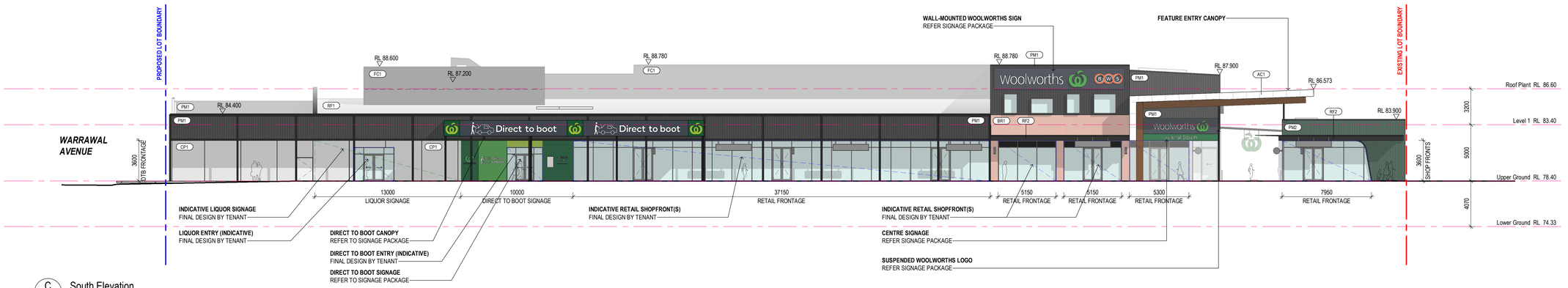
DA2.4 P7



A North Elevation
DA3.1 Scale 1 : 200



B West Elevation
DA3.1 Scale 1 : 200



C South Elevation
DA3.1 Scale 1 : 200

External Shopfronts

External Shopfront Design Parameters:
- All tenant shopfronts are shown indicatively only.
- Future shopfront design by tenant to future detail.
- Maximum 40% of each tenant shopfront to be solid (i.e. brickwork, masonry, filming, non-illuminated decals, signage, or the like).
- Minimum 60% of each tenant shopfront to be glazed (i.e. fixed glazing, glazed swing doors, glazed sliding doors, or the like).

Denotes zone of indicative shopfront

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Job No. 22108

Austral Square

330-350 Eighth Avenue AUSTRAL NSW 2179

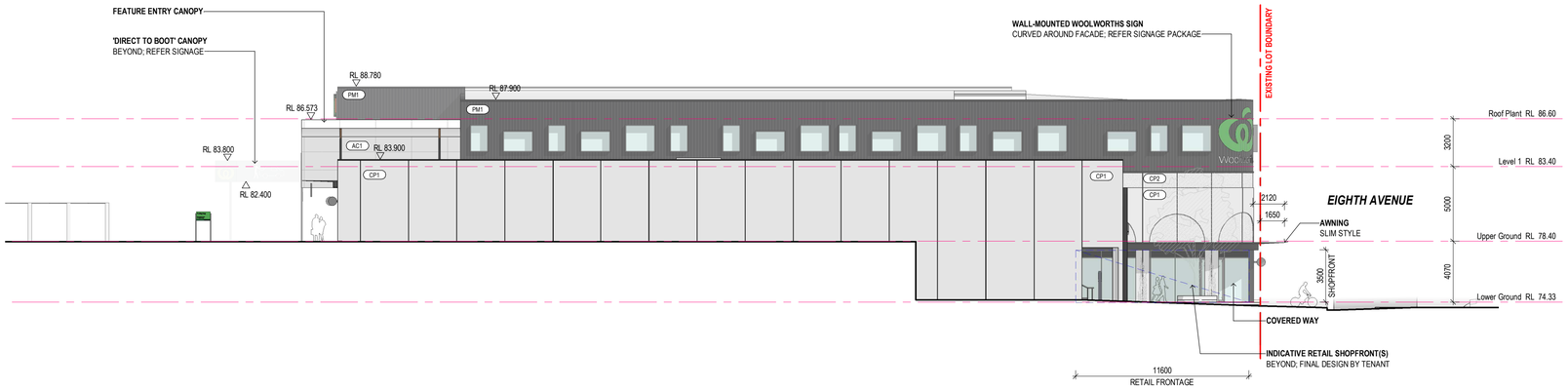
Scale 1 : 200 @ A1
0 6m

PRELIMINARY

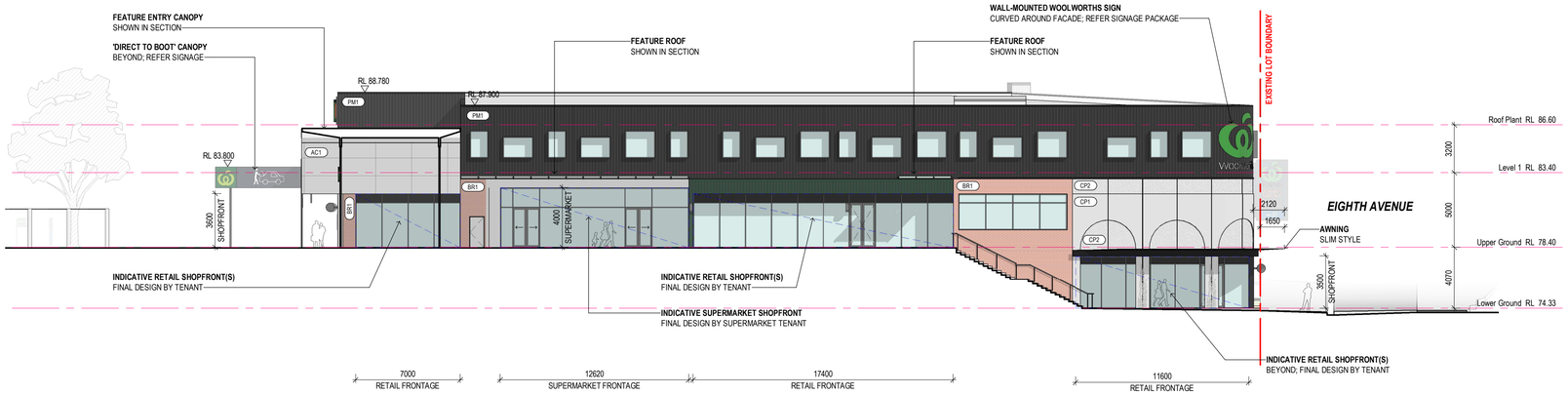
Building Elevations - Sheet 1

14.06.2023

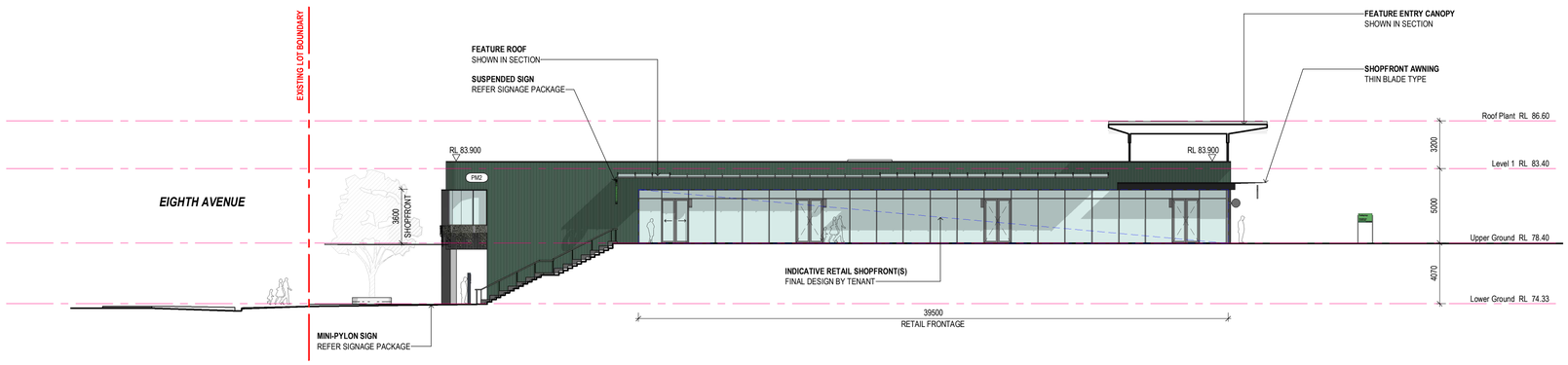
DA4.1 P4



D DA3.1 East Elevation
Scale 1 : 200



E DA3.1 East Sectional Elevation
Scale 1 : 200



F DA3.1 West Sectional Elevation
Scale 1 : 200

External Shopfronts

External Shopfront Design Parameters:
- All tenant shopfronts are shown indicatively only.
- Future shopfront design by tenant to future detail.
- Maximum 40% of each tenant shopfront to be solid (i.e. brickwork, masonry, filming, non-illuminated decals, signage, or the like).
- Minimum 60% of each tenant shopfront to be glazed (i.e. fixed glazing, glazed swing doors, glazed sliding doors, or the like).

Denotes zone of indicative shopfront

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Job No. 22108

Austral Square

330-350 Eighth Avenue AUSTRAL NSW 2179

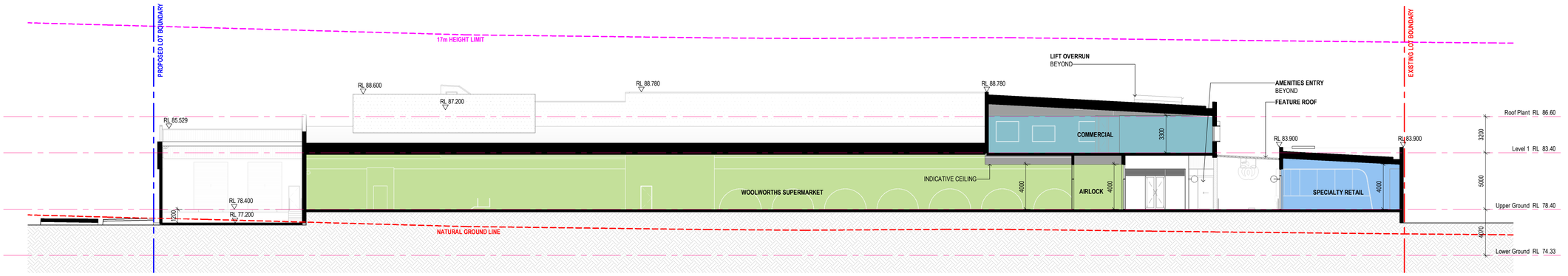
Scale 1 : 200 @ A1
0 6m

PRELIMINARY

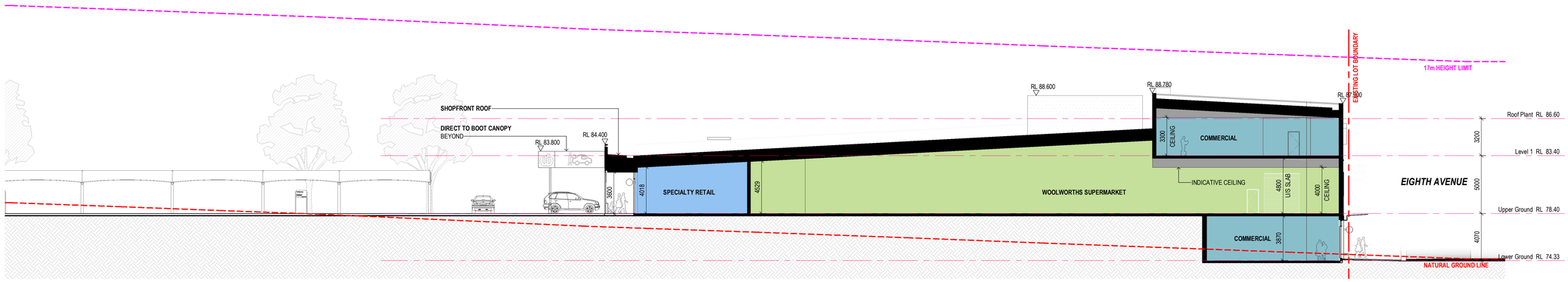
Building Elevations - Sheet 2

14.06.2023

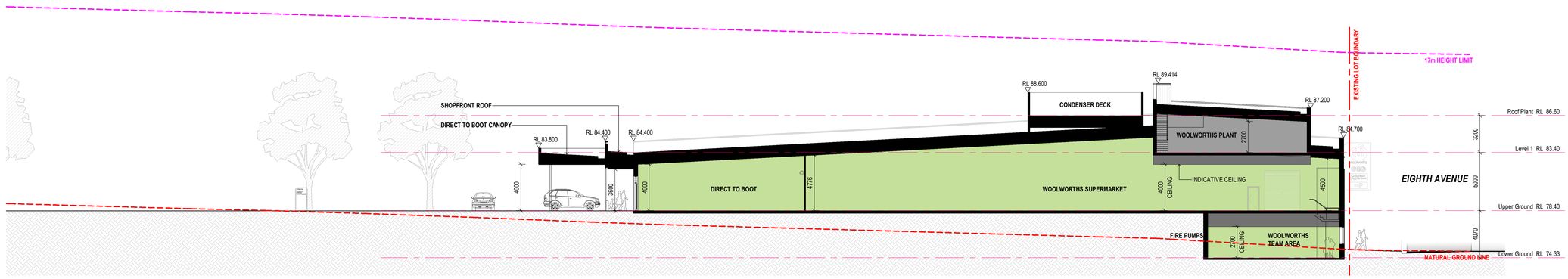
DA4.2 P4



1 DA3.1 Section 1
Scale 1 : 200



2 DA3.1 Section 2
Scale 1 : 200



3 DA3.1 Section 3
Scale 1 : 200

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Job No. 22108

Austral Square

330-350 Eighth Avenue AUSTRAL NSW 2179

Scale 1 : 200 @ A1
0 6m

PRELIMINARY

Building Sections - Sheet 1

14.06.2023

DA5.1 P4

ATTACHMENT B

BOREHOLE LOG: BH01

Geo-Logix Pty Ltd
Building Q2, Level 3
Unit 2309 / 4 Daydream Street
Warriewood NSW 2102
www.geo-logix.com.au

Project Number:	**2301008**
Hole Depth:	**9.00 m**
Date Started:	**07/03/2023**
Date Completed:	**07/03/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **Austral NSW**
Client: **Woolworths Ltd**
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger** **(Ute mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests: SPT	Observations / Comments
SFA (V-bit)		0.80	D	Z	BH01/0.0-0.2	Fill	F		**FILL**- dark reddish brown / moderate brown (5YR 3/4), 50% clay, 40% sand, 10% gravel, well compacted.	damp		
		1	R	Z	BH01/0.7-0.9		CH		**Sandy CLAY**- moderate red (5R 4/6), 60% clay, 40% sand, high plasticity, firm.	damp	3,4,3 N=7	
		1.50					CH		**Sandy CLAY**- red / moderate reddish brown (10R 4/6), 60% clay, 40% sand, high plasticity, very stiff.	damp		
		2									9,16,14 N=30	
		2.30	R	Z	BH01/2.3-2.5		CL		**CLAY with Sand**- light grey (N7), 80% clay, 20% sand, medium plasticity, hard.	damp		V-bit refusal at 2.6m, change to TC-bit.
		3.00	D	Z	BH01/3.2-3.5		CL		**CLAY with Sand**- very pale brown / very pale orange (10YR 8/2), 80% clay, 20% sand, medium plasticity, hard.	damp		
SFA (TC-bit)		3.70									12,20/50	
		4				Natural			**Weathered SHALE**.			
		5										
		5.20	D	Z	BH01/5.2-5.3						30/100	
		6							**SHALE**.			
		7									15,22/50	
		8										
		9										
									Terminated at 9.000 m			

Abbreviations:

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type
D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
Encountered Groundwater
Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery** Date: **07/03/2023**
Checked By: **Ted Lilly** Date: **03/05/2023**

BOREHOLE LOG: BH02

Geo-Logix Pty Ltd
Building Q2, Level 3
Unit 2309 / 4 Daydream Street
Warriewood NSW 2102
www.geo-logix.com.au

Project Number:	**2301008**
Hole Depth:	**9.00 m**
Date Started:	**07/03/2023**
Date Completed:	**07/03/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **Austral NSW**
Client: **Woolworths Ltd**
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger (Ute mounted)**

Method	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Material Description	Moisture	Tests (SPT)	Observations / Comments
SFA (V-bit)	0.15	D	Z	BH02/0.15-0.35 +Asb	Fill	F	**FILL**- Roadbase, gravel & asphalt.			
	0.70					F	**FILL**- light grey (N7), 80% clay, 20% sand, medium plasticity.	damp	1,1,3 N=4	
	1					CH	**CLAY**- moderate red (5R 4/6), 70% clay, 30% sand, high plasticity, firm.	damp		
	2.00	D	Z	BH02/1.6-1.8						
SFA (TC-bit)	2.30					CH	**Sandy CLAY**- yellowish red / light brown (5YR 5/6), 60% clay, 40% sand, high plasticity, stiff.	damp	8,8,13 N=21	V-bit refusal at 2.0m, change to TC-bit.
	3	R	Z	BH02/2.3-2.5	Natural	CL	**CLAY**- light grey (N7), 70% clay, 30% sand, medium plasticity, very stiff.	damp		
	3.60								22/120	
	4						**Weathered SHALE**- light grey (N7).	damp		
	5	D	Z	BH02/5.5-5.7						
	6	D	Z	BH02/6.0-6.2						
	7									
	8									
	9						**Terminated at 9.000 m**			

Abbreviations:

Hydrocarbon Odour
H High
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Sample Type
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R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
Encountered Groundwater
Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:

Log Drawn By:	Laurie White	Logged By:	**Thara Polassery** Date: **07/03/2023**
Contact:	laurie.white@reumad.com.au	Checked By:	**Ted Lilly** Date: **03/05/2023**

BOREHOLE LOG: BH03

Geo-Logix Pty Ltd
Building Q2, Level 3
Unit 2309 / 4 Daydream Street
Warriewood NSW 2102
www.geo-logix.com.au

Project Number:	**2301008**
Hole Depth:	**9.00 m**
Date Started:	**07/03/2023**
Date Completed:	**07/03/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **Austral NSW**
Client: **Woolworths Ltd**
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger** **(Ute mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests: SPT	Observations / Comments
SFA (V-bit)		0.00	D	Z	BH03/0.0-0.2	Fill	F		**FILL**- reddish brown / moderate brown (5YR 4/4), 60% clay, 40% sand, well compacted.	damp		
		0.70									3,5,7 N=12	
		1				Natural	CH		**CLAY**- dark greyish brown / dark yellowish brown (10YR 4/2), 70% clay, 30% sand, high plasticity, stiff.	damp		
		2.00	R	Z	BH03/2.0-2.2		CL		**CLAY**- light grey (N7), 70% clay, 30% sand, medium plasticity, stiff.	damp	7,10,16 N=26	
		2.30							**Weathered SHALE**- moderate red (5R 4/6).	damp		V-bit refusal at 2.8m, change to TC-bit.
		3	D	Z	BH03/3.0-3.2							
		4									18,22, 21/100	
SFA (TC-bit)	▽	5							Colour change to light brownish gray / pale yellowish brown (10YR 6/2) & brownish / yellow (10YR 6/8) at 4.5m.		25/90	
		6								wet		
		7										
		8										
		9							**Terminated at 9.000 m**			

Abbreviations:

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type
D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
▽ Encountered Groundwater
▼ Stabilised Groundwater

Abandonment Method: Backfill with soil and compact.
Additional Comments:

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery** Date: **07/03/2023**
Checked By: **Ted Lilly** Date: **03/05/2023**

BOREHOLE LOG: BH04

Geo-Logix Pty Ltd
Building Q2, Level 3
Unit 2309 / 4 Daydream Street
Warriewood NSW 2102
www.geo-logix.com.au

Project Number:	**2301008**
Hole Depth:	**9.00 m**
Date Started:	**07/03/2023**
Date Completed:	**07/03/2023**

Project Name: **Geotechnical Investigation**
Location / Site: **Austral NSW**
Client: **Woolworths Ltd**
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger** **(Ute mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests (SPT)	Observations / Comments
SFA (V-bit)		0.70	D	Z	BH04/0.0-0.2	Fill	F		**FILL**- reddish brown / moderate brown (5YR 4/4), 60% clay, 40% sand, well compacted.	damp		
		1.00					F		**FILL**- red / moderate reddish brown (10R 4/6) and light grey (N7), 70% clay, 30% sand.	damp	4,7,11 N=18	
		2					CH		**CLAY**- light grey (N7), 70% clay, 30% sand, high plasticity, very stiff.	damp		
		2.50	R	Z	BH04/2.0-2.2						11,9,10 N=19	V-bit refusal at 2.0m, change to TC-bit.
		3	D	Z	BH04/2.5-2.7		CL		**Sandy CLAY**- moderate red (5R 4/6), 60% clay, 40% sand, medium plasticity, very stiff.	damp		
SFA (TC-bit)		3.40				Natural			**Weathered SHALE**- very pale brown / greyish orange (10YR 7/4).	damp	25/120	
		4										
		5										
		6	D	Z	BH04/5.5-5.7							
		7										
		8										
		9							**Terminated at 9.000 m**			

Abbreviations:

Hydrocarbon Odour
H High
M Medium
L Low
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Sample Type
D Disturbed
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Abandonment Method: Backfill with soil and compact.
Additional Comments:

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Thara Polassery** Date: **07/03/2023**
Checked By: **Ted Lilly** Date: **03/05/2023**

Test Pit Logs
Geotechnical Investigation
Project No.: 2301008

330 Eighth Avenue,
Austral NSW 2179

Depth (m)	Location Total Depth (m) Date	TP21 1.5 8/03/2023	TP23 1.5 8/03/2023	TP30 3.0 8/03/2023	TP32 3.0 7/03/2023
0.0 – 0.9		**Fill -** moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, dry, moderately compacted.	**Fill -** moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, dry, moderately compacted.	**Fill -** moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, damp, moderately compacted.	**Fill -** moderate brown (5YR3/4), 40% clay, 50% sand, 10% gravel, damp, moderately compacted, sub angular gravels.
0.3 – 0.7		**Fat Clay (CH) -** dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.	**Fill -** very pale orange (10YR8/2), 30% clay, 30% sand, 40% gravel, dry, moderately compacted.	**Fat Clay (CH) -** dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.	**Fill -** moderate orange pink (10R7/4), 50% clay, 40% sand, 10% gravel, dry, moderately compacted, sub rounded gravels.
0.7 – 1.0			**Fat Clay (CH) -** dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.		**Fat Clay (CH) -** modrate yellowish brown (10YR5/4), 90% clay, 10% sand, damp, firm, high plasticity.
0.9 – 1.5		**Fat Clay (CH) -** light grey (N7), 80% clay, 20% sand, damp, stiff, high plasticity.	**Fat Clay (CH) -** light grey (N7), 90% clay, 10% sand, damp, stiff, high plasticity.	**Fat Clay (CH) -** light grey (N7), 90% clay, 10% sand, damp, stiff, high plasticity.	
1.5 – 3.0					**Fat Clay (CH) -** dark yellowish orange (10YR6/6), 85% clay, 15% sand, damp, soft, high plasticity, sub rounded gravel.

Test Pit Logs
Geotechnical Investigation
Project No.: 2301008

330 Eighth Avenue,
Austral NSW 2179

Depth (m)	Location Total Depth (m) Date	TP39 1.5 7/03/2023	TP41 3.0 8/03/2023	TP44 3.0 7/03/2023	TP59 1.5 7/03/2023
0.0 – 0.5		**Fill -** moderate brown (5YR3/4), 40% clay, 50% sand, 10% gravel, damp, moderately compacted.	**Fill -** moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, moderately compacted, with black plastic.	**Fill -** moderate brown (5YR3/4), 35% clay, 55% sand, 10% gravel, damp, moderately compacted, some angular gravels.	**Fill -** moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, moderately compacted.
0.5 – 0.7		**Gravelly Clay (CL) -** moderate reddish orange (10R6/6), 70% clay, 10% sand, 20% gravel, damp, soft, medium plasticity, semi rounded gravel.	**Fat Clay (CH) -** greyish orange (10YR7/4), 80% clay, 10% sand, 10% gravel, damp, firm, high plasticity.	**Fill -** light red (5R6/6), 85% clay, 10% sand, 5% gravel, damp, moderately compacted.	**Fat Clay (CH) -** moderate reddish orange (10R6/6), 70% clay, 20% sand, 10% gravel, damp, firm, medium plasticity.
0.7 – 1.5		**Fat Clay (CH) -** pale red (5R6/2), 90% clay, 10% sand, damp, soft, high plasticity.	**Fat Clay (CH) -** moderate red (5R4/6), 90% clay, 10% sand, damp, firm, high plasticity.	**Fill -** moderate brown (5YR3/4), 35% clay, 55% sand, 10% gravel, damp, moderately compacted.	**Fat Clay (CH) -** pale red (10R6/2), 85% clay, 15% sand, damp, firm, medium plasticity.
1.5 – 3.0				**Fat Clay (CH) -** light red (5R6/6), 85% clay, 10% sand, 5% gravel, damp, firm, high plasticity, with iron stone.	

Geo-Logix

Test Pit Logs

Detailed Site Investigation

Project No.: 2301008

330 - 350 Eighth Avenue,
Austral NSW

Location	Depth	Description
TP1	0.0-0.1	Fill - moderate brown (5YR3/4), 35% clay, 55% sand, 10% gravel, damp, well compacted, top soil, semi-rounded gravel, no ACM observed.
	0.1-0.3	Fill - greyish pink (5R8/2), 85% clay, 10% sand, 5% gravel, damp, well compacted, reworked natural clay, semi-rounded gravels, no ACM observed.
	0.3-0.6	Fill - moderate brown (5YR3/4), 35% clay, 55% sand, 10% gravel, damp, well compacted, old top soil, no ACM observed.
	0.6-0.8	Fat Clay (CH) - light red (5R6/6), 85% clay, 10% sand, 5% gravel, damp, firm, high plasticity, rounded gravels.
TP2	0.0-0.7	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, non-fibrous plaster cement fragment observed.
	0.7-1.1	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 10% sand, 10% gravel, damp, stiff, high plasticity, possibly reworked with some rounded gravel.
	1.1-1.2	Fat Clay (CH) - pale red (10R6/2), 90% clay, 10% sand, damp, firm, high plasticity, presence of ironstone.
TP3	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, wet, well compacted, suspected leaking pipe, top soil, no ACM observed.
	0.4-0.9	Fat Clay (CH) - pale red (5R6/2), 90% clay, 10% sand, wet, firm, high plasticity, water infiltrating at 0.4 m, sheen on water.
TP4	0.0-0.15	Fill - moderate brown (5YR4/4), 30% clay, 30% sand, 40% gravel, damp, well compacted, no ACM was observed.
	0.15-0.6	Fill - dark yellowish orange (10YR6/6), 70% clay, 30% sand, damp, well compacted, no ACM was observed.
	0.6-1.0	Fat Clay (CH) - light grey (N7), 80% clay, 20% sand, damp, stiff, high plasticity.
TP5	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, well compacted, no ACM was observed, top soil, plastic found.
	0.3-0.5	Fat Clay (CH) - light red (5R6/6), 80% clay, 15% sand, 5% gravel, damp, firm, high plasticity, sub rounded gravels.
	0.5-0.6	Fat Clay (CH) - light brown (5YR5/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP6	0.0-0.2	Fill - moderate brown (5YR4/4), 30% clay, 30% sand, 40% gravel, damp, well compacted, no ACM was observed.
	0.2-0.8	Fill - dark yellowish orange (10YR6/6), 70% clay, 30% sand, damp, well compacted, no ACM was observed.
	0.8-1.2	Fat Clay (CH) - light grey (N7), 80% clay, 20% sand, damp, stiff, high plasticity.
TP7	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, wet, well compacted, no ACM observed, top soil.
	0.4-0.7	Fat Clay (CH) - light brown (5YR5/6), 80% clay, 15% sand, 5% gravel, wet, soft, high plasticity, water infiltrating around 0.4 m.
	0.7-0.9	Fat Clay (CH) - pale red (5R6/2), 90% clay, 10% sand, wet, soft, high plasticity.
TP8	0.0-0.15	Fill - moderate brown (5YR3/4), 40% clay, 60% sand, dry, well compacted, top soil.
	0.15-1.0	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, non-fibrous plaster cement fragment, brick, plastic, concrete pieces.
	1.0-1.3	Fat Clay (CH) - light red (5R6/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP9	0.0-0.3	Fill - moderate brown (5YR3/4), 30% clay, 60% sand, 10% gravel, damp, well compacted, top soil, no ACM, concrete pieces, plastic pieces.
	0.3-0.4	Fill - pale red (5R6/2), 80% clay, 15% sand, 5% gravel, damp, well compacted, top 0.1 m has reworked clay, semi angular gravel.
	0.4-0.6	Fat Clay (CH) - moderate reddish orange (10R6/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP10	0.0-0.5	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, well compacted, top soil, some plastic pieces, no ACM.
	0.5-0.7	Fat Clay (CH) - moderate reddish orange (10R6/6), 85% clay, 10% sand, 5% gravel, damp, stiff, high plasticity, some subangular gravel.
TP11	0.0-0.3	Fill - moderate brown (5YR4/4), 40% clay, 30% sand, 30% gravel, damp, well compacted, no ACM observed.
	0.3-0.6	Sandy Clay (CH) - dark yellowish orange (10YR6/6), 70% clay, 30% sand, damp, firm, high plasticity.
	0.6-1.0	Fat Clay (CH) - light grey (N7), 90% clay, 10% sand, damp, firm, high plasticity.
TP12	0.0-0.4	Fill - moderate brown (5YR4/4), 40% clay, 30% sand, 30% gravel, damp, well compacted, no ACM was observed.
	0.4-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP13	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, well compacted, top soil, non-fibrous plaster cement fragment observed.
	0.3-0.6	Fat Clay (CH) - moderate red (5R4/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP14	0.0-0.3	Fill - moderate brown (5YR4/4), 40% clay, 30% sand, 30% gravel, damp, well compacted, no ACM was observed.
	0.3-1.0	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP15	0.0-0.5	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, top soil, bricks found, potential ACM fragment observed.
	0.5-0.7	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 10% sand, 10% gravel, damp, firm, high plasticity.
TP16	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, well compacted, no ACM was observed, top soil, sub angular gravel.
	0.4-0.7	Fat Clay (CH) - light brown (5YR5/6), 85% clay, 10% sand, 5% gravel, damp, stiff, high plasticity, some rounded gravel.
	0.7-0.9	Fat Clay (CH) - moderate reddish orange (10R6/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP17	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, moist, well compacted, top soil, semi angular gravel, no ACM observed.
	0.4-0.65	Fill - pale red (5R6/2), 20% clay, 20% sand, 60% gravel, wet, well compacted, septic trench pit, wet, gravel.
TP18	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 50% sand, 10% gravel, damp, well compacted, top soil, no ACM was observed.
	0.3-0.6	Fat Clay (CH) - dark yellowish orange (10YR6/6), 85% clay, 10% sand, 5% gravel, damp, soft, medium plasticity, some sub angular gravel.
	0.6-0.8	Fat Clay (CH) - pale red (10R6/2), 90% clay, 10% sand, damp, firm, high plasticity.
TP19	0.0-0.25	Fill - moderate brown (5YR4/4), 60% clay, 40% sand, damp, well compacted, no ACM was observed.
	0.25-0.6	Sandy Clay (CH) - moderate red (5R4/6), 70% clay, 30% sand, damp, firm.
	0.6-0.8	Fat Clay (CH) - light grey (N7), 90% clay, 10% sand, damp, firm, high plasticity.
TP20	0.0-0.2	Fill - moderate brown (5YR4/4), 40% clay, 30% sand, 30% gravel, damp, well compacted, no ACM was observed.
	0.2-1.0	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP21	0.0-0.2	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, dry, well compacted, no ACM was observed.
	0.2-0.9	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
	0.9-1.5	Fat Clay (CH) - light grey (N7), 80% clay, 20% sand, damp, stiff, high plasticity.
TP22	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, top soil, no ACM observed.
	0.4-0.6	Fat Clay (CH) - greyish orange (10YR7/4), 70% clay, 20% sand, 10% gravel, dry, firm, medium plasticity.
	0.6-0.8	Fat Clay (CH) - moderate red (5R4/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP23	0.0-0.2	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, dry, well compacted, no ACM observed.
	0.2-0.25	Fill - very pale orange (10YR8/2), 30% clay, 30% sand, 40% gravel, dry, well compacted.
	0.25-0.9	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
	0.9-1.5	Fat Clay (CH) - light grey (N7), 90% clay, 10% sand, damp, stiff, high plasticity.
TP24	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, medium dense, No ACM, top soil, gravel.
	0.4-0.9	Fat Clay (CH) - very dark red (5R2/6), 85% clay, 15% sand, damp, soft, high plasticity.
	0.9-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 85% clay, 15% sand, damp, soft, high plasticity.

Geo-Logix

Test Pit Logs

Detailed Site Investigation

Project No.: 2301008

330 - 350 Eighth Avenue,
Austral NSW

Location	Depth	Description
TP25	0.0-0.2	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, well compacted, some plastic film, no ACM observed, top soil, subrounded gravel.
	0.2-0.5	Fat Clay (CH) - pale red (5R6/2), 80% clay, 15% sand, 5% gravel, damp, firm.
	0.5-0.7	Fat Clay (CH) - moderate reddish orange (10R6/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP26	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 50% sand, 10% gravel, damp, well compacted, no ACM was observed, top soil.
	0.3-0.6	Fat Clay (CH) - light brown (5YR5/6), 85% clay, 10% sand, 5% gravel, damp, stiff, high plasticity, subangular gravel.
	0.6-0.8	Fat Clay (CH) - pale red (10R6/2), 90% clay, 10% sand, damp, firm, high plasticity.
TP27	0.0-0.3	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, damp, well compacted, no ACM observed.
	0.3-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
	1.0-1.5	Fat Clay (CH) - light grey (N7), 80% clay, 20% sand, damp, stiff, high plasticity.
TP28	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, top soil, no ACM was observed.
	0.4-0.5	Fill - moderate brown (5YR4/4), 50% clay, 40% sand, 10% gravel, dry, well compacted, no ACM was observed.
	0.5-0.8	Sandy Clay (CL) - greyish orange (10YR7/4), 70% clay, 20% sand, 10% gravel, dry, firm, medium plasticity.
	0.8-0.9	Fat Clay (CH) - pale red (10R6/2), 90% clay, 10% sand, damp, firm, high plasticity.
TP29	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, well compacted, top soil, no ACM was observed.
	0.4-0.7	Sandy Clay (CL) - greyish orange (10YR7/4), 70% clay, 20% sand, 10% gravel, damp, firm, medium plasticity, semi rounded gravel.
	0.7-0.9	Fat Clay (CH) - greyish pink (5R8/2), 90% clay, 10% sand, damp, firm, high plasticity.
TP30	0.0-0.3	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, damp, well compacted, no ACM observed.
	0.3-0.7	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
	0.7-3.0	Fat Clay (CH) - light grey (N7), 90% clay, 10% sand, damp, stiff, high plasticity.
TP31	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, well compacted, top soil, no ACM was observed.
	0.3-0.4	Fill - moderate brown (5YR4/4), 50% clay, 40% sand, 10% gravel, damp, well compacted, old top soil, no ACM observed.
	0.4-0.6	Sandy Clay (CH) - greyish orange (10YR7/4), 70% clay, 20% sand, 10% gravel, damp, firm, high plasticity, sub rounded gravel.
	0.6-0.7	Fat Clay (CH) - moderate red (5R4/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP32	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 50% sand, 10% gravel, damp, well compacted, top soil, sub angular gravels, no ACM was observed.
	0.3-0.4	Fill - moderate orange pink (10R7/4), 50% clay, 40% sand, 10% gravel, dry, well compacted, sub rounded gravels, no ACM was observed.
	0.4-1.3	Fat Clay (CH) - modrate yellowish brown (10YR5/4), 90% clay, 10% sand, damp, firm, high plasticity.
	1.3-3.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 85% clay, 15% sand, damp, soft, high plasticity, sub rounded gravel.
TP33	0.0-0.2	Fill - moderate brown (5YR3/4), 40% clay, 60% sand, damp, well compacted, top soil, no ACM was observed.
	0.2-0.5	Fat Clay (CH) - light brown (5YR5/6), 85% clay, 15% sand, damp, very stiff, high plasticity.
TP34	0.0-0.2	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, well compacted, top soil, semi-rounded gravel, black plastic sheet found, no ACM observed.
	0.2-0.3	Fill - moderate brown (5YR4/4), 30% clay, 65% sand, 5% gravel, dry, well compacted, finer sand.
	0.3-0.6	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 15% sand, 5% gravel, damp, stiff, high plasticity, semi rounded gravel.
TP35	0.0-0.3	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, damp, well compacted, no ACM observed.
	0.3-0.6	Fill - very pale orange (10YR8/2), 30% clay, 30% sand, 40% gravel, damp, well compacted, no ACM observed.
	0.6-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP36	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, top soil, gravel, black plastic, no ACM observed.
	0.3-0.8	Fill - moderate reddish orange (10R6/6), 40% clay, 50% sand, 10% gravel, dry, well compacted, charcoal wooden pieces found, no ACM found.
	0.8-0.9	Fat Clay (CH) - pale red (10R6/2), 85% clay, 15% sand, dry, firm, medium plasticity.
TP37	0.0-0.2	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, dry, well compacted, no ACM was observed.
	0.2-0.9	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
	0.9-1.5	Fat Clay (CH) - light grey (N7), 70% clay, 30% sand, damp, stiff, high plasticity.
TP38	0.0-0.6	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, lumps of clay, bricks, concrete, tin, plastic observed, no ACM was observed.
	0.6-0.8	Fat Clay (CH) - moderate red (5R4/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP39	0.0-0.6	Fill - moderate brown (5YR3/4), 40% clay, 50% sand, 10% gravel, damp, well compacted, top soil, no ACM was observed.
	0.6-1.0	Gravelly Clay (CL) - moderate reddish orange (10R6/6), 70% clay, 10% sand, 20% gravel, damp, soft, medium plasticity, semi rounded gravel.
	1.0-1.5	Fat Clay (CH) - pale red (5R6/2), 90% clay, 10% sand, damp, soft, high plasticity.
TP40	0.0-0.15	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, well compacted, top soil with semi rounded gravel, black plastic shells found, no ACM was observed.
	0.15-0.40	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 15% sand, 5% gravel, damp, very stiff, high plasticity, presence of ironstone.
TP41	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, well compacted, no ACM was observed, top soil, black plastic found.
	0.3-0.7	Fat Clay (CH) - greyish orange (10YR7/4), 80% clay, 10% sand, 10% gravel, damp, firm, high plasticity.
	0.7-3.0	Fat Clay (CH) - moderate red (5R4/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP42	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, well compacted, no ACM was observed.
	0.3-0.5	Fat Clay (CH) - light brown (5YR5/6), 80% clay, 15% sand, 5% gravel, damp, firm, high plasticity.
	0.5-0.8	Fat Clay (CH) - pale red (5R6/2), 90% clay, 10% sand, damp, soft, high plasticity.
TP43	0.0-0.7	Fill - moderate brown (5YR4/4), 50% clay, 40% sand, 10% gravel, damp, well compacted, no ACM was observed.
	0.7-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP44	0.0-0.05	Fill - moderate brown (5YR3/4), 35% clay, 55% sand, 10% gravel, damp, well compacted, some angular gravels, no ACM observed.
	0.05-0.15	Fill - light red (5R6/6), 85% clay, 10% sand, 5% gravel, damp, well compacted, no ACM observed.
	0.15-0.3	Fill - moderate brown (5YR3/4), 35% clay, 55% sand, 10% gravel, damp, well compacted, old top soil, no ACM observed.
	0.3-3.0	Fat Clay (CH) - light red (5R6/6), 85% clay, 10% sand, 5% gravel, damp, firm, high plasticity, Presence of red iron stone.
TP45	0.0-0.5	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 10% gravel, damp, well compacted, top soil, some plastic pieces, no ACM.
	0.5-0.7	Fat Clay (CH) - moderate reddish orange (10R6/6), 85% clay, 15% sand, 5% gravel, damp, stiff, high plasticity, top 0.1 m reworked clay, sub angular and sub rounded gravel found.
TP46	0.0-0.4	Fill - greyish black (N2), 60% clay, 30% sand, 10% gravel, moist, well compacted, no ACM was observed.
	0.4-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.

Geo-Logix

Test Pit Logs

Detailed Site Investigation

Project No.: 2301008

330 - 350 Eighth Avenue,
Austral NSW

Location	Depth	Description
TP47	0.0-0.4	Fill - moderate brown (5YR4/4), 50% clay, 40% sand, 10% gravel, damp, well compacted, no ACM was observed.
	0.4-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP48	0.0-0.2	Fill - moderate brown (5YR4/4), 40% clay, 30% sand, 30% gravel, damp, well compacted, no ACM was observed.
	0.2-1.0	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP49	0.0-0.25	Fill - moderate brown (5YR4/4), 30% clay, 30% sand, 40% gravel, damp, well compacted, no ACM was observed.
	0.25-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP50	0.0-0.4	Fill - moderate brown (5YR4/4), 25% clay, 25% sand, 50% gravel, damp, well compacted, top soil with grass, presence of gravel, no ACM was observed.
	0.4-1.0	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, firm, high plasticity.
TP51	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, well compacted, no ACM was observed, top soil.
	0.3-0.6	Fat Clay (CH) - light brown (5YR5/6), 85% clay, 10% sand, 5% gravel, damp, stiff, high plasticity, reworked natural clay, sub-angular gravel.
	0.6-0.8	Fat Clay (CH) - moderate reddish orange (10R6/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP52	0.0-0.5	Fill - moderate brown (5YR3/4), 30% clay, 60% sand, 10% gravel, damp, well compacted, top soil, gravels, concrete, plastic and brick pieces, no ACM found.
	0.5-0.6	Fill - pale red (5R6/2), 80% clay, 15% sand, 5% gravel, damp, well compacted, semi-angular gravels, reworked natural clay, no ACM observed.
	0.6-0.9	Fat Clay (CH) - moderate reddish orange (10R6/6), 90% clay, 10% sand, damp, firm, high plasticity, native soil.
TP53	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 55% sand, 5% gravel, damp, well compacted, No ACM observed, top soil, occasional gravel.
	0.3-0.7	Fat Clay (CH) - light brown (5YR5/6), 85% clay, 10% sand, 5% gravel, damp, stiff, high plasticity, reworked clay, sub gravels.
	0.7-0.9	Fat Clay (CH) - moderate reddish orange (10R6/6), 90% clay, 10% sand, damp, firm, high plasticity.
TP54	0.0-0.4	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, damp, well compacted, no ACM was observed, semi-rounded gravel found.
	0.4-0.7	Gravelly Clay (CL) - light brown (5YR6/4), 70% clay, 10% sand, 20% gravel, damp, soft, high plasticity.
TP55	0.0-0.2	Fill - moderate brown (5YR4/4), 40% clay, 30% sand, 30% gravel, damp, well compacted, no ACM was observed.
	0.2-1.0	Fat Clay (CH) - moderate reddish orange (10R6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP56	0.0-0.3	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, dry, well compacted, no ACM was observed.
	0.3-1.0	Fat Clay (CH) - moderate red (5R4/6), 80% clay, 20% sand, damp, stiff, high plasticity.
TP57	0.0-0.15	Fill - moderate brown (5YR4/4), 30% clay, 60% sand, 10% gravel, dry, well compacted, no ACM was observed.
	0.15-0.3	Fill - dark yellowish orange (10YR6/6), 20% clay, 70% sand, 10% gravel, damp, well compacted.
	0.3-1.2	Fill - light grey (N7), 60% clay, 40% sand, damp, well compacted.
	1.2-1.3	Fat Clay (CH) - light grey (N7), 80% clay, 20% sand, damp, stiff, high plasticity.
TP59	0.0-0.3	Fill - moderate brown (5YR3/4), 40% clay, 40% sand, 20% gravel, dry, well compacted, top soil, no ACM observed.
	0.3-0.7	Fat Clay (CH) - moderate reddish orange (10R6/6), 70% clay, 20% sand, 10% gravel, damp, firm, medium plasticity.
	0.7-1.5	Fat Clay (CH) - pale red (10R6/2), 85% clay, 15% sand, damp, firm, medium plasticity.
TP60	0.0-0.2	Fill - moderate brown (5YR4/4), 30% clay, 40% sand, 30% gravel, dry, well compacted, no ACM was observed.
	0.2-0.5	Fat Clay (CH) - dark yellowish orange (10YR6/6), 80% clay, 20% sand, damp, stiff, high plasticity.
	0.5-1.0	Fat Clay (CH) - moderate reddish orange (10R6/6), 90% clay, 10% sand, damp, stiff, high plasticity.
BH2	0.0-0.15	Asphalt
	0.15-0.7	Fill - light grey (N7), 80% clay, 20% sand, damp, well compacted, No ACM was observed.
	0.7-2.0	Fat Clay (CH) - moderate red (5R4/6), 80% clay, 20% sand, damp, stiff, high plasticity, V-bit refusal at 2m, change to TC bit.
	2.0-2.3	Fat Clay (CH) - light brown (5YR5/6), 80% clay, 20% sand, damp, stiff, high plasticity.
	2.3-3.6	Fat Clay (CH) - light grey (N7), 80% clay, 20% sand, damp, stiff, high plasticity, Shale at 3.6 m.
	3.6-9.0	Weathered Shale - light grey (N7), 80% clay, 20% sand, damp, hard.

ATTACHMENT C

SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	**Source**	BH4 0.70-0.90m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY with Sand, trace of Gravel
Project	Austral (2301008)	**Report No.**	S84848-PI
Job No.	S23096-1	**Lab No.**	S84848

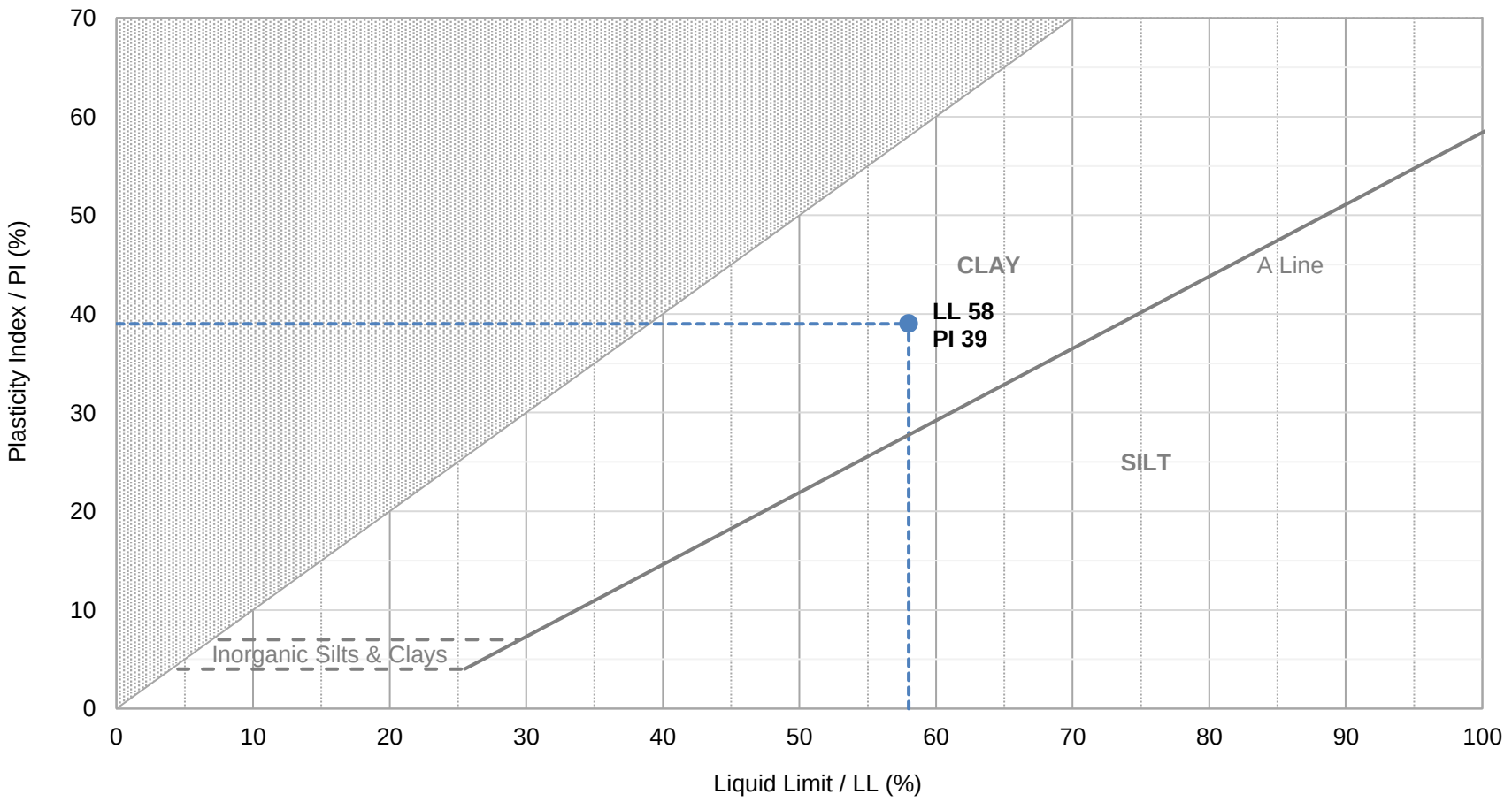
Test Procedure

☐	AS1289 3.1.1	Liquid Limit - Four point Casagrande method
☑	AS1289 3.1.2	Liquid Limit - One point Casagrande method
☑	AS1289 3.2.1	Plastic Limit - Standard method
☑	AS1289 3.3.1	Calculation of the Plasticity Index
☑	AS1289 3.4.1	Linear Shrinkage - Standard method

Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	7/03/2023
Preparation	Prepared in accordance with the test method	**Date Tested**	22/03/2023

Plasticity Chart for Classification of Fine-Grained Soils

AS 1726:2017 Clause 6.1.6 (Figure 5)



Preparation

Method of Preparation	**Dry Sieved**
History of the Sample	**Air Dried**

Results

Liquid Limit / LL (%)	**58**
Plastic Limit (%)	**19**
Plasticity Index / PI (%)	**39**
Linear Shrinkage (%)	**12.5**
Condition upon Drying	**Curling Occured**

Notes

Accredited for compliance with ISO/IEC 17025 - Testing.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards. This document shall not be reproduced, except in full. Results relate only to the samples tested.

NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

29/03/2023

Date:

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

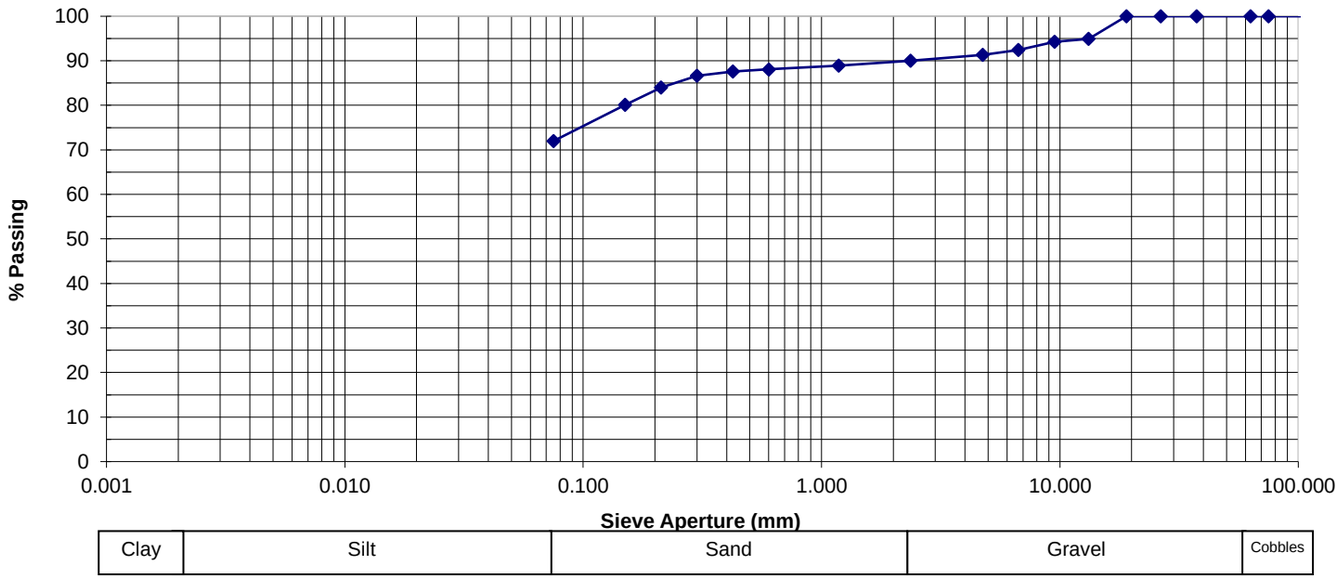
Particle Size Distribution Report

Client	Geo-Logix Pty Ltd	**Source**	BH4 0.70-0.90m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY with Sand, trace of Gravel
Project	Austral (2301008)	**Report No**	S84848-PSD
Job No	S23096-1	**Lab No**	S84848

Test Procedure AS 1289.3.6.1 - Particle size distribution of a soil

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 7/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 29/03/2023



Sieve Aperture: (mm)	% Passing	Specification (..) Envelope	Sieve Aperture: (mm)	% Passing	Specification (..) Envelope
200	100		4.75	91	
75	100		2.36	90	
63	100		1.18	89	
37.5	100		0.600	88	
26.5	100		0.425	88	
19	100		0.300	87	
13.2	95		0.212	84	
9.5	94		0.150	80	
6.7	92		0.075	72	

Notes

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NATA Accredited Laboratory Number: 14874

Authorised Signatory: Date:

29/03/2023

Chris Lloyd

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP23 0.90-1.10m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY, trace of Sand and Gravel
Project	Austral (2301008)	**Report No.**	S84846-PI
Job No.	S23096-1	**Lab No.**	S84846

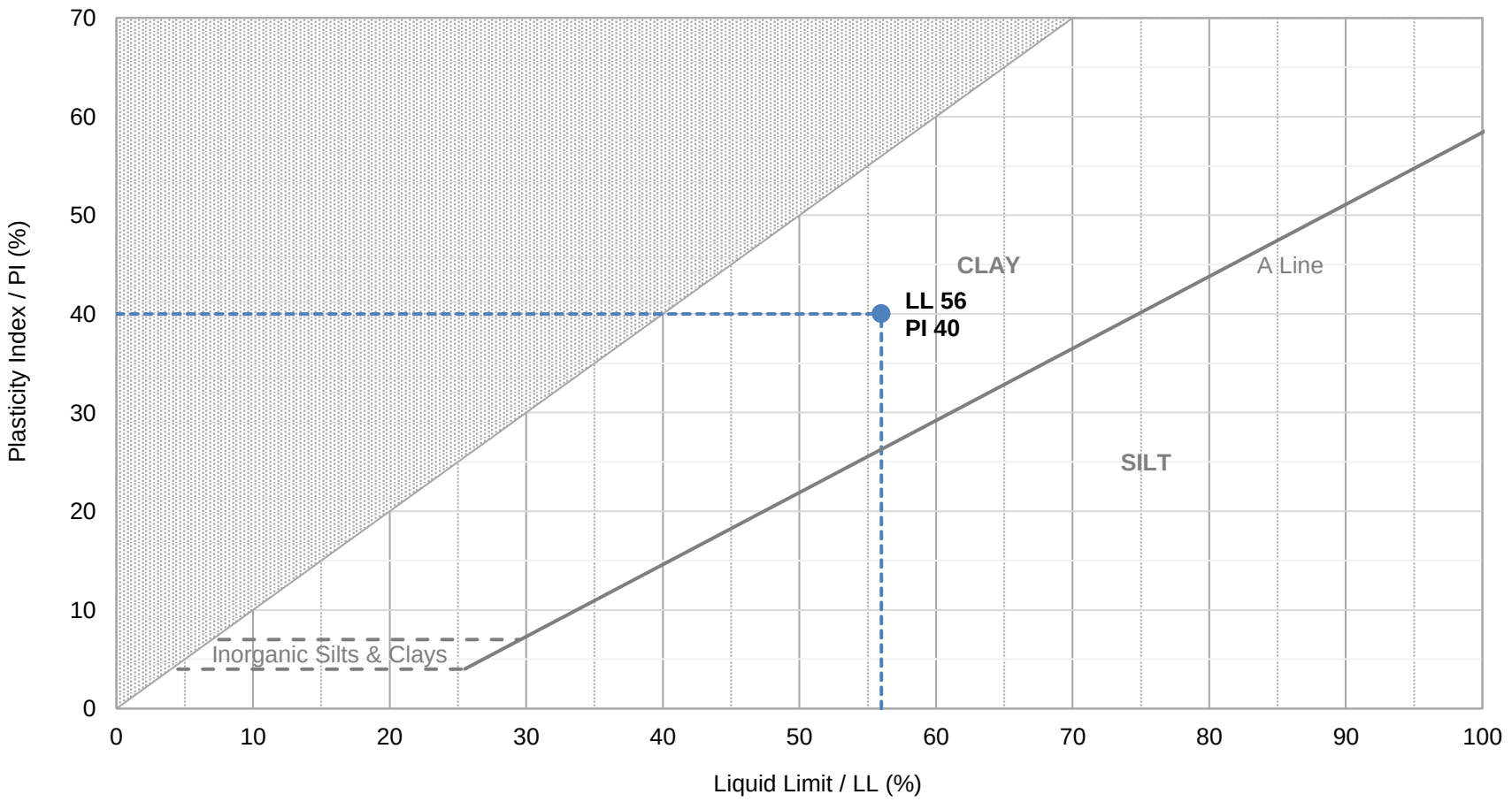
Test Procedure

☐	AS1289 3.1.1	Liquid Limit - Four point Casagrande method
☑	AS1289 3.1.2	Liquid Limit - One point Casagrande method
☑	AS1289 3.2.1	Plastic Limit - Standard method
☑	AS1289 3.3.1	Calculation of the Plasticity Index
☑	AS1289 3.4.1	Linear Shrinkage - Standard method

Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	8/03/2023
Preparation	Prepared in accordance with the test method	**Date Tested**	30/03/2023

Plasticity Chart for Classification of Fine-Grained Soils

AS 1726:2017 Clause 6.1.6 (Figure 5)



Preparation

Method of Preparation	**Dry Sieved**
History of the Sample	**Air Dried**

Results

Liquid Limit / LL (%)	**56**
Plastic Limit (%)	**16**
Plasticity Index / PI (%)	**40**
Linear Shrinkage (%)	**11.0**
Condition upon Drying	**Curling Occured**

Notes

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Authorised Signatory:

Chris Lloyd

3/04/2023

Date:

MACQUARIE GEOTECH

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

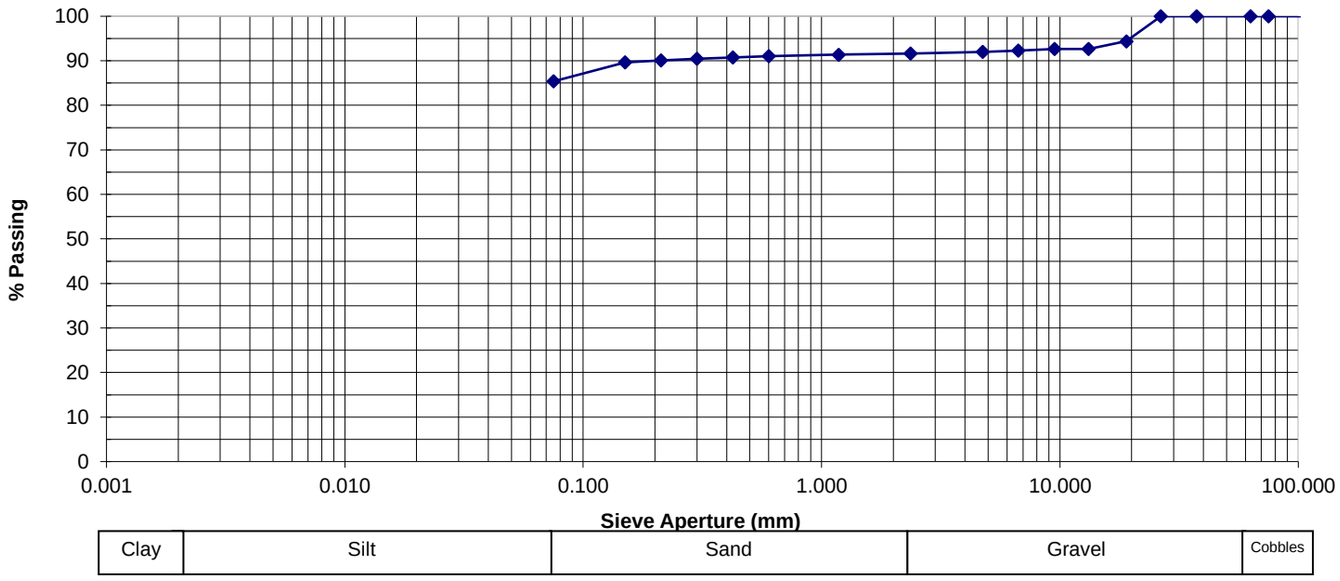
Particle Size Distribution Report

Client	Geo-Logix Pty Ltd	**Source**	TP23 0.90-1.10m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY, trace of Sand and Gravel
Project	Austral (2301008)	**Report No**	S84846-PSD
Job No	S23096-1	**Lab No**	S84846

Test Procedure AS 1289.3.6.1 - Particle size distribution of a soil

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 8/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 30/03/2023



Sieve Aperture: (mm)	% Passing	Specification (..) Envelope	Sieve Aperture: (mm)	% Passing	Specification (..) Envelope
200	100		4.75	92	
75	100		2.36	92	
63	100		1.18	91	
37.5	100		0.600	91	
26.5	100		0.425	91	
19	94		0.300	90	
13.2	93		0.212	90	
9.5	93		0.150	90	
6.7	92		0.075	85	

Notes

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30/03/2023

Chris Lloyd

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP44 0.30-0.50m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY, trace of Sand and Gravel
Project	Austral (2301008)	**Report No.**	S84847-PI
Job No.	S23096-1	**Lab No.**	S84847

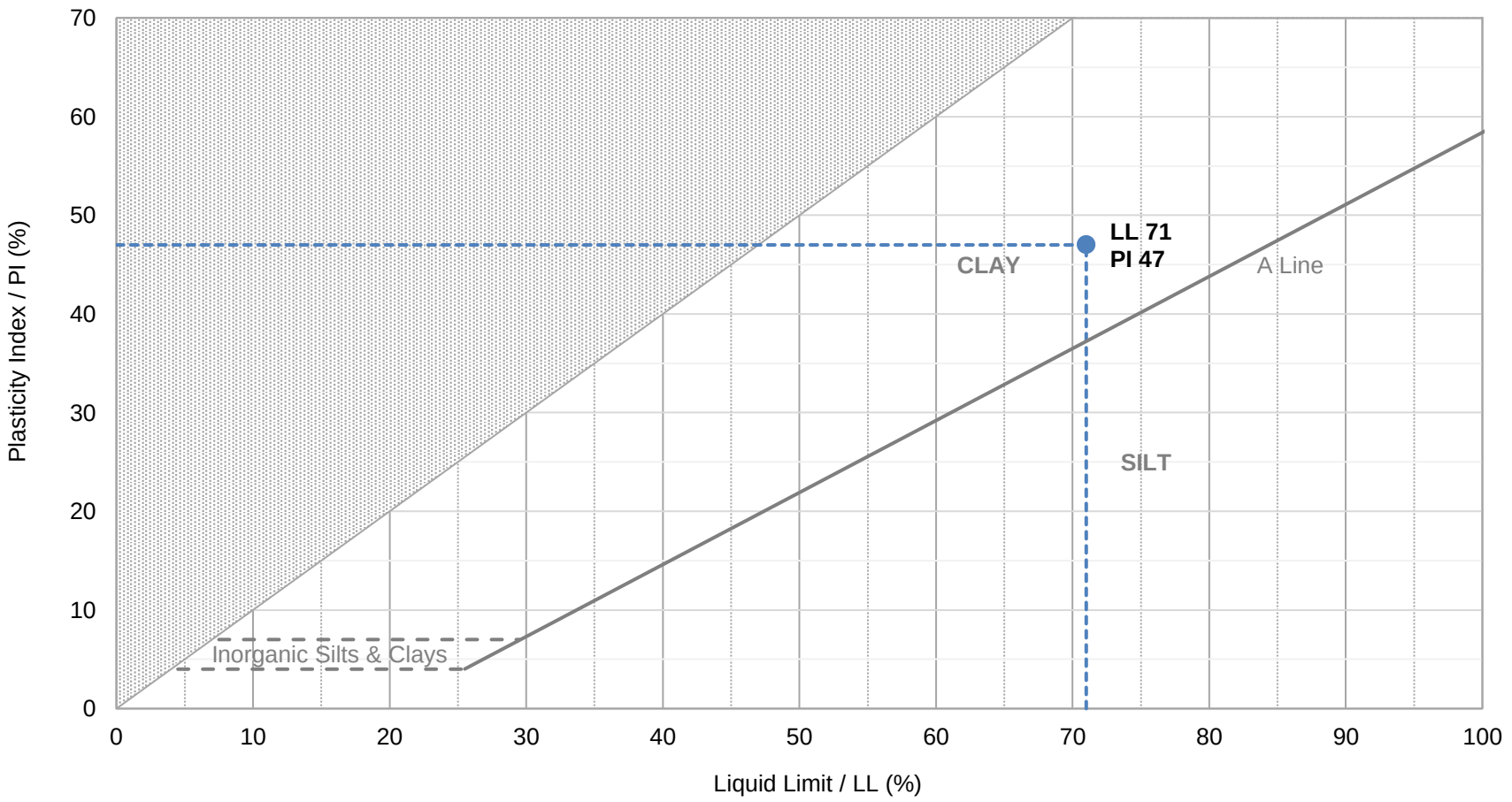
Test Procedure

☐	AS1289 3.1.1	Liquid Limit - Four point Casagrande method
☑	AS1289 3.1.2	Liquid Limit - One point Casagrande method
☑	AS1289 3.2.1	Plastic Limit - Standard method
☑	AS1289 3.3.1	Calculation of the Plasticity Index
☑	AS1289 3.4.1	Linear Shrinkage - Standard method

Sampling	Sampled by Client - results apply to the sample as received	**Date Sampled**	7/03/2023
Preparation	Prepared in accordance with the test method	**Date Tested**	22/03/2023

Plasticity Chart for Classification of Fine-Grained Soils

AS 1726:2017 Clause 6.1.6 (Figure 5)



Preparation		Results	
Method of Preparation	**Dry Sieved**	Liquid Limit / LL (%)	**71**
History of the Sample	**Air Dried**	Plastic Limit (%)	**24**
		Plasticity Index / PI (%)	**47**
		Linear Shrinkage (%)	**15.5**
		Condition upon Drying	**Curling Occured**

Notes

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Authorised Signatory:

Chris Lloyd

30/03/2023

Date:

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

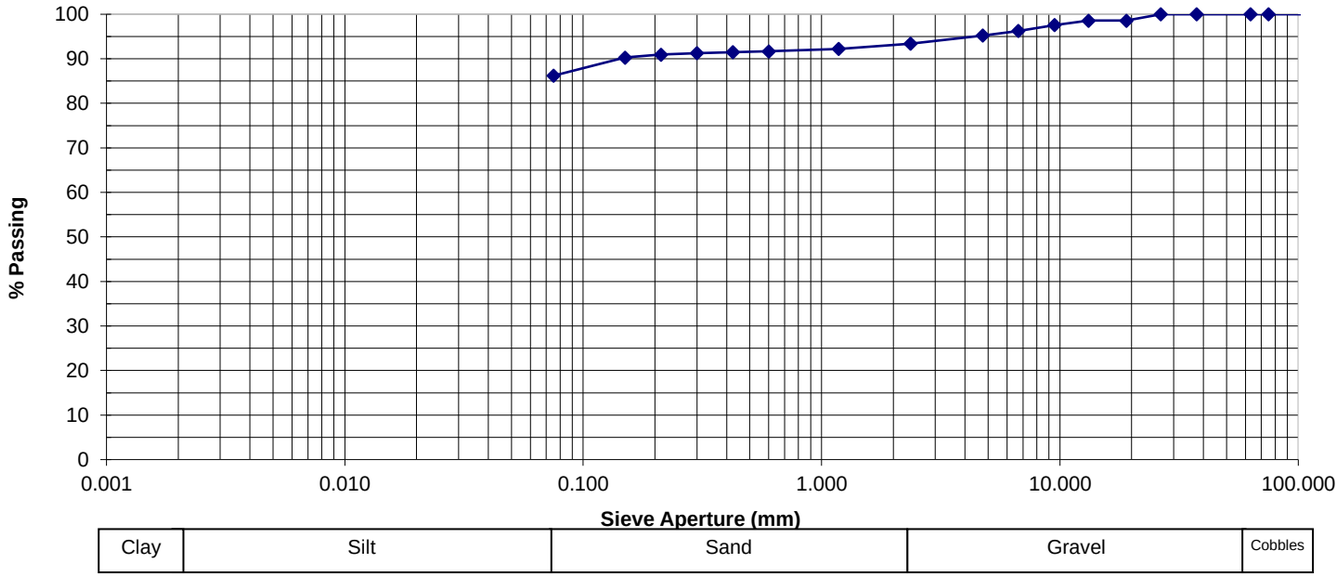
Particle Size Distribution Report

Client	Geo-Logix Pty Ltd	**Source**	TP44 0.30-0.50m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY, trace of Sand and Gravel
Project	Austral (2301008)	**Report No**	S84847-PSD
Job No	S23096-1	**Lab No**	S84847

Test Procedure AS 1289.3.6.1 - Particle size distribution of a soil

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 7/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 29/03/2023



Sieve Aperture: (mm)	% Passing	Specification (..) Envelope	Sieve Aperture: (mm)	% Passing	Specification (..) Envelope
200	100		4.75	95	
75	100		2.36	93	
63	100		1.18	92	
37.5	100		0.600	92	
26.5	100		0.425	91	
19	99		0.300	91	
13.2	99		0.212	91	
9.5	98		0.150	90	
6.7	96		0.075	86	

Notes

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29/03/2023

Chris Lloyd

MACQUARIE GEOTECH

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP32 0.40-0.90m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY
Project	Austral (2301008)	**Report No**	S84843-MDD
Job No	S23096-1	**Sample No**	S84843

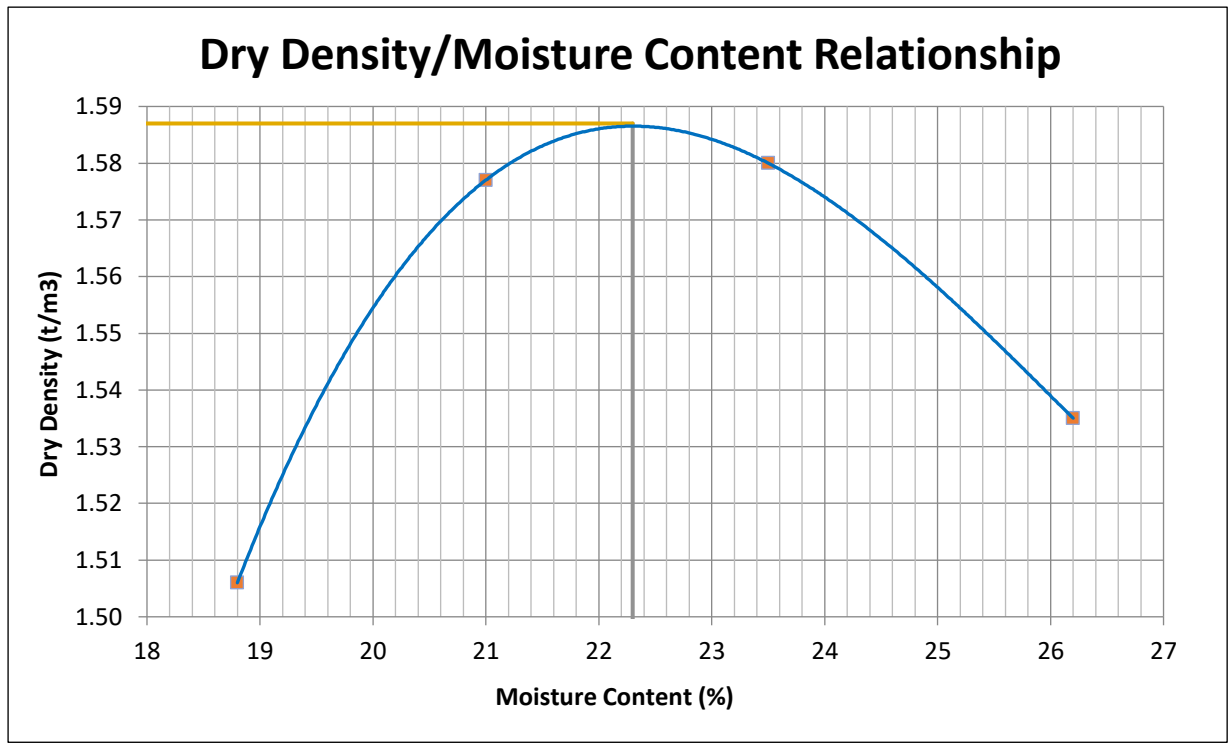
Test Procedure

☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction

☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 7/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 21/03/2023



Maximum Dry Density (t/m^3)	1.587
Optimum Moisture Content (%)	22.3
Oversize Retained on 19mm sieve (%)	1.3
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	218 hrs
Liquid Limit Determination	Technician Assessment

Notes

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Authorised Signatory:

Chris Lloyd

24/03/2023

Date:

MACQUARIE GEOTECH

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

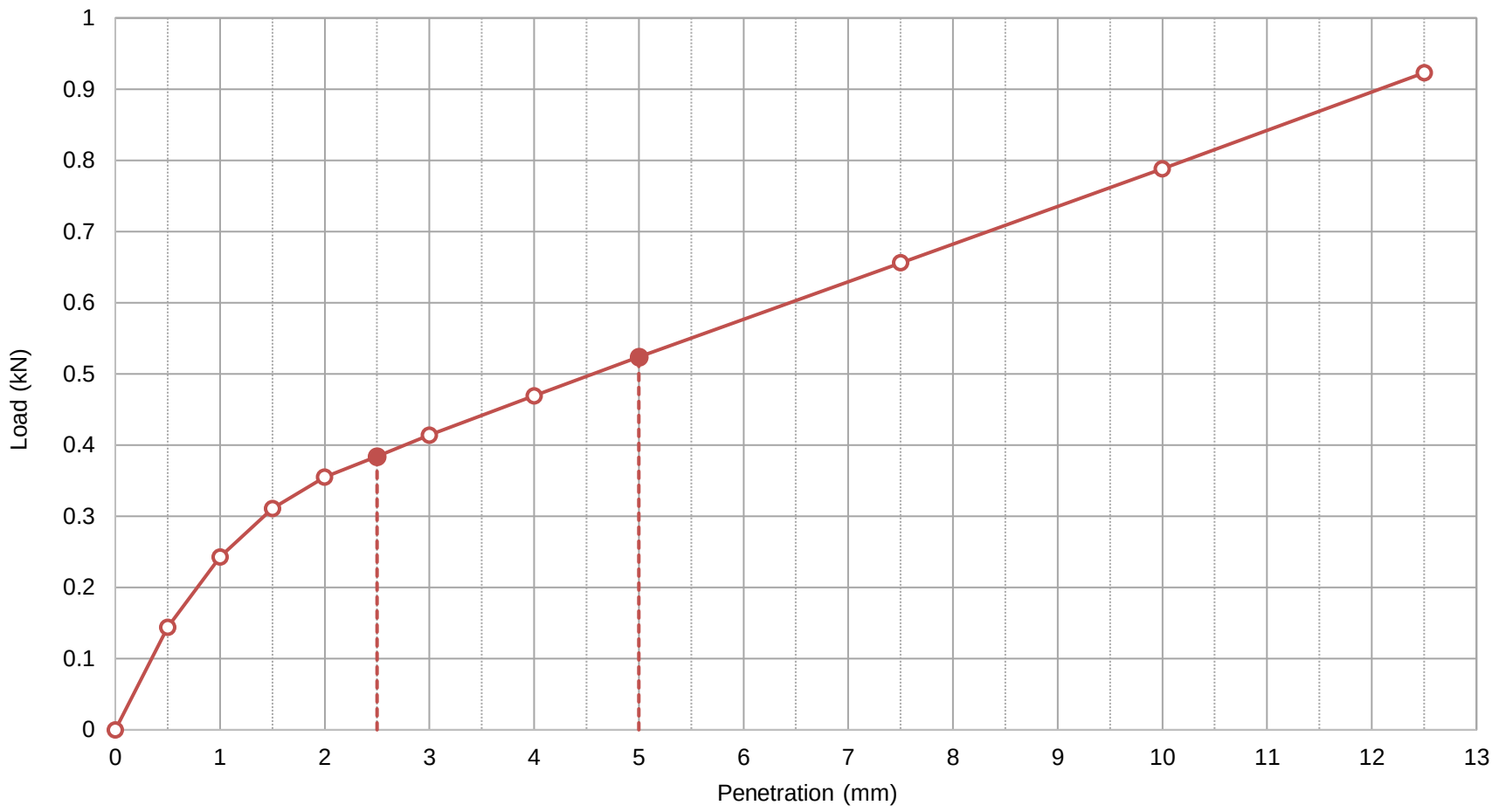
CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP32 0.40-0.90m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY
Project	Austral (2301008)	**Report No.**	S84843-CBR
Job No.	S23096-1	**Sample No.**	S84843

Test Procedure	☑ AS 1289.6.1.1	☐ RMS T117	California Bearing Ratio
	☑ AS 1289.5.1.1	☐ RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
	☐ AS 1289.5.2.1	☐ RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
	☑ AS 1289.2.1.1	☐ RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 7/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 31/03/2023



Preparation & Specification		Density & Moisture	Achieved	Target
Retained on 19.0mm Sieve (%)	1	Lab Moisture Ratio - LMR (%)	98.0	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	100.5	100.0
Sample Curing Time (hrs)	121 hrs	Dry Density - At Compaction (t/m³)	1.59	1.59
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	1.55	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)	2.7	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	21.9	
Maximum Dry Density - MDD (t/m³)	1.59	Moisture Content - Top 30mm (%)	31.6	
Optimum Moisture Content - OMC (%)	22.3	Moisture Content - Remainder (%)	24.2	

Material CBR Value (%): 3 at a penetration of 2.5 mm

Notes

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Authorised Signatory:

Chris Lloyd Date: 3/04/2023

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP41 0.30-0.70m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY
Project	Austral (2301008)	**Report No**	S84844-MDD
Job No	S23096-1	**Sample No**	S84844

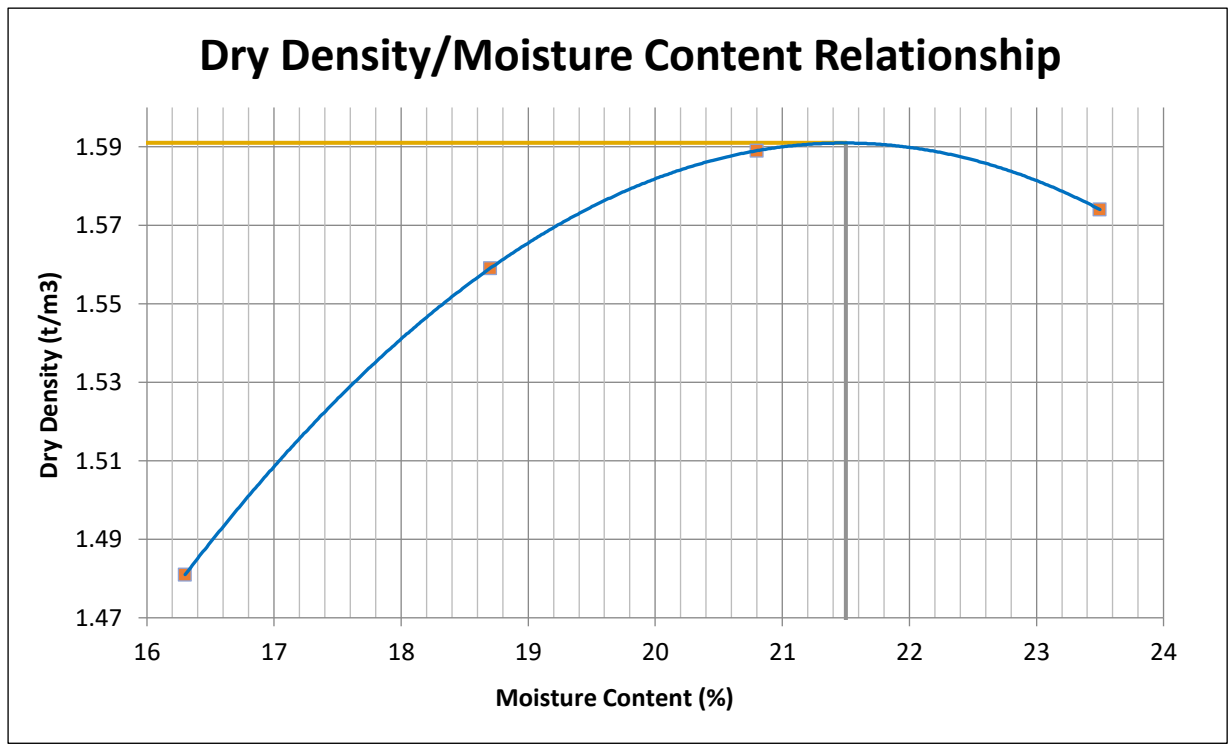
Test Procedure

☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction

☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 8/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 21/03/2023



Maximum Dry Density (t/m^3)	1.591
Optimum Moisture Content (%)	21.5
Oversize Retained on 19mm sieve (%)	0.8
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	214 hrs
Liquid Limit Determination	Technician Assessment

Notes

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Chris Lloyd

24/03/2023

Date:

MACQUARIE GEOTECH

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

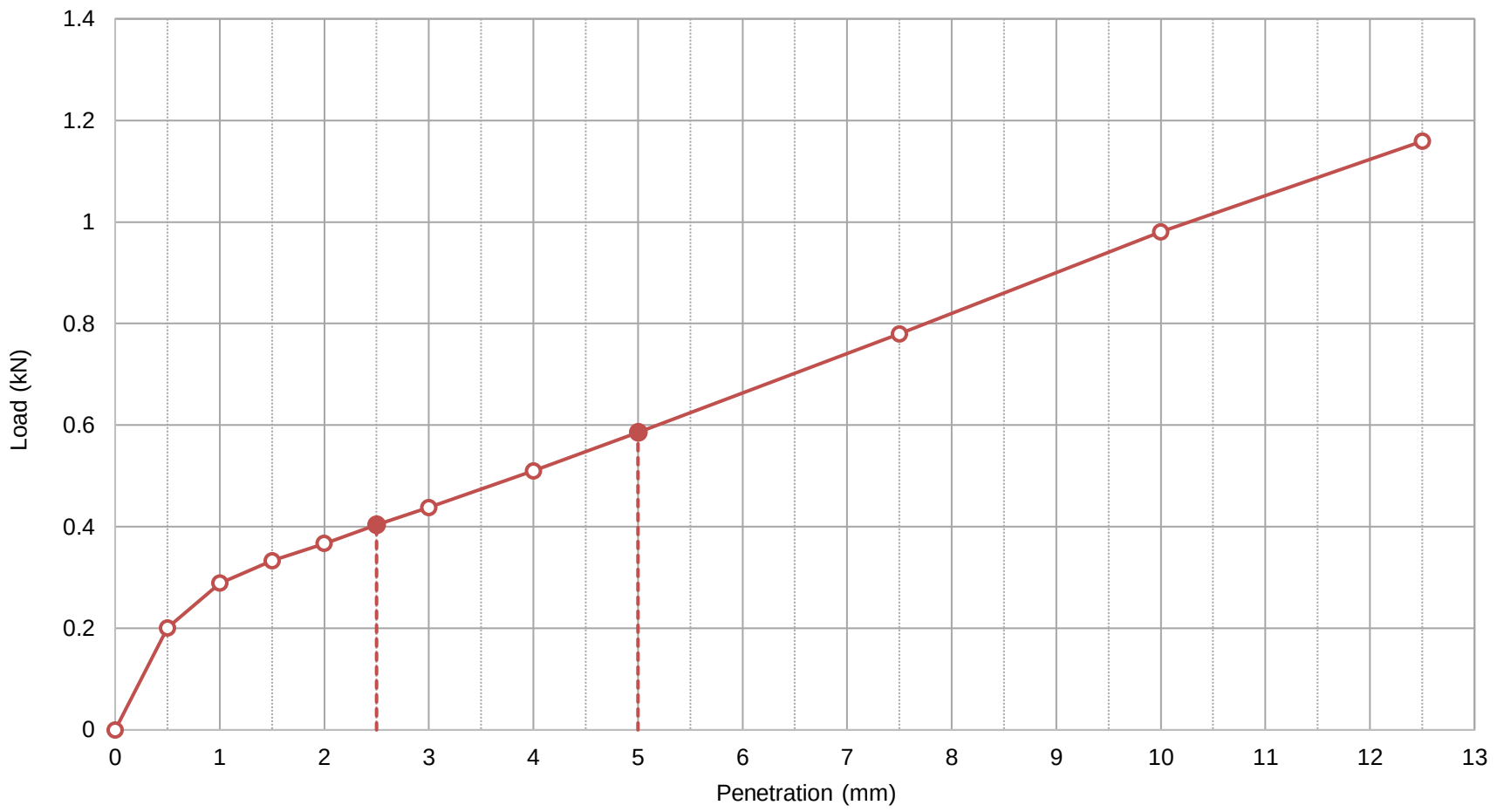
CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP41 0.30-0.70m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY
Project	Austral (2301008)	**Report No.**	S84844-CBR
Job No.	S23096-1	**Sample No.**	S84844

Test Procedure	☑ AS 1289.6.1.1	☐ RMS T117	California Bearing Ratio
	☑ AS 1289.5.1.1	☐ RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
	☐ AS 1289.5.2.1	☐ RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
	☑ AS 1289.2.1.1	☐ RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 8/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 31/03/2023



Preparation & Specification	
Retained on 19.0mm Sieve (%)	1
Method of Establishing Plasticity Level	Technician Assessment
Sample Curing Time (hrs)	96 hrs
Compaction Hammer Used	Standard
Surcharge Mass Applied (kg)	4.5
Period of Soaking (Days)	4
Maximum Dry Density - MDD (t/m³)	1.59
Optimum Moisture Content - OMC (%)	21.5

Density & Moisture	Achieved	Target
Lab Moisture Ratio - LMR (%)	100.5	100.0
Lab Density Ratio - LDR (%)	100.5	100.0
Dry Density - At Compaction (t/m³)	1.60	1.59
Dry Density - After Soaking (t/m³)	1.55	
Specimen Swell (%)	3.0	
Moisture Content - At Compaction (%)	21.6	
Moisture Content - Top 30mm (%)	27.2	
Moisture Content - Remainder (%)	23.3	

Material CBR Value (%): 3 at a penetration of 2.5 mm

Notes

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Authorised Signatory:

Chris Lloyd Date: 3/04/2023

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP44 0.30-0.80m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY
Project	Austral (2301008)	**Report No**	S84845-MDD
Job No	S23096-1	**Sample No**	S84845

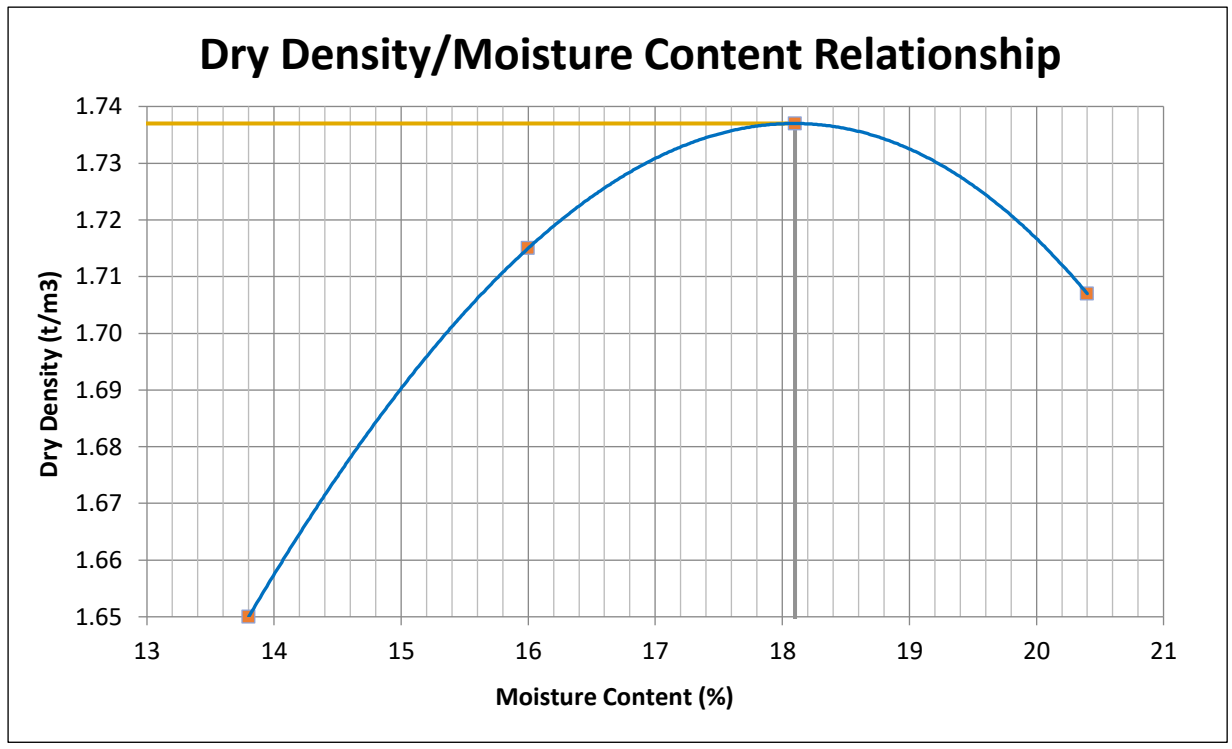
Test Procedure

☑ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction

☑ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 7/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 21/03/2023



Maximum Dry Density (t/m^3)	1.737
Optimum Moisture Content (%)	18.1
Oversize Retained on 19mm sieve (%)	0.7
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	216 hrs
Liquid Limit Determination	Technician Assessment

Notes

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Chris Lloyd

24/03/2023

Date:

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14 Carter St
Lidcombe NSW 2141

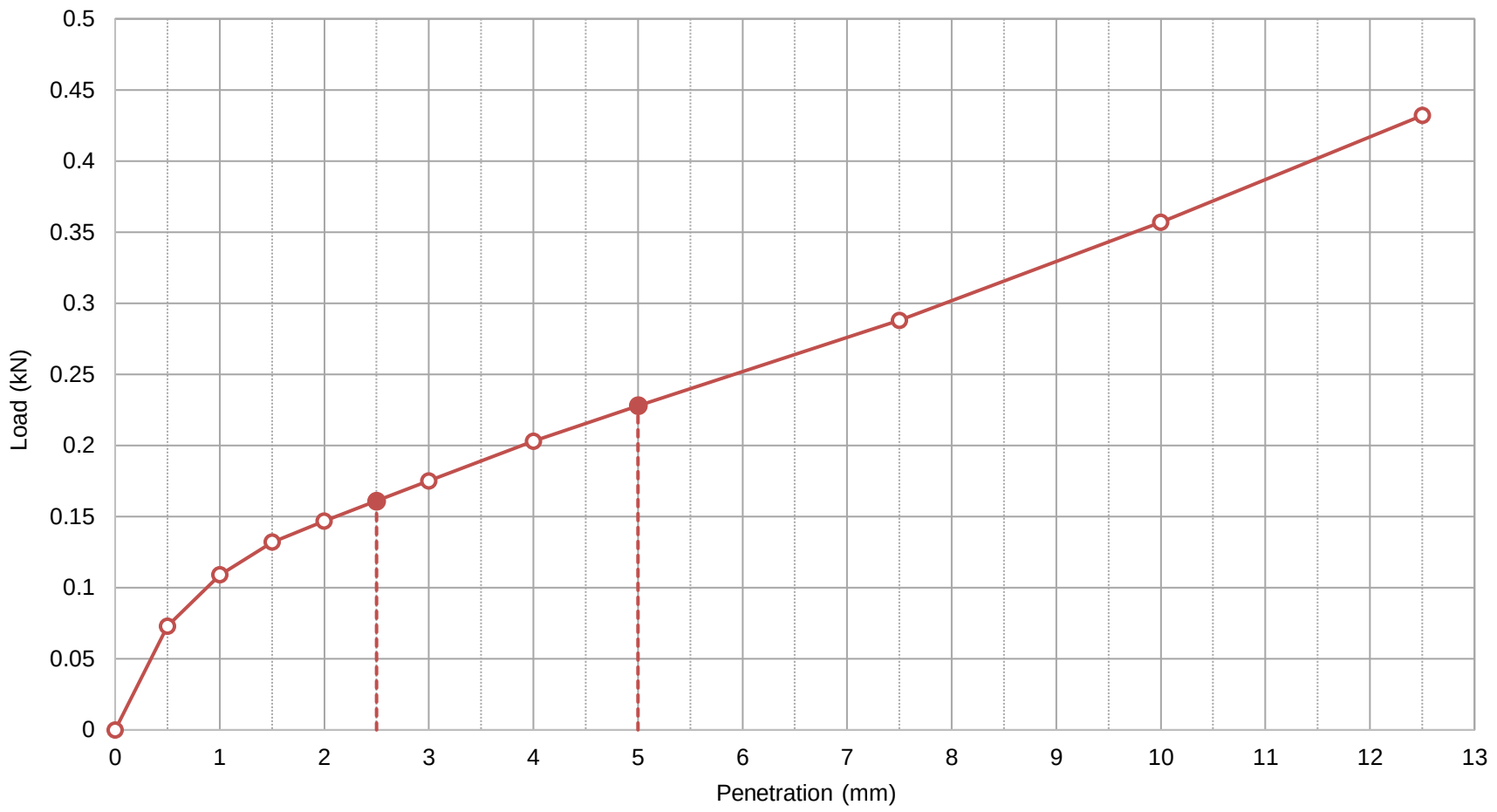
CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	**Source**	TP44 0.30-0.80m
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	**Sample Description**	Silty CLAY
Project	Austral (2301008)	**Report No.**	S84845-CBR
Job No.	S23096-1	**Sample No.**	S84845

Test Procedure	☑ AS 1289.6.1.1	☐ RMS T117	California Bearing Ratio
	☑ AS 1289.5.1.1	☐ RMS T111	Dry Density / Moisture Content Relationship - Standard Compaction
	☐ AS 1289.5.2.1	☐ RMS T112	Dry Density / Moisture Content Relationship - Modified Compaction
	☑ AS 1289.2.1.1	☐ RMS T120	Moisture Content - Oven Drying Method (Standard Method)

Sampling Sampled by Client - results apply to the sample as received **Date Sampled** 7/03/2023

Preparation Prepared in accordance with the test method **Date Tested** 31/03/2023



Preparation & Specification		Density & Moisture	Achieved	Target
Retained on 19.0mm Sieve (%)	1	Lab Moisture Ratio - LMR (%)	101.5	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	99.0	100.0
Sample Curing Time (hrs)	120 hrs	Dry Density - At Compaction (t/m³)	1.72	1.74
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	1.65	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)	4.7	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	18.4	
Maximum Dry Density - MDD (t/m³)	1.74	Moisture Content - Top 30mm (%)	30.5	
Optimum Moisture Content - OMC (%)	18.1	Moisture Content - Remainder (%)	19.9	

Material CBR Value (%): 1 at a penetration of 2.5 mm

Notes

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Authorised Signatory:

Chris Lloyd Date: 3/04/2023

Macquarie Geotechnical
14 Carter St
Lidcombe NSW 2141

Client Sample ID			TP35/0-0.2	TP35/0.3-0.5	TP35/0.6-0.8	TP21/0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Ma0031532	S23-Ma0031533	S23-Ma0031534	S23-Ma0031536
Date Sampled			Mar 08, 2023	Mar 08, 2023	Mar 08, 2023	Mar 08, 2023
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	< 10	< 10	320	-
Conductivity (1:5 aqueous extract at 25 °C as rec.)	10	uS/cm	15	20	260	-
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	5.9	5.8	6.0	-
Resistivity*	0.5	ohm.m	660	500	38	-
Sulphate (as SO4)	10	mg/kg	20	32	130	-

Client Sample ID			TP23/0-0.2	TP14/0-0.2	TP14/0.3-0.5	TP20/0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Ma0031537	S23-Ma0031539	S23-Ma0031540	S23-Ma0031542
Date Sampled			Mar 08, 2023	Mar 08, 2023	Mar 08, 2023	Mar 08, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
a-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
b-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
d-HCH	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	0.06
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	0.06
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Dibutylchlorendate (surr.)	1	%	111	115	-	114
Tetrachloro-m-xylene (surr.)	1	%	102	101	-	101
Heavy Metals						
Arsenic	2	mg/kg	17	20	-	9.9
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	< 0.4
Chromium	5	mg/kg	31	44	-	24
Copper	5	mg/kg	24	17	-	26
Lead	5	mg/kg	20	23	-	17
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Nickel	5	mg/kg	6.6	5.2	-	< 5
Zinc	5	mg/kg	38	47	-	46

Client Sample ID			TP23/0-0.2	TP14/0-0.2	TP14/0.3-0.5	TP20/0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Ma0031537	S23-Ma0031539	S23-Ma0031540	S23-Ma0031542
Date Sampled			Mar 08, 2023	Mar 08, 2023	Mar 08, 2023	Mar 08, 2023
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	-	21	130	-
Conductivity (1:5 aqueous extract at 25 °C as rec.)	10	uS/cm	-	38	220	-
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	-	6.3	5.4	-
Resistivity*	0.5	ohm.m	-	270	45	-
Sulphate (as SO4)	10	mg/kg	-	21	370	-

Client Sample ID			TP12/0-0.2	TP57/0.3-0.5	TP4/0.15-0.35	TP6/0.2-0.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Ma0031543	S23-Ma0031544	S23-Ma0031546	S23-Ma0031548
Date Sampled			Mar 08, 2023	Mar 08, 2023	Mar 08, 2023	Mar 08, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	144	146	135	84
Tetrachloro-m-xylene (surr.)	1	%	98	104	105	68
Heavy Metals						
Arsenic	2	mg/kg	17	15	6.2	7.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	29	31	14	13
Copper	5	mg/kg	13	19	8.6	8.2
Lead	5	mg/kg	17	20	8.6	8.9
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	24	23	9.4	7.3

Client Sample ID			TP17/0-0.2	TP17/0.4-0.6	TP16/0-0.2	TP18/0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Ma0031569	S23-Ma0031570	S23-Ma0031571	S23-Ma0031573
Date Sampled			Mar 07, 2023	Mar 07, 2023	Mar 07, 2023	Mar 07, 2023
Test/Reference	LOR	Unit				
Chloride	10	mg/kg	< 10	< 10	-	-
Conductivity (1:5 aqueous extract at 25 °C as rec.)	10	uS/cm	15	11	-	-
pH (1:5 Aqueous extract at 25 °C as rec.)	0.1	pH Units	6.2	6.3	-	-
Resistivity*	0.5	ohm.m	680	890	-	-
Sulphate (as SO4)	10	mg/kg	< 10	< 10	-	-

Client Sample ID			TP26/0-0.2	TP2/0-0.2	TP8/0.15-0.35	TP3/0-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S23-Ma0031574	S23-Ma0031575	S23-Ma0031579	S23-Ma0031581
Date Sampled			Mar 07, 2023	Mar 07, 2023	Mar 07, 2023	Mar 07, 2023
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-HCH	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	136	131	95	104
Tetrachloro-m-xylene (surr.)	1	%	100	104	86	97
Heavy Metals						
Arsenic	2	mg/kg	15	11	17	17
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	28	17	37	36
Copper	5	mg/kg	30	24	22	13
Lead	5	mg/kg	19	18	29	22
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	6.1	8.8	6.1	5.7
Zinc	5	mg/kg	63	43	36	24

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