

GEOTECHNICAL REPORT



Woolworths Wyong Regional Distribution Centre
11 Warren Road,
Warnervale NSW 2259

Woolworths Group – 22 March 2022



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GEOTECHNICAL REPORT

Woolworths Wyong Regional Distribution Centre
 11 Warren Road,
 Warnervale NSW 2259

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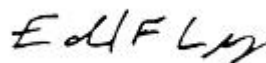
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1. INTRODUCTION

Geo-Logix Pty Ltd (Geo-Logix) was engaged by Woolworths Group (Woolworths) to conduct a geotechnical investigation of the Woolworths Wyong Regional Distribution Centre (RDC) site at 11 Warren Road, Warnervale, NSW (Figure 1).

The objective of the geotechnical investigation is to assess the subsurface soil strata to provide soil parameters and engineering recommendations for site earthworks and construction of the proposed extensions to the distribution warehouse, weighbridges, truck access and maintenance facility. This report provides information required for SSD 33701741 under Section 12 of the Planning Secretary's Environmental Assessment Requirements (SEARs) for Warehouses and distribution centres, Ground and Water Conditions.

1.1 Proposed Development

Based on preliminary development plans provided by Woolworths (Attachment A), the proposed development comprises the construction of various upgrades to the site including extensions to the existing 52,000 m² warehouse, refuelling area, two weighbridges, truck maintenance facility and wash area concrete driveways and hardstands to improve truck access.

The single storey extensions are likely to be constructed on a concreted slab with minimal filling (with exception to the southwestern extension) to ensure additions are level with the existing floor level. The precast panel walls and a steel framed roofed structures proposed include:

- Proposed mostly on grade single storey 4,400 m² cold storage (2-13°C) area;
- Proposed RTF loading bay 4,000m² for express Green Fleet transport. The area requires placement of up to 0.5m fill in some areas; and
- Proposed ambient extension, 14,160 m² on the southwestern corner of the building. The area will require placement of a minimum of 1.0 m of fill to meet the existing warehouse slab level.

The proposed truck queuing area and surrounding works to the south and east of the gatehouse are to include:

- Truck parking and refuelling area (4,050 m²), with placement of up to 1.0 m of fill;
- Truck maintenance facility and hardstand (3,000 m²), at the location of an existing wetland/stormwater retention area in the southeast portion of the site. Construction of the maintenance facility will require placement of up to 2.5 m of fill in the stormwater retention area;
- Hardstand and truck wash area (2,450 m²), requiring placement of up to 0.7 m of fill; and
- Two weighbridges within existing roadways leading toward the truck queuing area and the exit lane adjacent to the gatehouse.

Additional road relocation and upgrades are proposed on the western, northern and southern sides of the warehouse.

1.2 Objectives and Scope of Work

The objective of the geotechnical investigation was to assess the subsurface soil strata to provide soil parameters and engineering recommendations for site earthwork and proposed construction.

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

- Review of soils and geological maps for the area;
- Visual appraisal of the site conditions and locality;
- Completion of 14 soil bores (BH2–BH15) spread across the site to target proposed development locations to a maximum depth of 6 meters below grade (mbg) (Figure 2);
- Excavation of four test pits BH1A–BH1D in the onsite detention dam using a long arm excavator to investigate depth, vegetation volume, dam floor construction, and underlying soils;
- Logging of soil boring and trenching in accordance with the Unified Soil Classification System (USCS);
- Soil sampling for in situ and laboratory testing including Acid Sulfate Soil (ASS) screening, grain size distribution tests, California Bearing Ratio (CBR) tests and aggressivity tests;
- Backfilling of the borings with drill cuttings, capped with rapid set concrete in paved areas; and
- Provision of this report detailing the results of the above investigation, recommendations for design and construction of the proposed development.

The field investigations were conducted in September 2021.

2. SITE INFORMATION

2.1 Site Identification and Description

Site identification details for the investigation are presented in the table below:

Street Address	Lot and Deposited Plan (DP)	Approximate Area (m ²)
11 Warren Road, Warnervale, NSW 2259	Lot 413 DP 1058215	230,800

The following site descriptions are based on observations made during the site investigation conducted by Geo-Logix on 10 September 2021.

The site is situated within an industrial area in Warnervale with a small airport to the east and and M1 motorway to the west beyond the industrial area. The surrounding area is mostly flat with swamps and dense bushland on residual clay and alluvium. The site is accessed from the north via Warren Road, and Woolworths Way to the west.

At the time of Geo-Logix's investigation, the site was operating as the Woolworths distribution centre. The site is largely sealed with a central warehouse roughly oriented north-south, with loading bays for trucks on the eastern site. The building is surrounded by a loop concrete and asphalt driveway and an open, tree lined 1 m – 1.5 m deep drainage channel. An asphalt paved carpark for warehouse staff vehicles is located in the north eastern corner of the site, adjacent to the truck entry driveway. An asphalt paved truck parking

area, indoor communal space for drivers and concreted turning loop are situated adjacent to an engineered stormwater retention dam and cleared fire break in the south eastern corner of the site.

The property is mostly level with exception of excavated drainage channels and the sloped entry point at the terminus of Warren Road. An excavated sandstone wall on the northern side of the warehouse indicates earthworks were required to achieve the level length of the facility and northern truck loading area. The remaining undeveloped area of the site near the western boundary is grassed with a raised area in the southwest corner, likely excavated soil from the construction of the facility.

The site has been levelled and is relatively flat. A review of Google Earth indicates the site is located at an elevation of 7–10 mAHD and slopes down gently to the south.

2.2 Regional Geology

Review of the 1:100 000 Gosford-Lake Macquarie Geology Sheet (Geological Survey of NSW, 2015) indicates that the site is situated on Triassic aged red-brown claystone and siltstone, interbedded with fine to medium grained green-grey sandstone.

2.3 Regional Soils

Reference to the NSW OEH online soil mapping portal (eSPADE v2.1, 2021) indicates that the site is in the Gorokan Soil Landscape, characterised by loose brown loamy sand with underlying yellowish brown hard setting clayey sands and pedal clays.

2.4 Acid Sulfate Soils

Acid Sulfate Soils Formation

Acid Sulfate Soils (ASS) are those soils that naturally contain iron sulfides which, when exposed to air after being disturbed, can produce sulfuric acid due to oxidation of the sulfides. Their formation requires the presence of iron-rich sediments, sulfate (usually from sea water), removal of reaction products such as bicarbonate, the presence of sulfate-reducing bacteria and an abundant supply of organic matter. These conditions generally exist in mangroves, salt marshes, inter-tidal areas and on the beds of coastal rivers and lakes. In Australia they generally occur in soil horizons at a height of less than 5 m AHD.

The adverse environmental impacts of ASS disturbance can be significant and include fish kills, fish disease, release of heavy metals from contaminated sediments, and human and ecological impacts.

Potential Acid Sulfate Soils (PASS) are ASS which are unoxidised in their natural state. They possess the potential to generate acid upon lowering of the water table, excavation or other disturbance resulting in exposure to oxygen.

Actual Acid Sulfate Soils (AASS) are ASS which are partially or wholly oxidised in their natural state. The pore water in these soils is acidic as a result of previous acid generation. The potential for additional acid generation may also exist.

Regional Acid Sulfate Soils Mapping

Reference to the NSW OEH online ASS risk mapping tool (eSPADE v2.1, 2021) indicates that the site is underlain by soils with no known acid sulfate risk. Other nearby areas have known low probability of ASS occurrence at 1–3 mbg.

2.5 Regional Hydrology

Reference to the NSW All Groundwater Map (WaterNSW, 2021) indicates there are no registered groundwater bores within a 500 m radius of the site. Perched groundwater was found at selected locations during the investigation; however, the groundwater table is likely below the depth of investigation at 4.5 mbg.

3. METHOD OF INVESTIGATION

3.1 Investigation Methods

Geo-Logix undertook geotechnical fieldwork on 10 and 13 to 15 September 2021. Sample locations are presented in Figure 2.

Prior to commencement of the borings, the site 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.

Bores BH2–BH15 were completed using a truck mounted drill rig. All bores were completed to a minimum depth of 4.5 mbg or V-bit refusal on rock. Soil bores were advanced via a solid stem auger (SSA) with a "V" shaped hardened steel bit (V-bit). Standard Penetrometer Tests (SPTs) were completed using a donut hammer at depths of 1.0 mbg and at 1.5 m intervals thereafter.

Soil bores were reinstated with drill cuttings

Fill samples were collected at a depth of approximately 0.5 mbg and from each SPT. Samples for acid sulfate soil screening were collected where soils appeared to have ASS forming potential. Bulk soil samples were collected from most borings with selected representative samples submitted for CBR and Atterberg Limits analysis.

Four investigative trenches were completed in the wetland (BH1A–BH1D) with a 20 ton long reach excavator to determine the thickness of sediment and organic material as well as to investigate the integrity of the clay lining of the dam.

The soils encountered were logged in accordance with the Unified Soil Classification System (USCS). A copy of the bore and test pit logs is presented in Attachment B.

4. INVESTIGATION RESULTS

4.1 Surface and Subsurface Conditions

The following sections contain a summarised account of the site surface and subsurface. For detailed descriptions of individual locations refer to the soil bore and test pit logs.

Site Surface

The majority of site is sealed, either with asphalt or concrete pavement or on-grade building slabs. The remainder of the site is vegetated with grass. A few on-site trees were located adjacent to the open drainage channels.

Filling

Fill was encountered at locations near to the warehouse and other built up areas including driveways, access roads and the stormwater detention pond. Fill, where present, was typically encountered to 1.0–1.2 mbg, well compacted and comprised a mixture of sand, clay and gravel. Fill in the dam floor comprised well compacted clay.

Native Soils

Native soils underlying the fill, comprised low plasticity light to dusky brown sandy clays between 1.2 and 2.0 mbg. A stiff pinkish grey, reddish brown and yellowish orange clay with occasional ironstone pieces was encountered from 2.0 mbg to 3.3 mbg with SPT N values between 12 and 20. A yellowish orange and pale grey sandy clay was found from 3.3 mbg to 4.2, often moist, less firm than the overlying layers and with an increasing sand content with depth. A weathered shale or fine-grained sandstone was encountered in most locations at depths between 4.2 and 4.5 mbg.

4.2 Groundwater

Groundwater inflow was not generally encountered within the investigation depth (4.5 mbg) however was found at 5.6 mbg in BH4 drilled to 6.0 mbg. Shallower groundwater was encountered at 3.5 mbg in soil bore BH2 and is considered to be influenced by the swamp adjacent to this location. Groundwater is not expected to affect construction activities on the site.

4.3 Laboratory Results

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

- ASS screening and chromium reducible sulfur analysis to assess for the presence of potential and/or actual ASS;
- Linear shrinkage and Atterberg limits testing to determine the behaviour of the subgrade soils to water;
- Minimum and Maximum Dry Density and California Bearing Ratio (CBR) testing to assist with slab design; and
- Aggressivity testing (electrical conductivity, sulfate, chloride and pH) to assess the exposure classification of the soil with respect to buried structural concrete and/or exposed steel.

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

4.4 Acid Sulfate Soil Screening and Chromium Reducible Sulfur Suite

Soil samples were collected from locations BH1C/1.3, BH2/3.5, BH5/2.7, BH7/2.0, BH13/1.3 and BH14/2.0 for screening for acid sulfate soils (ASS). ASS screening comprised the following procedure:

- Initial pH testing of a sub-sample of soil in as received condition by the laboratory (pH_F);

- Oxidation of a second sub-sample by the addition of hydrogen peroxide. The reaction of the soil during oxidation was recorded using a reaction rating scale of 0 (No reaction) to 4.0 (Extreme reaction); and
- pH testing of the second sub-sample following oxidation (pH_{FOX}).

The results are summarised in the following table:

Location/ Depth (m)	pH _F	pH _{FOX}	pH	Reaction Rating
BH1C/1.3	6.7	3.6	3.1	4
BH2/3.5	5.9	5.3	0.6	1
BH3/4.0	5.4	5.2	0.2	1
BH5/2.7	5.5	4.7	0.8	1
BH7/2.0	5.3	3.7	1.6	1
BH13/1.3	6.1	4.3	1.8	1
BH14/2.0	6.6	3.9	2.7	2

The in-situ pH of soil was slightly acidic (pH 5.3 to 6.7). Following addition of hydrogen peroxide, a drop in pH of 0.2 to 3.1 units was observed. The greatest drops were observed in samples from 1–2 mbg. A strong oxidation reaction was observed in sample BH1C/1.3; this sample was additionally analysed for chromium reducible sulfur. This testing includes the following analysis:

- Potential Sulfidic Acidity – Chromium reducible sulfur (S_{CR});
- Actual Acidity – Titratable Actual Acidity (TAA);
- Retained Acidity – Net Acid Soluble Sulfur (S_{NAS}), calculated from KCl and HCl extractable sulfur; and
- Acid Neutralising Capacity (ANC_{BT}).

Net Acidity is calculated from the results of these analyses as:

$$\text{Net Acidity} = \frac{\text{Potential Sulfidic Acidity}}{\text{Acidity}} + \frac{\text{Actual Acidity}}{\text{Acidity}} + \frac{\text{Retained Acidity}}{\text{Acidity}} - \frac{\text{Acid Neutralising Capacity}}{\text{Capacity}}$$

The results are summarised below:

Location/ Depth (m)	Net Acidity (mol H+/t) (eq. %S)	S _{CR} (eq. mol H+/t) (%S)	TAA (mol H+/t) (eq. %S)	S _{NAS} (eq. mol H+/t) (%S)	ANC _{BT} (eq. mol H+/t) (eq. %S)
BH1C/1.3	23	7.5	16	n/a	n/a
	0.04	0.012	0.030	n/a	n/a

ASS risk is discussed in Section 5.2.

4.5 Atterberg Limits and Linear Shrinkage

Two soil samples were submitted to Macquarie and Eurofins for NATA accredited moisture content, Atterberg Limit and Linear Shrinkage. The samples were selected to confirm the USCS field classification of natural soils across the site. Linear Shrinkage tests were completed in order to calculate 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 (%)
BH5/0.5-1.0	Silty Clay from proposed southwest extension subgrade	32	18	10.0
BH6/0.5-1.0	Silty Clay from proposed west extension subgrade	38	23	11.5
BH8/0.4-1.0	Silty Clay from proposed northern extension subgrade	80	57	21.5
BH11/0.6-1.0	Silty Clay from proposed truck parking extension subgrade	36	20	10.5
BH12/0.5-1.0	Silty Clay from proposed truck wash and parking subgrade	34	19	9.5

-- = sample not submitted for analysis

The Atterberg Limits and Linear Shrinkage test results indicate whether the fine grained component of the samples may be 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 5.7.

4.6 Maximum Dry Density and California Bearing Ratio (CBR)

Bulk samples from locations BH5, BH6, BH8, BH11 and BH12 were selected in order to generate a site-wide understanding of CBR values for use in pavement design. These samples were submitted to Macquarie for NATA accredited testing of the CBR. These samples are representative samples of the soil which are expected to serve as subgrades for pavement and floor slabs.

The CBR samples were remoulded in the laboratory and compacted to 100% standard maximum dry density (MDD) 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	Maximum Dry Density (t/m ³)	OMC (%)	CBR Value (%)	Swell After Soaking (%)
BH5/0.5-1.0	Silty Clay from proposed southwest extension subgrade	1.90	13.8	7	0.3
BH6/0.5-1.0	Silty Clay from proposed west extension subgrade	1.90	14.0	7	1.5
BH8/0.4-1.0	Silty Clay from proposed northern extension subgrade	1.71	19.7	2.5	4.4
BH11/0.6-1.0	Silty Clay from proposed truck parking extension subgrade	1.82	14.8	9	0.8
BH12/0.5-1.0	Silty Clay from proposed truck wash and parking subgrade	1.77	16.5	10	0.6

Pavement design based on these CBR results is discussed in Section 5.9.

4.7 Exposure Classification Tests

Fourteen samples from TP6, TP8 and TP19 were submitted to Eurofins for NATA accredited testing of pH, sulfate, 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 on-site 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)	Sulfate (mg/kg)
BH6/0.5	B	0.24	8	2.2	4,200	7.5	180	330
BH6/1.0	B	0.13	8	1.0	7,700	6.2	160	120
BH6/2.5	B	0.037	8	0.30	27,000	5.8	32	28
BH6/4.0	B	0.06	8	0.48	17,000	5.8	34	43
BH8/0.5	B	0.074	8	0.59	14,000	5.1	53	94
BH8/1.2	B	0.074	8	0.59	14,000	5.2	44	97
BH8/2.5	B	0.19	8	1.5	5,200	5.6	200	110
BH8/4.0	B	0.4	8	3.2	2,500	5.9	590	120
BH11/0.4	B	0.04	8	0.32	25,000	6.3	12	< 10
BH11/1.0	B	0.089	8	0.71	11,000	5.8	18	120
BH11/2.4	B	0.14	8	1.1	7,100	5.5	160	110
BH11/4.0	B	0.38	8	3.0	2,600	5.2	530	100
BH12/0.5	B	0.029	8	0.23	34,000	5.5	< 10	42
BH12/1.0	B	0.029	8	0.23	34,000	5.5	16	32
BH12/2.7	B	0.13	8	1.0	7,700	6.1	130	67
BH12/4.0	B	0.11	8	0.88	9,100	6.1	120	70

The potential aggressivity of an environment towards concrete and steel is dependent on the sulfate, chloride and pH levels of the soil. Soil aggressivity is discussed in Section 5.10. Site salinity is discussed in Section 5.11.

5. DISCUSSION

5.1 Earthworks

The subject site should be prepared in accordance with AS 3798-2007 Section 6.1 and filled in accordance with AS 3798-2007 Section 6.2.

Initial Site Preparation

During initial site preparation, 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.

Where present, topsoil and vegetation should be stripped from the site, including an area extending at least 1.5 m laterally beyond any planned extensions and roadways.

Stormwater Retention Dam

Prior to construction of the mechanical workshop development (Figure 3) the north-eastern portion of the stormwater retention dam will need to be drained and cleared. Localised draining may be facilitated by the use of a water filled cofferdam (aqua-barrier) or sand bags. Following draining, the organic material and wet mud should be excavated until a firm base is established. Removal and storage of this material must follow the methodology outlined in section 5.2 below. Once drained and mucked out, filling should follow procedures outlined below to ensure a suitable base is prepared for the proposed maintenance shed. The new face of the stormwater detention dam should be constructed in accordance with NSW 'Blue Book' (Managing Urban Stormwater: Soils and Construction - Volume 1) guidelines. It is recommended that the new face of the detention dam be clay lined to limit infiltration to the new fill soils.

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. Under no circumstances should topsoil or other organic-laden soils be placed as fill beneath structures.

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 3798-2007.

Materials selected for use as Structural Fill should not contain organic matter, waste construction debris, or deleterious materials. Fill materials should have a Standard Maximum Dry Density (AS 1289.5.1.1–2003) greater than 1.5 t/m³ and be granular material or be of low or medium plasticity. Clean on-site fill meeting the above criteria may be used as Structural Fill.

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 of $\pm 2\%$ of the optimum moisture content.

Test rolling and fill placement should be undertaken under Level 1 Supervision.

5.2 Acid Sulfate Soils Risk

Geo-Logix considers it unlikely that on-site soils are AASS or PASS based on the following lines of evidence:

- The observed onsite geology comprised potentially alluvial clays in the upper soil profile above the water table and residual clays transitioning to weathered shale with groundwater at soil rock interface. ASS do not occur in this geology;
- Sulfurous odour was identified in only 2 of 14 bore locations. This odour may be indicative of ASS or of coaliferous shale found in the local geology. One of the two odour locations was in shale, making coaliferous shale the more probable odour source;
- If ASS, onsite soils above the water table would be expected to present strong acidity with a pH less than 4. The recorded pHs of on-site fill native soils above the water table was neutral to slightly acidic;
- During screening tests, the observed oxidation reaction ratings were generally either not present or mild. ASS typically display a strong reaction. The observed pH drops were ambiguous with respect to ASS presence; and
- The single sample displaying a pH drop and reaction was sample BH1C/1.3 from the wetland area. Chromium suite testing of this sample identified Net Acidity slight greater than the action criteria for large scale land disturbance. However the analysis did not identify reducible sulfur in concentrations characteristic of ASS. Organic acids are considered a more probable source of the acidity identified by testing

An ASS Management Plan is not considered warranted.

5.3 Excavations

On-site excavations are expected to comprise shallow cutting for earthworks and trenching for relocation of underground utilities. It is expected that proposed excavations will be achievable by excavator.

Groundwater inflow management and the batter and shoring of excavations are discussed in the following sections.

5.4 Groundwater Inflow

Groundwater was encountered at depths below 5.6 mbg, however groundwater may be present from 3.0 mbg near existing drainage channels. As excavation to these depths is not expected, groundwater inflow is not expected in on-site excavations.

Inflow after heavy rains from surface water and associated infiltration may be managed through sump and pump methods.

5.5 Batter Slopes

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 onsite fill and clay soils.

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.

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.

5.6 Shoring and Earth Retention

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)
Fill/Native Clay	21	0.55	0.4	2.5

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.

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.

5.7 Site Classification

Considering the depth of existing onsite fill, the appropriate site classification is Class 'P' in accordance with AS2870-2011.

5.8 Foundations

Geo-Logix recommends that future structural 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.

Shallow Foundations

The encountered site conditions primarily comprised low plasticity Clay of medium compressibility, expected to be suitable for shallow pad or strip foundations. Provided new structural fill is placed in a controlled manner as advised in Section 5.1, new structural fill would also be capable of supporting shallow footings. It is not recommended that shallow footings be founded on the existing site fill.

Assuming an allowable settlement of 25 mm, shallow footings bearing on native soil or new structural fill may be designed based on an allowable bearing capacity of 150 kPa.

We 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.

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. Geo-Logix also recommends consultation with a specialist piling contractor to discuss final design of piled foundations.

5.9 Ground Slabs and Pavements

Slab and pavement designs are based on the 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 5.1, should comprise native soils or structural fill. Both are considered to be suitable as a subgrade provided the material performs satisfactorily under test-rolling as detailed in AS3798-2007.

Provided the final subgrade performs under test-rolling and is compacted to at least 98% standard compaction, pavements and slabs-on-grade may be designed based on a CBR of 5% for natural soil and existing controlled fill subgrades. Any slabs founded on newly imported fill should be designed considering the CBR of the imported material.

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 μ m 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.

5.10 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 soils above the water table should be designed based on no less than non-aggressive 'A2' exposure.

5.11 Salinity Risk

Based on the measured soil electrical conductivity and a soil texture multiplication factor, the site soils are typically non-saline with an extract electrical conductivity (EC_e) less than 2 (Department of Land and Water Conservation NSW, 2002).

5.12 Seismic Site Classification

Structural design for earthquake loads should be carried out in accordance with the relevant provisions in AS1170.4–2007. Based on the subsurface soil profile encountered 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 0.09.

6. LIMITATIONS

The recommendations submitted are 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.

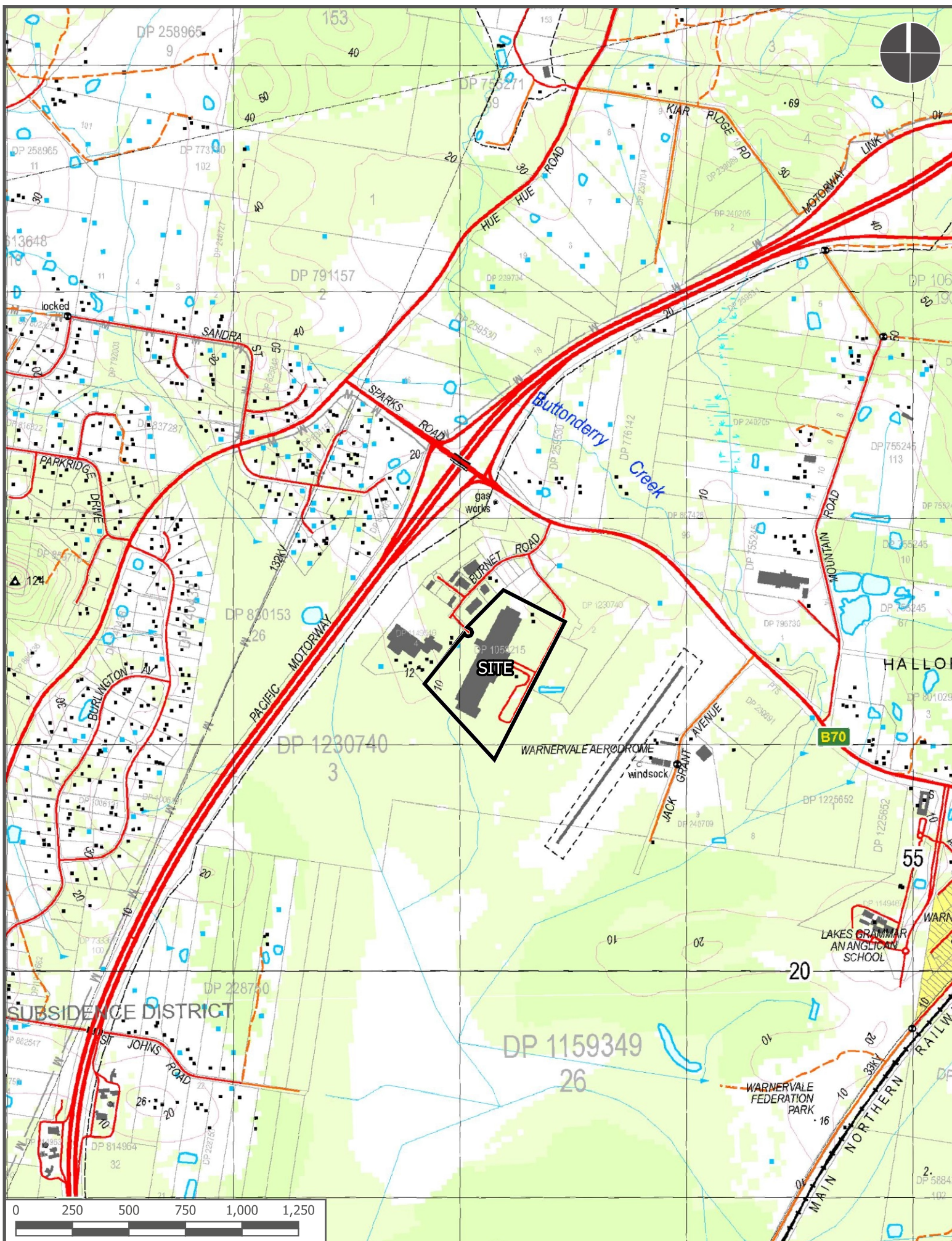
The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area at the time of this report. No other warranties are implied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

After the plans and specifications 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.

By accepting the advice presented in the Geo-Logix report you agree to indemnify Geo-Logix against any loss, damage, liability, claim, suits, demands and actions for advice which, as a result of local geological/hydrogeological anomalies caused pollution or exacerbated existing pollution. This report has been prepared for the exclusive use of client and their consultants for the specific application to the construction of the proposed extensions at 11 Warren Road, Warnervale NSW.

7. REFERENCES

- 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) AS3600–2018 *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.
- Department of Land and Water Conservation NSW (2002) *Site Investigations for Urban Salinity*.
- Geological Survey of New South Wales (2015) *Gosford – Lake Macquarie 1:100 000 Geological Sheet 9332*, First edition. Geological Survey of New South Wales, Sydney.
- Google (2021) Google Earth interactive map, Salamander Bay NSW.
- NSW Government Planning Industry & Environmental (2021) eSPADE v2.1, <https://www.environment.nsw.gov.au/eSpade2WebApp>, NSW Government. Accessed 04/09/2021.
- WaterNSW (2021) *Real-time water data*, groundwater works, www.realtimedata.watarnsw.com.au/water.stm. Accessed 04/09/2021.





Key

- Site boundary
- Borehole locations
- Test pit locations

0 50 100 150



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SITE MAP

Geotechnical Investigation
11 Warren Road, Warnervale NSW

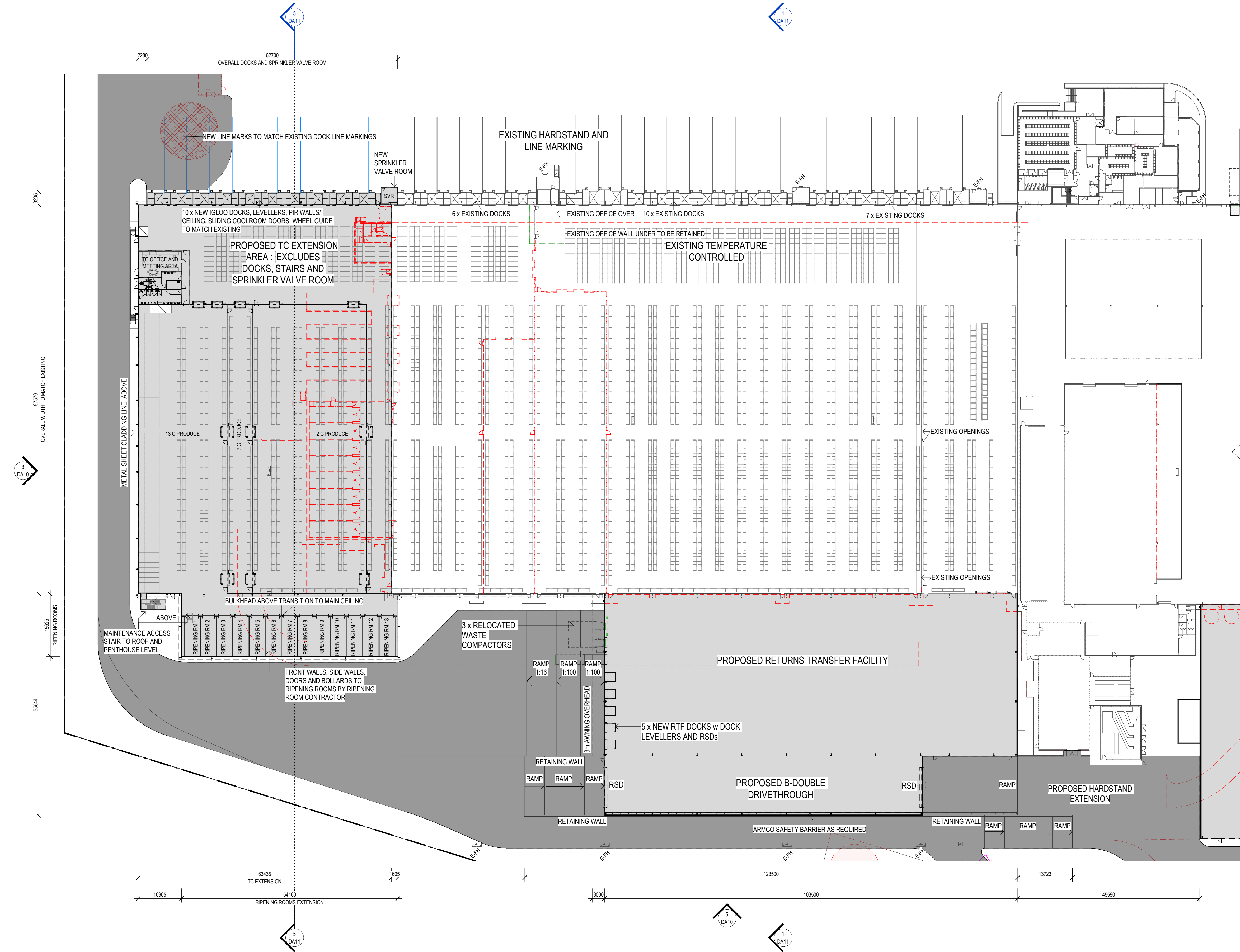
Project No. 2101104

Figure 2

ATTACHMENT A

LEGEND

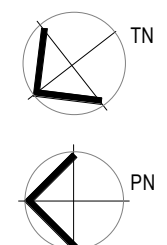
- SITE BOUNDARY
- - - BUILDING SETBACK
- FN-01 180MM HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, 3 BARB WIRES
- FN-02 FULL HEIGHT HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, ROLLER SHUTTER DOOR
- RSD ROLLER SHUTTER DOOR
- E-FH EXISTING FIRE HYDRANT
- E-FIV EXISTING - FIRE - POST INDICATOR VALVE
- - - PROPOSED DEMOLITION
- INDICATES EXTENT OF PROPOSED MAIN BUILDING EXTENSION
- INDICATES EXTENT OF PROPOSED HARDSTAND EXTENSIONS TO CIVIL ENGINEERS DETAILS
- INDICATES PROPOSED MAIN BUILDING INTERNAL ALTERATIONS AND PROPOSED EXTERNAL AWNINGS
- INDICATES PROPOSED OFFICE AND SECONDARY BUILDING ADDITIONS
- INDICATES EXTENT OF PROPOSED CONCRETE PAVING WITH OR SIMILAR TO CIVIL ENGINEERS DETAILS
- INDICATES EXISTING BUILDING AND SITE AREAS



PROPOSED FLOOR PLAN - PART 1
SCALE: 1 : 500

PROJECT:
PROPOSED EXTENSION TO WYONG RDC
11 WARREN ROAD, WARNERVALE

TITLE:
PROPOSED FLOORPLAN - TC



CLIENT:
WOOLWORTHS LTD



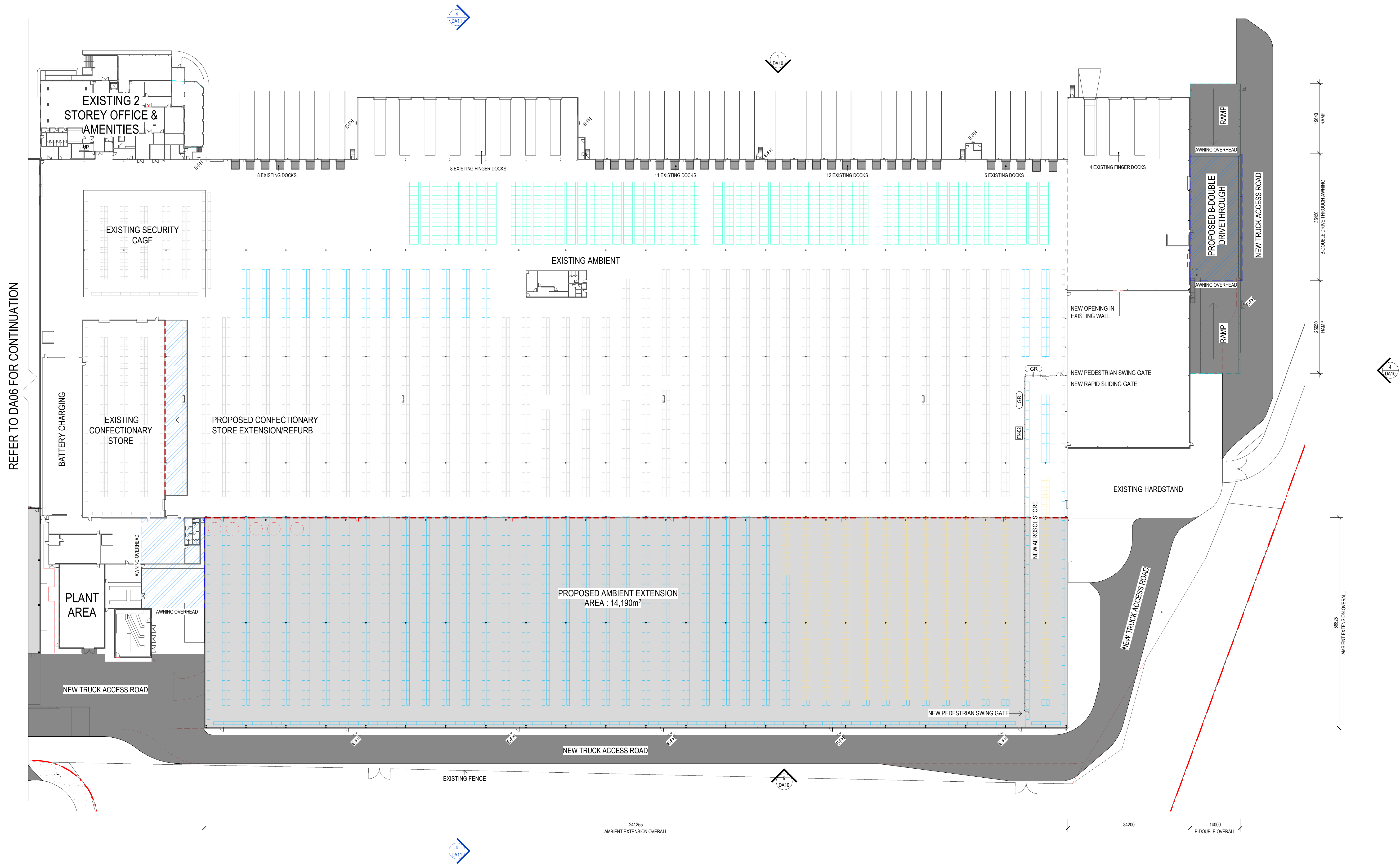
DATE: January, 2022
DRAWN BY: RF
SCALE: As indicated

JOB NO:	20231
DRAWING NO:	DA06
REVISION:	P4

NO.	DATE:	REVISION:	BY:	CHK:
P1	03.12.2021	ISSUED FOR SEARS	RF	JC
P2	28.01.2022	FOR REVIEW	RF	JC
P3	08.02.2022	ISSUED FOR REVIEW	RF	JC
P4	18.02.2022	ISSUED FOR INTERNAL APPROVAL	RF	JC

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PROPOSED FLOOR PLAN - AMBIENT
SCALE: 1:500

LEGEND

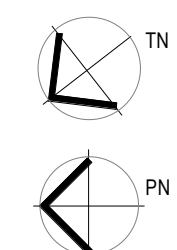
- SITE BOUNDARY
- - - BUILDING SETBACK
- FN-01 1800MM HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, 3 BARB WIRES
- FN-02 FULL HEIGHT HIGH BLACK VINYL COATED CYCLONE WIRE FENCE
- RSD ROLLER SHUTTER DOOR
- E-FH EXISTING FIRE HYDRANT
- E-FIV EXISTING - FIRE - POST INDICATOR VALVE
- - - PROPOSED DEMOLITION
- INDICATES EXTENT OF PROPOSED MAIN BUILDING EXTENSION
- INDICATES EXTENT OF PROPOSED HARDSTAND EXTENSIONS TO CIVIL ENGINEERS DETAILS
- INDICATES PROPOSED MAIN BUILDING INTERNAL ALTERATIONS AND PROPOSED EXTERNAL AWNINGS
- INDICATES PROPOSED OFFICE AND SECONDARY BUILDING ADDITIONS
- INDICATES EXTENT OF PROPOSED CONCRETE PAVING WITH OR SIMILAR TO CIVIL ENGINEERS DETAILS
- INDICATES EXISTING BUILDING AND SITE AREAS

NO.	DATE	REVISION	BY	CHK.
P2	08.02.2022	ISSUED FOR REVIEW	RF	JC
P3	18.02.2022	ISSUED FOR INTERNAL APPROVAL	RF	JC
P4	02.03.2022	ISSUED FOR INFORMATION	RF	JC
P5	07.03.2022	CIVIL UPDATES	RF	JC
P6	09.03.2022	ISSUED FOR ADEQUACY	RF	JC

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PROJECT:
PROPOSED EXTENSION TO WYONG RDC
11 WARREN ROAD, WARNERVALE

TITLE:
PROPOSED FLOOR PLAN - AMBIENT



CLIENT:
WOOLWORTHS LTD



DATE: January, 2022
DRAWN BY: RF
SCALE: As indicated

JOB NO.	20231
DRAWING NO.	DA07
REVISION	P6



— — —	SITE BOUNDARY		INDICATES EXTENT OF PROPOSED MAIN BUILDING EXTENSION
— — —	BUILDING SETBACK		INDICATES EXTENT OF PROPOSED HARDSTOP EXTENDING TO CIVIL ENGINEERS DETAILS
FN-01	1800MM HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, 3 BARB WIRES		INDICATES PROPOSED MAIN BUILDING INTERNAL ALTERATIONS AND PROPOSED EXTERNAL AWNINGS
FN-02	FULL HEIGHT HIGH BLACK VINYL COATED CYCLONE WIRE FENCE		INDICATES PROPOSED OFFICE AND SECONDARY BUILDING ADDITIONS
R-SH	ROLLER SHUTTER DOOR		INDICATES EXTENT OF PROPOSED CONCRETE PAVING WITH OR SIMILAR TO CIVIL ENGINEERS DETAILS
E-FH	EXISTING FIRE HYDRANT		INDICATES EXISTING BUILDING AND SITE AREAS
E-FV	EXISTING - FIRE - POST INDICATOR VALVE		
— — —	PROPOSED DEMOLITION		

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D.
(Australian Height Datum)

REFER TO LANDSCAPE ARCHITECTS DRAWING FOR UPDATED LANDSCAPING DETAILS

AREAS CALCULATED TO OUTSIDE FACE OF EXTERNAL WALLS AND CENTRELINE OF INTERTENANCY WALLS

REFER TO CIVIL ENGINEERS DETAIL FOR SITE AREAS

MAIN BUILDING	GLA
AMBIENT DC (TC)	
AMBIENT DC EXTENSION	14,454m ²
TOTAL AMBIENT DC EXTENSION	14,454m²
TOTAL EXISTING AMBIENT DC & OFFICE (L1)	33,225m ²
TOTAL EXISTING AMBIENT DC OFFICE (L2)	129m ²
TOTAL EXISTING AMBIENT	33,354m ²
TOTAL AMBIENT DC PROPOSED & EXISTING	47,808m²



TEMPERATURE CONTROLLED DC (TC)	
TEMPERATURE CONTROLLED DC EXTENSION	6,858m ²
TEMPERATURE CONTROLLED OFFICE/AMENITIES	174m ²
TOTAL PROPOSED TC EXTENSION	7,032m²
TOTAL EXISTING TC DC & OFFICE/AMENITIES (L1)	15,341m²
TOTAL EXISTING TC DC& OFFICE/AMENITIES (L2)	125m²
TOTAL EXISTING TC DC & OFFICE/AMENITIES	15,466m²
TOTAL TC PROPOSED & EXISTING	22,498m²
EXCLUDES PROPOSED DEMOLITION, DOCKS, DOCK AWINGS AND PENTHOUSES	

RETURNS TRANSFER FACILITY (RTF)	
RETURNS TRANSFER FACILITY EXTENSION	5,400m ²
TOTAL RTF EXTENSION	5,400m²

OVERALL	
TOTAL PROPOSED DC BUILDING EXTENSION	26,886m ²
TOTAL EXISTING DC BUILDING	48,820m ²
EXISTING MAIN OFFICE (L1)	980m ²
EXISTING MAIN OFFICE (L2)	900m ²
EXISTING SERVICE AREAS	1272m ²
TOTAL PROPOSED & EXISTING BUILDING	78,858m²

OUTBUILDINGS	GLA
TRUCK WASH	492m ²
TRUCK WASH OFFICE/WAITING/AMENITIES	28m ²
TOTAL TRUCK WASH	514m²
TRUCK MAINTENANCE	725m ²
TRUCK MAINTENANCE MEZZANINE (L2)	67m ²
TRUCK MAINTENANCE OFFICE/AMENITIES (L1)	38m ²
TRUCK MAINTENANCE AMENITIES (L2)	34m ²
TOTAL TRUCK MAINTENANCE	851m²
PUMP ROOM (REPLACES EXISTING)	56m ²
EXISTING GATEHOUSE	37m ²
EXISTING TRANSPORT OFFICE (EXC AWNINGS)	341m ²
TOTAL PROPOSED OUT BUILDINGS	1,421m²
TOTAL PROPOSED & EXISTING OUT BUILDINGS	1,800m²

AWNINGS	
PROPOSED RTF AWNING (3m)	122m²
PROPOSED B-DOUBLE THROUGH AWNING	563m²
PROPOSED AMBIENT DC EXTENSION AWNING	905m²
PROPOSED REFUELLING STATION AWNING	130m²
TOTAL PROPOSED AWNINGS	1,720m²
EXISTING TC FINGER DOCK AWNING	740m²
EXISTING AMBIENT DC DOCK AWNINGS	595m²
EXISTING OFFICE AND AMENITIES AWNINGS	155m²
TOTAL EXISTING AWNINGS	1,490m²
TOTAL PROPOSED & EXISTING AWNINGS	3,210m²

DOCKS	
PROPOSED IGLOO DOCKS	10
EXISTING IGLOO DOCKS	23
TOTAL PROPOSED & EXISTING IGLOO DOCKS	33
PROPOSED RTF DOCK	6
EXISTING RTF FINGER DOCKS	4
TOTAL PROPOSED & EXISTING RTF DOCKS	10
EXISTING AMBIENT DOCKS	36
EXISTING AMBIENT FINGER DOCKS	8
TOTAL EXISTING AMBIENT DOCKS	44

PARKING	
PROPOSED NEW PANTECH PARKING	49
EXISTING PANTECH PARKING	51
TOTAL PROPOSED & EXISTING PANTECH PARKING	100
PROPOSED CHEVRON PARKING	5
EXISTING CHEVRON PARKING	12
TOTAL PROPOSED & EXISTING CHEVRON PARKING	17
PROPOSED TRUCK WASH/ MAINTENANCE CAR PARKING	3
EXISTING CAR PARKING BAYS (INC PWD PARKING)	485
EXISTING POW CAR PARKING BAYS	6
TOTAL PROPOSED & EXISTING CHEVRON PARKING	488

SITE COVERAGE	
TOTAL SITE AREA	231,001m ²
PROPOSED BUILDING EXTENSION FOOTPRINT	26,986m ²
EXISTING BUILDING FOOTPRINT	51,196m ²
TOTAL PROPOSED & EXISTING BUILDING FOOTPRINT	78,182m²
EXCLUDES DOCKS, DOCK AWNINGS AND SITE BUILDINGS, LEVEL 2(L2) AREAS WITHIN BUILDING, LEVEL 1(L1) FOOTPRINT, BUT INCLUDES EXISTING GATEHOUSE, EXISTING TRAFFIC OFFICE, EQUIPMENTIES & L1 AREAS OF TRUCK WASH AND TRUCK MAINTENANCE.	
SITE COVERAGE	33.8%

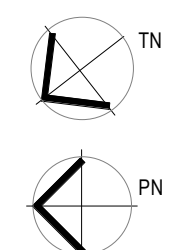
NO.	DATE	REVISION	BY:	CHK:
P4	16.02.2022	TRUCKWASH/MAINTENANCE UPDATE	RF	JC
P5	18.02.2022	ISSUED FOR INTERNAL APPROVAL	RF	JC
P6	21.02.2022	SITE PLAN UPDATES	RF	JC
P7	22.02.2022	GEO REFERENCED SITE PLANS	RF	JC
P8	02.03.2022	ISSUED FOR INFORMATION	RF	JC

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PROJECT: PROPOSED EXTENSION TO WYONG RDC
11 WARREN ROAD, WARNERVALE

TITLE: PROPOSED SITE PLAN



CLIENT: WOOLWORTHS LTD



DATE: January, 2022
DRAWN BY: RF
SCALE: As indicated
SCALE:

JOB NO:		20231
DRAWING NO:	DA05	REVISION:
		P8

ATTACHMENT B

TEST PIT LOG: BH1A



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Geo-Logix Pty Ltd

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

Project Number: **2101104**
Hole Depth: **1.80 m**
Date Started: **13/09/2021**
Date Completed: **13/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Warren Hunter Excavations**

Method: **Excavation (20t long arm excavator)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
EX											
		1.00							Water with Reeds & Mud.	sat'd	
		1.50	D	Z	BH1A/1.5	Fill	F		light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, well compacted.	moist	
						Natural	CL		CLAY with Sand - light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6) and yellowish red / light brown (5YR 5/6), 70% clay, 20% sand, 10% gravel, medium plasticity, very stiff.	moist	
									Terminated at 1.80 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:

Additional Comments:

GLLOG2021 2101104 WYONG GPJ GLGDT 10/19/21 8:58:57 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: **Laurie White**

Contact: laurie.white@reumad.com.au

Logged By: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **13/09/2021**

Date: **18/10/2021**

TEST PIT LOG: BH1B



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Geo-Logix Pty Ltd

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

Project Number: **2101104**
Hole Depth: **1.80 m**
Date Started: **13/09/2021**
Date Completed: **13/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Warren Hunter Excavations**

Method: **Excavation (20t long arm excavator)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
EX		0.70							Water with Reeds & Mud.	sat'd	
		1.20	D	Z	BH1B/1.2	CL			CLAY with SILT- dark reddish brown / greyish brown (5YR 3/2), 60% clay, 30% silt, 10% sand, medium plasticity, soft.	wet	Dam sediment from runoff.
		1.50				Fill	F		FILL- light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, moderately compacted.	moist	
						Natural	CL		CLAY with Sand- light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, stiff.	moist	
									Terminated at 1.80 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:
Additional Comments:



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

Logged By: Caden Pengelly
Checked By: Ted Lilly

Date: 13/09/2021
Date: 18/10/2021

GLLOG2021 2101104 WYONG GPJ GLGDT 10/19/21 8:58:58 AM - drawn by laurie white at www.reumad.com.au

TEST PIT LOG: BH1C



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Unit 2309 / 4 Daydream Street
Warriewood NSW 2102
www.geo-logix.com.au

Project Number: **2101104**
Hole Depth: **2.00 m**
Date Started: **13/09/2021**
Date Completed: **13/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Warren Hunter Excavations**

Method: **Excavation (20t long arm excavator)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
EX											
									Water with Reeds & Mud.	sat'd	
		1.20									
		1.60									
			D	Z	BH1C/1.3						
						CL			CLAY with SILT- dark reddish brown / greyish brown (5YR 3/2), 60% clay, 30% silt, 10% sand, medium plasticity, soft.	wet	Dam sediment from runoff.
						F			FILL?- light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, stiff.	moist	
									Terminated at 2.00 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:

Additional Comments:



Log Drawn By: **Laurie White**

Contact: laurie.white@reumad.com.au

Logged By: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **13/09/2021**

Date: **18/10/2021**

TEST PIT LOG: BH1D



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Geo-Logix Pty Ltd

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

Project Number: **2101104**
Hole Depth: **1.50 m**
Date Started: **13/09/2021**
Date Completed: **13/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Warren Hunter Excavations**

Method: **Excavation (20t long arm excavator)**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Observations / Comments
EX								
						Water with Reeds & Mud.	sat'd	
						Terminated at 1.50 m Harder material starting at 1.5m.		

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:
Additional Comments:



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

Logged By: **Caden Pengelly**
Checked By: **Ted Lilly**

Date: **13/09/2021**
Date: **18/10/2021**



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Building Q2, Level 3
Unit 2309 / 4 Daydream Street
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Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **15/09/2021**
Date Completed: **15/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
			D	Z	BH2/0.4 DS1, TS1		SC		Clayey SAND - dark reddish brown / moderate brown (5YR 3/4), 30% clay, 10% silt, 60% sand, loose.	moist		
		0.60	R	Z	BH2/1.0				CLAY with Sand - brownish yellow / dark yellowish orange (10YR 6/6) and light brownish grey / pale yellowish brown (10YR 6/2), 70% clay, 10% silt, 20% sand, low plasticity, stiff, slight loamy / silty texture.	damp	4,6,8 N=14	
			R	Z	BH2/2.5		CL				5,6,5 N=11	
		3.50	D	Z	BH2/3.5				CLAY with Sand - light brownish grey / pale yellowish brown (10YR 6/2), 60% clay, 15% silt, 25% sand, low plasticity, firm.	wet	1,2,3 N=5	
			R	Z	BH2/4.0		CL					
									Terminated at 4.50 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: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **15/09/2021**

Date: **18/10/2021**



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Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **14/09/2021**
Date Completed: **14/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
			D	Z	BH3/0.5	Fill	F		FILL - dark reddish brown / moderate brown (5YR 3/4), 50% clay, 50% sand, poorly compacted.	damp		
		0.80										
			R	Z	BH3/1.2		SC		Clayey SAND - very pale brown / greyish orange (10YR 7/4), 30% clay, 70% sand, medium dense, clay lenses, highly weathered sandstone.	damp	8,10,11 N=21	
		2.30										
			R	Z	BH3/2.7	Natural	SC		Clayey SAND - light red / moderate reddish orange (10R 6/6), 40% clay, 60% sand, dense.	damp	18,15,15 N=30	
		3.50										
			R	Z	BH3/4.2		SC		Clayey SAND / Sandy CLAY - light brownish grey / pale yellowish brown (10YR 6/2), 50% clay, 50% sand, dense.	damp	17,12,12 N=24	Sulfur odour.
		4.20										
									Terminated at 4.50 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:

GLLOG2021 2101104 WYONG GPJ GLGDT 10/19/21 8:59:02 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: Laurie White

Contact: laurie.white@reumad.com.au

Logged By: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **14/09/2021**

Date: **18/10/2021**



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Project Number: **2101104**
Hole Depth: **6.00 m**
Date Started: **15/09/2021**
Date Completed: **15/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
		0.60	D	Z	BH4/0.5		SC		reddish brown (5YR 5/4), 30% clay, 70% sand, loose.	damp		
			R	Z	BH4/1.2				CLAY with Sand- very pale brown / greyish orange (10YR 7/4) and light brownish grey / pale yellowish brown (10YR 6/2), 70% clay, 30% sand, medium plasticity, stiff.	damp	6,6,9 N=15	
		3.20	R	Z	BH4/2.5		CL				9,12,11 N=23	
		4.20	R	Z	BH4/4.3		CL		CLAY with Sand- brownish yellow / dark yellowish orange (10YR 6/6) and light brownish grey / pale yellowish brown (10YR 6/2), 80% clay, 20% sand, medium plasticity, stiff.	damp	4,5,7 N=12	
		5.60					CL		CLAY with Silty & Sand- pinkish grey / greyish orange pink (5YR 7/2), 60% clay, 20% silt, 20% sand, medium plasticity, stiff.	moist	4,9,8 N=17	
		5.70					SM		Silty SAND- reddish yellow (5YR 7/6), 10% clay, 20% silt, 70% sand, medium dense.	wet		Softer, could push fingers through cuttings.
							CL		CLAY with Sand- brownish yellow / dark yellowish orange (10YR 6/6) and light brownish grey / pale yellowish brown (10YR 6/2), 60% clay, 10% silt, 30% sand, low plasticity, highly weathered rock.	damp		Slightly denser than above.
									Terminated at 6.00 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:

No CBR, too many services.
Noticeably hard drilling than BH3 & BH12.

GLLOG2021 2101104 WYONG GPJ GLGDT 10/19/21 8:59:03 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: Laurie White

Contact: laurie.white@reumad.com.au

Logged By: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **15/09/2021**

Date: **18/10/2021**



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Unit 2309 / 4 Daydream Street
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Project Number: **2101104**
Hole Depth: **4.60 m**
Date Started: **10/09/2021**
Date Completed: **10/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
			D	Z	BH5/0.5	Fill	F		FILL - yellowish brown / moderate yellowish brown (10YR 5/4), 60% clay, 20% sand, 20% gravel, low plasticity, moderately compacted.	damp		
		0.70										
		1.20				CL			Sandy CLAY - brownish yellow / dark yellowish orange (10YR 6/6), 65% clay, 35% sand, medium plasticity, stiff.	damp		
											4,6,8 N=14	
		2.00				CL			CLAY with Sand - brownish yellow / dark yellowish orange (10YR 6/6) and pale red (10R 6/2), 75% clay, 25% sand, medium plasticity, stiff.	damp		
		2.60										
		2.90	R	Z	BH5/2.7	Natural	CL		CLAY with Sand - 70% clay, 10% silt, 20% sand, medium plasticity, stiff.	damp		
											4,5,9 N=14	
		3.30				CL			CLAY with Sand & Silt - very pale brown / very pale orange (10YR 8/2) and brownish yellow / dark yellowish orange (10YR 6/6), 50% clay, 20% silt, 30% sand, medium plasticity, stiff.	damp		
						CL			CLAY with Sand - brownish yellow / dark yellowish orange (10YR 6/6) and yellowish red / light brown (5YR 5/6), 70% clay, 20% sand, 10% gravel, medium plasticity, very stiff.	damp		
						CL			CLAY with Sand - dusky red (5R 3/4), 80% clay, 20% sand, low plasticity, weathered rock.	damp		
											20/100	V-bit refusal at 4.5m.
									Terminated at 4.60 m SPT refusal at 4.6m.			

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: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **10/09/2021**

Date: **18/10/2021**



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Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **10/09/2021**
Date Completed: **10/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
SFA (V-bit)			D	Z	BH6/0.5	Fill	F		FILL- yellowish brown / moderate yellowish brown (10YR 5/4), 50% clay, 40% sand, 10% gravel, well compacted.	damp		
		1.20	R	Z	BH6/1.0						4,5,4 N=9	
		2.00				CL			CLAY with Sand- brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, stiff.	damp		
		3.20	R	Z	BH6/2.5	Natural	CL		CLAY with Sand- light brownish grey / pale yellowish brown (10YR 6/2), 70% clay, 30% sand, medium plasticity, stiff.	damp	5,7,7 N=14	
		4.20	R	Z	BH6/4.0		CL		CLAY with Silt- light brownish grey / pale yellowish brown (10YR 6/2), 80% clay, 20% silt, medium plasticity, stiff.	moist		
						CL			CLAY with Sand & Gravel- brownish yellow / dark yellowish orange (10YR 6/6) and reddish grey / pale brown (5YR 5/2), 60% clay, 20% sand, 20% gravel, low plasticity, weathered shale with ironstone.	wet damp	4,5,10 N=15	Wet lense on top of weathered shale.
									Terminated at 4.50 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: Caden Pengelly

Checked By: Ted Lilly

Date: 10/09/2021

Date: 18/10/2021



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Location / Site: **11 Warren Road, Warnervale NSW**

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Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Tests	Observations / Comments
										SPT	
			R	Z	BH7/0.5	Fill	F		FILL - reddish grey / pale brown (5YR 5/2), 40% clay, 40% sand, 20% gravel, well compacted.		
			D	Z	BH7/1.0					3,6,7 N=13	
		1.50									
			D	Z	BH7/2.0	CL			CLAY with Silt - yellowish brown / moderate yellowish brown (10YR 5/4), 70% clay, 20% silt, 10% sand, stiff.		Slight sulfur odour.
		2.40									
						Natural			CLAY - light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 80% clay, 5% silt, 15% sand, stiff.	3,5,7 N=12	
						CL					
			R	Z	BH7/4.0					3,3,4 N=7	
									Terminated at 4.50 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:

GLLOG2021 2101104 WYONG GPJ GLGDT 10/19/21 8:59:07 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: **Laurie White**

Contact: laurie.white@reumad.com.au

Logged By: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **10/09/2021**

Date: **18/10/2021**



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Project Number: **2101104**
Hole Depth: **4.20 m**
Date Started: **14/09/2021**
Date Completed: **14/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
			D	Z	BH8/0.5	Fill	F		FILL- dark reddish brown / moderate brown (5YR 3/4) and yellowish red / light brown (5YR 5/6), 70% clay, 20% sand, 10% gravel, low plasticity, moderately compacted.	damp		CBR collected 0.5-1.0m
		1.00	B	Z	BH8/0.5-1.0							
			R	Z	BH8/1.2				CLAY with Sand- brownish yellow / dark yellowish orange (10YR 6/6) and light brownish grey / pale yellowish brown (10YR 6/2), 70% clay, 30% sand, low plasticity, firm.	damp	2,4,4 N=8	
						CL						
		2.90	R	Z	BH8/2.5	Natural					2,6,6 N=12	V-bit refusal at 4.1m.
			R	Z	BH8/4.0				CLAY with Sand- very pale brown / very pale orange (10YR 8/2) and brownish yellow / dark yellowish orange (10YR 6/6), 80% clay, 20% sand, low plasticity, stiff.	damp		
						CL					20/100	
									Terminated at 4.20 m SPT refusal at 4.6m on Sandstone.			

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: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **14/09/2021**

Date: **18/10/2021**



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Date Completed: **14/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
CC		0.30	D	Z	BH9/0.5	Fill	F		CONCRETE DRIVEWAY.			
		1.20	R	Z	BH9/1.2				FILL - light red / moderate reddish orange (10R 6/6) and pinkish white / greyish orange pink (10R 8/2), 60% clay, 20% sand, 20% gravel, medium plasticity, moderately compacted.	damp		
		2.00							CLAY with Sand - brownish yellow / dark yellowish orange (10YR 6/6) and light brownish grey / pale yellowish brown (10YR 6/2), 60% clay, 30% sand, 10% gravel, medium plasticity, very stiff, highly weathered sandstone, with yellowish red / light brown (5YR 5/6) rock pieces.	damp	5,8,9 N=17	
		3.50	R	Z	BH9/2.7	Natural	CL		CLAY with Gravel - pinkish grey / greyish orange pink (5YR 7/2) and yellowish red / light brown (5YR 5/6), 50% clay, 20% sand, 30% gravel, medium plasticity, very stiff, weathered sandstone, increasing ironstone pieces with depth.	damp	8,13,15 N=28	
			R	Z	BH9/4.2				Sandy CLAY - very pale brown / very pale orange (10YR 8/2), 60% clay, 40% sand, medium plasticity, very stiff, weathered sandstone.	damp	7,10,10 N=20	
									Terminated at 4.50 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. Resurface with concrete.

Additional Comments:



Log Drawn By: Laurie White

Contact: laurie.white@reumad.com.au

Logged By: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **14/09/2021**

Date: **18/10/2021**



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Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **15/09/2021**
Date Completed: **15/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
		0.40	D	Z	BH10/0.5	Fill	F		FILL - dark reddish brown / greyish brown (5YR 3/2), 20% sand, 80% gravel, poorly compacted.	damp		
		1.10				Fill	F		FILL - yellowish brown / moderate yellowish brown (10YR 5/4), 60% clay, 20% sand, 20% gravel, medium plasticity, moderately compacted.	damp		
		2.10				CL			CLAY with Sand - light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, stiff.	damp	2,5,8 N=13	
		3.50	R	Z	BH10/2.5	Natural	CL		CLAY with Sand - light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 75% clay, 20% sand, 5% gravel, medium plasticity, stiff, minor pieces of weathered rock.	damp	6,8,10 N=18	
			R	Z	BH10/4.2		CL		CLAY - brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 15% silt, 15% sand, medium plasticity, stiff, becoming stiffer with depth.	damp	3,6,9 N=15	
									Terminated at 4.50 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: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **15/09/2021**

Date: **18/10/2021**



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Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **15/09/2021**
Date Completed: **15/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
			D	Z	BH11/0.4		CL		Sandy CLAY - dark reddish brown / moderate brown (5YR 3/4), 60% clay, 40% sand, medium plasticity, stiff.	moist		
		0.70										
			R	Z	BH11/1.0		CL		CLAY with Sand - reddish grey / pale brown (5YR 5/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, stiff.	damp	3,4,8 N=12	
		2.00										
			R	Z	BH11/2.5	Natural			CLAY with Sand - brownish yellow / dark yellowish orange (10YR 6/6) and pinkish grey / greyish orange pink (5YR 7/2) and yellowish red / light brown (5YR 5/6), 75% clay, 20% sand, 5% gravel, medium plasticity, very stiff.	damp	7,7,12 N=19	
			R	Z	BH11/4.0		CL		Some ironstone fragments near extent of investigation.		7,8,11 N=19	
									Terminated at 4.50 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: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **15/09/2021**

Date: **18/10/2021**



Geo-Logix
environment · geotech

Geo-Logix Pty Ltd

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

Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **15/09/2021**
Date Completed: **15/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
		0.60	D B	Z Z	BH12/0.5 BH12/0.6			CL	Sandy CLAY / Clayey SAND - dark reddish brown / moderate brown (5YR 3/4), 50% clay, 50% sand, soft, loose.	damp		CBR collected 0.6m.
			R	Z	BH12/1.0			CL	Clayey with Sand - light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 30% sand, medium plasticity, stiff.	damp	3,4,6 N=10	
		2.20	R	Z	BH12/2.7			CL	Clayey with Sand - light brownish grey / pale yellowish brown (10YR 6/2) and brownish yellow / dark yellowish orange (10YR 6/6), 70% clay, 10% silt, 20% sand, medium plasticity, stiff, slight silty texture, becoming silty and moist with depth.	damp to moist	5,5,8 N=13	
			R	Z	BH12/4.0			CL			4,5,7 N=12	
									Terminated at 4.50 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:

GLLOG2021 2101104 WYONG GPJ GLGDT 10/19/21 8:59:13 AM - drawn by laurie white at www.reumad.com.au



Log Drawn By: Laurie White

Contact: laurie.white@reumad.com.au

Logged By: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **15/09/2021**

Date: **18/10/2021**



Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
								SPT	
SFA (V-bit)									

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:



Geo-Logix
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Geo-Logix Pty Ltd

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

Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **10/09/2021**
Date Completed: **10/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
			D	Z	BH14/0.5	Fill	F		FILL - reddish grey / pale brown (5YR 5/2), 40% clay, 30% sand, 30% gravel, well compacted.	damp		
		1.20	R	Z	BH14/1.3				CLAY with Silt - reddish grey / pale brown (5YR 5/2) and light brownish grey / pale yellowish brown (10YR 6/2), 70% clay, 30% silt, medium plasticity, firm.	damp	2,3,5 N=8	
			D	Z	BH14/2.0							
		2.60	R	Z	BH14/2.7				CLAY with Silt & Sand - brownish yellow / dark yellowish orange (10YR 6/6) and light brownish grey / pale yellowish brown (10YR 6/2), 40% clay, 30% silt, 30% sand, firm.	damp	2,2,4 N=6	
		3.10							CLAY with Silt - light brownish grey / pale yellowish brown (10YR 6/2), 70% clay, 20% silt, 10% sand, medium plasticity, firm, increasing sand with depth.	moist		Increased moisture with depth.
		4.20							Weathered SHALE - brownish yellow / dark yellowish orange (10YR 6/6) and yellowish red / light brown (5YR 5/6), stiff.		5,5,7 N=12	Water sitting on weathered rock at 4.2m.
									Terminated at 4.50 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: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **10/09/2021**

Date: **18/10/2021**



Geo-Logix
environment · geotech

Geo-Logix Pty Ltd

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

Project Number: **2101104**
Hole Depth: **4.50 m**
Date Started: **15/09/2021**
Date Completed: **15/09/2021**

Project Name: **Geotechnical Investigation & Waste Classification**

Location / Site: **11 Warren Road, Warnervale NSW**

Client: **Woolworths Group**

Contractor: **Fico Group Pty Limited**

Method: **Solid Flight Auger (Truck mounted)**

Method	Water Level	Depth (mBGL)	Sample Type	HC Odour	Sample ID	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture	Tests	Observations / Comments
											SPT	
			D	Z	BH15/0.5	Fill	F		FILL - very pale brown / greyish orange (10YR 7/4), 60% clay, 20% sand, 20% gravel, medium plasticity, moderately compacted.	damp		
		1.10	R	Z	BH15/1.3				CLAY with Sand - pinkish grey / greyish orange pink (5YR 7/2), 70% clay, 30% sand, medium plasticity, firm.	damp	3,4,4 N=8	
		2.00	R	Z	BH15/2.5	Natural			CLAY with Sand - brownish yellow / dark yellowish orange (10YR 6/6) and light brownish grey / pale yellowish brown (10YR 6/2), 80% clay, 20% sand, medium plasticity, firm.	damp	2,3,3 N=6	
		4.20	R	Z	BH15/4.0				Weathered SANDSTONE - pinkish grey / greyish orange pink (5YR 7/2) and light reddish brown / light brown (5YR 6/4).	damp	6,9,18 N=27	
									Terminated at 4.50 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: **Caden Pengelly**

Checked By: **Ted Lilly**

Date: **15/09/2021**

Date: **18/10/2021**

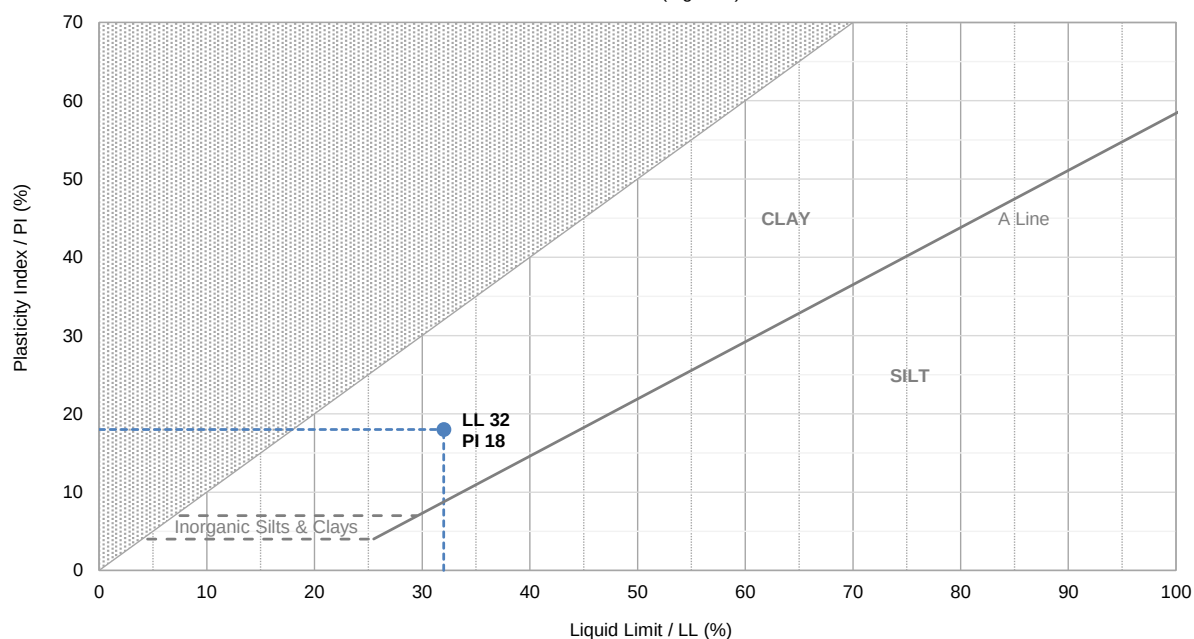
ATTACHMENT C

SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	Source	BH5
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70765-PI
Job No.	S21351-1	Lab No.	S70765
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	10/09/2021
Preparation	Prepared in accordance with the test method	Date Tested	30/09/2021

Plasticity Chart for Classification of Fine-Grained Soils

AS 1726:2017 Clause 6.1.6 (Figure 5)



Preparation	Results
Method of Preparation	Liquid Limit / LL (%)
History of the Sample	Plastic Limit (%)
	Plasticity Index / PI (%)
	Linear Shrinkage (%)
	Condition upon Drying

Notes



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

Chris Lloyd

6/10/2021

Date:

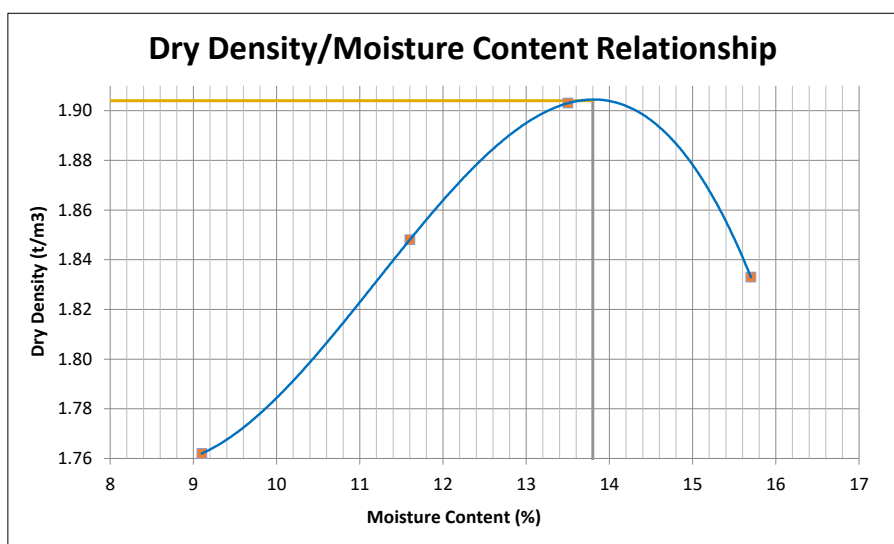


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U7/8 10 Bradford Street
Alexandria NSW 2015

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	Source	BH5
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No	S70765-MDD
Job No	S21351-1	Sample No	S70765

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	10/09/2021
Preparation	Prepared in accordance with the test method	Date Tested	27/09/2021



Maximum Dry Density (t/m³)	1.904
Optimum Moisture Content (%)	13.8
Oversize Retained on 19mm sieve (%)	0.0
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	119 hrs
Liquid Limit Determination	Technician Assessment

Notes



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Authorised Signatory:

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6/10/2021

Date:

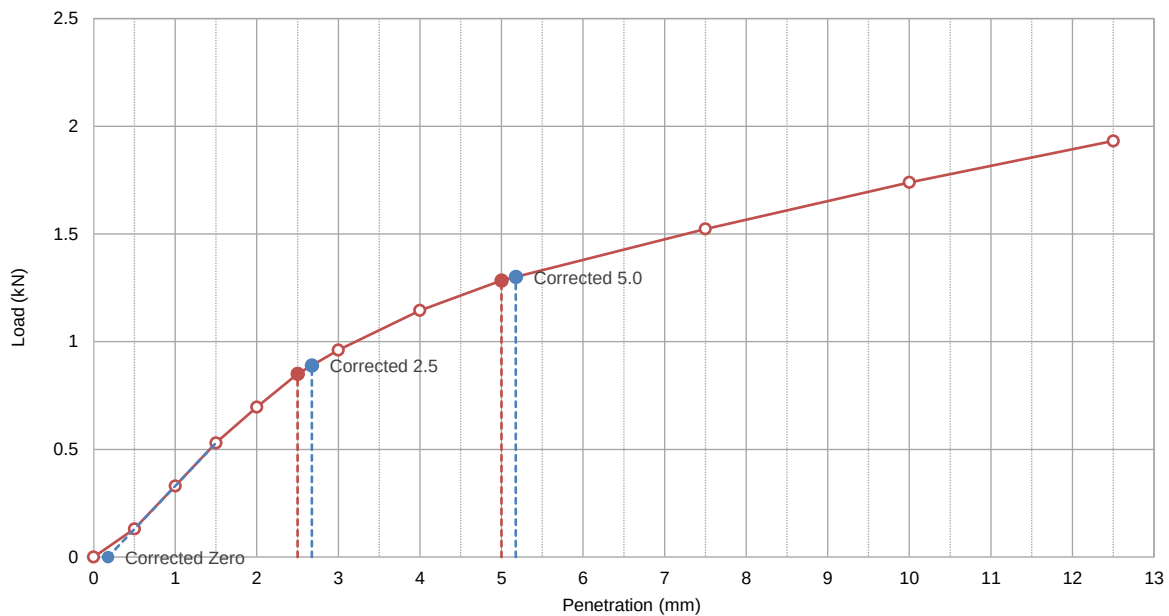


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CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	Source	BH5
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70765-CBR
Job No.	S21351-1	Sample No.	S70765

Test Procedure	☒ AS 1289.6.1.1 ☐ RMS T117 ☒ AS 1289.5.1.1 ☐ RMS T111 ☐ AS 1289.5.2.1 ☐ RMS T112 ☒ AS 1289.2.1.1 ☐ RMS T120	California Bearing Ratio Dry Density / Moisture Content Relationship - Standard Compaction Dry Density / Moisture Content Relationship - Modified Compaction Moisture Content - Oven Drying Method (Standard Method)
Sampling	Sampled by Client - results apply to the sample as received	Date Sampled 10/09/2021
Preparation	Prepared in accordance with the test method	Date Tested 5/10/2021



Preparation & Specification		Density & Moisture		Achieved	Target
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)	101.0	100.0	
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)	99.5	100.0	
Sample Curing Time (hrs)	55 hrs	Dry Density - At Compaction (t/m³)	1.89	1.90	
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)	1.89		
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)	0.3		
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)	14.0		
Maximum Dry Density - MDD (t/m³)	1.90	Moisture Content - Top 30mm (%)	15.8		
Optimum Moisture Content - OMC (%)	13.8	Moisture Content - Remainder (%)	14.2		

Material CBR Value (%): 7 at a penetration of 2.5 mm

Notes



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

6/10/2021

Chris Lloyd

Date:



Macquarie Geotechnical
 U7/8 10 Bradford Street
 Alexandria NSW 2015

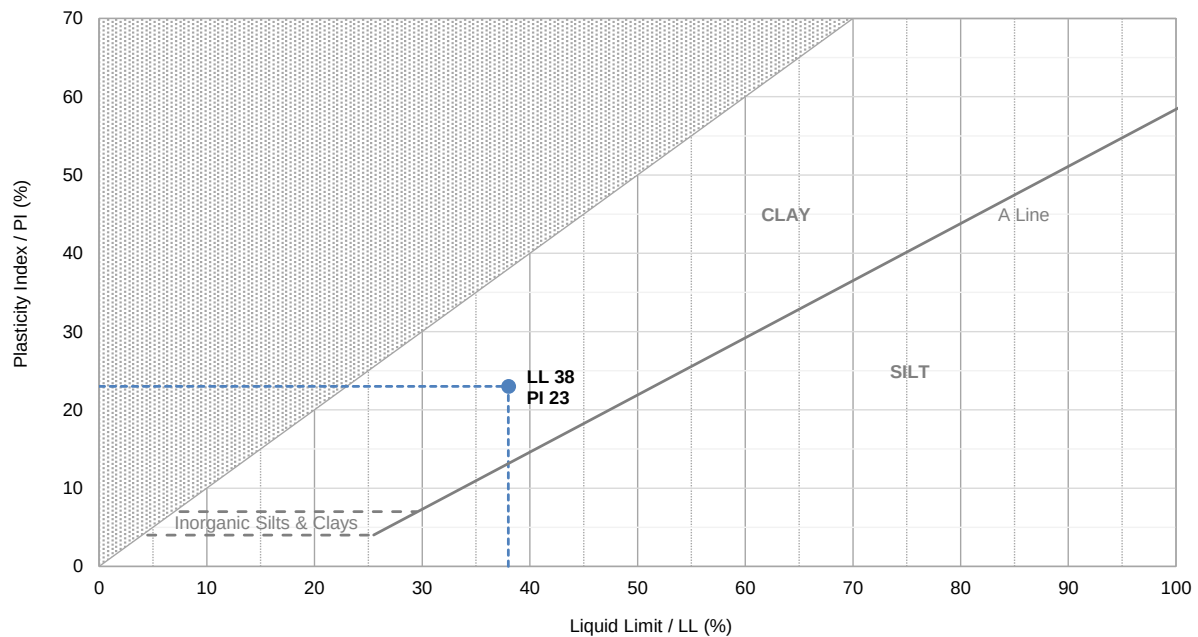
SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	Source	BH6
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70766-PI
Job No.	S21351-1	Lab No.	S70766

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	Date Sampled	10/09/2021
Sampling	Sampled by Client - results apply to the sample as received	Date Tested	30/09/2021
Preparation	Prepared in accordance with the test method		

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 (%)	38
History of the Sample	Air Dried	Plastic Limit (%)	15
		Plasticity Index / PI (%)	23
		Linear Shrinkage (%)	11.5
		Condition upon Drying	Linear

Notes



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NATA Accredited Laboratory Number: 14874

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Chris Lloyd

Chris Lloyd

6/10/2021

Date:

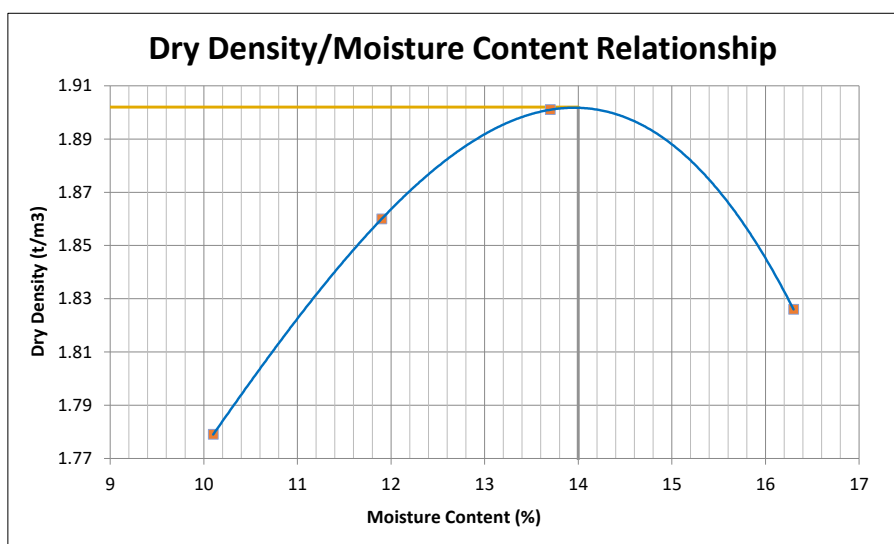


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DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	Source	BH6
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No	S70766-MDD
Job No	S21351-1	Sample No	S70766

Test Procedure	☒ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction	Date Sampled	10/09/2021
	☒ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)	Date Tested	27/09/2021
Sampling	Sampled by Client - results apply to the sample as received		
Preparation	Prepared in accordance with the test method		



Maximum Dry Density (t/m³)	1.902
Optimum Moisture Content (%)	14.0
Oversize Retained on 19mm sieve (%)	0.0
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	123 hrs
Liquid Limit Determination	Technician Assessment

Notes



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Authorised Signatory:

Chris Lloyd

6/10/2021

Date:

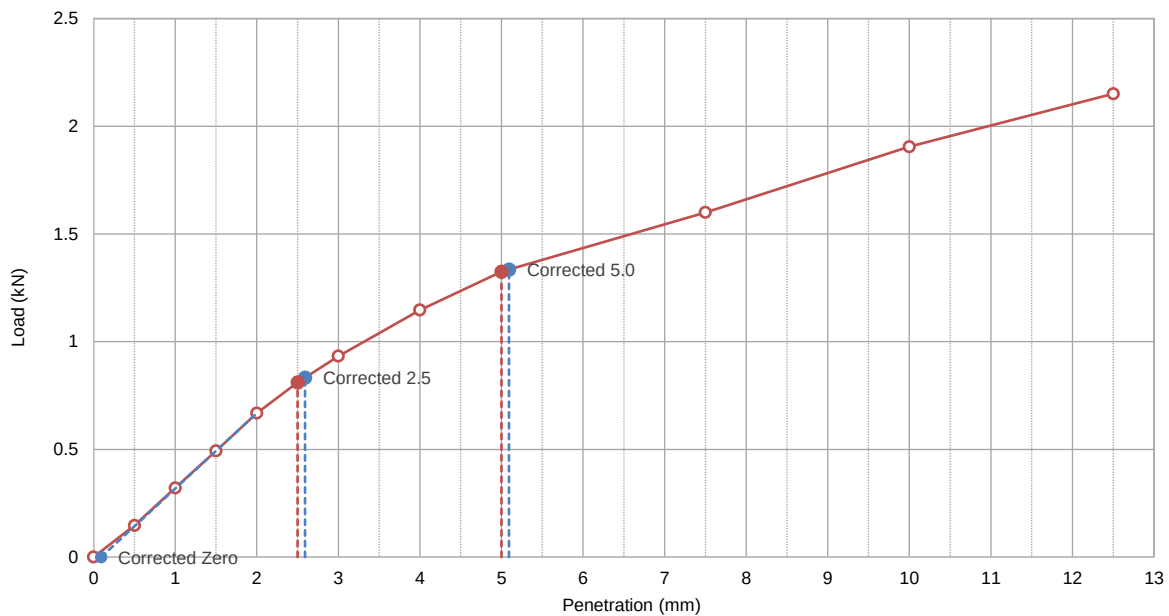


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CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	Source	BH6
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70766-CBR
Job No.	S21351-1	Sample No.	S70766

Test Procedure	☒ AS 1289.6.1.1 ☐ RMS T117 ☒ AS 1289.5.1.1 ☐ RMS T111 ☐ AS 1289.5.2.1 ☐ RMS T112 ☒ AS 1289.2.1.1 ☐ RMS T120	California Bearing Ratio Dry Density / Moisture Content Relationship - Standard Compaction Dry Density / Moisture Content Relationship - Modified Compaction Moisture Content - Oven Drying Method (Standard Method)
Sampling	Sampled by Client - results apply to the sample as received	Date Sampled 10/09/2021
Preparation	Prepared in accordance with the test method	Date Tested 5/10/2021



Preparation & Specification		Density & Moisture		Achieved	Target
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)		98.5	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)		100.5	100.0
Sample Curing Time (hrs)	52 hrs	Dry Density - At Compaction (t/m³)		1.91	1.90
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)		1.88	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)		1.5	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)		13.8	
Maximum Dry Density - MDD (t/m³)	1.90	Moisture Content - Top 30mm (%)		18.4	
Optimum Moisture Content - OMC (%)	14.0	Moisture Content - Remainder (%)		14.7	

Material CBR Value (%): 7 at a penetration of 5.0 mm

Notes



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

6/10/2021

Chris Lloyd

Date:



Macquarie Geotechnical
 U7/8 10 Bradford Street
 Alexandria NSW 2015

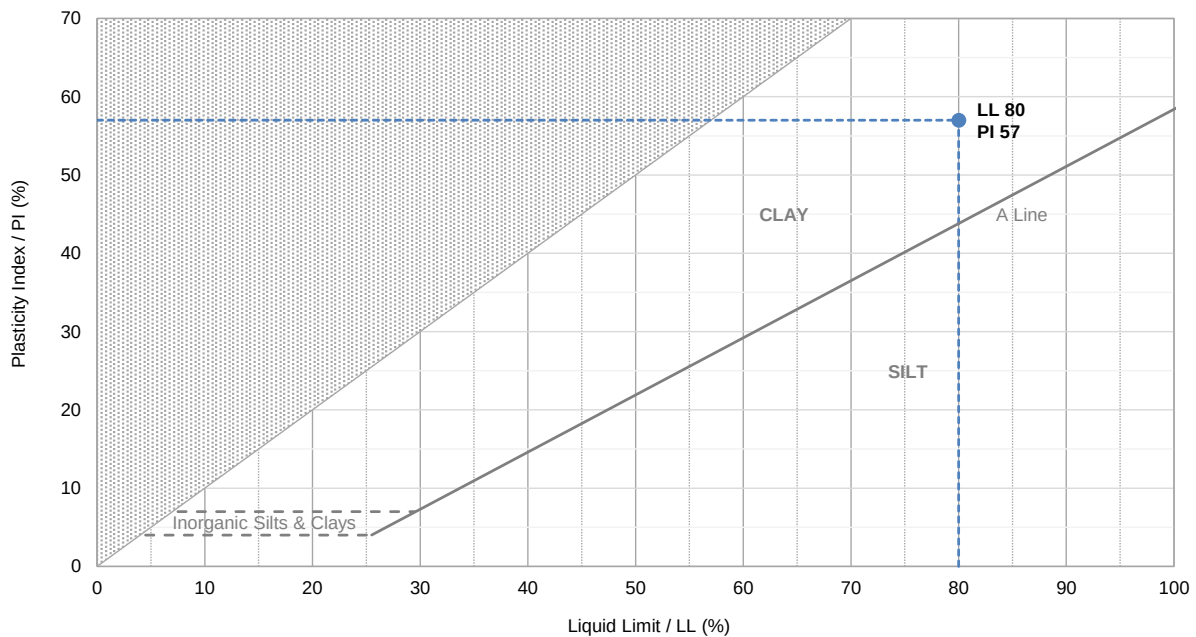
SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	Source	BH8
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70767-PI
Job No.	S21351-1	Lab No.	S70767

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	Date Sampled	14/09/2021
Sampling	Sampled by Client - results apply to the sample as received	Date Tested	28/09/2021
Preparation	Prepared in accordance with the test method		

Plasticity Chart for Classification of Fine-Grained Soils

AS 1726:2017 Clause 6.1.6 (Figure 5)



Preparation	Results
Method of Preparation	Liquid Limit / LL (%)
History of the Sample	Plastic Limit (%)
	Plasticity Index / PI (%)
	Linear Shrinkage (%)
	Condition upon Drying

Notes	
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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

Chris Lloyd

8/10/2021

Date:

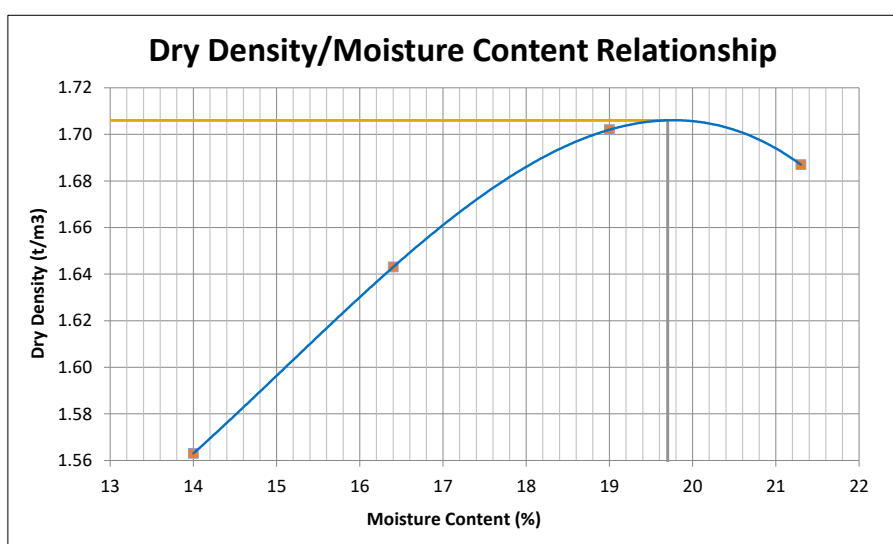


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 U7/8 10 Bradford Street
 Alexandria NSW 2015

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	Source	BH8
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No	S70767-MDD
Job No	S21351-1	Sample No	S70767

Test Procedure	☒ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction	Date Sampled	14/09/2021
	☒ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)	Date Tested	27/09/2021
Sampling	Sampled by Client - results apply to the sample as received		
Preparation	Prepared in accordance with the test method		



Maximum Dry Density (t/m³)	1.706
Optimum Moisture Content (%)	19.7
Oversize Retained on 19mm sieve (%)	0.0
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	98 hrs
Liquid Limit Determination	Technician Assessment

Notes



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

8/10/2021

Date:

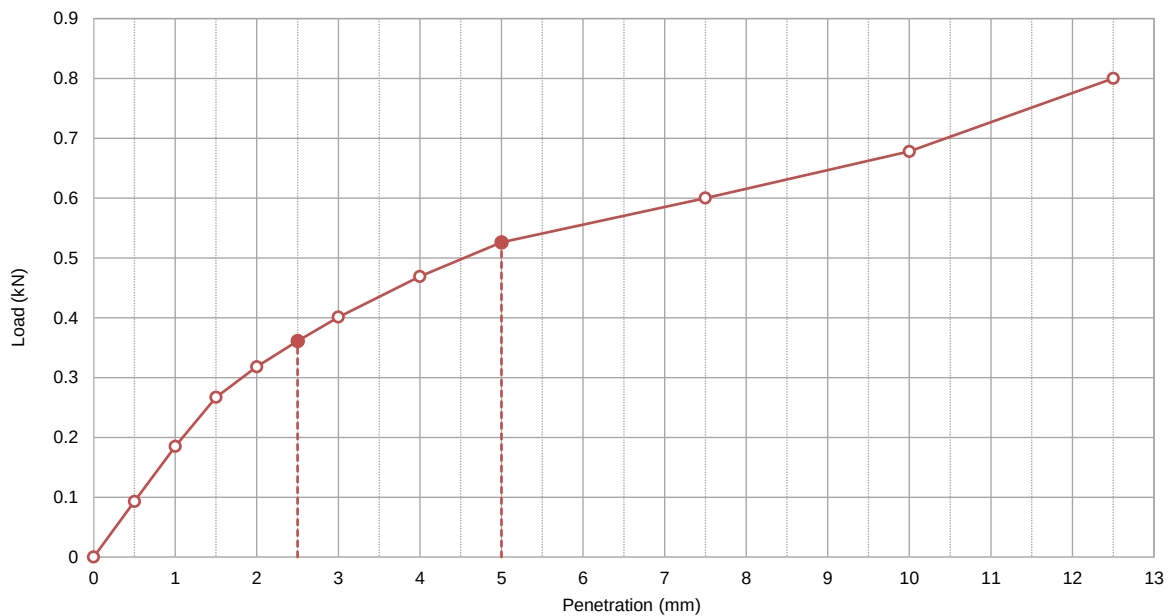


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U7/8 10 Bradford Street
Alexandria NSW 2015

CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	Source	BH8
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70767-CBR
Job No.	S21351-1	Sample No.	S70767

Test Procedure	☒ AS 1289.6.1.1 ☐ RMS T117 ☒ AS 1289.5.1.1 ☐ RMS T111 ☐ AS 1289.5.2.1 ☐ RMS T112 ☒ AS 1289.2.1.1 ☐ RMS T120	California Bearing Ratio Dry Density / Moisture Content Relationship - Standard Compaction Dry Density / Moisture Content Relationship - Modified Compaction Moisture Content - Oven Drying Method (Standard Method)
Sampling	Sampled by Client - results apply to the sample as received	Date Sampled 14/09/2021
Preparation	Prepared in accordance with the test method	Date Tested 7/10/2021



Preparation & Specification		Density & Moisture		Achieved	Target
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)		99.0	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)		99.0	100.0
Sample Curing Time (hrs)	121 hrs	Dry Density - At Compaction (t/m³)		1.69	1.71
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)		1.62	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)		4.4	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)		19.5	
Maximum Dry Density - MDD (t/m³)	1.71	Moisture Content - Top 30mm (%)		29.0	
Optimum Moisture Content - OMC (%)	19.7	Moisture Content - Remainder (%)		21.8	

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

Notes



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

8/10/2021

Chris Lloyd

Date:

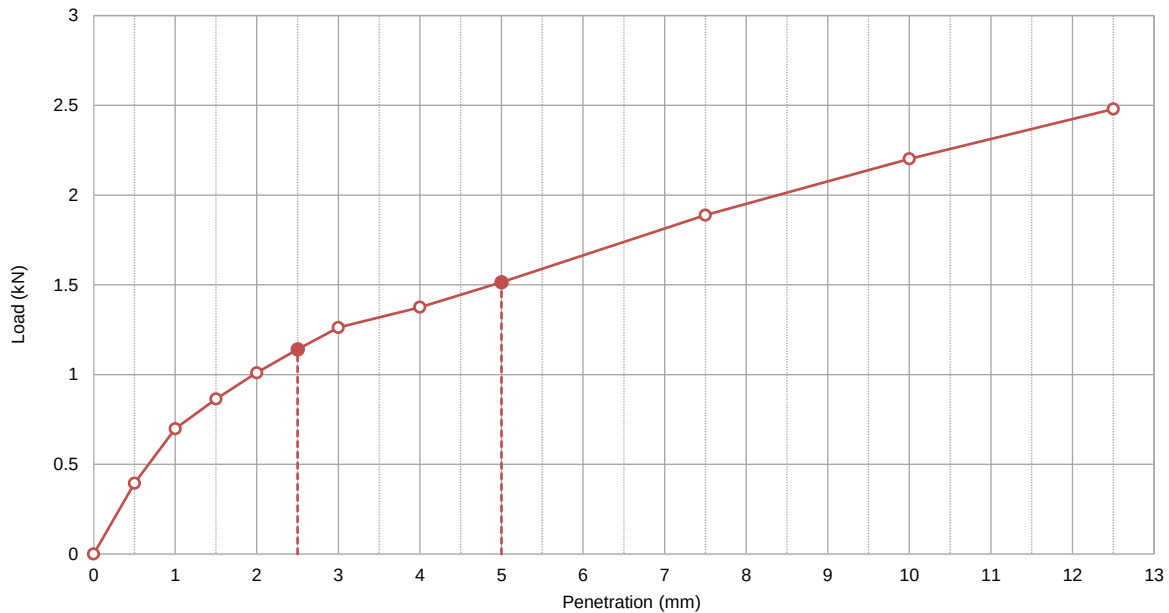


Macquarie Geotechnical
 U7/8 10 Bradford Street
 Alexandria NSW 2015

CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	Source	BH11
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70768-CBR
Job No.	S21351-1	Sample No.	S70768

Test Procedure	☒ AS 1289.6.1.1 ☐ RMS T117 ☒ AS 1289.5.1.1 ☐ RMS T111 ☐ AS 1289.5.2.1 ☐ RMS T112 ☒ AS 1289.2.1.1 ☐ RMS T120	California Bearing Ratio Dry Density / Moisture Content Relationship - Standard Compaction Dry Density / Moisture Content Relationship - Modified Compaction Moisture Content - Oven Drying Method (Standard Method)
Sampling	Sampled by Client - results apply to the sample as received	Date Sampled 15/09/2021
Preparation	Prepared in accordance with the test method	Date Tested 5/10/2021



Preparation & Specification		Density & Moisture		Achieved	Target
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)		101.0	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)		100.0	100.0
Sample Curing Time (hrs)	72 hrs	Dry Density - At Compaction (t/m³)		1.82	1.82
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)		1.81	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)		0.8	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)		15.0	
Maximum Dry Density - MDD (t/m³)	1.82	Moisture Content - Top 30mm (%)		20.1	
Optimum Moisture Content - OMC (%)	14.8	Moisture Content - Remainder (%)		16.1	

Material CBR Value (%): 9 at a penetration of 2.5 mm

Notes



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NATA Accredited Laboratory Number: 14874

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6/10/2021

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Date:

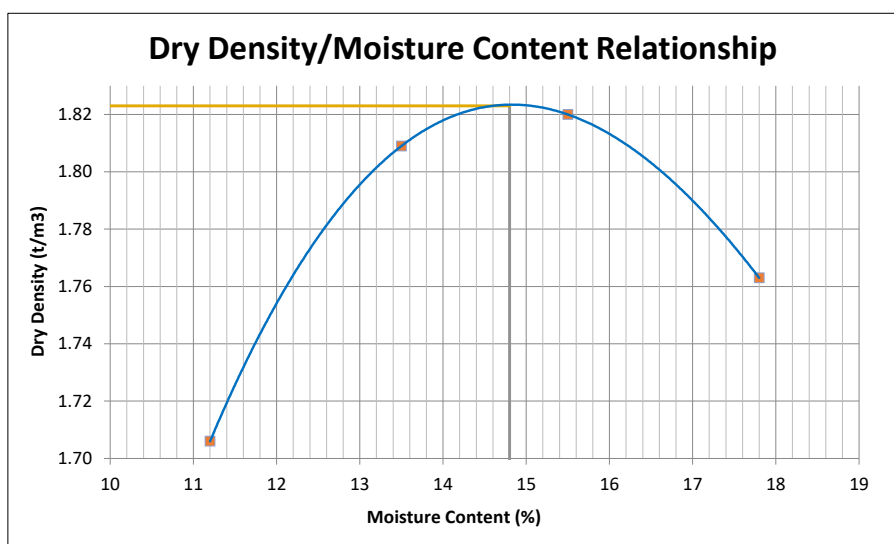


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DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	Source	BH11
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No	S70768-MDD
Job No	S21351-1	Sample No	S70768

Test Procedure	☒ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction	Date Sampled	15/09/2021
	☒ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)	Date Tested	27/09/2021
Sampling	Sampled by Client - results apply to the sample as received		
Preparation	Prepared in accordance with the test method		



Maximum Dry Density (t/m³)	1.823
Optimum Moisture Content (%)	14.8
Oversize Retained on 19mm sieve (%)	0.0
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	90 hrs
Liquid Limit Determination	Technician Assessment

Notes



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Authorised Signatory:

Chris Lloyd

6/10/2021

Date:



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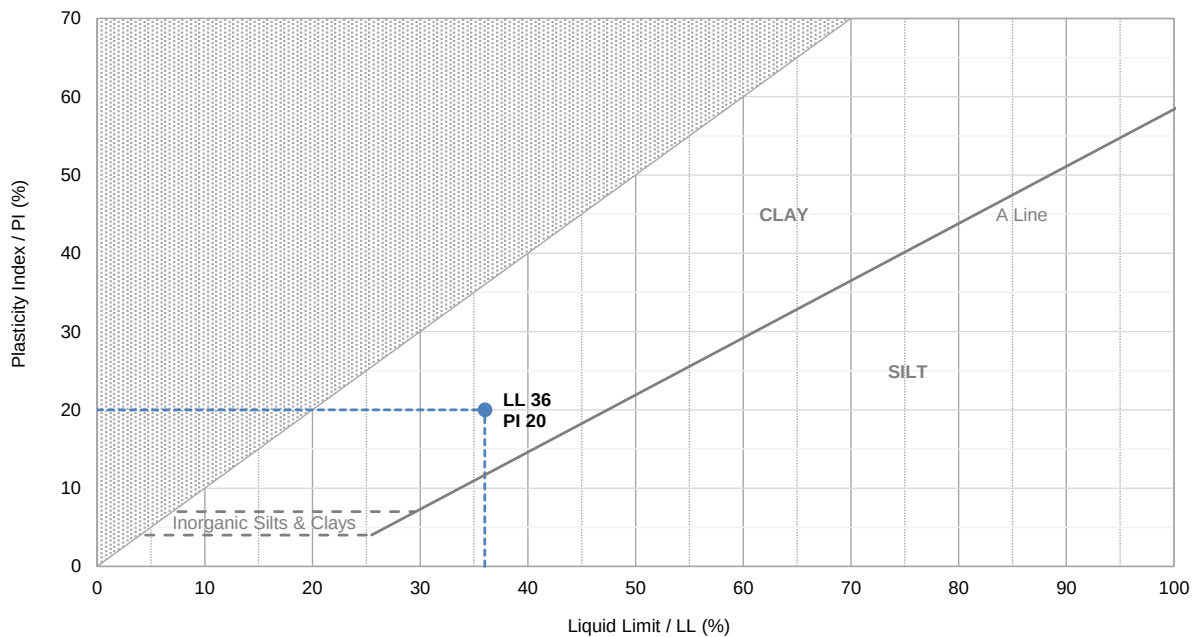
SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	Source	BH11
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70768-PI
Job No.	S21351-1	Lab No.	S70768

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	Date Sampled	15/09/2021
Sampling	Sampled by Client - results apply to the sample as received	Date Tested	30/09/2021
Preparation	Prepared in accordance with the test method		

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 (%)	36
History of the Sample	Air Dried	Plastic Limit (%)	16
		Plasticity Index / PI (%)	20
		Linear Shrinkage (%)	10.5
		Condition upon Drying	Linear

Notes



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Chris Lloyd

6/10/2021

Date:

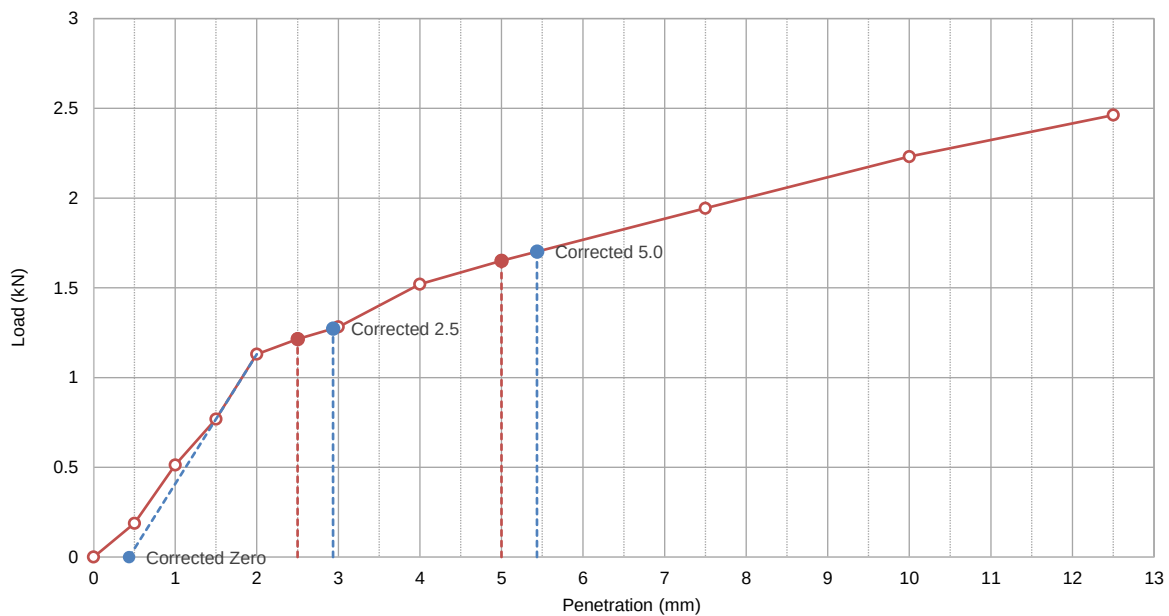


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Alexandria NSW 2015

CALIFORNIA BEARING RATIO REPORT

Client	Geo-Logix Pty Ltd	Source	BH12
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70769-CBR
Job No.	S21351-1	Sample No.	S70769

Test Procedure	☒ AS 1289.6.1.1 ☐ RMS T117 ☒ AS 1289.5.1.1 ☐ RMS T111 ☐ AS 1289.5.2.1 ☐ RMS T112 ☒ AS 1289.2.1.1 ☐ RMS T120	California Bearing Ratio Dry Density / Moisture Content Relationship - Standard Compaction Dry Density / Moisture Content Relationship - Modified Compaction Moisture Content - Oven Drying Method (Standard Method)
Sampling	Sampled by Client - results apply to the sample as received	Date Sampled 15/09/2021
Preparation	Prepared in accordance with the test method	Date Tested 5/10/2021



Preparation & Specification		Density & Moisture		Achieved	Target
Retained on 19.0mm Sieve (%)	0	Lab Moisture Ratio - LMR (%)		100.0	100.0
Method of Establishing Plasticity Level	Technician Assessment	Lab Density Ratio - LDR (%)		100.0	100.0
Sample Curing Time (hrs)	68 hrs	Dry Density - At Compaction (t/m³)		1.77	1.77
Compaction Hammer Used	Standard	Dry Density - After Soaking (t/m³)		1.76	
Surcharge Mass Applied (kg)	4.5	Specimen Swell (%)		0.6	
Period of Soaking (Days)	4	Moisture Content - At Compaction (%)		16.5	
Maximum Dry Density - MDD (t/m³)	1.77	Moisture Content - Top 30mm (%)		20.5	
Optimum Moisture Content - OMC (%)	16.5	Moisture Content - Remainder (%)		17.6	

Material CBR Value (%): 10 at a penetration of 2.5 mm

Notes



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Authorised Signatory:

6/10/2021

Chris Lloyd

Date:

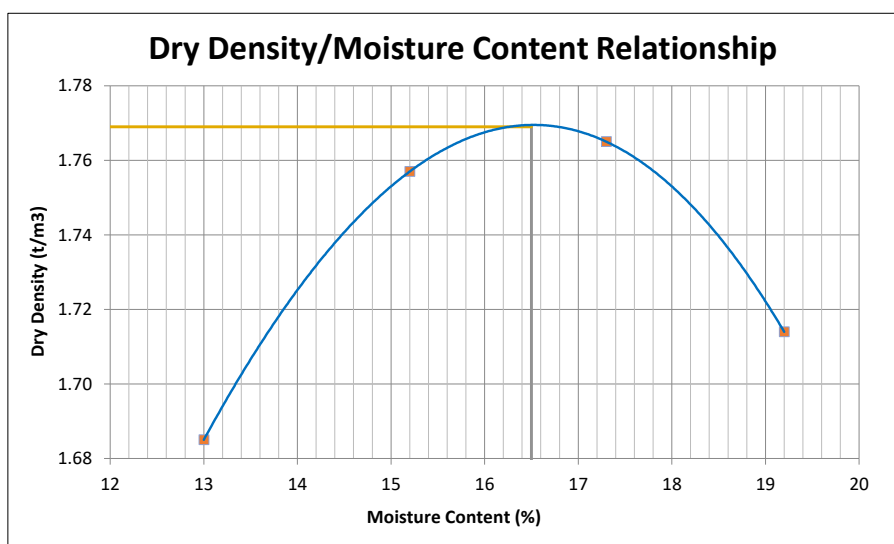


Macquarie Geotechnical
 U7/8 10 Bradford Street
 Alexandria NSW 2015

DRY DENSITY / OPTIMUM MOISTURE CONTENT REPORT

Client	Geo-Logix Pty Ltd	Source	BH12
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No	S70769-MDD
Job No	S21351-1	Sample No	S70769

Test Procedure	☒ AS1289.5.1.1 Dry Density / Moisture Content Relationship - Standard Compaction	Date Sampled	15/09/2021
	☒ AS1289.2.1.1 Moisture Content - Oven Drying Method (Standard Method)	Date Tested	27/09/2021
Sampling	Sampled by Client - results apply to the sample as received		
Preparation	Prepared in accordance with the test method		



Maximum Dry Density (t/m³)	1.769
Optimum Moisture Content (%)	16.5
Oversize Retained on 19mm sieve (%)	0.0
Oversize Retained on 37.5mm sieve (%)	0.0
Curing Time	112 hrs
Liquid Limit Determination	Technician Assessment

Notes



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Authorised Signatory:

Chris Lloyd

6/10/2021

Date:



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U7/8 10 Bradford Street
Alexandria NSW 2015

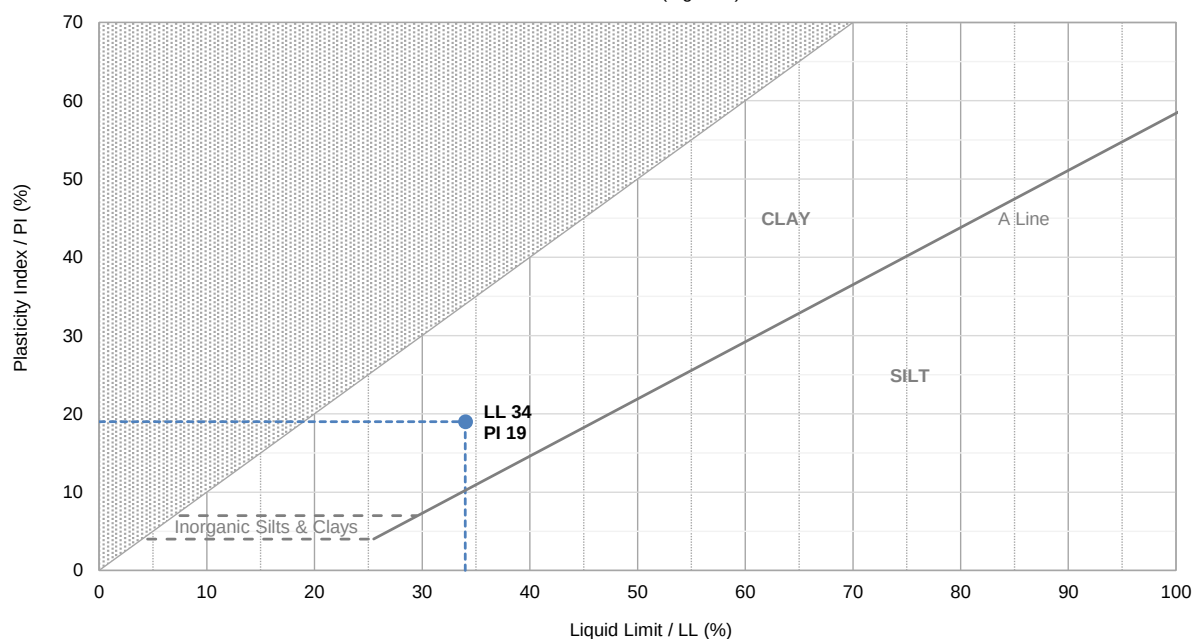
SOIL CLASSIFICATION REPORT

Client	Geo-Logix Pty Ltd	Source	BH12
Address	Building Q2, Level 3, 2309/4 Daydream St, Warriewood, NSW 2102	Sample Description	Silty CLAY
Project	Wyong (2101104)	Report No.	S70769-PI
Job No.	S21351-1	Lab No.	S70769

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	Date Sampled	15/09/2021
Sampling	Sampled by Client - results apply to the sample as received	Date Tested	30/09/2021
Preparation	Prepared in accordance with the test method		

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 (%)	34
History of the Sample	Air Dried	Plastic Limit (%)	15
		Plasticity Index / PI (%)	19
		Linear Shrinkage (%)	9.5
		Condition upon Drying	Linear

Notes



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NATA Accredited Laboratory Number: 14874

Authorised Signatory:

Chris Lloyd

Chris Lloyd

6/10/2021

Date:



Macquarie Geotechnical
U7/8 10 Bradford Street
Alexandria NSW 2015

Geo-Logix P/L
Bld Q2 Level 3, 2309/4 Daydream St
Warriewood
NSW 2102



NATA Accredited
Accreditation Number 1261
Site Number 18217

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NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention: **Ted Lilly**

Report **825621-S**
Project name **WYONG**
Project ID **2101104**
Received Date **Sep 17, 2021**

Client Sample ID			BH1B/1.2	BH1C/1.3	BH2/0.3	BH3/0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37803	S21-Se37804	S21-Se37805	S21-Se37806
Date Sampled			Sep 13, 2021	Sep 13, 2021	Sep 15, 2021	Sep 14, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	-	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	-	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	-	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	-	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	-	< 50	< 50
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	-	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	-	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	-	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	-	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	-	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	-	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	-	< 100	< 100
BTEX						
Benzene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	-	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	93	-	106	99
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5

Client Sample ID			BH1B/1.2 Soil S21-Se37803 Sep 13, 2021	BH1C/1.3 Soil S21-Se37804 Sep 13, 2021	BH2/0.3 Soil S21-Se37805 Sep 15, 2021	BH3/0.5 Soil S21-Se37806 Sep 14, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	-	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	62	-	75	103
p-Terphenyl-d14 (surr.)	1	%	67	-	81	98
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
α-HCH	0.05	mg/kg	< 0.05	-	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	-	< 0.05	< 0.05
β-HCH	0.05	mg/kg	< 0.05	-	< 0.05	< 0.05
δ-HCH	0.05	mg/kg	< 0.05	-	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	-	< 0.05	< 0.05
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
γ-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	< 0.05
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
Dibutylchlorodate (surr.)	1	%	64	-	87	120
Tetrachloro-m-xylene (surr.)	1	%	65	-	79	103
Heavy Metals						
Arsenic	2	mg/kg	< 2	-	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	-	< 0.4	< 0.4
Chromium	5	mg/kg	11	-	12	9.6
Copper	5	mg/kg	5.6	-	< 5	< 5
Lead	5	mg/kg	5.5	-	5.5	5.1
Mercury	0.1	mg/kg	< 0.1	-	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	-	< 5	< 5
Zinc	5	mg/kg	12	-	6.1	6.5
% Moisture	1	%	17	24	19	11

Client Sample ID			BH1B/1.2	BH1C/1.3	BH2/0.3	BH3/0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37803	S21-Se37804	S21-Se37805	S21-Se37806
Date Sampled			Sep 13, 2021	Sep 13, 2021	Sep 15, 2021	Sep 14, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	6.7	-	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	3.6	-	-
Reaction Ratings* ^{S05}	0	-	-	4.0	-	-

Client Sample ID			BH4/0.5	BH5/0.5	BH6/0.5	BH6/1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37807	S21-Se37808	S21-Se37809	S21-Se37810
Date Sampled			Sep 15, 2021	Sep 10, 2021	Sep 10, 2021	Sep 10, 2021
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	-
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	-
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	-
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	-
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	-
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	< 20	-
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	< 50	-
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	-
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	-
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	-
4-Bromofluorobenzene (surr.)	1	%	90	92	66	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-

Client Sample ID			BH4/0.5	BH5/0.5	BH6/0.5	BH6/1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37807	S21-Se37808	S21-Se37809	S21-Se37810
Date Sampled			Sep 15, 2021	Sep 10, 2021	Sep 10, 2021	Sep 10, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	56	86	80	-
p-Terphenyl-d14 (surr.)	1	%	63	95	87	-
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	< 0.05	-
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	< 0.05	-
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	-
Dibutylchloroendate (surr.)	1	%	76	116	84	-
Tetrachloro-m-xylene (surr.)	1	%	63	92	93	-
Heavy Metals						
Arsenic	2	mg/kg	< 2	3.2	3.8	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	-
Chromium	5	mg/kg	14	20	19	-
Copper	5	mg/kg	9.2	8.1	14	-
Lead	5	mg/kg	< 5	6.5	7.9	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	-
Nickel	5	mg/kg	13	10	15	-
Zinc	5	mg/kg	18	19	41	-
% Moisture	1	%	9.6	15	16	15
Chloride	10	mg/kg	-	-	180	160
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	-	240	130
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	-	7.5	6.2
Resistivity*	0.5	ohm.m	-	-	42	78
Sulphate (as SO4)	10	mg/kg	-	-	330	120

Client Sample ID			BH6/2.5 Soil S21-Se37811 Sep 10, 2021	BH6/4.0 Soil S21-Se37812 Sep 10, 2021	BH7/0.5 Soil S21-Se37813 Sep 10, 2021	BH8/0.5 Soil S21-Se37814 Sep 14, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	-	-	< 20	< 20
TRH C10-C14	20	mg/kg	-	-	< 20	< 20
TRH C15-C28	50	mg/kg	-	-	110	< 50
TRH C29-C36	50	mg/kg	-	-	160	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	270	< 50
Naphthalene ^{N02}	0.5	mg/kg	-	-	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	-	-	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	-	< 20	< 20
TRH >C10-C16	50	mg/kg	-	-	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	-	< 50	< 50
TRH >C16-C34	100	mg/kg	-	-	210	< 100
TRH >C34-C40	100	mg/kg	-	-	160	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	370	< 100
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	-	110	83
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	1.2	1.2
Acenaphthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Chrysene	0.5	mg/kg	-	-	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluorene	0.5	mg/kg	-	-	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	-	-	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	-	-	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	-	95	90
p-Terphenyl-d14 (surr.)	1	%	-	-	90	97
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	< 0.1	< 0.1
4,4'-DDD	0.05	mg/kg	-	-	< 0.05	< 0.05
4,4'-DDE	0.05	mg/kg	-	-	< 0.05	< 0.05
4,4'-DDT	0.05	mg/kg	-	-	< 0.05	< 0.05

Client Sample ID			BH6/2.5	BH6/4.0	BH7/0.5	BH8/0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37811	S21-Se37812	S21-Se37813	S21-Se37814
Date Sampled			Sep 10, 2021	Sep 10, 2021	Sep 10, 2021	Sep 14, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
a-HCH	0.05	mg/kg	-	-	< 0.05	< 0.05
Aldrin	0.05	mg/kg	-	-	< 0.05	< 0.05
b-HCH	0.05	mg/kg	-	-	< 0.05	< 0.05
d-HCH	0.05	mg/kg	-	-	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	-	-	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	-	-	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	-	-	< 0.05	< 0.05
g-HCH (Lindane)	0.05	mg/kg	-	-	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	-	-	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	-	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	-	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	-	-	< 0.05	< 0.05
Toxaphene	0.5	mg/kg	-	-	< 0.5	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	< 0.1	< 0.1
Dibutylchloroendate (surr.)	1	%	-	-	96	116
Tetrachloro-m-xylene (surr.)	1	%	-	-	94	94
Heavy Metals						
Arsenic	2	mg/kg	-	-	2.6	13
Cadmium	0.4	mg/kg	-	-	< 0.4	< 0.4
Chromium	5	mg/kg	-	-	21	48
Copper	5	mg/kg	-	-	5.2	< 5
Lead	5	mg/kg	-	-	15	12
Mercury	0.1	mg/kg	-	-	< 0.1	< 0.1
Nickel	5	mg/kg	-	-	11	< 5
Zinc	5	mg/kg	-	-	13	6.9
% Moisture	1	%	16	16	34	19
Chloride	10	mg/kg	32	34	-	53
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	37	60	-	74
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.8	5.8	-	5.1
Resistivity*	0.5	ohm.m	270	170	-	130
Sulphate (as SO4)	10	mg/kg	28	43	-	94

Client Sample ID			BH8/1.2 Soil S21-Se37815 Sep 14, 2021	BH8/2.5 Soil S21-Se37816 Sep 14, 2021	BH8/4.0 Soil S21-Se37817 Sep 14, 2021	BH9/0.5 Soil S21-Se37818 Sep 14, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	-	-	-	< 20
TRH C10-C14	20	mg/kg	-	-	-	< 20
TRH C15-C28	50	mg/kg	-	-	-	< 50
TRH C29-C36	50	mg/kg	-	-	-	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	-	< 50
Naphthalene ^{N02}	0.5	mg/kg	-	-	-	< 0.5
TRH C6-C10	20	mg/kg	-	-	-	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	-	-	< 20
TRH >C10-C16	50	mg/kg	-	-	-	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	-	-	< 50
TRH >C16-C34	100	mg/kg	-	-	-	< 100
TRH >C34-C40	100	mg/kg	-	-	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	-	< 100
BTEX						
Benzene	0.1	mg/kg	-	-	-	< 0.1
Toluene	0.1	mg/kg	-	-	-	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	-	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	-	< 0.2
o-Xylene	0.1	mg/kg	-	-	-	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	-	-	82
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	-	1.2
Acenaphthene	0.5	mg/kg	-	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	-	< 0.5
Anthracene	0.5	mg/kg	-	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	-	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	-	-	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	-	-	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Chrysene	0.5	mg/kg	-	-	-	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	-	-	-	< 0.5
Fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Fluorene	0.5	mg/kg	-	-	-	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	-	-	-	< 0.5
Naphthalene	0.5	mg/kg	-	-	-	< 0.5
Phenanthrene	0.5	mg/kg	-	-	-	< 0.5
Pyrene	0.5	mg/kg	-	-	-	< 0.5
Total PAH*	0.5	mg/kg	-	-	-	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	-	-	76
p-Terphenyl-d14 (surr.)	1	%	-	-	-	80
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	-	< 0.1
4,4'-DDD	0.05	mg/kg	-	-	-	< 0.05
4,4'-DDE	0.05	mg/kg	-	-	-	< 0.05
4,4'-DDT	0.05	mg/kg	-	-	-	< 0.05

Client Sample ID			BH8/1.2	BH8/2.5	BH8/4.0	BH9/0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37815	S21-Se37816	S21-Se37817	S21-Se37818
Date Sampled			Sep 14, 2021	Sep 14, 2021	Sep 14, 2021	Sep 14, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
a-HCH	0.05	mg/kg	-	-	-	< 0.05
Aldrin	0.05	mg/kg	-	-	-	< 0.05
b-HCH	0.05	mg/kg	-	-	-	< 0.05
d-HCH	0.05	mg/kg	-	-	-	< 0.05
Dieldrin	0.05	mg/kg	-	-	-	< 0.05
Endosulfan I	0.05	mg/kg	-	-	-	< 0.05
Endosulfan II	0.05	mg/kg	-	-	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	-	-	-	< 0.05
Endrin	0.05	mg/kg	-	-	-	< 0.05
Endrin aldehyde	0.05	mg/kg	-	-	-	< 0.05
Endrin ketone	0.05	mg/kg	-	-	-	< 0.05
g-HCH (Lindane)	0.05	mg/kg	-	-	-	< 0.05
Heptachlor	0.05	mg/kg	-	-	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	-	-	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	-	-	-	< 0.05
Methoxychlor	0.05	mg/kg	-	-	-	< 0.05
Toxaphene	0.5	mg/kg	-	-	-	< 0.5
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	-	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	-	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	-	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	-	< 0.1
Dibutylchlorobenzene (surr.)	1	%	-	-	-	82
Tetrachloro-m-xylene (surr.)	1	%	-	-	-	77
Heavy Metals						
Arsenic	2	mg/kg	-	-	-	6.3
Cadmium	0.4	mg/kg	-	-	-	< 0.4
Chromium	5	mg/kg	-	-	-	23
Copper	5	mg/kg	-	-	-	< 5
Lead	5	mg/kg	-	-	-	< 5
Mercury	0.1	mg/kg	-	-	-	< 0.1
Nickel	5	mg/kg	-	-	-	< 5
Zinc	5	mg/kg	-	-	-	< 5
% Moisture	1	%	18	16	16	17
Chloride	10	mg/kg	44	200	590	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	74	190	400	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.2	5.6	5.9	-
Resistivity*	0.5	ohm.m	130	53	25	-
Sulphate (as SO4)	10	mg/kg	97	110	120	-

Client Sample ID			BH10/0.5 Soil S21-Se37819 Sep 15, 2021	BH11/0.4 Soil S21-Se37820 Sep 15, 2021	BH11/1.0 Soil S21-Se37821 Sep 15, 2021	BH11/2.4 Soil S21-Se37822 Sep 15, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	-	-
TRH C10-C14	20	mg/kg	< 20	< 20	-	-
TRH C15-C28	50	mg/kg	< 50	< 50	-	-
TRH C29-C36	50	mg/kg	< 50	< 50	-	-
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	-	-
Naphthalene ^{N02}	0.5	mg/kg	< 0.5	< 0.5	-	-
TRH C6-C10	20	mg/kg	< 20	< 20	-	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	< 20	< 20	-	-
TRH >C10-C16	50	mg/kg	< 50	< 50	-	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	< 50	< 50	-	-
TRH >C16-C34	100	mg/kg	< 100	< 100	-	-
TRH >C34-C40	100	mg/kg	< 100	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	-
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	-
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	-
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	-	-
4-Bromofluorobenzene (surr.)	1	%	90	89	-	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	-	-
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(g,h,i)perylene	0.5	mg/kg	< 0.5	< 0.5	-	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Chrysene	0.5	mg/kg	< 0.5	< 0.5	-	-
Dibenz(a,h)anthracene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	-	-
Fluorene	0.5	mg/kg	< 0.5	< 0.5	-	-
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	-	-
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Pyrene	0.5	mg/kg	< 0.5	< 0.5	-	-
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	-	-
2-Fluorobiphenyl (surr.)	1	%	91	97	-	-
p-Terphenyl-d14 (surr.)	1	%	98	98	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	-	-
4,4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	-
4,4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	-
4,4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-	-

Client Sample ID			BH10/0.5	BH11/0.4	BH11/1.0	BH11/2.4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37819	S21-Se37820	S21-Se37821	S21-Se37822
Date Sampled			Sep 15, 2021	Sep 15, 2021	Sep 15, 2021	Sep 15, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
a-HCH	0.05	mg/kg	< 0.05	< 0.05	-	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
b-HCH	0.05	mg/kg	< 0.05	< 0.05	-	-
d-HCH	0.05	mg/kg	< 0.05	< 0.05	-	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	-
g-HCH (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	-
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	-	-
Toxaphene	0.5	mg/kg	< 0.5	< 0.5	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	-	-
Dibutylchloroendate (surr.)	1	%	107	89	-	-
Tetrachloro-m-xylene (surr.)	1	%	94	101	-	-
Heavy Metals						
Arsenic	2	mg/kg	2.9	< 2	-	-
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	-
Chromium	5	mg/kg	19	7.9	-	-
Copper	5	mg/kg	11	< 5	-	-
Lead	5	mg/kg	5.2	5.3	-	-
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	-
Nickel	5	mg/kg	17	< 5	-	-
Zinc	5	mg/kg	22	54	-	-
% Moisture	1	%	14	16	12	15
Chloride	10	mg/kg	-	12	18	160
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	40	89	140
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	6.3	5.8	5.5
Resistivity*	0.5	ohm.m	-	250	110	74
Sulphate (as SO4)	10	mg/kg	-	< 10	120	110

Client Sample ID			BH11/4.0 Soil S21-Se37823 Sep 15, 2021	BH12/0.5 Soil S21-Se37824 Sep 15, 2021	BH12/1.0 Soil S21-Se37825 Sep 15, 2021	BH12/2.7 Soil S21-Se37826 Sep 15, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	-	< 20	-	-
TRH C10-C14	20	mg/kg	-	< 20	-	-
TRH C15-C28	50	mg/kg	-	< 50	-	-
TRH C29-C36	50	mg/kg	-	< 50	-	-
TRH C10-C36 (Total)	50	mg/kg	-	< 50	-	-
Naphthalene ^{N02}	0.5	mg/kg	-	< 0.5	-	-
TRH C6-C10	20	mg/kg	-	< 20	-	-
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	< 20	-	-
TRH >C10-C16	50	mg/kg	-	< 50	-	-
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	< 50	-	-
TRH >C16-C34	100	mg/kg	-	< 100	-	-
TRH >C34-C40	100	mg/kg	-	< 100	-	-
TRH >C10-C40 (total)*	100	mg/kg	-	< 100	-	-
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	-	-
Toluene	0.1	mg/kg	-	< 0.1	-	-
Ethylbenzene	0.1	mg/kg	-	< 0.1	-	-
m&p-Xylenes	0.2	mg/kg	-	< 0.2	-	-
o-Xylene	0.1	mg/kg	-	< 0.1	-	-
Xylenes - Total*	0.3	mg/kg	-	< 0.3	-	-
4-Bromofluorobenzene (surr.)	1	%	-	78	-	-
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	< 0.5	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	0.6	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	1.2	-	-
Acenaphthene	0.5	mg/kg	-	< 0.5	-	-
Acenaphthylene	0.5	mg/kg	-	< 0.5	-	-
Anthracene	0.5	mg/kg	-	< 0.5	-	-
Benz(a)anthracene	0.5	mg/kg	-	< 0.5	-	-
Benzo(a)pyrene	0.5	mg/kg	-	< 0.5	-	-
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	< 0.5	-	-
Benzo(g,h,i)perylene	0.5	mg/kg	-	< 0.5	-	-
Benzo(k)fluoranthene	0.5	mg/kg	-	< 0.5	-	-
Chrysene	0.5	mg/kg	-	< 0.5	-	-
Dibenz(a,h)anthracene	0.5	mg/kg	-	< 0.5	-	-
Fluoranthene	0.5	mg/kg	-	< 0.5	-	-
Fluorene	0.5	mg/kg	-	< 0.5	-	-
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	-	< 0.5	-	-
Naphthalene	0.5	mg/kg	-	< 0.5	-	-
Phenanthrene	0.5	mg/kg	-	< 0.5	-	-
Pyrene	0.5	mg/kg	-	< 0.5	-	-
Total PAH*	0.5	mg/kg	-	< 0.5	-	-
2-Fluorobiphenyl (surr.)	1	%	-	108	-	-
p-Terphenyl-d14 (surr.)	1	%	-	105	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4,4'-DDD	0.05	mg/kg	-	< 0.05	-	-
4,4'-DDE	0.05	mg/kg	-	< 0.05	-	-
4,4'-DDT	0.05	mg/kg	-	< 0.05	-	-

Client Sample ID			BH11/4.0	BH12/0.5	BH12/1.0	BH12/2.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37823	S21-Se37824	S21-Se37825	S21-Se37826
Date Sampled			Sep 15, 2021	Sep 15, 2021	Sep 15, 2021	Sep 15, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
a-HCH	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-HCH	0.05	mg/kg	-	< 0.05	-	-
d-HCH	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	< 0.05	-	-
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-HCH (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	-
Methoxychlor	0.05	mg/kg	-	< 0.05	-	-
Toxaphene	0.5	mg/kg	-	< 0.5	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchloroendate (surr.)	1	%	-	102	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	111	-	-
Heavy Metals						
Arsenic	2	mg/kg	-	2.1	-	-
Cadmium	0.4	mg/kg	-	< 0.4	-	-
Chromium	5	mg/kg	-	16	-	-
Copper	5	mg/kg	-	< 5	-	-
Lead	5	mg/kg	-	5.4	-	-
Mercury	0.1	mg/kg	-	< 0.1	-	-
Nickel	5	mg/kg	-	< 5	-	-
Zinc	5	mg/kg	-	8.5	-	-
% Moisture	1	%	13	18	16	15
Chloride	10	mg/kg	530	< 10	16	130
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	380	29	29	130
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.2	5.5	5.5	6.1
Resistivity*	0.5	ohm.m	27	340	340	80
Sulphate (as SO4)	10	mg/kg	100	42	32	67

Client Sample ID			BH12/4.0 Soil S21-Se37827 Sep 15, 2021	BH13/0.5 Soil S21-Se37828 Sep 10, 2021	BH15/0.5 Soil S21-Se37829 Sep 15, 2021	DS1 Soil S21-Se37830 Sep 15, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	-	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	-	< 20	< 20	52
TRH C15-C28	50	mg/kg	-	< 50	< 50	54
TRH C29-C36	50	mg/kg	-	120	< 50	83
TRH C10-C36 (Total)	50	mg/kg	-	120	< 50	189
Naphthalene ^{N02}	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	-	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1) ^{N04}	20	mg/kg	-	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	-	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2) ^{N01}	50	mg/kg	-	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	-	110	< 100	100
TRH >C34-C40	100	mg/kg	-	110	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	220	< 100	100
BTEX						
Benzene	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	-	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	135	85	96
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene ^{N07}	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Benzo(g,h,i)perylene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Dibenz(a,h)anthracene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	-	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	100	78	70
p-Terphenyl-d14 (surr.)	1	%	-	97	78	73
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

Client Sample ID			BH12/4.0	BH13/0.5	BH15/0.5	DS1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37827	S21-Se37828	S21-Se37829	S21-Se37830
Date Sampled			Sep 15, 2021	Sep 10, 2021	Sep 15, 2021	Sep 15, 2021
Test/Reference	LOR	Unit				
Organochlorine Pesticides						
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	< 0.05
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	< 0.05
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
Dibutylchloroendate (surr.)	1	%	-	116	88	80
Tetrachloro-m-xylene (surr.)	1	%	-	104	82	76
Heavy Metals						
Arsenic	2	mg/kg	-	< 2	2.7	< 2
Cadmium	0.4	mg/kg	-	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	-	6.0	18	5.9
Copper	5	mg/kg	-	< 5	< 5	< 5
Lead	5	mg/kg	-	< 5	6.3	< 5
Mercury	0.1	mg/kg	-	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	-	< 5	< 5	< 5
Zinc	5	mg/kg	-	< 5	8.1	< 5
% Moisture	1	%	14	17	15	17
Chloride	10	mg/kg	120	-	-	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	110	-	-	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	6.1	-	-	-
Resistivity*	0.5	ohm.m	92	-	-	-
Sulphate (as SO4)	10	mg/kg	70	-	-	-

Client Sample ID			BH2/3.5	BH3/4.0	BH5/2.7	BH13/1.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-Se37831	S21-Se37832	S21-Se37858	S21-Se37859
Date Sampled			Sep 15, 2021	Sep 14, 2021	Sep 10, 2021	Sep 10, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	5.4	5.5	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	5.2	4.7	4.3
Reaction Ratings* ^{S05}	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH14/2.0	BH7/2.0
Sample Matrix			Soil	Soil
Eurofins Sample No.			S21-Se37860	S21-Se38008
Date Sampled			Sep 10, 2021	Sep 10, 2021
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	6.6	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	3.7
Reaction Ratings* ^{S05}	0	-	2.0	1.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B9			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Sep 23, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 23, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Sep 23, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Sydney	Sep 23, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Sydney	Sep 23, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organochlorine Pesticides	Sydney	Sep 23, 2021	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Metals M8	Sydney	Sep 23, 2021	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Sydney	Sep 18, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Chloride	Sydney	Sep 23, 2021	28 Days
- Method: In-house method LTM-INO-4270 Anions by Ion Chromatography			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Sydney	Sep 23, 2021	7 Days
- Method: LTM-INO-4030 Conductivity			
pH (1:5 Aqueous extract at 25°C as rec.)	Sydney	Sep 23, 2021	7 Days
- Method: LTM-GEN-7090 pH by ISE			
Sulphate (as SO ₄)	Sydney	Sep 23, 2021	28 Days
- Method: In-house method LTM-INO-4270 Sulphate by Ion Chromatograph			
Acid Sulfate Soils Field pH Test	Sydney	Sep 24, 2021	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			

Company Name:	Geo-Logix P/L	Order No.:	TBA	Received:	Sep 17, 2021 9:35 AM
Address:	Bld Q2 Level 3, 2309/4 Daydream St Warriewood NSW 2102	Report #:	825621	Due:	Sep 24, 2021
		Phone:	02 9979 1722	Priority:	5 Day
		Fax:	02 9979 1222	Contact Name:	Ted Lilly
Project Name:	WYONG				
Project ID:	2101104				

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set	Eurofins Suite B9
Melbourne Laboratory - NATA # 1261 Site # 1254										
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794										
Mayfield Laboratory - NATA # 1261 Site # 25079										
Perth Laboratory - NATA # 2377 Site # 2370										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	BH1B/1.2	Sep 13, 2021		Soil	S21-Se37803				X	X
2	BH1C/1.3	Sep 13, 2021		Soil	S21-Se37804		X		X	
3	BH2/0.3	Sep 15, 2021		Soil	S21-Se37805				X	X
4	BH3/0.5	Sep 14, 2021		Soil	S21-Se37806				X	X
5	BH4/0.5	Sep 15, 2021		Soil	S21-Se37807				X	X
6	BH5/0.5	Sep 10, 2021		Soil	S21-Se37808				X	X
7	BH6/0.5	Sep 10, 2021		Soil	S21-Se37809			X	X	X
8	BH6/1.0	Sep 10, 2021		Soil	S21-Se37810			X	X	
9	BH6/2.5	Sep 10, 2021		Soil	S21-Se37811			X	X	

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Warriewood
NSW 2102

Project Name: WYONG
Project ID: 2101104

Order No.: TBA
Report #: 825621
Phone: 02 9979 1722
Fax: 02 9979 1222

Received: Sep 17, 2021 9:35 AM
Due: Sep 24, 2021
Priority: 5 Day
Contact Name: Ted Lilly

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Acid Sulfate Soils Field pH Test	Aggressivity Soil Set	Moisture Set	Eurofins Suite B9
Melbourne Laboratory - NATA # 1261 Site # 1254										
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794										
Mayfield Laboratory - NATA # 1261 Site # 25079										
Perth Laboratory - NATA # 2377 Site # 2370										
External Laboratory										
10	BH6/4.0	Sep 10, 2021		Soil	S21-Se37812			X	X	
11	BH7/0.5	Sep 10, 2021		Soil	S21-Se37813				X	X
12	BH8/0.5	Sep 14, 2021		Soil	S21-Se37814			X	X	X
13	BH8/1.2	Sep 14, 2021		Soil	S21-Se37815			X	X	
14	BH8/2.5	Sep 14, 2021		Soil	S21-Se37816			X	X	
15	BH8/4.0	Sep 14, 2021		Soil	S21-Se37817			X	X	
16	BH9/0.5	Sep 14, 2021		Soil	S21-Se37818				X	X
17	BH10/0.5	Sep 15, 2021		Soil	S21-Se37819				X	X
18	BH11/0.4	Sep 15, 2021		Soil	S21-Se37820			X	X	X
19	BH11/1.0	Sep 15, 2021		Soil	S21-Se37821			X	X	
20	BH11/2.4	Sep 15, 2021		Soil	S21-Se37822			X	X	

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Melbourne Laboratory - NATA # 1261 Site # 1254										
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794										
Mayfield Laboratory - NATA # 1261 Site # 25079										
Perth Laboratory - NATA # 2377 Site # 2370										
External Laboratory										
21	BH11/4.0	Sep 15, 2021		Soil	S21-Se37823			X	X	
22	BH12/0.5	Sep 15, 2021		Soil	S21-Se37824			X	X	X
23	BH12/1.0	Sep 15, 2021		Soil	S21-Se37825			X	X	
24	BH12/2.7	Sep 15, 2021		Soil	S21-Se37826			X	X	
25	BH12/4.0	Sep 15, 2021		Soil	S21-Se37827			X	X	
26	BH13/0.5	Sep 10, 2021		Soil	S21-Se37828				X	X
27	BH15/0.5	Sep 15, 2021		Soil	S21-Se37829				X	X
28	DS1	Sep 15, 2021		Soil	S21-Se37830				X	X
29	BH2/3.5	Sep 15, 2021		Soil	S21-Se37831		X			
30	BH3/4.0	Sep 14, 2021		Soil	S21-Se37832		X			
31	BH1A/1.5	Sep 13, 2021		Soil	S21-Se37833	X				

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Melbourne Laboratory - NATA # 1261 Site # 1254										
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794										
Mayfield Laboratory - NATA # 1261 Site # 25079										
Perth Laboratory - NATA # 2377 Site # 2370										
External Laboratory										
32	BH2/1.0	Sep 15, 2021		Soil	S21-Se37834	X				
33	BH2/2.5	Sep 15, 2021		Soil	S21-Se37835	X				
34	BH2/4.0	Sep 15, 2021		Soil	S21-Se37836	X				
35	BH3/1.2	Sep 14, 2021		Soil	S21-Se37837	X				
36	BH3/2.7	Sep 14, 2021		Soil	S21-Se37838	X				
37	BH4/1.2	Sep 15, 2021		Soil	S21-Se37839	X				
38	BH4/2.5	Sep 15, 2021		Soil	S21-Se37840	X				
39	BH4/4.3	Sep 15, 2021		Soil	S21-Se37841	X				
40	BH7/1.0	Sep 10, 2021		Soil	S21-Se37842	X				
41	BH7/2.5	Sep 10, 2021		Soil	S21-Se37843	X				
42	BH7/4.0	Sep 10, 2021		Soil	S21-Se37844	X				

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Melbourne Laboratory - NATA # 1261 Site # 1254										
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794										
Mayfield Laboratory - NATA # 1261 Site # 25079										
Perth Laboratory - NATA # 2377 Site # 2370										
External Laboratory										
43	BH9/1.2	Sep 14, 2021		Soil	S21-Se37845	X				
44	BH9/2.7	Sep 14, 2021		Soil	S21-Se37846	X				
45	BH9/4.2	Sep 14, 2021		Soil	S21-Se37847	X				
46	BH10/1.2	Sep 15, 2021		Soil	S21-Se37848	X				
47	BH10/2.5	Sep 15, 2021		Soil	S21-Se37849	X				
48	BH10/4.2	Sep 15, 2021		Soil	S21-Se37850	X				
49	BH14/0.5	Sep 10, 2021		Soil	S21-Se37851	X				
50	BH14/1.3	Sep 10, 2021		Soil	S21-Se37852	X				
51	BH14/2.7	Sep 10, 2021		Soil	S21-Se37853	X				
52	BH14/4.0	Sep 10, 2021		Soil	S21-Se37854	X				
53	BH15/1.3	Sep 15, 2021		Soil	S21-Se37855	X				

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Melbourne Laboratory - NATA # 1261 Site # 1254										
Sydney Laboratory - NATA # 1261 Site # 18217						X	X	X	X	X
Brisbane Laboratory - NATA # 1261 Site # 20794										
Mayfield Laboratory - NATA # 1261 Site # 25079										
Perth Laboratory - NATA # 2377 Site # 2370										
External Laboratory										
54	BH15/2.5	Sep 15, 2021		Soil	S21-Se37856	X				
55	BH15/4.0	Sep 15, 2021		Soil	S21-Se37857	X				
56	BH5/2.7	Sep 10, 2021		Soil	S21-Se37858		X			
57	BH13/1.3	Sep 10, 2021		Soil	S21-Se37859		X			
58	BH14/2.0	Sep 10, 2021		Soil	S21-Se37860		X			
59	BH7/2.0	Sep 10, 2021		Soil	S21-Se38008		X			
60	BH12/3.5	Sep 15, 2021		Soil	S21-Se38009	X				
Test Counts						26	7	16	28	15

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NC	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g,h,i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4,4'-DDD	mg/kg	< 0.05			0.05	Pass	
4,4'-DDE	mg/kg	< 0.05			0.05	Pass	
4,4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-HCH	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-HCH	mg/kg	< 0.05			0.05	Pass	
d-HCH	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-HCH (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Conductivity (1:5 aqueous extract at 25°C as rec.)	uS/cm	< 10			10	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	94			70-130	Pass	
Naphthalene	%	120			70-130	Pass	
TRH C6-C10	%	94			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	102			70-130	Pass	
Toluene	%	104			70-130	Pass	
Ethylbenzene	%	100			70-130	Pass	
m&p-Xylenes	%	96			70-130	Pass	
o-Xylene	%	98			70-130	Pass	
Xylenes - Total*	%	97			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	82			70-130	Pass	
Acenaphthylene	%	82			70-130	Pass	
Anthracene	%	85			70-130	Pass	
Benz(a)anthracene	%	77			70-130	Pass	
Benzo(a)pyrene	%	80			70-130	Pass	
Benzo(b&j)fluoranthene	%	78			70-130	Pass	
Benzo(g,h,i)perylene	%	77			70-130	Pass	
Benzo(k)fluoranthene	%	89			70-130	Pass	
Chrysene	%	81			70-130	Pass	
Dibenz(a,h)anthracene	%	72			70-130	Pass	
Fluoranthene	%	78			70-130	Pass	
Fluorene	%	85			70-130	Pass	
Indeno(1,2,3-cd)pyrene	%	73			70-130	Pass	
Naphthalene	%	82			70-130	Pass	
Phenanthrene	%	78			70-130	Pass	
Pyrene	%	79			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	75			70-130	Pass	
4,4'-DDD	%	78			70-130	Pass	
4,4'-DDE	%	79			70-130	Pass	
4,4'-DDT	%	84			70-130	Pass	
α-HCH	%	73			70-130	Pass	
Aldrin	%	78			70-130	Pass	
β-HCH	%	72			70-130	Pass	

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
d-HCH				%	76			70-130	Pass	
Dieldrin				%	79			70-130	Pass	
Endosulfan I				%	76			70-130	Pass	
Endosulfan II				%	72			70-130	Pass	
Endosulfan sulphate				%	72			70-130	Pass	
Endrin				%	100			70-130	Pass	
Endrin aldehyde				%	90			70-130	Pass	
Endrin ketone				%	70			70-130	Pass	
g-HCH (Lindane)				%	79			70-130	Pass	
Heptachlor				%	87			70-130	Pass	
Heptachlor epoxide				%	76			70-130	Pass	
Hexachlorobenzene				%	76			70-130	Pass	
Methoxychlor				%	83			70-130	Pass	
LCS - % Recovery										
Heavy Metals										
Arsenic				%	89			80-120	Pass	
Cadmium				%	94			80-120	Pass	
Chromium				%	102			80-120	Pass	
Copper				%	110			80-120	Pass	
Lead				%	100			80-120	Pass	
Mercury				%	109			80-120	Pass	
Nickel				%	108			80-120	Pass	
Zinc				%	105			80-120	Pass	
LCS - % Recovery										
Conductivity (1:5 aqueous extract at 25°C as rec.)				%	103			70-130	Pass	
Resistivity*				%	103			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Total Recoverable Hydrocarbons				Result 1						
TRH C6-C9	S21-Se37553	NCP	%	108				70-130	Pass	
Naphthalene	S21-Se37553	NCP	%	109				70-130	Pass	
TRH C6-C10	S21-Se37553	NCP	%	110				70-130	Pass	
Spike - % Recovery										
BTEX				Result 1						
Benzene	S21-Se37553	NCP	%	114				70-130	Pass	
Toluene	S21-Se37553	NCP	%	95				70-130	Pass	
Ethylbenzene	S21-Se37553	NCP	%	127				70-130	Pass	
m&p-Xylenes	S21-Se38661	NCP	%	118				70-130	Pass	
o-Xylene	S21-Se37553	NCP	%	129				70-130	Pass	
Xylenes - Total*	S21-Se38661	NCP	%	116				70-130	Pass	
Spike - % Recovery										
				Result 1						
Chloride	S21-Se37814	CP	%	92				70-130	Pass	
Sulphate (as SO4)	S21-Se37814	CP	%	92				70-130	Pass	
Spike - % Recovery										
Total Recoverable Hydrocarbons				Result 1						
TRH C6-C9	S21-Se37824	CP	%	118				70-130	Pass	
Naphthalene	S21-Se37824	CP	%	112				70-130	Pass	
TRH C6-C10	S21-Se37824	CP	%	122				70-130	Pass	
Spike - % Recovery										
BTEX				Result 1						
Benzene	S21-Se37824	CP	%	116				70-130	Pass	
Toluene	S21-Se37824	CP	%	99				70-130	Pass	
Ethylbenzene	S21-Se37824	CP	%	128				70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
m&p-Xylenes	S21-Se37824	CP	%	128			70-130	Pass	
o-Xylene	S21-Se37824	CP	%	127			70-130	Pass	
Xylenes - Total*	S21-Se37824	CP	%	128			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S21-Se37829	CP	%	84			75-125	Pass	
Cadmium	S21-Se37829	CP	%	91			75-125	Pass	
Chromium	S21-Se37829	CP	%	104			75-125	Pass	
Copper	S21-Se37829	CP	%	107			75-125	Pass	
Lead	S21-Se37829	CP	%	95			75-125	Pass	
Mercury	S21-Se37829	CP	%	105			75-125	Pass	
Nickel	S21-Se37829	CP	%	107			75-125	Pass	
Zinc	S21-Se37829	CP	%	112			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-Se37803	CP	%	17	18	1.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S21-Se37805	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	S21-Se37805	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S21-Se37805	CP	mg/kg	12	16	26	30%	Pass	
Copper	S21-Se37805	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	S21-Se37805	CP	mg/kg	5.5	6.6	18	30%	Pass	
Mercury	S21-Se37805	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S21-Se37805	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	S21-Se37805	CP	mg/kg	6.1	8.3	30	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C as rec.)	S21-Se37809	CP	uS/cm	240	280	16	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	S21-Se37809	CP	pH Units	7.5	7.6	<1	30%	Pass	
Resistivity*	S21-Se37809	CP	ohm.m	42	35	16	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g,h,i)perylene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a,h)anthracene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1,2,3-cd)pyrene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate								
Organochlorine Pesticides				Result 1	Result 2	RPD		
Chlordanes - Total	S21-Se37813	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
4,4'-DDD	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
4,4'-DDE	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
4,4'-DDT	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
a-HCH	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Aldrin	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
b-HCH	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
d-HCH	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Dieldrin	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan I	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan II	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endosulfan sulphate	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin aldehyde	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Endrin ketone	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
g-HCH (Lindane)	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Heptachlor	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Heptachlor epoxide	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Hexachlorobenzene	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Methoxychlor	S21-Se37813	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass
Toxaphene	S21-Se37813	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	S21-Se37813	CP	%	34	40	18	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD		
TRH C6-C9	S21-Se37552	NCP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C10-C14	S21-Se37814	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	S21-Se37814	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH C29-C36	S21-Se37814	CP	mg/kg	< 50	< 50	<1	30%	Pass
Naphthalene	S21-Se37552	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	S21-Se37552	NCP	mg/kg	< 20	< 20	<1	30%	Pass
TRH >C10-C16	S21-Se37814	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	S21-Se37814	CP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	S21-Se37814	CP	mg/kg	< 100	< 100	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	S21-Se37552	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	S21-Se37552	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	S21-Se37552	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	S21-Se37552	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	S21-Se37552	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	S21-Se37552	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Chloride	S21-Se37814	CP	mg/kg	53	53	1.0	30%	Pass
Sulphate (as SO4)	S21-Se37814	CP	mg/kg	94	91	3.0	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD		
TRH C6-C9	S21-Se37820	CP	mg/kg	< 20	< 20	<1	30%	Pass
Naphthalene	S21-Se37820	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	S21-Se37820	CP	mg/kg	< 20	< 20	<1	30%	Pass

Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	S21-Se37820	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	S21-Se37820	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	S21-Se37820	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	S21-Se37820	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	S21-Se37820	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	S21-Se37820	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Conductivity (1:5 aqueous extract at 25°C as rec.)	S21-Se37822	CP	uS/cm	140	140	<1	30%	Pass
pH (1:5 Aqueous extract at 25°C as rec.)	S21-Se37822	CP	pH Units	5.5	5.5	<1	30%	Pass
Resistivity*	S21-Se37822	CP	ohm.m	74	74	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	S21-Se37823	CP	%	13	16	22	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	S21-Se37824	CP	mg/kg	2.1	3.1	39	30%	Fail
Cadmium	S21-Se37824	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	S21-Se37824	CP	mg/kg	16	17	10	30%	Pass
Copper	S21-Se37824	CP	mg/kg	< 5	< 5	<1	30%	Pass
Lead	S21-Se37824	CP	mg/kg	5.4	5.7	6.0	30%	Pass
Mercury	S21-Se37824	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	S21-Se37824	CP	mg/kg	< 5	< 5	<1	30%	Pass
Zinc	S21-Se37824	CP	mg/kg	8.5	8.6	2.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
Chloride	S21-Se37826	CP	mg/kg	130	130	<1	30%	Pass
Sulphate (as SO4)	S21-Se37826	CP	mg/kg	67	67	1.0	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Ursula Long	Analytical Services Manager
Andrew Sullivan	Senior Analyst-Organic (NSW)
Charl Du Preez	Senior Analyst-Inorganic (NSW)
John Nguyen	Senior Analyst-Metal (NSW)
Roopesh Rangarajan	Senior Analyst-Volatile (NSW)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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Geo-Logix P/L
Bld Q2 Level 3, 2309/4 Daydream St
Warriewood
NSW 2102



NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention: **Caden Pengelly**

Report **828897-S**
Project name **ADDITIONAL-WYONG**
Project ID **2101104**
Received Date **Oct 01, 2021**

Client Sample ID			BH1C/1.3
Sample Matrix			Soil
Eurofins Sample No.			S21-Oc01215
Date Sampled			Sep 13, 2021
Test/Reference	LOR	Unit	
Chromium Suite			
pH-KCL	0.1	pH Units	5.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	16
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.030
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.012
Chromium Reducible Sulfur -acidity units	3	mol H+/t	7.5
Sulfur - KCl Extractable	0.02	% S	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0
HCl Extractable Sulfur	0.02	% S	N/A
Net Acid soluble sulfur	0.02	% S	N/A
Net Acid soluble sulfur - acidity units	10	mol H+/t	N/A
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	N/A
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	N/A
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	N/A
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	N/A
ANC Fineness Factor		factor	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.04
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	23
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	1.8
Extraneous Material			
<2mm Fraction	0.005	g	51
>2mm Fraction	0.005	g	< 0.005
Analysed Material	0.1	%	100
Extraneous Material	0.1	%	< 0.1
% Moisture	1	%	24

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Chromium Reducible Sulfur Suite			
Chromium Suite	Brisbane	Oct 06, 2021	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Oct 06, 2021	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	Oct 01, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

Company Name:	Geo-Logix P/L	Order No.:		Received:	Oct 1, 2021 12:18 PM
Address:	Bld Q2 Level 3, 2309/4 Daydream St Warriewood NSW 2102	Report #:	828897	Due:	Oct 7, 2021
Project Name:	ADDITIONAL-WYONG	Phone:	02 9979 1722	Priority:	3 Day
Project ID:	2101104	Fax:	02 9979 1222	Contact Name:	Caden Pengelly
Eurofins Analytical Services Manager : Ursula Long					

Sample Detail						Chromium Reducible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							X
Brisbane Laboratory - NATA # 1261 Site # 20794						X	
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	BH1C/1.3	Sep 13, 2021		Soil	S21-Oc01215	X	X
Test Counts						1	1

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs..

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Chromium Suite									
pH-KCL			%	101			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	89			80-120	Pass	
Chromium Reducible Sulfur			%	96			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Chromium Suite				Result 1	Result 2	RPD			
pH-KCL	P21-Oc04835	NCP	pH Units	9.7	9.7	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P21-Oc04835	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P21-Oc04835	NCP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Chromium Reducible Sulfur	P21-Oc04835	NCP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P21-Oc04835	NCP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	P21-Oc04835	NCP	% S	N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	P21-Oc04835	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur	P21-Oc04835	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - acidity units	P21-Oc04835	NCP	mol H+/t	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P21-Oc04835	NCP	% S	N/A	N/A	N/A	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P21-Oc04835	NCP	% CaCO3	81	81	<1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P21-Oc04835	NCP	% S	26	26	<1	30%	Pass	
ANC Fineness Factor	P21-Oc04835	NCP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	P21-Oc04835	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	P21-Oc04835	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	P21-Oc04835	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO ₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m ³ in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m ³ '
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl is greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised by:

Ursula Long Analytical Services Manager
Myles Clark Senior Analyst-SPOCAS (QLD)



Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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22 February 2022

Mr Andrew Hollander
Development Manager
Woolworths Ltd
ahollander@woolworths.com.au

SUBJECT: SEARs Response - Acid Sulfate Soils / Soil Salinity

SITE: 11 Warren Road, Warnervale, NSW

Dear Andrew,

It is understood Woolworths is seeking to expand the Wyong Regional Distribution Centre at 11 Warren Road, Warnervale NSW.

An application was submitted to the NSW Planning Secretary SSD-33701741 with associated consultants reports and EIS. The Planning Secretary has responded in writing requesting additional information in their SEARs Letter dated 21 December 2021.

In respect of Geo-Logix discipline (Geotechnical Engineering) the Planning Secretary requested the following items:

- Item 12 last bullet – provide an assessment of salinity and acid sulfate soil impacts

Please find our response below:

In October 2021, Geo-Logix conducted a geotechnical investigation of the site (Geo-Logix 2021), consisting of fourteen soil bores and six test pits, spatially located across the property (Attached Figure). The investigation considered the potential for acid sulfate soils and soil salinity by field screening soils and laboratory analysis of select soil samples. Neither condition exists at the site. Extracts of the report conclusions are presented below:

Section 5.2 (Geo-Logix 2021) – Acid Sulfate Soils Risk

Geo-Logix considers it unlikely that on-site soils are AASS or PASS based on the following lines of evidence:

- Reference to the NSW OEH online ASS risk mapping tool (eSPADE v2.1, 2021) indicates that the site is underlain by soils with no known acid sulfate risk.
- The observed onsite geology comprised potentially alluvial clays in the upper soil profile above the water table and residual clays transitioning to weathered shale with groundwater at soil rock interface. ASS do not occur in this geology;

- Sulfurous odour was identified in only 2 of 14 bore locations. This odour may be indicative of ASS or of coaliferous shale found in the local geology. One of the two odour locations was in shale, making coaliferous shale the more probable odour source;
- If ASS was present onsite soils above the water table would be expected to present strong acidity with a pH less than 4. The recorded pHs of on-site fill native soils above the water table was neutral to slightly acidic;
- During screening tests, the observed oxidation reaction ratings were generally either not present or mild. ASS typically display a strong reaction. The observed pH drops were ambiguous with respect to ASS presence; and
- The single sample displaying a pH drop and reaction was sample BH1C/1.3 from the wetland area. Chromium suite testing of this sample identified Net Acidity slightly greater than the action criteria for large scale land disturbance. However the analysis did not identify reducible sulfur in concentrations characteristic of ASS. Organic acids are considered a more probable source of the acidity identified by testing

An ASS Management Plan is not considered warranted.

Section 5.11 (Geo-Logix 2021) - Salinity Risk

Based on the measured soil electrical conductivity and a soil texture multiplication factor, the site soils are typically non-saline with an extract electrical conductivity (EC_e) less than 2 (Department of Land and Water Conservation NSW, 2002).

Further detail regarding the assessment works are outlined in the report. Geo-Logix concludes there are no acid sulfate soils or saline soils on the site and therefore construction management of those conditions is not required.

Please feel free to contact me should you have any further questions regarding this letter.

Yours sincerely



David Gregory
BSc Hons, R.G, CEnvP# 139
Principal Geologist



Reference: Geo-Logix 2021, Geotechnical Report, Woolworths Wyong Regional Distribution Centre, 11 Warren Road, Warnervale NSW 2259 (2101104GTRpt01FinalV01_19Oct21.doc)

ATTACHED:

Figures

Geotechnical Bore Locations



Key

- Site boundary
- Borehole locations
- Test pit locations

0 50 100 150



Geo-Logix

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SITE MAP

Geotechnical Investigation
11 Warren Road, Warnervale NSW

Project No. 2101104

Figure 2