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Benima Pty Ltd

Douglas Park Memorial Park – Concept Plan and Stage 1

430-490 Douglas Park Drive, Douglas Park

Geotechnical Investigation

Report No 14329/3-AA R3

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CONSULTANT DECLARATION

PROJECT DETAILS	
PROJECT NAME	**Proposed Douglas Park Memorial Park-Concept Plan and Stage 1**
Application number	SSD- 68287712
Address of subject land	430-490 Douglas Park Drive, Douglas Park
Lot / DP	Lot 2 in DP 250359.
APPLICANT DETAILS	
Applicant name	Benima Pty Ltd (ABN 77 003 010 320)
Applicant address	L2, 60 York Street, Sydney NSW 2000
REPORT DETAILS	
Name of report this declaration relates	Geotechnical Investigation Report
Report reference no.	Report No 14329/3-AA R2
Report date	19 May 2025
Company name (inc. ABN / ACN)	Geotechnique Pty Ltd (ABN 64 002 841 063)
Author name	Indra Jworchan
Author qualifications	Doctor of Engineering – Principal Geotechnical Engineer
Author address	1 Lemko Place, Penrith, NSW 2750
DECLARATION BY CONSULTANT	
Name	Indra Jworchan
Registration no.	EA ID 806995
Organisation registered with	Institution of Engineers Australia
Declaration	The undersigned declares that the Geotechnical Investigation Report for the proposed Douglas Park Memorial Park-Concept Plan and Stage 1: • has been prepared in accordance with the following policy, guidelines, or legislative requirements: - Australian Standard AS1726-2017, Geotechnical Investigation - Australian Standard AS2870-2011, Residential Slabs and Footings - Australian Standard AS2159-2009, Piling Design and Installation - Australian Standard AS3798-2007, Guidelines on Earthworks for Commercial and Residential Development. • contains all available information relevant to the geotechnical assessment of the development, activity or infrastructure to which the geotechnical investigation report relates; • does not contain information that is false or misleading; • identifies and addresses the relevant Planning Secretary's environmental assessment requirements (SEARs) for the project; • identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments to which the geotechnical investigation report relates; • contains a consolidated summary of the proposed or necessary mitigation measures
Signature	
Date	19 May 20254

Secretary's Environmental Assessment Requirements (SEAR's reporting)

The Secretary's Environmental Assessment Requirements (SEARs) addressed in tis report are listed below.

Item	SEARS Requirement	Relevant Section of Report
16.0	**Concept Proposal – Ground and Water Conditions** • Assess the suitability of ground conditions for burial and potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion, salinity, and acid sulfate soils. • Provide a Surface and Groundwater Impact Assessment for the Concept Proposal that assesses potential impacts on: ○ surface water resources (quality and quantity) including related infrastructure, hydrology, dependent ecosystems, drainage lines, downstream assets and watercourses. ○ groundwater resources in accordance with the relevant Groundwater Guidelines.	Section 5.2 – Groundwater conditions Section 7.1 – Soil erosion Section 7.2 – Saline soils Section 7.4 – Acid sulphate soils Section 12 – Suitability of ground conditions for proposed development Section 5.2 – Groundwater conditions (Refer to specialist consultant reports for surface and groundwater impact assessments)
14.0	**Stage 1 – Ground and Water Conditions** • Assess the suitability of ground conditions for burial and potential impacts on soil resources and related infrastructure and riparian lands on and near the site, including soil erosion, salinity, and acid sulfate soils. • Provide a Surface and Groundwater Impact Assessments.	Section 5.2 – Groundwater conditions Section 7.1 – Soil erosion Section 7.2 – Saline soils Section 7.4 – Acid sulphate soils Section 13 – Suitability of ground conditions for proposed development Section 5.2 – Groundwater conditions (Refer to specialist consultant reports for surface and groundwater impact assessments)

Referral Agency Requirements

Geotechnical investigation report does not require to address any specific requirement from referral agency

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Job No: 14329/3
Our Ref: 14329/3-AA R3
19 May 2025

Benima Pty Ltd
L2, 60 York Street
SYDNEY NSW 2000
Email: wsinger@htbuilding.com.au

Attention: Mr W Singer

Dear Sir

re: **Proposed Douglas Park Memorial Park-Concept Plan and Stage 1 Detailed Works**
430-490 Douglas Park Drive, Douglas Park
Geotechnical Investigation

This report details the results of a geotechnical investigation carried out for a proposed development at the above site.

The project is seeking approval for a State Significant Development Application (SSDA). Project specific Planning Secretary's Environmental Assessment Requirements (SEARs) have been issued by the Department of Planning, Housing and Infrastructure (DPHI).

A geotechnical investigation was required to assess subsurface conditions across the site to (1) assess soil erosion, salinity and acid sulphate soil (2) address SEARs on the suitability of the ground conditions for cemetery development and (3) assess potential impacts from the proposed development on soil resources and related infrastructure and riparian lands.

If you have any questions, please do not hesitate to contact the undersigned.

Yours faithfully
GEOTECHNIQUE PTY LTD

Dr INDRA JWORCHAN
MIEAust CPEng NER APEC Engineer IntPE(Aus)
Principal Geotechnical Engineer

EXECUTIVE SUMMARY

Geotechnique Pty Ltd prepared this geotechnical investigation report for the proposed Douglas Park Memorial Park – Concept Plan and Stage 1 detailed works, a new multi-denominational cemetery at 430-490 Douglas Park Drive, Douglas Park. Concept approval is sought for the use and operation of the site as a cemetery with a maximum, staged capacity of up to 37,107 burial plots including a crematoria and chapel, vaults, remembrance sanctuaries, general site layout and all associated groundworks, roads, pathways, landscaping and ancillary buildings.

This report is to accompany a State Significant Development Application (SSDA) that seeks approval for a combined Concept Plan approval and Stage 1 detailed works for a new multi-denominational cemetery. The geotechnical investigation indicates the following:

1. The sub-surface profile across the site, including Stage 1, comprises a sequence of topsoil and residual soil underlain by bedrock. Thickness of topsoil is about 200mm and the depth to bedrock varies from about 0.7m to 3.4m from existing ground surface. The depth to bedrock is generally less than 2.0m from existing ground surface except in the southern portion of the site or Stage 1. In general, subsurface materials encountered in test pits and boreholes may be described as follows.
2. Topsoil is silty clay of low to medium plasticity and residual soils include stiff to hard silty clay and sandy clay of medium to high plasticity with layers of medium dense to dense fine grained clayey silty sand. Bedrock is shale with layers of sandstone of very low to very high strength.
3. Proposed development includes three types of burial plots, designated as Shallow Single burial, Single burial and Tripe burial, and design depths of excavations these burials are up to about 1.05m, 1.35m and 2.85m respectively.
4. The proposed sequence of works for the proposed development includes (1) excavation in burial areas to design burial depths mentioned above (2) backfilling the excavated burial areas with controlled fill to recreate existing ground profile (3) provision of an impermeable layer on the backfilled surface (4) spreading a layer of topsoils and (4) excavation of burial plots in backfilled areas when required.
5. Soils likely to be excavated or disturbed during earthworks for the proposed cemetery development works are assessed to be (1) non-saline soils; and (2) not acid sulphate or potential acid sulphate soils. Therefore, site preparation/earthworks for the proposed development may be carried out without need for a Saline Soil Management Plan an Acid Sulphate Soil Management Plan.
6. Soils likely to be excavated or disturbed during earthworks for the proposed cemetery development works are likely to be dispersive and susceptible to excessive erosion. Therefore, earthworks for the proposed development should be carried out in accordance with a Soil Management Plan which ensures that the (1) design of surface water drainage system ensures no concentration of surface water flows that could erode the soils; (2) ground surface is protected from erosion by covering the soils surface by proper grassing and/or other covers (jute, geotextile). In the areas where soil surface could not be grassed or covered, the upper 400mm of soils may be treated with 5% of hydrated lime and compacted in two layers to achieve minimum dry density ration off 95% standard; and (3) an appropriately located sediment basin should be constructed to collect and properly dispose off any possible sediment run-off. Soil Management Plan recommended should also be implemented during earthworks is also applicable to minimise impact of erodible soils during operation of the cemetery.

7. Excavations for the proposed cemetery development is understood to involve about 1.05m to 2.85m deep excavations for burial areas and placement of controlled fill. The materials to be excavated across the site as well as Stage 1 detailed works will include topsoil, residual soils and bedrock. The depth to very low to low strength bedrock across Stage 1 varies from about 0.4m to 1.8m and the depth to medium to very high strength bedrock across Stage 1 varies from about 1.0m to 2.5m from existing ground surface. The design intention is that the existing subsurface materials (specifically bedrock) will first be excavated to design burial depths and then backfilled with controlled fill to recreate existing landform. Burial plots, when required, will be excavated into backfilled materials.

8. Excavations of topsoil, residual soils and very low to low strength bedrock can be achieved using conventional earthmoving equipment such as excavators and dozers. However, excavation into medium to very high strength bedrock will require larger equipment (such as rock saw, Caterpillar D10 or equivalent). Selection of rock cutting equipment should be based on site access, desired smoothness of the excavated rock surface and acceptable ground vibration during rock excavation. Excavated topsoil, residual soils and bedrock should be stockpiled for future uses with and without treatments.

9. Excavations for the proposed development are unlikely to encounter significant groundwater inflow. Minor groundwater inflow, if any, could be managed by a conventional sump and pump method. However, the likely depth to groundwater level and its potential impact on proposed grave excavations should be reassessed by the specialist consultant conducting groundwater investigation.

10. Controlled fill placement will be required for (1) backfilling of excavated burial areas to recreate existing ground profiles (2) preparation of foundations/subgrades for construction of buildings and other structures, car parks, access roads etc and (3) construction of impermeable clay liner at the recreated ground profile.

11. Controlled fill materials for backfilling of excavated burial areas and foundation/subgrade preparation should comprise suitable fill materials placed in layers 200mm to 250mm and compacted to Minimum Dry Density Ratio (MDDR) of 98% Standard, at moisture content within 2% of Optimum Moisture Content (OMC). However, upper 300mm of foundation/subgrade for buildings and car park/access way should be compacted to MDDR of 100% Standard, at moisture content within 2% OMC. Suitable controlled fill materials include residual soils and bedrock obtained from excavations within the site after removal of unsuitable materials (topsoil, organic matters, high plasticity clay etc), if any, crushing to sizes finer than 75mm, and moisture conditioning.

12. Place about 150mm thick layer of impermeable clay liner on the surface of the backfilled compacted controlled fill to prevent infiltration of surface water into compacted backfilled materials. The thickness, compaction level and permeability of impermeable layers should be in accordance with design specification provided by Civil/Groundwater designer.

13. Cut and fill slopes for the proposed development works should be battered for stability or retained with engineered retaining wall designed in accordance with recommendations provided in this report.

14. At the completion of site preparation/earthworks, the foundation materials for structures to be constructed for proposed cemetery development are anticipated to include controlled fill and residual soil. Therefore, floor slabs for the proposed structures may be constructed as ground bearing slabs or suspended slabs supported by footings designed in accordance with recommendations provided in this report. For design of ground floors slabs bearing on controlled fill and/or residual soil, we recommend a Modulus of Subgrade Reaction Value of 25kPa/mm. Alternatively, the ground bearing slabs may be designed for a “Class M” site in accordance with Australian Standard AS2870.

15. Appropriate footings for proposed structures would comprise shallow footings (pad and strip footings) founded on controlled fill or residual soils, or bedrock or deep footings (bored piers) socketed into bedrock. The recommended allowable bearing pressures for design of footings founded on controlled fill and residual soils is 100.0kPa and for footings founded/socketed into bedrock varies from 800.0kPa to 1200.0kPa.

16. Geotechnical investigation indicates that the potential geotechnical risks for the proposed Douglas Park Memorial Park Development - Concept Master Plan and Stage 1 detailed works include (1) variabilities in depths to bedrock of varying strengths and (2) presence of erodible soils. Table 13 in this report provides mitigation measures for these geotechnical risks. Therefore, from geotechnical engineering considerations the site is assessed to be suitable for proposed development.

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TABLE OF CONTENTS

1.0 INTRODUCTION

This geotechnical investigation report has been prepared by Geotechnique Pty Ltd on behalf of Benima Pty Ltd for a combined Concept Plan approval and Stage 1 detailed works for a new multi-denominational cemetery at 430-490 Douglas Park Drive, Douglas Park (Douglas Park Memorial Park – Concept Plan and Stage 1).

The site is located at 430-490 Douglas Park Drive, Douglas Park within the Wollondilly Local Government Area (LGA). The site is irregular in shape with a total size of 16,7940m^2. It is legally described as Lot 2 in DP 250359. The site is mostly vacant with scattered vegetation and a single residential dwelling with driveway accessible from Douglas Park Drive. The site comprises two street frontages, to the east is Mitchell Place and to the west is Douglas Park Drive.

This report accompanies a State Significant Development Application (SSDA) that seeks approval for a combined Concept Plan approval and Stage 1 detailed works for a new multi-denominational cemetery.

Concept approval is sought for the use and operation of the site as a cemetery with a maximum, staged capacity of up to 37,107 burial plots including a crematorium, chapel, vaults, remembrance sanctuaries, general site layout and all associated groundworks, roads, pathways, landscaping and ancillary buildings. Figure 1 is Concept Site Plan.

Figure 1 Concept Site Plan

Stage 1 works comprise the following and Figure 2 shows the extent of Stage 1 works.

- All preparatory site works including vegetation protection, enhancement and removal, demolition of existing structures, bulk excavation for burial zones, general ground works and utility service augmentation;
- Vehicular access/egress from Douglas Park Drive with separate vehicular egress only to Mitchell Place;
- Construction of internal roads, pathways and parking areas for approximately 118 car parking spaces inclusive of 1 hearse car parking space;
- Perimeter memorial pedestrian pathway with remembrance sanctuaries;
- Burial zones with a maximum capacity of 15,447 comprising Shallow, Single and Triple layered burial plots. The burial zone preparation works within Stage 1 will be carried out sequentially within each burial zone and will be based on the demand for burial plots;
- Construction of single storey chapel, single storey administration building and single storey storage shed and garage;
- Site landscaping, fencing, lighting and entry signage; and

Figure 2 Stage 1 Works

The cemetery operating hours, including public access, will be between the hours of 6:00am and 6:00pm, 7 days a week. The opening hours of the Chapel and Administration Building (including café) will be between 8:00am and 5:00pm, 7 days a week.

For a detailed project description refer to the Environmental Impact Statement prepared by Ethos Urban.

Project specific Planning Secretary's Environmental Assessment Requirements (SEARs) have been issued by the Department of Planning, Housing and Infrastructure (DPHI). This geotechnical investigation was required to assess subsurface conditions across the site, including Stage 1, to address SEARs concerning ground conditions in relation to soil erosion, salinity and acid sulphate soils.

This investigation was carried out in general accordance with Geotechnique Pty Ltd proposal IJ/Q10687 Revised dated 31 May 2024 and Australian Standard AS1726 (Reference 1).

2.0 SCOPE OF WORKS

The scope of works for the geotechnical investigation included the following:

- Reviewing available geological, soil landscape, salinity potential and acid sulphate soil risk maps relevant to the site.
- Carrying out a walk over survey to assess existing site conditions.
- Reviewing services plans obtained from "Before You Dig Australia" to determine locations of services across the site.
- Drilling of four boreholes to assess subsurface conditions across the Stage 1.
- Conducting field and laboratory tests to assess nature of subsurface materials (soils and bedrock).
- Preparation of a report detailing assessment of subsurface conditions and geotechnical recommendations for the proposed cemetery development.

3.0 REVIEW OF AVAILABLE INFORMATION

Reference to the Geological Map of Wollongong - Port Hacking (scale 1:100,000) indicates that the bedrock at the central portion of the site is Ashfield Shale, belonging to the Wianamatta Group of rocks and comprising dark grey to black shale and laminate (Reference 2). However, in most portions of the site the bedrock is Hawkesbury sandstone, comprising medium to coarse grained quartz sandstone, very minor shale and laminite lenses.

Reference to the Soil Landscape Map Wollongong - Port Hacking (scale 1:100,000) indicates that the landscape across the site belongs to the Blacktown Group, which is characterised by gently undulating rises on Wianamatta Group shales, with local relief to 30m, ground slopes less than 5 percent, broad rounded crests and gently inclined slopes. The sub-surface soil in this landscape is likely to be up to 3.0m thick, moderately reactive, highly plastic and with poor drainage (Reference 3).

Reference to the Map showing Salinity Potential in Western Sydney, prepared by Department of Infrastructures, Planning and Natural Resources in 2002, indicates very low to moderate salinity potential across the site (Reference 4).

Department of Land and Water Conservation has produced Acid Sulphate Soil Risk Maps for areas with known or potential occurrence of acid sulphate soils in NSW. The site for proposed cemetery is located outside the area with known or probabilities of occurrences of acid sulphate soils across. Therefore, it is unlikely that the proposed development will be impacted by acid sulphate soils.

Geotechnique Pty Ltd completed a geotechnical investigation for concept plan of the proposed cemetery development in 2018 and submitted Report No 14329/1-AA dated 3 October 2018 (Reference 5). Based on information from 34 test pits uniformly distributed across the site and results of laboratory tests on representative soil samples, this report indicates the following:

- The sub-surface profile across the site comprises a sequence of topsoil and residual soil underlain by bedrock. Topsoil is 100mm to 200mm thick and comprised fine to medium grained silty sand. Residual soils include medium to high plasticity silty clay/silty sandy clay and clayey silt/sandy clayey silt of low plasticity. Bedrock across the site varies from shale and sandstone. The depth to bedrock varies from 0.4m to 1.5m from existing ground surface.
- The depth to groundwater level is more than about 2.0m from existing ground surface. It should however be noted that groundwater levels might vary due to rainfall and other factors not evident during field work.
- Soils across the site are generally non-saline but dispersive and susceptible to excessive erosion.
- Infiltration rate of subsurface soils across the site is estimated to be in range of $9.5X10^{-4}$ m/s to $9.5X10^{-4}$ m/s.

Mine subsidence desk study assessment prepared by Rapid Geo (Reference 6) indicates that the following.

- The current risk of mining-induced subsidence in Douglas Park Memorial Park is “Very Low”.
- Due to the depths (between 450.0m to 585.0m) at which coal seams are located, earthworks for the proposed development are unlikely to affect the future mining operation.
- No mining activities are planned beneath the proposed Douglas Park Cemetery or adjacent to the site for at least the next 20 years.

Therefore, the site is considered suitable for the proposed development from mine subsidence consideration provided the development is designed in accordance with recommendations provided in Reference 6.

4.0 FIELD WORKS

Field works for the current geotechnical investigation were carried out during 13 to 17 May 2024 and consisted of the following:

- Reviewing geotechnical investigation report available in our archive and relevant to the site.
- Reviewing salinity potential map and acid sulphate risk map relevant to the site.
- Reviewing proposed development plan.
- Obtaining services plans from “Before You Dig Australia” and reviewing these plans to identify locations of existing underground services across the Stage 1.
- Preparing Work Methodology for Geotechnical Investigation and Safe Work Method Statement (SWMS) detailing work procedures to complete geotechnical investigation safely and within minimal impact on environment and submit to Benima Pty Ltd/HT Building Pty Ltd for review and approval.
- Carrying out a walkover inspection to assess existing site condition and nominate four borehole locations uniformly distributed across the Stage 1.
- Scanning nominated borehole locations with the aim of avoiding damages to existing underground services during borehole drilling. We engaged a specialist services locator for this purpose.
- Drilling four boreholes (BH1 to BH4) using a truck mounted drilling rig fully equipped for a geotechnical investigation. Boreholes will be initially drilled to TC-bit refusal in bedrock at depths of about 1.3m to 2.2m. Three boreholes (BH1 to BH3) were continued to depth of about 6.5m to 6.9m using rock coring. Approximate borehole locations are indicated on the Drawing No 20429/3-AA1. Boreholes logs and core photos are also included in Appendix A.
- Conducting Standard Penetration Tests (SPT) at regular depth intervals in the borehole to assess the strength of the subsurface soils. SPT results are included in appropriate borehole logs.
- Recovering representative soil samples and rock cores for visual assessments and laboratory tests.
- Measuring depths to groundwater levels in boreholes, if encountered.
- Locating the borehole locations using an inhouse GPS.

Field works were supervised by a team of two Field Engineers from this company, responsible for walk over survey, nominating borehole locations, supervising drilling and SPT, sampling and preparation of borehole logs.

5.0 SITE CONDITIONS

5.1 Subsurface Profile

Sub-surface profiles encountered in test pits (TP1 to TP4) distributed across the site and boreholes (BH1 to BH4) drilled in within Stage 1 are summarised in Table 1 (Reference 5).

Table 1 – Sub-surface Profiles Encountered in Boreholes and Test Pits

Borehole/ Test Pit	Easting (m)	Northing (m)	Ground Surface RL (m AHD)	Termination Depth (m)	Depth Range Topsoil (m)	Depth Range Natural Soil (m)	Depth to Bedrock (m)
BH1	288965.7	6213258.2	147.1	6.8	0.0-0.1	0.1-1.1	1.1
BH2	289177.7	6213055.6	143.0	6.5	0.0-0.1	0.1-1.7	1.7
BH3	289121.3	6213331.4	137.5	6.9	0.0-0.1	0.1-1.5	1.5
BH4	289135.3	6213224.2	141.8	1.3	0.0-0.1	0.1-1.2	1.2
TP1	288994.0	6213666.3	134.5	1.0	0.0-0.1	0.1-0.7	0.7
TP2	289058.6	6213592.1	137.3	1.4	0.0-0.2	0.2-1.2	1.2
TP3	289024.0	6213558.9	138.6	1.6	0.0-0.2	0.2-1.5	1.5
TP4	288972.1	6213521.1	140.6	1.5	0.0-0.2	0.2-1.3	1.3
TP5	288953.6	6213573.4	138.4	1.3	0.0-0.2	0.2-1.1	1.1
TP6	288900.1	6213510.6	143.6	1.2	0.0-0.1	0.1-1.0	1.0
TP7	288853.9	6213412.5	147.0	1.5	0.0-0.2	0.2-1.3	1.3
TP8	288922.0	6213420.9	146.4	1.0	0.0-0.1	0.1-0.8	0.8
TP9	288988.4	6213451.5	142.5	1.2	0.0-0.1	0.1-1.0	1.0
TP10	289054.4	6213481.6	138.9	1.7	0.0-0.2	0.2-1.4	1.4
TP11	289107.1	6213467.9	136.5	1.9	0.0-0.1	0.1-1.7	1.7
TP12	289080.7	6213404.0	137.6	1.3	0.0-0.2	0.2-1.1	1.1
TP13	289032.2	6213403.0	139.8	1.2	0.0-0.2	0.0-1.0	1.0
TP14	288984.2	6213387.7	143.6	1.3	0.0-0.2	0.2-1.1	1.1
TP15	288941.5	6213374.0	146.6	1.1	0.0-0.1	0.1-1.0	1.0
TP16	288896.6	6213351.3	148.6	1.1	0.0-0.1	0.1-0.9	0.9
TP17	288917.2	6213280.9	148.6	1.7	0.0-0.1	0.1-1.5	1.5
TP18	288958.4	6213301.4	146.5	1.1	0.0-0.2	0.2-1.0	1.0
TP19	289026.4	6213332.6	142.4	0.9	0.0-0.2	0.2-0.8	0.8
TP20	289144.6	6213389.0	135.4	0.8	0.0-0.1	0.1-0.6	0.6
TP21	289180.4	6213331.0	134.7	0.6	0.0-0.1	0.1-0.4	0.4
TP22	289171.5	6213269.8	136.4	0.8	0.0-0.1	0.1-0.6	0.6
TP23	289116.6	6213298.3	137.4	2.0	0.0-0.2	0.2-1.8	1.8
TP24	289071.8	6213210.2	144.2	1.6	0.0-0.2	0.2-1.5	1.5
TP25	289021.7	6213226.0	144.7	1.3	0.0-0.2	0.2-1.1	1.1
TP26	289002.1	6213254.5	144.3	1.1	0.0-0.2	0.2-1.0	1.0
TP27	288997.9	6213184.9	146.7	1.2	0.0-0.2	0.2-0.9	0.9
TP28	289048.6	6213162.7	147.7	1.0	0.0-0.2	0.2-0.7	0.7
TP29	289117.1	6213109.4	145.8	1.3	0.0-0.1	0.1-1.3	1.3
TP30	289149.9	6213156.4	143.2	1.7	0.0-0.1	0.1-1.5	1.5
TP31	289202.1	6213176.4	139.0	1.2	0.0-0.2	0.2-1.0	1.0
TP32	289195.2	6213099.9	140.2	1.2	0.0-0.2	0.2-1.0	1.0
TP33	289162.0	6213087.8	142.2	1.8	0.0-0.1	0.1-1.7	1.7
TP34	289211.0	6213053.2	141.0	0.9	0.0-0.1	0.1-0.7	0.7

Table 1 indicates that the sub-surface profile across the site, including Stage 1, comprises a sequence of topsoil and residual soil underlain by bedrock. Thickness of topsoil is about 200mm and the depth to bedrock varies from about 0.7m to 3.4m from existing ground surface. The depth to bedrock was generally less than 2.0m from existing ground surface except in one borehole BH1 located in the southern portion of the site or Stage 1. In general, subsurface materials encountered in test pits and boreholes may be described as follows:

Topsoil	Silty CLAY, low to medium plasticity, dark grey, with some root
Residual Soils	Silty CLAY, Sandy CLAY, medium to high plasticity, moisture content generally lower than plastic limit, stiff to hard
	Clayey Silty SAND, fine grained, pale grey mottled yellow, moist to dry, medium dense to dense with some gravel
Bedrocks	SHALE with layers of SANDSTONE, fine grained, grey, extremely to highly weathered, very low to very high strength

5.2 Groundwater Conditions

Martens has completed a hydrogeological assessment for the proposed Douglas Park Memorial Park-Concept Plan and Stage 1 development. Based on monitoring of groundwater levels in total of 21 wells, between 7 November 2024 and 20 March 2025, the site has been divided into three 'Hydrological Zones' (designated as Hydrological Zone 1, 2 and 3) with similar hydrogeological (Reference 7). Figure 3 is in the following page is an extract from Reference 6 showing outlines of Hydrogeological zones. The following are noted.

- Hydrogeological Zone 1 (Burial Areas D, E and portion of B) is located in the southeastern portion of the sit, where average mean groundwater level is 2.1m below existing ground.
- Hydrogeological Zone 2 (Burial Area C) is located in the central portion of the site and exhibits the shallowest groundwater table with a mean depth of 1.27m below existing ground surface.
- Hydrogeological Zone 3 (Burial Areas A, Portion of B, F, G, H, I, J) includes the remaining portions of the site and has a groundwater depth typically greater than 5.0m below existing ground surface. Several monitoring wells in Zone 3 were observed to be dry, up maximum depth of 9.21m.
- It is noted that shallow groundwater observed in Zone 1 and Zone 2 could be impacted by several up gradient factors including the existing farm dam in the central west portion of the site, current irrigation of the horse paddocks downslope of the existing dwelling and possibly from effluent disposal from the dwelling.
- Shallow or perched groundwater appears to be present in the southeastern portion the site (which has sandstone with interbedded shale lenses), whilst the southwestern western and northern portions of the site appear to have a deeper aquifer in sandstone bedrock.

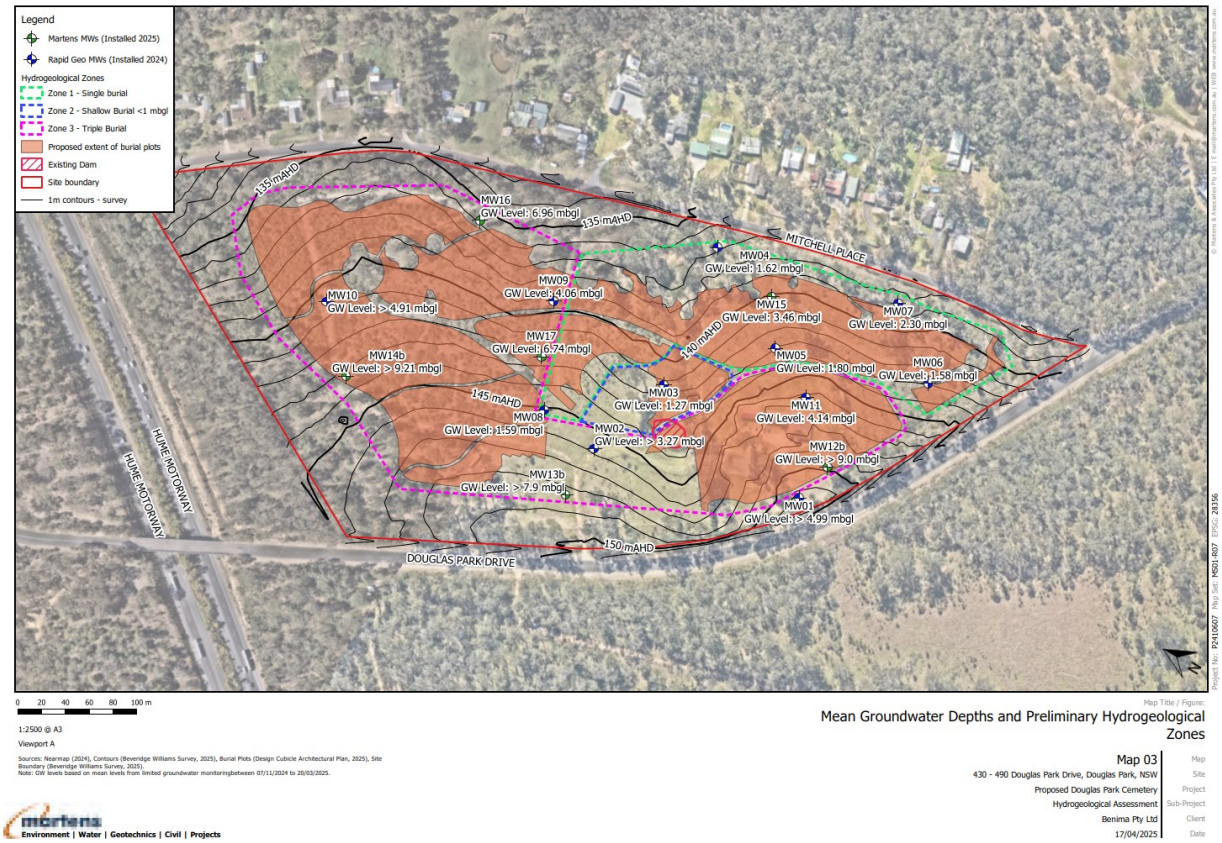

Figure 3 Outlines of Hydrogeologocal Zones

Test pits excavated for preparation of Reference 5 and boreholes drilled for the current geotechnical investigation did not encounter groundwater levels up to TC-bit refusal depths of about 1.3m to 2.2m from existing ground surface. Use of water for rock coring precluded measurements of possible groundwater levels at the completion of borehole drilling. Therefore, even if fluctuations in groundwater level might occur due to variations in rainfall and/or other factors not evident during drilling, it is our assessment that the indictive depths to groundwater levels presented in Reference 7 are likely to be indicative for the site.

6.0 LABORATORY TESTS

6.1 Soil Testing

Representative soil samples recovered from boreholes drilled in Stage 1 were tested in NATA Accredited laboratory to determine the following.

- Chemical properties to assess erodibility of the soils in term of Exchangeable Sodium Percentage.
- Chemical properties to assess acid sulphate or potential acid sulphate soils in terms of pH of KCl extract (pH_{kcl}), pH of KCl extract after peroxide digestion (pH_{ox}), Total Potential Acidity TPA), Total Actual Acidity (TAA), Total Sulphidic Acidity (TSA), Percent Peroxide Oxidisable Sulphur (S_{POS}) and Chromium Reducible Sulphur (S_{cr}).

Detailed results of laboratory tests on representative soil samples are presented in Appendix B and summarised below in Tables 2 to 4. It is noted that the Table 2 includes Exchangeable Sodium Percentage (ESP) values and Table 3 includes Electrical Conductivity (EC), pH and sulphate content of representative soil samples recovered from Stage 1.

Table 2 – Results of Exchangeable Sodium Percentage (ESP) Determination

Borehole/ Test Pit	Sample Depth (m)	Exchangeable Sodium Percentage (%)
BH1	0.5-0.95	10.5
BH1	1.5-1.57	6.8
BH2	0.2-0.3	10.0
BH2	0.5-0.95	11.4
BH2	1.5-1.57	36.0
BH3	0.5-0.95	15.5
BH3	1.1-1.2	19.8
BH4	0.5-0.95	16.1
TP23	0.4-0.6	22.0
TP23	1.5-1.8	15.1
TP27	0.3-0.5	23.9
TP27	0.7-0.9	24.7
TP30	0.8-1.0	9.5
TP31	0.2-0.4	8.8
TP34	0.2-0.4	5.9
TP34	0.5-0.7	19.9

Table 3 – Results of Salinity and Aggressivity Determination Tests

Test Pit	Sample	EC	pH	Sulphate
TP20	0.1-0.3	14	6.1	-
TP20	0.6-0.8	250	5	-
TP21	0.2-0.4	24	6.2	-
TP22	0.2-0.4	31	5.8	-
TP22	0.4-0.6	83	5.6	-
TP23	0.4-0.6	250	4.9	70
TP23	1.5-1.8	560	4.2	8.9
TP24	0.2-0.4	28	5.9	-
TP24	1.0-1.2	32	5.9	-
TP25	0.3-0.5	36	5.7	-
TP25	0.8-1.0	38	5.9	-
TP26	0.2-0.4	40	6.4	-
TP26	0.7-1.0	100	6.1	-
TP27	0.3-0.5	37	5.7	51
TP27	0.7-0.9	53	5.4	51
TP28	0.2-0.4	23	5.5	-
TP28	0.5-0.7	45	5.6	-
TP29	0.5-0.7	39	6.3	-
TP29	1.0-1.3	120	5.4	-
TP30	0.2-0.4	19	6.1	-
TP30	0.8-1.0	33	4.9	34
TP31	0.2-0.4	9	5.5	<5
TP31	0.8-1.0	60	5.5	-
TP32	0.2-0.4	16	5.6	-
TP32	0.5-0.7	28	6.1	-
TP33	0.5-0.7	160	5.9	-
TP33	1.3-1.5	290	5.8	-
TP34	0.2-0.4	9	5.5	<5
TP34	0.5-0.7	130	5.4	27

Table 4 – Laboratory Test Results for Acid Sulphate Soil Assessment

Borehole	Depth (m)	pH_{KCl}	pH_{ox}	TAA	TPA	TSA	S_{POS} %	S_{cr} %
BH1	0.5-0.95	4.7	4.9	30	15	<5	0.006	<0.005
BH1	1.5-1.57	7.0	8.0	<5	<5	<5	0.005	<0.005
BH2	0.5-0.95	5.4	5.3	7	7	<5	0.012	<0.005
BH2	1.5-1.57	5.7	5.3	7	<5	<5	<0.005	<0.005
BH3	0.5-0.95	4.6	5.2	37	32	<5	0.005	<0.005
BH3	1.1-1.2	4.6	5.0	40	27	<5	0.006	<0.005
BH4	0.3-0.4	4.3	4.6	65	55	<5	0.009	<0.005
BH4	0.5-0.95	4.3	4.9	67	57	<5	0.007	<0.005

6.2 Rock Strength

Rock cores obtained from obtained from boreholes were photographed and tested at regular depth intervals for determination of Point Load Strength Index (Is_{50}). The point load strength indices for the rock cores and the assessed rock strengths, in accordance with Australian Standard AS1726 (Reference 1), are summarised in the following Table 5.

Table 5 – Results of Point Load Strength Index Tests

Borehole No	Depth (m)	Diametral $I_{s(50)}$ MPa	Axial $I_{s(50)}$ (MPa)	Assessed Diametral Strength	Assessed Axial Strength
BH1	2.81	0.59	3.40	Medium	Very High
BH1	3.84	1.67	2.24	High	High
BH1	4.74	0.31	2.40	Medium	High
BH1	5.68	0.75	2.04	Medium	High
BH1	6.72	1.84	2.31	High	High
BH2	1.79	0.84	1.51	Medium	High
BH2	2.69	1.11	1.69	High	High
BH2	3.93	1.55	2.57	High	High
BH2	4.76	1.03	1.45	High	High
BH2	5.82	0.86	0.84	Medium	Medium
BH2	6.28	2.11	2.10	High	High
BH3	2.86	1.33	1.20	High	High
BH3	3.76	1.33	1.42	High	High
BH3	4.84	1.01	1.18	High	High
BH3	5.26	0.77	1.54	Medium	High
BH3	6.79	1.07	1.78	High	High

It should be noted that Point Load Strength tests could only be carried out on intact (stronger) portions of rock cores. Therefore, strength assessments presented in Table 5 indicates the upper limits of rock strengths. However, the following are our assessments on strength of bedrock likely to be encountered during excavations for the proposed Stage 1 cemetery development.

- The depth to very low to low strength bedrock across the site including Stage 1 varies from about 0.4m to 1.8m.
- The depth to medium to very high strength bedrock across Stage 1 varies from about 1.0m to 2.5m from existing ground surface.

7.0 PROPERTIES OF SUBSURFACE SOILS

7.1 Soil Erodibility

Erosion is the detachment and movement of soil materials. Susceptibility of soils to erosion depends on dispersibility (or sodicity) of soils, which is generally assessed by conducting physical tests like Emerson Class Test and Dispersion Percent as well as chemical tests such as Exchangeable Sodium Percentage and Sodium Absorption Ratio. Assessment of soil dispersibility based on the above tests might differ from each other.

For the proposed geotechnical investigation only Exchangeable Sodium Percentage (ESP) were determined for 16 representative soil samples recovered from Stage 1. Test results are summarised in Table 2 and indicate that the ESP values of representative soil samples vary from 5.9% to 36.0%. Soils with ESP more than 5.0% are considered sodic and those with ESP more than 15.0% are considered highly sodic (Reference 8). Therefore, it is our assessment that the soils across the site, including Stage 1, are dispersive and susceptible to erosion. Therefore, earthworks for the proposed development should be carried out in accordance with a Soil Management Plan (SMP) developed in accordance with NSW Department of Housing Guidelines (Reference 9).

7.2 Soil Salinity

Salinity refers to the presence of excess salt in the environment, either in soil or water. Salinity is a serious problem for any development due to the many environmental, economic and social impacts. Main impacts attributed to soil salinity and relevant to proposed development include damage to vegetation, houses, roads, highways and other structures, caused by the deterioration of brick, mortar, concrete, bitumen and asphalt, corrosion of metal (pipes, cables) etc.

Soil salinity is generally assessed by measuring Electrical Conductivity (EC) of a soil sample made up of 1:5 soil water suspension. Thus, determined Electrical Conductivity (EC) is multiplied by a factor varying from 6 to 23, based on the texture of the soil sample, to obtain Corrected Electrical Conductivity designated as ECe. Alternatively, ECe may be directly measured in soil saturation extract. Soils are classified as saline if Electrical Conductivity (ECe) of the saturated extracts exceeds 4.0dS/m. The criteria for assessment of soil salinity classes are shown in the following Table 6 (Reference 10).

Table 6 – The Criteria for Assessment of Soil Salinity Classes

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

Results of EC for 29 representative soil samples recovered from Stage 1 are summarised in Table 3. For the clayey soils encountered across the site, it is our assessment that the appropriate multiplying factor is about 8 to 9. But for sandy soils, appropriate multiplying factor is assessed to vary from about 10 to 13. Even for a multiplying factor of 13, the EC_e values of all samples vary from about 0.12dS/m to 7.28dS/m. However, only one sample out of 29 indicated an EC_e value of more than 4.0dS/m. Therefore, it is our assessment that the soils across the site, including Stage 1, are non-saline. Therefore, earthworks for the proposed cemetery development can be carried out without a Saline Soil Management Plan.

7.3 Exposure Classification

Australian Standard AS2870 (Reference 11) provides guidelines to assess Exposure Classification for saline and sulphate soils. Table 7 below provides salinity and Exposure Classifications based on EC_e, and Table 8 provides Exposure Classification for sulphate soils.

Table 7 – Exposure Classifications for Saline Soils

Electrical Conductivity, EC_e (dS/m)	Exposure Classification	Salinity Classification
<2	A1	Non-saline
2 – 4	A1	Slightly saline
4 – 8	A2	Moderately saline
8 – 16	B1	Very saline
>16	B2	Highly saline

Table 8 – Exposure Classifications for Sulphate Soils

Sulphate expressed as SO_3		pH	Exposure Classification*	
In Soil (ppm)	In Groundwater (ppm)		Soil Condition A	Soil Condition B
<5000	<1000	>5.5	A2	A1
5000-10000	1000-3000	4.5-5.5	B1	A2
10000-20000	3000-10000	4.0-4.5	B2	B1
>20000	>10000	<4.0	C2	B2

Approximately 100ppm of SO_4 = 80ppm of SO_3
*Soil Condition A = high permeability soils (e.g. sands and gravels) which are below groundwater
*Soil Condition B = low permeability soils (e.g. silts and clays) and all soils above groundwater

Soils across the site are predominantly clayey. But localised sandy soils are also encountered. Therefore, appropriate Soil Condition for Exposure Classification varies from “Condition A” to “Condition B”. Therefore, based on laboratory test results presented in Tables 3 and guidelines on Exposure Classifications presented in Tables 7 and 8, the appropriate Exposure Classification for the soils across site varies from Class A1 to B1. pH values and sulphate content are dominant. Therefore, we recommend that the construction materials (such as concrete, bricks etc) and construction methods used for proposed development, including Stage 1 development, should be appropriate for Exposure Class B1.

7.4 Acid Sulphate Soils

Acid sulphate soils are a problem because they produce significant acid (sulphuric acid) by oxidation when exposed to oxygen, which might occur during excavation or disturbance of soils containing iron sulphides/oxidisable sulphur. Lowering the groundwater level might also encourage oxidation. However, some acid may also be produced during decomposition of organic matters. The Acid Sulphate Management Advisory Committee, New South Wales (Reference 12) recommends that the assessment of acid sulphate soils and/or potentially acid sulphate soils at a site is carried out in stages, as follows:

Step 1 – Check the Acid Sulphate Soils Map.

Step 2 – Check if the area meets the geomorphic or site criteria.

Step 3 – Analyse soil and water indicators.

Step 4 – Carry out chemical analysis to confirm acid sulphate soil and action level.

The series of Acid Sulphate Soil Risk Maps for NSW prepared by Department of Land and Water Conservation does not extend to the site for the proposed cemetery development. Therefore, it is unlikely that the proposed development will be impacted by acid sulphate soils.

The ground surface elevation across the site, including Stage 1, is at least RL130.0m AHD and the site is underlain by residual soils profile where occurrence of acid sulphate soils or potential acid sulphate soils are unlikely. Acid sulphate occurrences are generally noted at elevation of 10.0m AHD or lower. Therefore, geomorphology indicates acid sulphate or potentially acid sulphate soils are unlikely to be encountered across the site. In addition, no visual indicators of acid sulphate soils were observed during field works.

As depth to groundwater level is anticipated to be more than 4.5m from existing ground surface, the excavation works for the proposed development are unlikely to involve site dewatering. Therefore, acid sulphate soil issues related to lowering of groundwater is unlikely to be applicable for the proposed development works.

Although information review and site inspection indicated acid sulphate soils and unlikely to be present across the site, chemical tests were conducted on representative soil samples recovered from Stage 1 to confirm if excavation and/or disturbance of soils during proposed Stage 1 development will have to be carried out in accordance with a Council approved Acid Sulphate Soil Management Plan.

The New South Wales Acid Sulphate Soils Management Advisory Committee (Reference 12) recommends "Action Criteria" presented in Table 9 based on results of acid sulphate soils analysis for three broad texture categories. Works in soils that exceed these "Action Criteria" must be carried out in accordance with an approved Acid Sulphate Soils Management Plan.

Table 9 – Action Criteria for Acid Sulphate Soils

Type of Material		**Action Criteria 1-1000 tonnes of soil is disturbed**		**Action Criteria More than 1000 tonnes of soil is disturbed**	
Texture Range	**Approximate Clay Content <0.002mm** (%)	**Sulphur Trail** % S oxidisable (S_{TOS} or S_{POS})	**Acid Trail** mol H^+/tonne (TPA or TSA)	**Sulphur Trail** % S oxidisable (S_{TOS} or S_{POS})	**Acid Trail** mol H^+/tonne (TPA or TSA)
Coarse Texture Sands to loamy sands	≤5	0.03	18	0.03	18
Medium Texture Sandy loams to light clays	5-40	0.06	36	0.03	18
Fine Texture Medium to heavy clays and silty clays	≥40	0.10	62	0.03	18

The excavation/boreholes logs indicate that the soils likely to be disturbed or excavated during excavations are predominantly clay with some sandy soils. Therefore, soils to be disturbed or excavated are assessed to belong to "Fine to Medium Texture". It is anticipated that the volume of soils to be excavated and/or disturbed during proposed Stage 1 development works will exceed 1000 tonnes.

Therefore, laboratory test results summarised in Table 4 and Action Criteria presented in Table 9 indicate the following:

- The Peroxide Oxidisable Sulphur (S_{pos}) contents in representative samples from Stage 1 are lower than 0.005% (instrument detectable limit) to 0.012%. Likewise, Chromium Reducible Sulphur (S_{cr}) are also lower than 0.005% (instrument detectable limit). Therefore, Oxidisable Sulphur and Chromium Reducible Sulphate contents in the soils across the Stage 1 are unlikely to produce significant acid. Therefore, based on "Sulphur Trail" for S_{pos} soils across Stage 1 are unlikely to be acid sulphate or potentially acid sulphate soils.
- Total Potential Acidity (TPA) of representative samples from Stage 1 vary from less than 5.0 mol H^+/tonne to 57.0 mol H^+/tonne. However, Total Sulphidic Acidity (TSA) of all samples are less than 5.0 mol H^+/tonne (instrument detectable limits). The TPA values of more than 18.0 mol H^+/tonne for some samples are likely because of acid from other sources not related to acid sulphate soils. Therefore, TSA of representative soils samples indicate that the soils across the Stage 1 are unlikely to be acid sulphate or potentially acid sulphate soils even based on "Acid Trail".

Therefore, based on both "Sulphur Trail" and "Acid Trail", it is our assessment that the acid sulphate soils, and potential acid sulphate soils are unlikely to be encountered during earthworks for the proposed Stage 1 cemetery development. Therefore, it is our assessment that the excavation and disturbance of soils during proposed Stage 1 development works can be completed without an approved "Acid Sulphate Soils Management Plan".

8.0 PROPOSED DEVELOPMENT APPLICATION

8.1 Proposed Cemetery Development

The geotechnical investigation report is prepared to accompany Development Application (DA) for the proposed Douglas Park Memorial Park Development - Concept Master Plan and Stage 1 detailed works. The Concept Masterplan (Full Scope) includes:

- Administration Building
- Chapel
- Caretaker Building
- Crematorium Building
- Family Vaults
- Burial Zone A
- Burial Zone B
- Burial Zone C
- Burial Zone D
- Burial Zone E
- Burial Zone F
- Burial Zone G
- Burial Zone H
- Burial Zone I
- Burial Zone J
- Reflection Pond
- Flora / Fauna Fencing and Protection Area (full perimeter of site)
- Landscape domain (Hardscape & Softscape)
- Main Access/Egress Entry from Douglas Park Drive
- Secondary Egress & Emergency Access/Egress from Mitchell Place
- Servicing Roads, Parking & Infrastructure (within stage boundary)

Stage 1 Detailed works include the following.

- Administration Building
- Chapel
- Caretaker Building
- Burial Zone A
- Burial Zone B
- Burial Zone C
- Burial Zone D

- Burial Zone E
- Reflection Pond
- Flora / Fauna Fencing and Protection Area (full perimeter of site)
- Landscape Hardscape & Softscape (within stage boundary)
- Main Access/Egress Entry from Douglas Park Drive
- Secondary Egress & Emergency Access/Egress from Mitchell Place
- Servicing Roads, Footpaths, Parking & Infrastructure (within stage boundary)

Future Detailed Development Application/s includes the following.

- Crematorium Building
- Family Vaults
- Burial Zone F
- Burial Zone G
- Burial Zone H
- Burial Zone I
- Burial Zone J
- Landscape domain (within stage boundary)
- Servicing Roads, Footpaths, Parking & Infrastructure (within stage boundary)

8.2 Construction Methodology

HT Building recommends Construction Methodology for the proposed Douglas Park Memorial Park-Concept Plan and Stage 1 detailed works. The stepwise procedure or sequence of recommended works is listed below (Reference 13). The works should be completed under appropriate environmental management/control recommended in Reference 13. In addition, we recommend that the construction works should be carried out in accordance with Soil Management Plan provided below in this report.

- Site Mobilisation: Setting up the construction site with temporary access roads, facilities, utilities, and safety measures. Equipment and materials are brought in to prepare for works.
- Ecological & Tree Protection Works: Protection of existing trees and habitats through fencing and monitoring. Works are planned to avoid ecological disturbance.
- Sediment Erosion Controls Erosion and sediment control measures like silt fences and sediment basins are installed to protect the environment during construction.
- Demolition Removal of any designated trees for removal, existing structures or surfaces on-site, with safe disposal or recycling of debris.
- Earthworks for preparation of site for proposed cemetery development. The staging of earthworks will as per the following:
    - Strip topsoil and stockpile as per LC2996-20250424-Burials Bulk Earthworks- Issue 1
    - Excavation of burial zones following LC2996-20250424-Burials Bulk Earthworks- Issue 1

  - Treatment of excavated materials
  - Placement of treated material into burial zones under geotechnical supervision
  - Capping layer impermeable material as per LC2996-20250424-Burials Bulk Earthworks-Issue 1
  - Spread topsoil & revegetation of each area
- Civil & Infrastructure Works (Burial Zones A, B, C, D & E): Ground preparation, cut/fill works, drainage, and access infrastructure are constructed across designated burial zones. Roads and services shall be installed.
- Construction Works (Chapel, Administration, Storage Shed, Bin Store & Pond) Buildings and facilities are constructed and fully fitted out, including the chapel and admin areas, along with the pond feature.
- Landscaping (Hardscape) Paths, paving, seating, and other structural landscape elements are installed to shape the cemetery's public spaces.
- Landscaping (Softscape) Trees, plants, turf, and irrigation systems are added to enhance the natural beauty and serenity of the site.
- Handover and Operation Upon completion of construction and certification, the site is formally handed over to the operational management team. All facilities, documentation, and maintenance schedules are transferred to enable the cemetery's full operational use, including public access, interments, and grounds upkeep.

To ensure operational feasibility and respond to market demand, the following works are to be delivered concurrently; completion of internal roads and burial zones, construction and fit-out of the chapel and administration buildings, installation of core services (stormwater, water, power). These works allow for partial operational readiness while remaining construction progresses in other zones.

Once infrastructure is in place and the site is operational, burial excavation operations commence in active zones. This includes the systematic preparation of burial plots aligned with interment schedules and ongoing site maintenance.

8.3 Excavation Conditions

Proposed Douglas Park Memorial Park Development - Concept Master Plan as well as Stage 1 detailed works are understood to include three types of burial zones/areas designated as Shallow Single burial, Single burial and Triple burial.

Plans showing burial zones/areas and Stage 1 cut and fill plan are presented in Appendix C.

The design depths of excavations for various types of burial areas are as follows.

- Shallow Single Burials = Maximum depth of excavation is 1.05m from existing ground surface.
- Single Burials = Maximum depth of excavation is 1.35m from existing ground surface
- Triple Burials = Maximum depth of excavation is 2.85m from existing ground surface

The depth to very low to low strength bedrock across Stage 1 varies from about 0.4m to 1.8m and the depth to medium to very high strength bedrock across Stage 1 varies from about 1.0m to 2.5m from existing

ground surface. Therefore, the material to be excavated for burial plots for Concept Master Plan as well as Stage 1 detail works, will include topsoil, residual soils and bedrock.

Construction Methodology for the proposed Douglas Park Memorial Park Development - Concept Master Plan and Stage 1 detailed works recommends that the materials in burial areas are excavated to design burial depths indicated above and the excavated areas are backfilled to recreate existing landform so that the burial plots, when required, are re-excavated into backfilled materials.

It is our assessment that the excavations of topsoil, residual soils and low to medium strength bedrock can be achieved using conventional earthmoving equipment such as excavators and dozers. However, excavation into high to very high strength bedrock will require larger equipment (such as rock saw, Caterpillar D10 or equivalent). Although selection of rock cutting equipment should be based on site access, desired smoothness of the excavated rock surface and acceptable ground vibration during rock excavation, it is our assessment that the rock sawing would be preferable to minimise ground vibration during rock excavation.

Excavated topsoil, residual soils and bedrock should be stockpiles separately for future uses with or without treatment.

Ground vibration during rock excavation is generally represented by maximum peak particle velocity. The ground vibration during proposed development works should be maintained within the limit tolerable to the existing structures in the vicinity of the site. Specialist consultant should ascertain the tolerable ground vibration. However, we anticipate low rise residential buildings in the vicinity of the site can generally tolerate ground vibration of about 5.0mm/s to 10.0mm/s.

It is our assessment that the excavation into topsoil, residual soils and very low to low strength bedrock will results in ground vibrations that are likely to be within tolerable limits for stability of existing structures in the vicinity of the site. However, a rock saw will be preferable for excavation into medium to very high strength bedrock to minimise ground vibration during rock excavation.

Hydrogeological assessment (Reference 7) indicates that the depth to groundwater levels are such that the Hydrogeological Zones 1 and 2 will be suitable for single burial plots and shallow single burial respectively plots but Hydrogeological Zone 3 is suitable for triple burial plots. Therefore, excavations of proposed single burials, shallow burials and tripe burial plots in Hydrogeological Zones 1, 2 and 3 respectively will not encounter significant groundwater inflow.

8.4 Fill Placement

As stated above, Construction Methodology for the proposed Douglas Park Memorial Park Development - Concept Master Plan and Stage 1 detailed works recommends that the materials in burial areas are excavated to design burial depths and excavated areas are backfilled with controlled fill to recreate existing landform so that the burial plots, when required, are excavated into backfilled materials.

In addition, site preparation for construction of proposed structures, including buildings, access roads, car park etc. will also require placement of some controlled fill. The controlled fill placed to recreate existing landform or any other subgrade/foundation should be placed in controlled manner and the following procedures are recommended for placement of controlled fill:

- Strip topsoil and stockpile separately for possible future uses or disposal off site. Topsoils can be used for landscaping purposes. It is anticipated that the topsoil from most portions of the site will be stripped during excavation of burial areas to design level.
- Undertake proof rolling of the exposed residual soils using an 8 to 10 tonne roller to detect potential weak spots (heaving materials). Excavate areas of localised heaving to a depth of about 300mm and replace with granular fill or crushed sandstone and then compact as described below. No proof rolling is required if stripping of topsoil and heaving materials expose bedrock.
- Undertake proof rolling of heaving spots backfilled with granular fill/crushed sandstone, as described above. If the backfilled area shows movement during further proof rolling, this office should be contacted for further recommendations, which may include stripping residual soils and/or lime/cement stabilisation and/or providing a geogrid reinforced layer. However, this is unlikely to be required.
- Place suitable controlled fill materials (backfill) on proof rolled surface of residual soils and/or bedrock. The controlled fill should be placed in horizontal layers of 200mm to 250mm maximum loose thickness and compacted to a Minimum Dry Density Ratio (MDDR) of 98% Standard, at moisture content within 2% of Optimum Moisture Content (OMC). However, upper 300mm of controlled fill forming subgrade for car parks/access ways should be compacted to a MDDR of 100% Standard, at moisture content within 2% of OMC. Controlled fill should preferably comprise non-reactive fill (e.g. crushed sandstone) with a maximum particle size not exceeding 75mm, or low plasticity clay. The residual soils and bedrock obtained from excavations within the site may be used in controlled fill after removal of unsuitable materials (topsoil, organic matters, high plasticity clay etc), if any, crushing to sizes finer than 75mm, and moisture conditioning.
- Place about 150mm thick layer of impermeable clay liner on the surface of the backfilled compacted controlled fill to prevent infiltration of surface water into compacted backfilled materials. The thickness, compaction level and permeability of impermeable layers should be in accordance with design specification provided by Civil/Groundwater designer. However, we suggest that the impermeable liner is compacted MDDR of 100% Standard, at moisture content within -2% to +3% of OMC.
- Placement of backfill and impermeable liner should be supervised to ensure that material quality, layer thickness, testing frequency and compaction criteria conform to the specifications. We recommend "Level 2" or better supervision, in accordance with Australian Standard AS3798 (Reference 14). It should be noted that a Geotechnical Inspection and Testing Authority will generally provide certification on the quality of the entire compacted fill only if Level 1 supervision and testing is carried out.
- Spread a layer of 150mm thick topsoil on impermeable liner for grassing purposes.

9.0 BATTER SLOPE AND RETAINING STRUCTURES

As discussed, the proposed development is likely to involve up to about 2.85m deep excavations and some fill placement. The cut and fill slopes should be battered for stability or retained by engineered retaining structures. Recommended batter slopes for stability of cut and fill slopes are presented in Table 10.

Table 10 – Recommended Batter Slopes for Excavation Faces

Material	Temporary (Horizontal : Vertical)	Permanent (Horizontal : Vertical)
Residual Soil and Controlled Fill	1.0:1.0	2.0:1.0
Bedrock – Vey Low to Low Strength	Vertical	1.0:1.0
Bedrock – Medium to High Strength	Vertical	

Surface protection of the slopes can be provided by shotcreting, which may be reinforced. Vertical excavations in medium strength or better bedrock, where required, will have very low risk of instability. However, some localised rock bolting and shotcreting might be required, depending on the relative orientations of rock discontinuities (bedding partings, fractures and joint systems) and excavation faces. Therefore, a Geotechnical Engineer should inspect the excavation face at depth intervals of about 1.5m to ascertain if localised rock bolting or shotcreting are required.

However, if batter slopes steeper than those recommended in Table 10 are required for whatever reason, the batter slopes would need to be retained by engineered retaining structures. Appropriate retaining structures for the proposed basement excavations would comprise bored pile walls or cantilever wall or gravity wall. Active earth pressure distribution on such retaining walls may be estimated using following equation:

$$p_h = \gamma k H$$

Where,

p_h = Horizontal active pressure (kN/m^2)
γ = Total density of materials to be retained (kN/m^3)
k = Coefficient of earth pressure (k_a or k_o)
H = Retained height (m)

For design of flexible retaining structures where some lateral movement is acceptable, an active earth pressure coefficient (ka) is recommended. If it is critical to limit the horizontal deformation of a retaining structure, use of an earth pressure coefficient at rest (ko) is recommended. Recommended earth pressure coefficients for design of retaining structures are presented in the following Table 11.

Table 11 – Recommended Earth Pressure Parameters

Retained Material	Unit Weight (kN/m^3)	Active Earth Pressure Coefficient (k_a)	Passive Earth Pressure (kPa)	At Rest Earth Pressure Coefficient (k_o)
Residual Soil and Controlled Fill	18.0	0.40	Ignore	0.60
Bedrock – Vey Low to Low Strength	21.0	0.25	250.0	0.40
Bedrock – Medium to High Strength	22.0	None	400.0	None

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

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

p_h is linearly increasing from zero at ground surface (top of retaining wall) to $0.3\gamma H$ at depth of 0.25H, where γ = Equivalent unit weight of retained materials, say 21.0kN/m^3 and H= Depth of excavation

p_h is constant at $0.3\gamma H$ from depth of 0.25H to 0.75H

p_h is decreasing from $0.3\gamma H$ at depth of 0.75H to zero the base of excavation

10.0 FLOOR SLABS AND FOOTINGS

Proposed development includes construction of a crematoria and chapel, vaults, remembrance sanctuaries, roads, pathways and ancillary buildings. The foundation materials for these proposed structures are anticipated to include controlled fill placed in accordance with recommendations provided in this report and residual soil. Therefore, floor slabs for the proposed structures may be constructed as ground bearing slabs or suspended slabs supported by footings designed in accordance with recommendations provided in this report.

For design of ground floors slabs bearing on controlled fill and/or residual soil, we recommend a Modulus of Subgrade Reaction Value of 25kPa/mm. Alternatively, the ground bearing slabs may be designed for a “Class M” site in accordance with Australian Standard AS2870 (Reference 10).

Loading conditions from the proposed structures are not known at this stage. However, we consider that the appropriate footings would comprise shallow footings (pad and strip footings) founded on controlled fill or residual soils, or bedrock or deep footings (bored piers) socketed into bedrock. Deep footings might be preferable if footings are to support significant lateral and/or uplift pressures. The recommended allowable bearing pressures for design of shallow and deep footings are presented in the following Table 12.

Table 12 – Recommended Allowable Bearing Pressures

Founding Material	Founding Depth (m)	Allowable Bearing Pressure (kPa)	Allowable Shaft Adhesion (kPa)
Residual Soil and Controlled Fill	0.0-1.0	100.0	Ignore
Bedrock – Vey Low to Low Strength	0.5-1.5	800.0	100.0
Bedrock – Medium to High Strength	1.5-2.5	1200.0	450.0

The recommended allowable shaft adhesions against uplift pressures are halves the shaft adhesions for compressive loads presented in Table 12.

As depths of bedrock with the recommended allowable bearing pressures could vary across the site, the founding depths of footings to be constructed will also vary. Therefore, an experienced Geotechnical Engineer should confirm allowable bearing pressures at founding levels during construction on the basis of assessment made during footing excavation or pier hole drilling.

For footings founded in residual soil and/or controlled fill, the total settlements under the recommended allowable bearing pressures are estimated to be about 2.0% of minimum footing dimension. For footings founded in bedrock, total settlements under the recommended allowable bearing pressures are estimated to be about 1.0% of pier diameter or minimum footing dimension. Differential settlements are estimated to be about half the estimated total settlements.

11.0 SOIL MANAGEMENT PLAN

Soils encountered across the Stage 1 are assessed to be non-saline and not acid sulphate soils. Therefore, soil salinity and acid sulphate soils are not of concern for the proposed cemetery development. However, soils across the site, including Stage 1, are assessed to be susceptible to excessive erosion. Therefore, earthworks for the proposed development works should be carried out in accordance with a Soil Management Plan (SMP) aimed at minimising impacts of erosion. The objective of this SMP should include the following:

- Minimise erosion and sediment loss during and after construction.
- Minimise water pollution due to erosion, siltation and sedimentation.

SMP must be developed and implemented by the earthwork contractors, in accordance with recommendations provided by the NSW Department of Housing (Reference 9). However, SMP should aim the following:

- Control the drainage to manage volumes and velocity of storm water runoff to prevent formation of concentrated flows that cause rill and gully erosion. This can be achieved by grading the ground surface and diverting the stormwater away from the site by constructing appropriate drainage system.
- Control erosion by (1) minimising exposure of erodible soils; (2) protecting exposed soil surfaces to prevent or reduce erosion caused by storm water surface flows; and (3) protect the soil surface by providing grass cover or other ground covers (jute, geotextile etc) and chemical stabilisation of exposed soil surfaces.
- Control sediment by trapping and retaining sediment and preventing it from being lost off site or accumulating in local waterways. Buffer zones with good ground cover and grass filter strips can be used for this purpose. Other sediment control measures include sediment basins, filter dams/bags, check dams, sediment fence etc.

Implementation of an appropriate SMP is crucial during earthworks for the proposed development because soils across the site are assessed to be dispersive and susceptible to excessive erosion. However, the abovementioned principles of controlling drainage, erosion and sediment are also applicable for managing impacts from erosion during operational life of the cemetery.

Therefore, the design of proposed cemetery should ensure the following to minimise the impacts from the erodible soils on the operation of the cemetery:

- The surface water drainage system should be designed to ensure no concentration of surface water flows that could erode the soils.
- Ground surface should be protected from erosion by covering the soils surface by proper grassing and/or other covers (jute, geotextile). In the areas where soil surface could not be grassed or covered, the upper 400mm of soils may be treated with 5% of hydrated lime and compacted in two layers to achieve minimum dry density ration off 95% standard.
- An appropriately located sediment basin may be constructed to collect and properly dispose off any possible sediment run-off.

12.0 SUITABILITY OF SITE FOR PROPOSED DEVELOPMENT

12.1 Geotechnical Risks

Proposed Douglas Park Memorial Park Development - Concept Master Plan and Stage 1 detailed works include cut and fill operations in proposed burial areas and construction of crematoria, chapel, vaults, remembrance sanctuaries, roads, pathways, landscaping and ancillary buildings.

Geotechnical investigation indicates that the subsurface profile across the site, including Stage 1, comprises a sequence of topsoil and residual soil underlain by bedrock. Thickness of topsoil is about 200mm and the depth to bedrock varies from about 0.7m to 3.4m from existing ground surface. The depth to bedrock was generally less than 2.0m from existing ground surface except in the southern portion of the site.

Earthworks for the proposed development work are unlikely to encounter saline soils and acid sulphate or potential acid sulphate soils. Therefore, earthworks can be completed without need of Saline Soil Management Plan and Acid Sulphate Soil Management Plan.

The risk of mine subsidence impacting on the proposed development is “Very Low” (Reference 6). In addition, hydrogeological assessment indicates that the depths to groundwater levels across the site are such that the Hydrogeological Zones 1 and 2 will be suitable for single burial plots and shallow single burial plots respectively but Hydrogeological Zone 3 is suitable for triple burial plots. Therefore, groundwater is unlikely to impact on the proposed development if burial plots are sited in accordance with recommendations provided in Reference 7.

However, potential geotechnical constraints/risks for the proposed development includes presence of erodible soils and excavation into medium to very high strength bedrock. These potential geotechnical constraints can be addressed as follows:

12.2 Mitigation Measures

The geotechnical risks associated with variabilities in depth to bedrock of varying strengths can be addressed by conducting inspection during construction stage. However, geotechnical information presented in this report is adequate for assessment of variability of depth to bedrock for structural design and cost management purposes. Likewise, constrained associated with erodible soil can be addressed if earthworks are carried out in accordance with an appropriate Soil Management Plan prepared in accordance with recommendation provided in Department of Housing Guidelines (Reference 9).

Table 13 in the following page presents recommended mitigation measures to address potential geotechnical constraints or risks so that the residual risks are “Low”.

12.3 Conclusions

It is our assessment that the geotechnical conditions across the site, including Stage 1, are suitable for proposed cemetery development provided the following.

- The cut and fill operations in burial areas and design of the proposed structures are carried out in accordance with the recommendations provided in this report as well as recommendations provided in References 6 and 7.
- Potential geotechnical risks to the proposed development are addressed in accordance with mitigation measures provided in Table 13.

Table 13 –Geotechnical Risks and Recommended Mitigation Measures to Manage Geotechnical Risks

Project Stage Design (D) Construction (C) Operation (O)	Mitigation Measures	Reason for Mitigation Measure	Relevant Section of Report
D, C & O	The designer should recognise that the subsurface soils across the site are susceptible to erosion and therefore disturbance and excavation of soils across the site should be carried out in accordance Reference 9. Soil Management Plan (SMP) developed in accordance with recommendations provided in Department of Housing Guidelines. (Reference The cost for management of erodible soil should be considered in project costing.	To manage adverse impacts from the erodible soils to proposed activity and vice versa and to develop appropriate soil management plan to reduce impact on environment and variation claims during construction stage.	Sections 5.1, 7.1 & 11.0
D & C	The designer should recognise variability in the depth to bedrock of varying strengths to ascertain that the designs of activities are appropriate to actual foundation conditions and its impact on project design and costing. The depth to bedrock will need to be confirmed by inspections during construction stage	To reduce the risk or uncertainties due to variation in depths to bedrock of varying strengths so that (1) actual strength of bedrock to be excavated in known and (2) founding depths for footings supporting buildings and other proposed structures are known. This means appropriate, economical and reliable excavation and foundation design can be achieved and potential variation claims during construction stage can be minimised.	Sections 5.1, 5.2, 6.1, 6.2, 9.0 & 10.0

13.0 LIMITATIONS

It is our assessment that the geotechnical conditions across the site, including Stage 1, are suitable for proposed cemetery development provided cut and fill operations and design of the proposed structures are carried out in accordance with the recommendations provided in this report as well as recommendations provided in References 6 and 7 and potential geotechnical constraints are addressed in accordance with the recommended mitigation measured provided in Table 13.

Assessments and recommendations presented in this report are based on site observation and information from limited number of boreholes. Although we believe that the sub-surface profile presented in this report is indicative of the general profile across the site, it is possible that the sub-surface profile including depth to groundwater level could differ from that encountered in the boreholes. Therefore, we recommend that this company is contacted for further advice if soils or bedrock encountered during the construction stage differ from those presented in this report.

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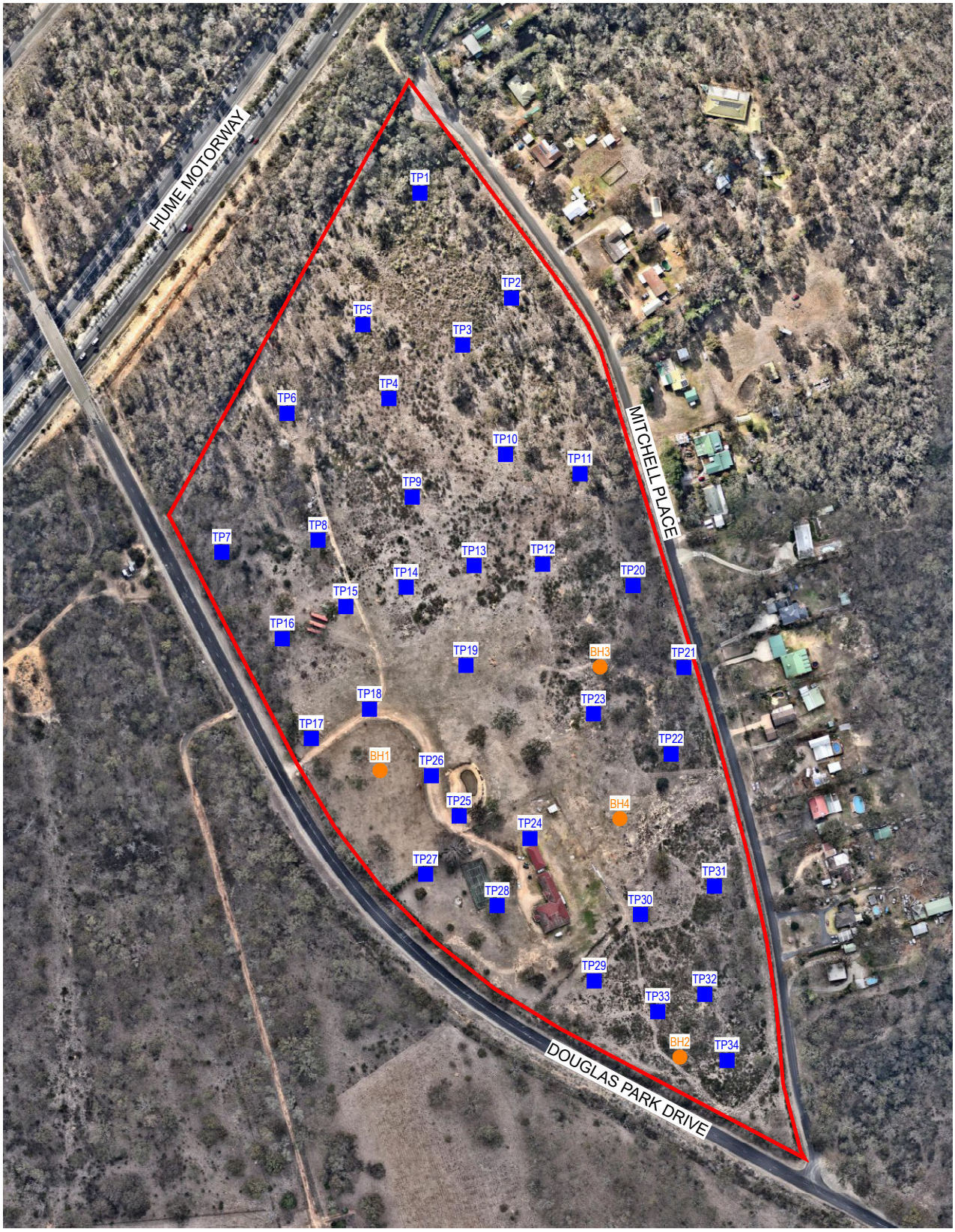
APPENDIX A

Drawing No 14329/3-AA1 Borehole Locations Plan

Borehole Logs with Core Photographs



Imagery © NearMap.com

LEGEND

- Test Pit (September 2018)
- Borehole (May 2024)

0 40 80 120 160 200m

Scale 1:4000

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Benima Pty Ltd
Proposed Cemetary Development
430-490 Douglas Park Drive
Douglas Park

Borehole and Test Pit Locations

Drawing No: 14329/3-AA1
Job No: 14329/3
Drawn By: MH
Date: 30 May 2024
Checked By: JSH/SS/IJ

File No: 14329-3
Layers: 0, AA1

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engineering log - borehole

Client : Benima Pty Ltd
Project : Proposed Cemetary Development
Location : 430-490 Douglas Park Dr, Douglas Park

Job No. : 14329/3
Borehole No. : 1
Date : 27/05/2024
Logged/Checked by: SS

drill model and mounting : Hanjin D&B, Track mounted **slope :** 90 **deg.** **R.L. surface :** 147.092

hole diameter : 125 **mm** **bearing :** N/A **deg.** **datum :** AHD

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
TC-BIT	Dry				N=13 3,4,9	0			TOPSOIL: Silty Clay, low-medium plasticity, brown, trace rootlets				Grass cover
								CL-CI	Silty CLAY, low-medium plasticity, red	M<PL	F-St		Residual
						0.5		CH	Silty CLAY, high plasticity, red		St-VSt		
						1			@ 0.9m, grey				@ 1.1m Resistance to auger
					N=R 12/70	1.5			SANDSTONE, fine grained, grey, medium-high strength				Bedrock
						2							
									Started coring BH1 @ 2.2m				
						2.5							
						3							
						3.5							
						4							
						4.5							

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engineering log
cored borehole

Client : Benima Pty Ltd
Project : Proposed Cemetary Development
Location : 430-490 Douglas Park Dr, Douglas Park

Job No. : 14329/3
Borehole No. : 1
Date : 28/05/2024
Logged/Checked by : SS

drill model and mounting : Hanjin D&B, Track mounted **slope :** 90 **deg.** **R.L. surface :** 147.092

core size: NMLC **bearing :** N/A **deg.** **datum :** AHD

barrel lift	water loss/level	depth of R.L. in meters	graphic log	CORE DESCRIPTION rock type, grain characteristics, colour, structure, minor components.	weathering	strength	point load index strength $I_S(50)$ EL VL L M H VH	DEFECT DETAILS defect spacing (mm) 2000 1000 500 300 100 50	DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
		2		Started coring BH1 @ 2.2m					
				SANDSTONE/SILTSTONE, fine grained, grey	DW	H-VH			2.2m clay band=20mm 2.35m Is(clay) 2.61m clay band=40mm
		3							
		4							
				SHALE, grey	DW	H-VH			4.81m Is(clay)
		5							5.13m Is(clay) 5.16m clay band=20mm 5.29 Is(clay)=10mm
				SANDSTONE, medium grained, yellow	DW	H-VH			5.73m Is(clay)=10mm 6.0m Jo=30°
		6							6.48m Is 6.55m Is
		7		Coring terminated @ 6.8m					
		8							
		9							
		10							
		11							

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Job No 14329/3-AA BH1 started coring at 2.2m

Started at 2.2m

Ended at 6.8m

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engineering log - borehole

Client : Benima Pty Ltd
Project : Proposed Cemetary Development
Location : 430-490 Douglas Park Dr, Douglas Park

Job No. : 14329/3
Borehole No. : 2
Date : 28/05/2024
Logged/Checked by: JSH

drill model and mounting : Hanjin D&B, Track mounted **slope :** 90 **deg.** **R.L. surface :** 142.950

hole diameter : 125 **mm** **bearing :** N/A **deg.** **datum :** AHD

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
TC-BIT	Dry					0			TOPSOIL: Clayey Silt, low plasticity, dark brown, with fine grained sand				Grass cover
				DS				CI	Silty CLAY, medium plasticity, pale brown, trace fine-medium grained sand	M<PL	St		Residual
				DS	N=8 3,3,5	0.5			@ 0.5m, pale brown mottled red-brown				
						1					VSt		
								CL-CI	Silty Sandy CLAY, low-medium plasticity, mottled grey and pale orange-brown, fine-medium grained sand, cemented		H		@ 1.2m, increase TC-BIT resistance Extremely weathered material
					N=R 4/80	1.5							
									Started coring BH2 @ 1.68m				@ 1.68m, TC-BIT refusal
						2							
						2.5							
						3							
						3.5							
						4							
						4.5							

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engineering log
cored borehole

Client : Benima Pty Ltd
Project : Proposed Cemetary Development
Location : 430-490 Douglas Park Dr, Douglas Park

Job No. : 14329/3
Borehole No. : 2
Date : 28/05/2024
Logged/Checked by : SS

drill model and mounting : Hanjin D&B, Track mounted **slope :** 90 **deg.** **R.L. surface :** 142.95
core size: NMLC **bearing :** N/A **deg.** **datum :** AHD

barrel lift	water loss/level	depth of R.L. in meters	graphic log	CORE DESCRIPTION rock type, grain characteristics, colour, structure, minor components.	weathering	strength	point load index strength $I_S(50)$ EL VL L M H VH	DEFECT DETAILS defect spacing (mm) 2000 1000 500 300 100 50	DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
				Started coring BH2 @ 1.68m					
		2		SANDSTONE, fine-medium grained, grey mottled grey-brown	SW	H-VH			1.805m Bp=2°,Pl,Ro,Sn
		3							
		4							4.0m Jo=8°,Pl,Ro
		5		@ 4.71m, pale red-brown-grey					
		6		@ 6.03m, grey					6.03m Bp=1°,Pl,Ro
				@ 6.32m, grey mottled dark grey					6.32m Bp=0°,Pl,Ro,Sm
				BH2 terminated @ 6.5m					
		7							
		8							
		9							
		10							

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Job No 14329/3-AA BH2 started coring at 1.68m

Ended at 6.5m

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engineering log - borehole

Client : Benima Pty Ltd
Project : Proposed Cemetary Development
Location : 430-490 Douglas Park Dr, Douglas Park

Job No. : 14329/3
Borehole No. : 3
Date : 28/05/2024
Logged/Checked by: JSH

drill model and mounting : Hanjin D&B, Track mounted **slope :** 90 **deg.** **R.L. surface :** 137.483

hole diameter : 125 **mm** **bearing :** N/A **deg.** **datum :** AHD

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
TC-BIT	Dry					0			TOPSOIL: Sandy Silty Clay, high plasticity, pale grey-brown				Grass cover
								CI-CH	Sandy Silty CLAY, medium-high plasticity, pale orange-brown, fine-medium grained sand, trace fine grained gravel	M<PL	St-VSt		Residual
				DS									
				DS	N=12 4,5,7	0.5							
				DS		1							
					N=R 5,7/50	1.5			SANDSTONE, fine grained, grey, very low-low strength, extremely-highly weathered				Bedrock
						2			Started coring BH3 @ 2.06m				@ 2.06m, TC-BIT refusal
						2.5							
						3							
						3.5							
						4							
						4.5							

GEOTECHNIQUE
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engineering log
cored borehole

Client : Benima Pty Ltd
Project : Proposed Cemetary Development
Location : 430-490 Douglas Park Dr, Douglas Park

Job No. : 14329/3
Borehole No. : 3
Date : 28/05/2024
Logged/Checked by : SS

drill model and mounting : Hanjin D&B, Track mounted **slope :** 90 **deg.** **R.L. surface :** 137.483

core size: NMLC **bearing :** N/A **deg.** **datum :** AHD

barrel lift	water loss/level	depth of R.L. in meters	graphic log	CORE DESCRIPTION rock type, grain characteristics, colour, structure, minor components.	weathering	strength	point load index strength $I_S(50)$ EL VL L M H VH	DEFECT DETAILS defect spacing (mm) 2000 1000 500 300 100 50	DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
		2		Started coring BH3 @ 2.06m					
		3		SANDSTONE, fine-medium grained, grey mottled dark grey	MW-SW	H-VH			2.27m Bp=1°,Pl,Ro,Sn 2.8m Bp=0°,Pl,Ro 2.89m Jo=20°,Pl,Ro,Sn 3.11m Jo=20°,Pl,Ro 3.335m Jo=15°,Pl
		4							3.8m Bp=0°,Pl 3.9m Jo=1°,Pl,Ro,Cn
		5							5.3m Jo=5°,Pl,Ro,Cn
		6							5.69m Jo=5°,Pl,Ro,Cn
		7		BH3 terminated @ 6.86m					
		8							
		9							
		10							

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Job No 14329/3-AA BH3 started coring at 2.06m

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engineering log - borehole

Client : Benima Pty Ltd
Project : Proposed Cemetary Development
Location : 430-490 Douglas Park Dr, Douglas Park

Job No. : 14329/3
Borehole No. : 4
Date : 28/05/2024
Logged/Checked by: JSH

drill model and mounting : Hanjin D&B, Track mounted **slope :** 90 **deg.** **R.L. surface :** 141.8

hole diameter : 125 **mm** **bearing :** N/A **deg.** **datum :** AHD

method	groundwater	env samples	PID reading (ppm)	geo samples	field test	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	moisture condition	consistency density index	hand penetrometer kPa	Remarks and additional observations
TC-BIT	Dry			DS	N=20 3,9,11	0 0.5 1		CH	TOPSOIL: Clayey Silt, low-medium plasticity, dark brown, trace fine grained sand Silty CLAY, high plasticity, pale brown, trace fine grained sand @ 0.5m, trace sandstone fragments @ 0.9m, with sandstone gravel	M<PL	VSt-H		Grass cover Residual Bedrock
						1 1.5 2 2.5 3 3.5 4 4.5			SANDSTONE, fine-medium grained, grey, very low-low strength, extremely-highly weathered BH4 terminated @ 1.3m				@ 1.3m, TC-BIT refusal

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Log Symbols & Abbreviations (Non-cored Borehole Log)

Log Column	Symbol/Value	Description
Drilling Method	V-bit TC-bit RR DB BB	Hardened steel 'V' shaped bit attached to auger Tungsten Carbide bit attached to auger Tricone (Rock Roller) bit Drag bit Blade bit
Groundwater	Dry  	Groundwater not encountered to the drilled or auger refusal depth Groundwater level at depths shown on log Groundwater seepage at depths shown on log
Environment Sample	GP G P	Glass bottle and plastic bag sample over depths shown on log Glass bottle sample over depths shown on log Plastic bag sample over depths shown on log
PID Reading	100	PID reading in ppm
Geotechnical Sample	DS DB U_{50}	Disturbed Small bag sample over depths shown on log Disturbed Bulk sample over depths shown on log Undisturbed 50mm tube sample over depths shown on log
Field Test	N=10 3,5,5 N=R 10,15/100	Standard Penetration Test (SPT) 'N' value. Individual numbers indicate blows per 150mm penetration. 'R' represents refusal to penetration in hard/very dense soils or in cobbles or boulders. The first number represents10 blows for 150mm penetration whereas the second number represents 15 blows for 100mm penetration where SPT met refusal
	DCP/PSP: 5 6 R/10	Dynamic Cone Penetration (DCP) or Perth Sand Penetrometer (PSP). Each number represents blows per 100mm penetration. 'R/10' represents refusal after 10mm penetration in hard/very dense soils or in gravels or boulders.
Classification	GP GW GM GC SP SW SM SC ML MI MH CL CI CH	Poorly Graded GRAVEL Well graded GRAVEL Silty GRAVEL Clayey GRAVEL Poorly graded SAND Well graded SAND Silty SAND Clayey SAND SILT / Sandy SILT / clayey SILT, low plasticity SILT / Sandy SILT / clayey SILT, medium plasticity SILT / Sandy SILT / clayey SILT, high plasticity CLAY / Silty CLAY / Sandy CLAY / Gravelly CLAY, low plasticity CLAY / Silty CLAY / Sandy CLAY / Gravelly CLAY, medium plasticity CLAY / Silty CLAY / Sandy CLAY / Gravelly CLAY, high plasticity
Moisture Condition Cohesive soils Cohesionless soils	 M<PL M=PL M>PL D M W	 Moisture content less than Plastic Limit Moisture content equal to Plastic Limit Moisture content to be greater than Plastic Limit Dry - Runs freely through hand Moist - Tends to cohere Wet - Tends to cohere
Consistency Cohesive soils	 VS S F St VSt H	**Term** / **Undrained shear strength, C_u (kPa)** / **Hand Penetrometer (Qu)** Very Soft / ≤12 / <25 Soft / >12 & ≤25 / 25 – 50 Firm / >25 & ≤50 / 50 – 100 Stiff / >50 & ≤100 / 100 – 200 Very Stiff / >100 & ≤200 / 200 – 400 Hard / >200 / >400
Density Index Cohesionless soils	 VL L M D VD	**Term** / **Density Index, I_D (%)** / **SPT 'N' (blows/300mm)** Very Loose / ≤15 / ≤5 Loose / >15 & ≤35 / >5 & ≤10 Medium Dense / >35 & ≤65 / >10 & ≤30 Dense / >65 & ≤85 / >30 & ≤50 Very Dense / >85 / >50
Hand Penetrometer	100 200	Unconfined compressive strength (q_u) in kPa determined using pocket penetrometer, at depths shown on log
Remarks	 Residual Alluvium Colluvial Aeolian Marine	Geological origin of soils Residual soils above bedrock River deposited Alluvial soils Gravity deposited Colluvial soils Wind deposited Aeolian soils Marine Soils

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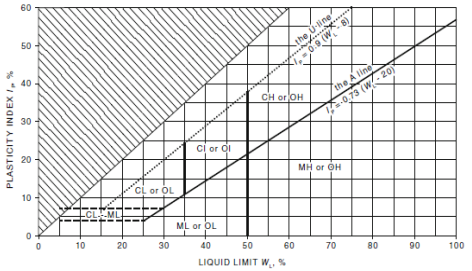
AS1726 : 2017– Unified Soil Classification System

Major Divisions		Particle size (mm)	Group Symbol	Typical Names	Field Identifications Sand and Gravels			Laboratory classification				
OVERSIZE	BOULDERS	>200						Use the gradation of material passing 63mm for classification of fractions according to the criteria given in 'Major Divisions'	% Fines (2)	Plasticity of Fine Fraction	$C_u = D_{60}/D_{10}$	$C_c = (D_{30})^2/(D_{10}D_{60})$	Notes
	COBBLES	63										
COARSE GRAINED SOIL (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm)	Coarse 19	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength				≤5	-	>4	between 1 and 3	1. Identify lines by the method given for fine grained soils 2. Borderline classifications occur when the percentage of fines (fraction smaller than 0.075mm size) is greater than 5% and less than 12%. Borderline classifications require the use of dual symbols e.g. SP-SM, GW-GC
		Medium 6.7	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength				≤5	-	Fails to comply with above		
			GM	Silty gravels, gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength				≥12	Below 'A' line or I_p<4	-	-	
		Fine 2.36	GC	Clayey gravels, gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength				≥12	Above 'A' line or I_p>7	-	-	
	SAND (more than half of coarse fraction is smaller than 2.36mm)	Coarse 0.6	SW	Well-graded sands, gravelly sands, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength				≤5	-	>6	between 1 and 3	
		Medium 0.21	SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength				≤5	-	Fails to comply with above		
			SM	Silty sands, sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength				≥12	Below 'A' line or I_p<4	-	-	
		Fine 0.075	SC	Clayey sand, sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength				≥12	Above 'A' line of I_p>7	-	-	
FINE GRAINED SOIL (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT (0.075mm to 0.002mm) & CLAY (<0.002mm) Liquid Limit<50%		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	**Dry Strength**	**Dilatancy**	**Toughness**		More than 35% passing 0.075mm	Below 'A' line			
					None to low	Slow to rapid	Low						
			CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Medium to high	None to very slow	Medium			Above 'A' line			
			OL	Organic silts and organic silty clays of low plasticity	Low to medium	Slow	Low			Below 'A' line			
	SILT (0.075mm to 0.002mm) & CLAY (<0.002mm) Liquid Limit>50%		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Low to medium	None to slow	Low to medium			Below 'A' line			
			CH	Inorganic clays of medium to high plasticity, fat clays	High to very high	None	High			Above 'A' line			
			OH (1)	Organic clays of medium to high plasticity, organic silts	Medium to high	None to very slow	Low to medium			Below 'A' line			
	HIGHLY ORGANIC SOILS		Pt (1)	Peat and highly organic soils	Identified by colour, odour, spongy feel and generally by fibrous texture				Effervesces with H_2O_2				



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Log Symbols & Abbreviations (Cored Borehole Log)

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

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AS1726 – Identification of Sedimentary Rocks for Engineering Purposes

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

AS1726 – Identification of Metamorphic and Igneous Rocks for Engineering Purposes

Obviously foliated rocks (mostly metamorphic)		Rocks with massive structure and crystalline texture (mostly igneous)						Grain size (mm)
Grain size description			Grain size description	Pegmatite			Pyrosenite	More than 20
		MARBLE						20
	GNEISS Well developed but often widely spaced foliation sometimes with schistose bands	QUARTZITE		GRANITE	Diorite	GABBRO	Peridorite	6
COARSE		Granulite	COARSE	These rocks are sometimes phorphyritic and are then described, for example, as porphyritic granite				
	Migmatite Irregularly foliated: mixed schists and gneisses	HORNFELS						2
	SCHIST Well developed undulose foliation; generally much mica	Amphibolite		Micorgranite	Microdiorite			0.6
MEDIUM		Serpentine	MEDIUM	These rocks are sometimes phorphyritic and are then described as porphyries		Dolerite		0.2
								0.06
	PHYLLITE Slightly undulose foliation; sometimes 'spotted'			RHYOLITE	ANDESITE			0.002
FINE	SLATE Well developed plane cleavage (foliation)		FINE	These rocks are sometimes phorphyritic and are then described as porphyries		BASALT		Less than 0.002
	Mylonite Found in fault zones, mainly in igneous and metamorphic areas			Obsidian	Volcanic glass			Amorphous or cryptocrystalline
CRYSTALLINE				Pale<----------->Dark				
SILICEOUS		Mainly SILICEOUS		ACID Much quartz	INTERMEDIATE Some quartz	BASIC Little or no quartz	ULTRA BASIC	
METAMORPHIC ROCKS Most metamorphic rocks are distinguished by foliation which may impart fissility. Foliation in gneisses is best observed in outcrop. Non-foliated metamorphics are difficult to recognize except by association. Any rock baked by contact metamorphism is described as 'hornfels' and is generally somewhat stronger than the parent rock Most fresh metamorphic rocks are strong although perhaps fissile			IGNEOUS ROCKS Composed of closely interlocking mineral grains. Strong when fresh; not porous Mode of occurrence : 1 Batholith; 2 Laccoliths; 3 Sills; 4 Dykes; 5 Lava Flows; 6 Veins					

APPENDIX B

Laboratory Test Results

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
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Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329/3 430-490 Douglas Park Drive, Doug**
Order Number	**14329/3**
Samples	9

LABORATORY DETAILS

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Laboratory	SGS Alexandria Environmental
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SGS Reference	**SE266264 R0**
Date Received	3/6/2024
Date Reported	7/6/2024

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SPOCAS and Chromium Suite content subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146. Report No. CE175532

SIGNATORIES

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264.001	BH2 SOIL 0.2-0.3 30/5/2024 SE266264.002	BH2 SOIL 0.5-0.95 30/5/2024 SE266264.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264.005
Exchangeable Calcium, Ca	mg/kg	2	-	-	-	-	-
Exchangeable Calcium, Ca	meq/100g	0.01	-	-	-	-	-
Exchangeable Calcium Percentage*	%	0.1	-	-	-	-	-
Exchangeable Potassium, K	mg/kg	2	-	-	-	-	-
Exchangeable Potassium, K	meq/100g	0.01	-	-	-	-	-
Exchangeable Potassium Percentage*	%	0.1	-	-	-	-	-
Exchangeable Magnesium, Mg	mg/kg	2	-	-	-	-	-
Exchangeable Magnesium, Mg	meq/100g	0.02	-	-	-	-	-
Exchangeable Magnesium Percentage*	%	0.1	-	-	-	-	-
Exchangeable Sodium, Na	mg/kg	2	-	-	-	-	-
Exchangeable Sodium, Na	meq/100g	0.01	-	-	-	-	-
Exchangeable Sodium Percentage*	%	0.1	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.02	-	-	-	-	-

PARAMETER	UOM	LOR	BH3 SOIL 1.1-1.2 30/5/2024 SE266264.006	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008	BH1 SOIL 1.5-1.57 30/5/2024 SE266264.009
Exchangeable Calcium, Ca	mg/kg	2	-	-	-
Exchangeable Calcium, Ca	meq/100g	0.01	-	-	-
Exchangeable Calcium Percentage*	%	0.1	-	-	-
Exchangeable Potassium, K	mg/kg	2	-	-	-
Exchangeable Potassium, K	meq/100g	0.01	-	-	-
Exchangeable Potassium Percentage*	%	0.1	-	-	-
Exchangeable Magnesium, Mg	mg/kg	2	-	-	-
Exchangeable Magnesium, Mg	meq/100g	0.02	-	-	-
Exchangeable Magnesium Percentage*	%	0.1	-	-	-
Exchangeable Sodium, Na	mg/kg	2	-	-	-
Exchangeable Sodium, Na	meq/100g	0.01	-	-	-
Exchangeable Sodium Percentage*	%	0.1	-	-	-
Cation Exchange Capacity	meq/100g	0.02	-	-	-

Moisture Content [AN002] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264.001	BH2 SOIL 0.5-0.95 30/5/2024 SE266264.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264.005	BH3 SOIL 1.1-1.2 30/5/2024 SE266264.006
% Moisture	%w/w	1	**15.7**	**13.2**	**10.2**	**15.8**	**15.8**

PARAMETER	UOM	LOR	BH4 SOIL 0.3-0.4 30/5/2024 SE266264.007	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008
% Moisture	%w/w	1	**22.5**	**20.3**

TAA (Titratable Actual Acidity) [AN219] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264.001	BH2 SOIL 0.5-0.95 30/5/2024 SE266264.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264.005	BH3 SOIL 1.1-1.2 30/5/2024 SE266264.006
pH KCl*	pH Units	-	4.7	5.4	5.7	4.6	4.6
Titratable Actual Acidity	kg H2SO4/T	0.25	1.5	0.37	0.37	1.8	2.0
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	30	7	7	37	40
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	0.05	0.01	0.01	0.06	0.06
Sulphur (SKCl)	%w/w	0.005	<0.005	<0.005	<0.005	0.008	0.008
Calcium (CaKCl)	%w/w	0.005	0.058	0.008	<0.005	<0.005	0.005
Magnesium (MgKCl)	%w/w	0.005	0.065	0.067	0.024	0.080	0.079

PARAMETER	UOM	LOR	BH4 SOIL 0.3-0.4 30/5/2024 SE266264.007	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008
pH KCl*	pH Units	-	4.3	4.3
Titratable Actual Acidity	kg H2SO4/T	0.25	3.2	3.3
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	65	67
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	0.10	0.11
Sulphur (SKCl)	%w/w	0.005	<0.005	0.006
Calcium (CaKCl)	%w/w	0.005	0.008	<0.005
Magnesium (MgKCl)	%w/w	0.005	0.041	0.041

TPA (Titratable Peroxide Acidity) [AN218] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264.001	BH2 SOIL 0.5-0.95 30/5/2024 SE266264.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264.005	BH3 SOIL 1.1-1.2 30/5/2024 SE266264.006
Peroxide pH (pH Ox)	pH Units	-	4.9	5.3	5.3	5.2	5.0
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	0.74	0.37	<0.25	1.6	1.3
TPA as moles H+/tonne	moles H+/T	5	15	7	<5	32	27
TPA as S % W/W	%w/w S	0.01	0.02	0.01	<0.01	0.05	0.04
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	<5	<5	<5	<5
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5	<5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)*	%w/w	0.005	0.006	0.012	<0.005	0.005	0.006
Peroxide Oxidisable Sulphur as moles H+/tonne*	moles H+/T	5	<5	8	<5	<5	<5
Sulphur (Sp)	%w/w	0.005	0.009	0.016	0.006	0.013	0.014
Calcium (Cap)	%w/w	0.005	0.064	0.011	0.006	0.005	0.007
Reacted Calcium (CaA)*	%w/w	0.005	0.006	<0.005	<0.005	<0.005	<0.005
Reacted Calcium (CaA)*	moles H+/T	5	<5	<5	<5	<5	<5
Magnesium (Mgp)	%w/w	0.005	0.070	0.071	0.028	0.084	0.083
Reacted Magnesium (MgA)*	%w/w	0.005	0.005	<0.005	<0.005	<0.005	<0.005
Reacted Magnesium (MgA)*	moles H+/T	5	<5	<5	<5	<5	<5
Net Acid Soluble Sulphur as % w/w*	%w/w	0.005	-	-	-	-	-
Net Acid Soluble Sulphur as moles H+/tonne*	moles H+/T	5	-	-	-	-	-

PARAMETER	UOM	LOR	BH4 SOIL 0.3-0.4 30/5/2024 SE266264.007	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008	BH1 SOIL 1.5-1.57 30/5/2024 SE266264.009
Peroxide pH (pH Ox)	pH Units	-	4.6	4.9	-
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	2.7	2.8	<0.25
TPA as moles H+/tonne	moles H+/T	5	55	57	<5
TPA as S % W/W	%w/w S	0.01	0.09	0.09	<0.01
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	<5	-
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	<0.25	-
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	<0.01	-
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01	-
ANCE as moles H+/tonne	moles H+/T	5	<5	<5	-
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01	-
Peroxide Oxidisable Sulphur (Spos)*	%w/w	0.005	0.009	0.007	-
Peroxide Oxidisable Sulphur as moles H+/tonne*	moles H+/T	5	5	<5	-
Sulphur (Sp)	%w/w	0.005	0.013	0.013	-
Calcium (Cap)	%w/w	0.005	0.010	<0.005	-
Reacted Calcium (CaA)*	%w/w	0.005	<0.005	<0.005	-
Reacted Calcium (CaA)*	moles H+/T	5	<5	<5	-
Magnesium (Mgp)	%w/w	0.005	0.045	0.044	-
Reacted Magnesium (MgA)*	%w/w	0.005	<0.005	<0.005	-
Reacted Magnesium (MgA)*	moles H+/T	5	<5	<5	-
Net Acid Soluble Sulphur as % w/w*	%w/w	0.005	0.008	0.007	-
Net Acid Soluble Sulphur as moles H+/tonne*	moles H+/T	5	<5	<5	-

SPOCAS Net Acidity Calculations [AN220] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264.001	BH2 SOIL 0.5-0.95 30/5/2024 SE266264.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264.005	BH3 SOIL 1.1-1.2 30/5/2024 SE266264.006
s-Net Acidity	%w/w S	0.005	0.054	0.024	0.016	0.065	0.070
a-Net Acidity	moles H+/T	5	34	15	10	41	44
Liming Rate*	kg CaCO3/T	0.1	2.5	NA	NA	3.1	3.3
Verification s-Net Acidity*	%w/w S	-20	0.00	0.00	0.00	0.00	0.00
a-Net Acidity without ANCE*	moles H+/T	5	34	15	10	41	44
Liming Rate without ANCE*	kg CaCO3/T	0.1	2.5	NA	NA	3.1	3.3

PARAMETER	UOM	LOR	BH4 SOIL 0.3-0.4 30/5/2024 SE266264.007	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008	BH1 SOIL 1.5-1.57 30/5/2024 SE266264.009
s-Net Acidity	%w/w S	0.005	0.12	0.12	-
a-Net Acidity	moles H+/T	5	74	75	-
Liming Rate*	kg CaCO3/T	0.1	5.5	5.6	-
Verification s-Net Acidity*	%w/w S	-20	0.00	0.00	-
a-Net Acidity without ANCE*	moles H+/T	5	74	75	-
Liming Rate without ANCE*	kg CaCO3/T	0.1	5.5	5.6	-

Chromium Reducible Sulfur (CRS) [AN217] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264.001	BH2 SOIL 0.5-0.95 30/5/2024 SE266264.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264.005	BH3 SOIL 1.1-1.2 30/5/2024 SE266264.006
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5	<5

PARAMETER	UOM	LOR	BH4 SOIL 0.3-0.4 30/5/2024 SE266264.007	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5

HCl Extractable S, Ca and Mg in Soil/Solids ICP OES [AN014] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH4 SOIL 0.3-0.4 30/5/2024 SE266264.007	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008
Acid Soluble Sulfur (SHCl)	%w/w	0.005	**0.012**	**0.014**

Chromium Suite Net Acidity Calculations [AN220] Tested: 7/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264.001	BH2 SOIL 0.5-0.95 30/5/2024 SE266264.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264.005	BH3 SOIL 1.1-1.2 30/5/2024 SE266264.006
s-Net Acidity	%w/w S	0.005	0.050	0.012	0.014	0.060	0.064
a-Net Acidity	moles H+/T	5	31	7	9	37	40
Liming Rate*	kg CaCO3/T	0.1	2.3	NA	NA	2.8	3.0
Verification s-Net Acidity*	%w/w S	-20	0.00	0.00	0.00	0.00	0.00
a-Net Acidity without ANCBT*	moles H+/T	5	31	7	9	37	40
Liming Rate without ANCBT*	kg CaCO3/T	0.1	2.3	NA	NA	2.8	3.0
s-Net Acidity without ANC	%w/w S	0.005	0.050	0.012	0.014	0.060	0.064

PARAMETER	UOM	LOR	BH4 SOIL 0.3-0.4 30/5/2024 SE266264.007	BH4 SOIL 0.5-0.95 30/5/2024 SE266264.008	BH1 SOIL 1.5-1.57 30/5/2024 SE266264.009
s-Net Acidity	%w/w S	0.005	0.11	0.11	-
a-Net Acidity	moles H+/T	5	70	71	-
Liming Rate*	kg CaCO3/T	0.1	5.2	5.3	-
Verification s-Net Acidity*	%w/w S	-20	0.00	0.00	-
a-Net Acidity without ANCBT*	moles H+/T	5	70	71	-
Liming Rate without ANCBT*	kg CaCO3/T	0.1	5.2	5.3	-
s-Net Acidity without ANC	%w/w S	0.005	0.11	0.11	-

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN014	This method is for the determination of soluble sulfate (SO4-S) by extraction with hydrochloric acid. Sulphides should not react and would normally be expelled. Sulfate as Sulfur is determined by ICP.
AN122	Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
AN122	The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100. ESP can be used to categorise the sodicity of the soil as below: ESP < 6% non-sodic ESP 6-15% sodic ESP >15% strongly sodic Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-
AN214	Acid Neutralising Capacity (ANC)or Neutralising Value (NV): The crushed or as received sample is reacted with excess normal acid (HCl) and then back titrated with standard sodium hydroxide to determine the acid consumed. The result is expressed as kg H2SO4/tonne or %CaCO3. Based on AS4969-13.
AN217	Dried pulped sample is mixed with acid and chromium metal in a rapid distillation unit to produce hydrogen sulfide (H2S) which is collected and titrated with iodine (I2(aq)) to measure SCR.
AN218	Soil samples are subjected to extreme oxidising conditions using hydrogen peroxide. Continuous application of heat and peroxide ensure all sulfide is converted to sulfuric acid. Excess peroxide is broken down by a copper catalyst prior to titration for acidity. Calcium, magnesium, and sulfur are determined by ICP-OES. Also included is a carbonate modification step which, depending on pH after the initial oxidation, gives a measure of ANC.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	Chromium Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

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

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

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

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

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

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

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

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

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

STATEMENT OF QA/QC PERFORMANCE

SE266264 R0

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
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Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329/3 430-490 Douglas Park Drive, Doug**
Order Number	**14329/3**
Samples	9

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
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Facsimile	+61 2 8594 0499
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SGS Reference	**SE266264 R0**
Date Received	03 Jun 2024
Date Reported	07 Jun 2024

COMMENTS

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

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

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

SAMPLE SUMMARY

Sample counts by matrix	9 Soil	Type of documentation received	COC
Date documentation received	4/6/2024@10:24AM	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	12.2°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE266264 R0

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

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

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

No holding time data is available for this job.

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

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

No surrogates were required for this job.

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

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

No method blanks were required for this job.

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

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

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

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

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

No duplicates were required for this job.

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

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

No laboratory control standards were required for this job.

MATRIX SPIKES

SE266264 R0

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

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

No matrix spikes were required for this job.

MATRIX SPIKE DUPLICATES

SE266264 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

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

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Admin	Manager	Anthony Nilsson
Client	SGS I&E SYDNEY	Laboratory	SGS Cairns Environmental
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Facsimile	0285940499	Facsimile	+61 07 4035 5122
Email	au.environmental.sydney@sgs.com	Email	AU.Environmental.Cairns@sgs.com
Project	**13918/1 430-490 Douglas Park Drive, Doug**	SGS Reference	**CE175532 R0**
Order Number	**SE266264**	Date Received	05 Jun 2024
Samples	7	Date Reported	07 Jun 2024

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146)

SIGNATORIES

Anthony NILSSON
Operations Manager

Jon DICKER
Manager Northern QLD

Parameter	Units	LOR	Sample Number Sample Matrix Sample Depth Sample Date Sample Name	CE175532.001 Soil 0.5-0.95 30 May 2024 SE266264.001	CE175532.003 Soil 0.5-0.95 30 May 2024 SE266264.003	CE175532.004 Soil 1.5-1.57 30 May 2024 SE266264.004
Moisture Content Method: AN002 Tested: 5/6/2024						
% Moisture	%w/w	0.5		**16**	**13**	**10**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 6/6/2024						
pH KCl	pH Units	-		**4.7**	**5.4**	**5.7**
Titratable Actual Acidity	kg H2SO4/T	0.25		**1.5**	**0.37**	**0.37**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5		**30**	**7**	**7**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01		**0.05**	**0.01**	**0.01**
Sulphur (SKCl)	%w/w	0.005		<0.005	<0.005	<0.005
Calcium (CaKCl)	%w/w	0.005		**0.058**	**0.008**	<0.005
Magnesium (MgKCl)	%w/w	0.005		**0.065**	**0.067**	**0.024**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 6/6/2024						
Chromium Reducible Sulfur (Scr)	%	0.005		<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5		<5	<5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 7/6/2024						
Acid Soluble Sulfur (SHCl)	%w/w	0.005		-	-	-
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 7/6/2024						
s-Net Acidity	%w/w S	0.005		**0.050**	**0.012**	**0.014**
s-Net Acidity without ANC	%w/w S	0.005		**0.050**	**0.012**	**0.014**
a-Net Acidity	moles H+/T	5		**31**	**7**	**9**
Liming Rate	kg CaCO3/T	0.1		**2.3**	NA	NA
Verification s-Net Acidity	%w/w S	-20		**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5		**31**	**7**	**9**
Liming Rate without ANCBT	kg CaCO3/T	0.1		**2.3**	NA	NA
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 6/6/2024						
Peroxide pH (pH Ox)	pH Units	-		**4.9**	**5.3**	**5.3**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25		**0.74**	**0.37**	<0.25
TPA as moles H+/tonne	moles H+/T	5		**15**	**7**	<5
TPA as S % W/W	%w/w S	0.01		**0.02**	**0.01**	<0.01
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5		<5	<5	<5
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25		<0.25	<0.25	<0.25
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01		<0.01	<0.01	<0.01
ANCE as % $CaCO_3$	% CaCO3	0.01		<0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5		<5	<5	<5
ANCE as S % W/W	%w/w S	0.01		<0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005		**0.006**	**0.012**	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5		<5	**8**	<5
Sulphur (Sp)	%w/w	0.005		**0.009**	**0.016**	**0.006**
Calcium (Cap)	%w/w	0.005		**0.064**	**0.011**	**0.006**
Reacted Calcium (CaA)	%w/w	0.005		**0.006**	<0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5		<5	<5	<5
Magnesium (Mgp)	%w/w	0.005		**0.070**	**0.071**	**0.028**
Reacted Magnesium (MgA)	%w/w	0.005		**0.005**	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T	5		<5	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005		-	-	-
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5		-	-	-

Parameter	Units	LOR	Sample Number CE175532.001 Sample Matrix Soil Sample Depth 0.5-0.95 Sample Date 30 May 2024 Sample Name SE266264.001	CE175532.003 Soil 0.5-0.95 30 May 2024 SE266264.003	CE175532.004 Soil 1.5-1.57 30 May 2024 SE266264.004
SPOCAS Net Acidity Calculations Method: AN220 Tested: 7/6/2024					
s-Net Acidity	%w/w S	0.005	**0.054**	**0.024**	**0.016**
a-Net Acidity	moles H+/T	5	**34**	**15**	**10**
Liming Rate	kg CaCO3/T	0.1	**2.5**	NA	NA
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	**34**	**15**	**10**
Liming Rate without ANCE	kg CaCO3/T	0.1	**2.5**	NA	NA

Parameter	Units	LOR	Sample Number Sample Matrix Sample Depth Sample Date Sample Name CE175532.005 Soil 0.5-0.95 30 May 2024 SE266264.005	CE175532.006 Soil 1.1-1.2 30 May 2024 SE266264.006	CE175532.007 Soil 0.3-0.4 30 May 2024 SE266264.007	CE175532.008 Soil 0.5-0.95 30 May 2024 SE266264.008
Moisture Content Method: AN002 Tested: 5/6/2024						
% Moisture	%w/w	0.5	**16**	**16**	**22**	**20**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 6/6/2024						
pH KCl	pH Units	-	**4.6**	**4.6**	**4.3**	**4.3**
Titratable Actual Acidity	kg H2SO4/T	0.25	**1.8**	**2.0**	**3.2**	**3.3**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**37**	**40**	**65**	**67**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.06**	**0.06**	**0.10**	**0.11**
Sulphur (SKCl)	%w/w	0.005	**0.008**	**0.008**	<0.005	**0.006**
Calcium (CaKCl)	%w/w	0.005	<0.005	**0.005**	**0.008**	<0.005
Magnesium (MgKCl)	%w/w	0.005	**0.080**	**0.079**	**0.041**	**0.041**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 6/6/2024						
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	<5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 7/6/2024						
Acid Soluble Sulfur (SHCl)	%w/w	0.005	-	-	**0.012**	**0.014**
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 7/6/2024						
s-Net Acidity	%w/w S	0.005	**0.060**	**0.064**	**0.11**	**0.11**
s-Net Acidity without ANC	%w/w S	0.005	**0.060**	**0.064**	**0.11**	**0.11**
a-Net Acidity	moles H+/T	5	**37**	**40**	**70**	**71**
Liming Rate	kg CaCO3/T	0.1	**2.8**	**3.0**	**5.2**	**5.3**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**37**	**40**	**70**	**71**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**2.8**	**3.0**	**5.2**	**5.3**
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 6/6/2024						
Peroxide pH (pH Ox)	pH Units	-	**5.2**	**5.0**	**4.6**	**4.9**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**1.6**	**1.3**	**2.7**	**2.8**
TPA as moles H+/tonne	moles H+/T	5	**32**	**27**	**55**	**57**
TPA as S % W/W	%w/w S	0.01	**0.05**	**0.04**	**0.09**	**0.09**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	<5	<5	<5
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	<0.25	<0.25	<0.25
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	<0.01	<0.01	<0.01
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005	**0.005**	**0.006**	**0.009**	**0.007**
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5	<5	**5**	<5
Sulphur (Sp)	%w/w	0.005	**0.013**	**0.014**	**0.013**	**0.013**
Calcium (Cap)	%w/w	0.005	**0.005**	**0.007**	**0.010**	<0.005
Reacted Calcium (CaA)	%w/w	0.005	<0.005	<0.005	<0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5	<5	<5	<5	<5
Magnesium (Mgp)	%w/w	0.005	**0.084**	**0.083**	**0.045**	**0.044**
Reacted Magnesium (MgA)	%w/w	0.005	<0.005	<0.005	<0.005	<0.005
Reacted Magnesium (MgA)	moles H+/T	5	<5	<5	<5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	-	-	**0.008**	**0.007**
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	-	-	<5	<5

Parameter	Units	LOR	Sample Number Sample Matrix Sample Depth Sample Date Sample Name	CE175532.005 Soil 0.5-0.95 30 May 2024 SE266264.005	CE175532.006 Soil 1.1-1.2 30 May 2024 SE266264.006	CE175532.007 Soil 0.3-0.4 30 May 2024 SE266264.007	CE175532.008 Soil 0.5-0.95 30 May 2024 SE266264.008
SPOCAS Net Acidity Calculations **Method: AN220** **Tested: 7/6/2024**							
s-Net Acidity	%w/w S	0.005		**0.065**	**0.070**	**0.12**	**0.12**
a-Net Acidity	moles H+/T	5		**41**	**44**	**74**	**75**
Liming Rate	kg CaCO3/T	0.1		**3.1**	**3.3**	**5.5**	**5.6**
Verification s-Net Acidity	%w/w S	-20		**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCE	moles H+/T	5		**41**	**44**	**74**	**75**
Liming Rate without ANCE	kg CaCO3/T	0.1		**3.1**	**3.3**	**5.5**	**5.6**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Chromium Reducible Sulfur (CRS) **Method: ME-(AU)-[ENV]AN217**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chromium Reducible Sulfur (Scr)	LB129524	%	0.005	<0.005	0%	95%
Chromium Reducible Sulfur (Scr)	LB129524	moles H+/T	5	<5		

TAA (Titratable Actual Acidity) **Method: ME-(AU)-[ENV]AN219**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB129525	pH Units	-	5.5	0%	101%
Titratable Actual Acidity	LB129525	kg H2SO4/T	0.25	<0.25	0 - 9%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB129525	moles H+/T	5	<5	0 - 9%	105%
Titratable Actual Acidity (TAA) S%w/w	LB129525	%w/w S	0.01	<0.01	0 - 9%	106%
Sulphur (SKCl)	LB129525	%w/w	0.005	<0.005	4 - 5%	87%
Calcium (CaKCl)	LB129525	%w/w	0.005	<0.005	0 - 2%	97%
Magnesium (MgKCl)	LB129525	%w/w	0.005	<0.005	0 - 26%	93%

TPA (Titratable Peroxide Acidity) **Method: ME-(AU)-[ENV]AN218**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Peroxide pH (pH Ox)	LB129523	pH Units	-	6.2	1 - 2%	100%
TPA as kg H_2SO_4/tonne	LB129523	kg H2SO4/T	0.25	<0.25	0 - 8%	99%
TPA as moles H+/tonne	LB129523	moles H+/T	5	<5	0 - 8%	99%
TPA as S % W/W	LB129523	%w/w S	0.01	<0.01	0 - 8%	99%
ANCE as % $CaCO_3$	LB129523	% CaCO3	0.01	<0.01	0%	
ANCE as moles H+/tonne	LB129523	moles H+/T	5	<5	0%	
ANCE as S % W/W	LB129523	%w/w S	0.01	<0.01	0%	
Sulphur (Sp)	LB129523	%w/w	0.005	<0.005	1 - 2%	89%
Calcium (Cap)	LB129523	%w/w	0.005	<0.005	0 - 2%	104%
Magnesium (Mgp)	LB129523	%w/w	0.005	<0.005	1%	98%

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN014	This method is for the determination of soluble sulfate (SO4-S) by extraction with hydrochloric acid. Sulphides should not react and would normally be expelled. Sulfate as Sulfur is determined by ICP.
AN217	Dried pulped sample is mixed with acid and chromium metal in a rapid distillation unit to produce hydrogen sulfide (H2S) which is collected and titrated with iodine (I2(aq)) to measure SCR.
AN218	Soil samples are subjected to extreme oxidising conditions using hydrogen peroxide. Continuous application of heat and peroxide ensure all sulfide is converted to sulfuric acid. Excess peroxide is broken down by a copper catalyst prior to titration for acidity. Calcium, magnesium, and sulfur are determined by ICP-OES. Also included is a carbonate modification step which, depending on pH after the initial oxidation, gives a measure of ANC.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	Chromium Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

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

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

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

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

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

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

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

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

GEOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

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

Page

TO:	SGS ENVIRONMENTAL SERVICES UNIT 16 33 MADDOX STREET ALEXANDRIA NSW 2015	Sampling By:	SS/JSH
PH:	02 8594 0400	FAX:	02 8594 0499
ATTN:	Ms Emily Yin	Project Manager:	IJ
Job No:	13918/1		
Project:	Proposed Cemetery Development		
Location:	430-490 Douglas Park Drive, Douglas Park		

Sampling details

Results required by:

	Location	Depth	Soil	Water	sPOCAS	CRS	ESP	Notes	Keep Sample
1	BH1	0.5-0.95	DSP		✓	✓	✓	sPOCAS test includes	✓
9	BH1	1.5-1.57	DSP		✓	✓	✓	pH(kcl), pH(ox), TPA, TAA, TSA, Sox	✓
2	BH2	0.2-0.3	DSP				✓		✓
3	BH2	0.5-0.95	DSP		✓	✓	✓	CRS=Chromium Reducible Sulphur	✓
5	BH3	0.5-0.95	DSP		✓	✓	✓		✓
6	BH3	1.1-1.2	DSP		✓	✓	✓	ESP = Exchangeable Sodium Percentag	✓
7	BH4	0.3-0.4	DSP		✓	✓			✓
8	BH4	0.5-0.95	DSP		✓	✓	✓		✓
4	BH2	1.5-1.57	DSP		✓	✓	✓		✓

SGS EHS Sydney COC
SE266264

Excel Geotech_Geo Required

Relinquished by			Received by	
Name	Signature	Date	Name	Signature
Indra Jworchan		30-May-24		31.5.24 2:35

Legend:

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

Form No 4.7F2-5 SGS

E-MAILED
4.6.24 10:27AM

Luong, Thi Song Van (Alexandria)

From: Indra Jworchan <indra@geotech.com.au>
Sent: Wednesday, 5 June 2024 3:26 PM
To: AU.SampleReceipt.Sydney, AU (Sydney)
Subject: RE: SE266264 - Ref.14329/3 RE: [EXTERNAL] Sample Check

Categories: PRINTED

Hi Van

Please test this sample as per initial request if all results can be obtained at the same time. Otherwise, please ignore this sample.

Regards,
Indra Jworchan
Principal Geotechnical Engineer | General Manager
MIEAust, CPEng, NER, APEC Engineer, IntPE (Aust)

GEOTECHNIQUE® PTY LTD

An eiaustralia company

PO BOX 880
Penrith NSW 2751
Tel: 02 4722 2744
Mob: 0414 223 720

www.geotech.com.au

From: AU.SampleReceipt.Sydney, AU (Sydney) <AU.SampleReceipt.Sydney@sgs.com>
Sent: Wednesday, June 5, 2024 3:08 PM
To: Indra Jworchan <indra@geotech.com.au>; AU.SampleReceipt.Sydney, AU (Sydney) <AU.SampleReceipt.Sydney@sgs.com>
Cc: AU.Environmental.Sydney, AU (Sydney) <AU.Environmental.Sydney@sgs.com>
Subject: SE266264 - Ref.14329/3 RE: [EXTERNAL] Sample Check

Hi Indra,

Following your email forwarded below, just letting you know BH1_1.5-1.57 (1 small bag) arrived at our lab yesterday. Please advise how you would like us to proceed. Thank you.

RE: [EXTERNAL] Sample Check

Indra Jworchan <indra@geotech.com.au>
Tue 4/06/2024 2:03 PM
To:AU.SampleReceipt.Sydney, AU (Sydney) <AU.SampleReceipt.Sydney@sgs.com>

Hi Michael

We were not up to the task. Apology. I confirm the following.

Our Job No is 14329/3.

If all samples, (except BH1 1.5-1.57m) listed in COC are available, please proceed with testing of available samples plus BH2 (1.5-1.7m). Hold remaining extra samples for time being.

Regards,
Indra Jworchan
Principal Geotechnical Engineer | General Manager
MIEAust, CPEng, NER, APEC Engineer, IntPE (Aust)

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An eiaustralia company

PO BOX 880
Penrith NSW 2751
Tel: 02 4722 2744
Mob: 0414 223 720

www.geotech.com.au

From: AU.SampleReceipt.Sydney, AU (Sydney) <AU.SampleReceipt.Sydney@sgs.com>
Sent: Tuesday, June 4, 2024 1:24 PM
To: Indra Jworchan <indra@geotech.com.au>
Subject: Re: [EXTERNAL] Sample Check

Hi Indra,

We did receive some samples last week that sort of but don't entirely match this COC. See below and please advise:

- Project reference on samples is 14329/1, where COC file name is 14329/3 and reference on COC is 13918/1
- BH1 1.5-1.57 Listed Not Received
- Extra Samples:
    - BH2 1.5-1.57
    - BH3 0.3-0.4

- BH3 1.5-1.7
- BH4 1.1-1.2

Regards,

Michael Bousquet
Sydney Sample Receipt Team
Environment, Health & Safety
Sample Receipt

SGS Australia Pty Ltd
Unit 16, 33 Maddox Street
Alexandria NSW 2015

Phone: +61 (0)2 8594 0400
Fax: +61 (0)2 8594 0499
E-mail: au.samplereceipt.sydney@sgs.com

From: Indra Jworchan <indra@geotech.com.au>
Sent: Tuesday, 4 June 2024 10:24 AM
To: AU.SampleReceipt.Sydney, AU (Sydney) <au.samplereceipt.sydney@sgs.com>
Subject: [EXTERNAL] Sample Check

*** WARNING: this message is from an EXTERNAL SENDER. Please be cautious, particularly with links and attachments. ***

HI

Just making sure you have received attached COC and samples for this COC last week.

Regards,
Indra Jworchan
Principal Geotechnical Engineer | General Manager
MIEAust, CPEng, NER, APEC Engineer, IntPE (Aust)

GEOTECHNIQUE ® PTY LTD

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PO BOX 880
Penrith NSW 2751
Tel: 02 4722 2744
Mob: 0414 223 720

https://link.edgepilot.com/s/557afb59/-NF_z0LpBEGm0zKw8lg0EQ?u=http://www.geotech.com.au/

PRM ***TRANSFER***

CONNOTE:

STARTRACK **JKKZ00074429**

TO: Sample Receipt (Fiona)
SGS Cairns
Unit 2, 58 Comport Street
PORTSMITH, QLD, 4870

PH: 0740355111	**PORTSMITH**	**4870**

AU CNS CNS

PRM4870CNS

FROM: SGS ALEXANDRIA CONTACT: Sample Receipt (Elsa) PH: 0285940400
16/33 Maddox Street
ALEXANDRIA, NSW, 2015

5058.201

Date: 04/06/2024 UNIT: CTN ITEM: 1 of 1 WEIGHT: 1 CUBIC: 0.010

Article ID: JKKZ00074429FPP00001

PRM

STARTRACK

CONNOTE:

JKDZ00074510

TO: Sample Receipt (Fiona)
SGS Cairns
Unit 2, 58 Comport Street
PORTSMITH, QLD, 4870

PH: 0740355111 | **PORTSMITH** | **4870**

AU CNS CNS

PRM4870CNS

FROM: SGS ALEXANDRIA CONTACT: Sample Receipt (Elsa) PH: 0285940400
16/33 Maddox Street
ALEXANDRIA, NSW, 2015

5058.201

Date: 05/06/2024 UNIT: CTN ITEM: 1 of 1 WEIGHT: 3 CUBIC: 0.010

Article ID: JKDZ00074510FPP00001

SAMPLE RECEIPT ADVICE

SE266264

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329/3 430-490 Douglas Park Drive, Doug**
Order Number	**14329/3**
Samples	9

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Mon 3/6/2024
Report Due	Wed 12/6/2024
SGS Reference	**SE266264**

SUBMISSION DETAILS

This is to confirm that 9 samples were received on Monday 3/6/2024. Results are expected to be ready by COB Wednesday 12/6/2024. Please quote SGS reference SE266264 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	9 Soil	Type of documentation received	COC
Date documentation received	4/6/2024@10:24AM	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	12.2°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

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

COMMENTS

SPOCAS and Chromium Suite content subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146. Report No.

SAMPLE RECEIPT ADVICE

SE266264

CLIENT DETAILS

Client Geotechnique

Project 14329/3 430-490 Douglas Park Drive, Doug

SUMMARY OF ANALYSIS

No.	Sample ID	Acid Neutralising Capacity (ANC)	Chromium Reducible Sulfur (CRS)	Exchangeable Cations and Cation Exchange Capacity	HCl Extractable S, Ca and Mg in Soil/Solids ICP OES	Moisture Content	SPOCAS Net Acidity Calculations	TAA (Titratable Actual Acidity)	TPA (Titratable Peroxide Acidity)
001	BH1 0.5-0.95	6	2	13	1	1	6	7	21
002	BH2 0.2-0.3	-	-	13	-	1	-	-	-
003	BH2 0.5-0.95	6	2	13	1	1	6	7	21
004	BH2 1.5-1.57	6	2	13	1	1	6	7	21
005	BH3 0.5-0.95	6	2	13	1	1	6	7	21
006	BH3 1.1-1.2	6	2	13	1	1	6	7	21
007	BH4 0.3-0.4	6	2	-	1	1	6	7	21
008	BH4 0.5-0.95	6	2	13	1	1	6	7	21
009	BH1 1.5-1.57	6	2	13	1	1	6	7	21

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE266264

CLIENT DETAILS

Client Geotechnique

Project 14329/3 430-490 Douglas Park Drive, Doug

SUMMARY OF ANALYSIS

No.	Sample ID	Chromium Suite Net Acidity Calculations
001	BH1 0.5-0.95	7
003	BH2 0.5-0.95	7
004	BH2 1.5-1.57	7
005	BH3 0.5-0.95	7
006	BH3 1.1-1.2	7
007	BH4 0.3-0.4	7
008	BH4 0.5-0.95	7
009	BH1 1.5-1.57	7

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

CHAIN OF CUSTODY RECORD

COC#: SE266264

Owner job:

Ship to: XML	Project Name:	Due date: 12/6/2024 2:35:00 PM
	Client: GEOTECH_NSW	Send Results to: AUENVSE
	Sampler Name: SS/JSH	
Carrier:	Airbill #:	

Field Sample ID	Client ID	Date sampling	Time	Matrix	# of Containers	Analyses Requested										Comments
						AN214_ANC	NET_ACID_C	NET_ACID_S	AN219_SPOC	AN218_ANC	AN217_CRS	AN014	ZCE_CHROMSUITE	ZCE_SPOCAS		
SE266264.001	BH1	5/30/2024	0:00:00	Soil	1	X	X	X	X	X	X	X	X	X		
SE266264.002	BH2	5/30/2024	0:00:00	Soil	1											
SE266264.003	BH2	5/30/2024	0:00:00	Soil	1	X	X	X	X	X	X	X	X	X		
SE266264.004	BH2	5/30/2024	0:00:00	Soil	1	X	X	X	X	X	X	X	X	X		
SE266264.005	BH3	5/30/2024	0:00:00	Soil	1	X	X	X	X	X	X	X	X	X		
SE266264.006	BH3	5/30/2024	0:00:00	Soil	1	X	X	X	X	X	X	X	X	X		
SE266264.007	BH4	5/30/2024	0:00:00	Soil	1	X	X	X	X	X	X	X	X	X		
SE266264.008	BH4	5/30/2024	0:00:00	Soil	1	X	X	X	X	X	X	X	X	X		
SE266264.009	BH1	5/30/2024	0:00:00	Soil		X	X	X	X	X	X	X	X	X		

Already in Cairns (dispatched 4/6/24)

pls add in CE175532

SGS Alexandria Environmental

SE266264 SUBCON

Received: 03 – Jun – 2024

Sample Condition Upon Receipt at Laboratory:	Cooler temperature:
Special Instructions/Comments: Job Booked by:ML 4/6/2024 Job received date:3/6/2024 Loggin Checked by: XGS 4/6/24	

#1 Released by: (Sig)	Date:	#2 Released by: (Sig)	Date:	#3 Released by: (Sig)	Date:
Company Name:	Time	Company Name:	Time	Company Name:	Time
#1 Received by: (Sig)	Date	#2 Received by: (Sig)	Date	#3 Received by: (Sig)	Date
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329/3 430-490 Douglas Park Drive, Doug**
Order Number	**14329/3**
Samples	9

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE266264A R0**
Date Received	13/6/2024
Date Reported	14/6/2024

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Dong LIANG

Metals/Inorganics Team Leader

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 14/6/2024

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 30/5/2024 SE266264A.001	BH2 SOIL 0.2-0.3 30/5/2024 SE266264A.002	BH2 SOIL 0.5-0.95 30/5/2024 SE266264A.003	BH2 SOIL 1.5-1.57 30/5/2024 SE266264A.004	BH3 SOIL 0.5-0.95 30/5/2024 SE266264A.005
Exchangeable Calcium, Ca	mg/kg	2	420	120	96	29	33
Exchangeable Calcium, Ca	meq/100g	0.01	2.1	0.59	0.48	0.15	0.16
Exchangeable Calcium Percentage*	%	0.1	31.2	8.1	6.4	4.1	2.7
Exchangeable Potassium, K	mg/kg	2	89	59	55	55	69
Exchangeable Potassium, K	meq/100g	0.01	0.23	0.15	0.14	0.14	0.18
Exchangeable Potassium Percentage*	%	0.1	3.4	2.1	1.9	3.9	2.9
Exchangeable Magnesium, Mg	mg/kg	2	460	710	740	250	580
Exchangeable Magnesium, Mg	meq/100g	0.02	3.7	5.8	6.1	2.0	4.8
Exchangeable Magnesium Percentage*	%	0.1	55.0	79.8	80.4	56.0	78.8
Exchangeable Sodium, Na	mg/kg	2	160	170	200	300	220
Exchangeable Sodium, Na	meq/100g	0.01	0.71	0.73	0.86	1.3	0.94
Exchangeable Sodium Percentage*	%	0.1	10.5	10.0	11.4	36.0	15.5
Cation Exchange Capacity	meq/100g	0.02	6.8	7.3	7.6	3.6	6.0

PARAMETER	UOM	LOR	BH3 SOIL 1.1-1.2 30/5/2024 SE266264A.006	BH4 SOIL 0.5-0.95 30/5/2024 SE266264A.008	BH1 SOIL 1.5-1.57 30/5/2024 SE266264A.009
Exchangeable Calcium, Ca	mg/kg	2	37	29	850
Exchangeable Calcium, Ca	meq/100g	0.01	0.18	0.15	4.2
Exchangeable Calcium Percentage*	%	0.1	2.7	4.2	50.1
Exchangeable Potassium, K	mg/kg	2	73	51	82
Exchangeable Potassium, K	meq/100g	0.01	0.19	0.13	0.21
Exchangeable Potassium Percentage*	%	0.1	2.8	3.8	2.5
Exchangeable Magnesium, Mg	mg/kg	2	620	320	420
Exchangeable Magnesium, Mg	meq/100g	0.02	5.1	2.6	3.4
Exchangeable Magnesium Percentage*	%	0.1	74.7	75.9	40.6
Exchangeable Sodium, Na	mg/kg	2	310	130	130
Exchangeable Sodium, Na	meq/100g	0.01	1.3	0.56	0.58
Exchangeable Sodium Percentage*	%	0.1	19.8	16.1	6.8
Cation Exchange Capacity	meq/100g	0.02	6.8	3.4	8.5

METHOD	METHODOLOGY SUMMARY
AN122	Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
AN122	The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100. ESP can be used to categorise the sodicity of the soil as below: ESP < 6% non-sodic ESP 6-15% sodic ESP >15% strongly sodic Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-

FOOTNOTES

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

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

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

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

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

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

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

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

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

STATEMENT OF QA/QC PERFORMANCE

SE266264A R0

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329/3 430-490 Douglas Park Drive, Doug**
Order Number	**14329/3**
Samples	9

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE266264A R0**
Date Received	13 Jun 2024
Date Reported	14 Jun 2024

COMMENTS

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

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

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

SAMPLE SUMMARY

Sample counts by matrix	8 Soil	Type of documentation received	COC
Date documentation received	4/6/2024@10:24AM	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	12.2°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE266264A R0

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

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

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE266264A.001	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024
BH2	SE266264A.002	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024
BH2	SE266264A.003	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024
BH2	SE266264A.004	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024
BH3	SE266264A.005	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024
BH3	SE266264A.006	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024
BH4	SE266264A.008	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024
BH1	SE266264A.009	LB314903	30 May 2024	13 Jun 2024	27 Jun 2024	14 Jun 2024	27 Jun 2024	14 Jun 2024

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

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

No surrogates were required for this job.

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

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

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

Sample Number	Parameter	Units	LOR	Result
LB314903.001	Exchangeable Sodium, Na	mg/kg	2	0.6107
	Exchangeable Potassium, K	mg/kg	2	0.1571
	Exchangeable Calcium, Ca	mg/kg	2	-0.4123
	Exchangeable Magnesium, Mg	mg/kg	2	-0.0655

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

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

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

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

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

No duplicates were required for this job.

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

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB314903.002	Exchangeable Sodium, Na	meq/100g	0.01	0.21	0.194	80 - 120	110
	Exchangeable Potassium, K	meq/100g	0.01	0.68	0.63	80 - 120	108
	Exchangeable Calcium, Ca	meq/100g	0.01	6.8	6.3	80 - 120	107
	Exchangeable Magnesium, Mg	meq/100g	0.02	1.1	1.11	80 - 120	102

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

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

No matrix spikes were required for this job.

MATRIX SPIKE DUPLICATES

SE266264A R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

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

Yin, Emily (Alexandria)

From: Indra Jworchan <indra@geotech.com.au>
Sent: Thursday, 13 June 2024 12:14 PM
To: AU.SampleReceipt.Sydney, AU (Sydney)
Subject: [EXTERNAL] FW: Report Job SE266264, your reference 14329/3 430-490 Douglas Park Drive, Doug, order number 14329/3
Attachments: SE266264_COMBINED.PDF; SE266264_1_F_SGS_SAMP.XLSX; SE266264_CE175532__F_SGS_SAMP.XLSX; SE266264_CE175532A__F_SGS_SAMP.XLSX; SE266264_F_GEOTECH_GEO.XLSX; SE266264_ESDAT_CE175532_F.ZIP; SE266264_ESDAT_CE175532A_F.ZIP

HI

I do not seem to have requested ESP values in the report. Could you please include those values and email the report.

Regards,
Indra Jworchan
Principal Geotechnical Engineer | General Manager
MIEAust, CPEng, NER, APEC Engineer, IntPE (Aust)

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Mob: 0414 223 720

www.geotech.com.au

From: AU.Environmental.Sydney@SGS.com <AU.Environmental.Sydney@SGS.com>
Sent: Tuesday, June 11, 2024 2:20 PM
To: Environmental Team <e@geotech.com.au>; Indra Jworchan <indra@geotech.com.au>
Subject: Report Job SE266264, your reference 14329/3 430-490 Douglas Park Drive, Doug, order number 14329/3

SAMPLE RECEIPT ADVICE

SE266264A

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329/3 430-490 Douglas Park Drive, Doug**
Order Number	**14329/3**
Samples	9

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Thu 13/6/2024
Report Due	Fri 14/6/2024
SGS Reference	**SE266264A**

SUBMISSION DETAILS

This is to confirm that 9 samples were received on Thursday 13/6/2024. Results are expected to be ready by COB Friday 14/6/2024. Please quote SGS reference SE266264A when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	8 Soil	Type of documentation received	COC
Date documentation received	4/6/2024@10:24AM	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	12.2°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes		

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

COMMENTS

SAMPLE RECEIPT ADVICE

SE266264A

CLIENT DETAILS

Client Geotechnique

Project 14329/3 430-490 Douglas Park Drive, Doug

SUMMARY OF ANALYSIS

No.	Sample ID	Exchangeable Cations and Cation Exchange Capacity
001	BH1 0.5-0.95	13
002	BH2 0.2-0.3	13
003	BH2 0.5-0.95	13
004	BH2 1.5-1.57	13
005	BH3 0.5-0.95	13
006	BH3 1.1-1.2	13
008	BH4 0.5-0.95	13
009	BH1 1.5-1.57	13

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329-1 430 Douglas Park Drive**
Order Number	(Not specified)
Samples	67

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183973 R0**
Date Received	14/9/2018
Date Reported	21/9/2018

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

Kamrul Ahsan
Senior Chemist

pH in soil (1:5) [AN101] Tested: 20/9/2018

PARAMETER	UOM	LOR	TP1 SOIL 0.1-0.3 12/9/2018 SE183973.001	TP1 SOIL 0.5-0.7 12/9/2018 SE183973.002	TP2 SOIL 0.2-0.5 12/9/2018 SE183973.003	TP2 SOIL 1.0-1.2 12/9/2018 SE183973.004	TP3 SOIL 0.4-0.6 12/9/2018 SE183973.005
pH	pH Units	0.1	5.6	5.5	5.5	4.9	5.2

PARAMETER	UOM	LOR	TP3 SOIL 1.0-1.3 12/9/2018 SE183973.006	TP4 SOIL 0.3-0.5 12/9/2018 SE183973.007	TP4 SOIL 1.0-1.2 12/9/2018 SE183973.008	TP5 SOIL 0.2-0.4 12/9/2018 SE183973.009	TP5 SOIL 0.8-1.0 12/9/2018 SE183973.010
pH	pH Units	0.1	4.9	5.3	5.2	5.4	5.4

PARAMETER	UOM	LOR	TP6 SOIL 0.2-0.4 12/9/2018 SE183973.011	TP6 SOIL 0.8-1.0 12/9/2018 SE183973.012	TP7 SOIL 0.5-0.7 12/9/2018 SE183973.013	TP7 SOIL 1.0-1.3 12/9/2018 SE183973.014	TP8 SOIL 0.1-0.3 12/9/2018 SE183973.015
pH	pH Units	0.1	5.9	5.1	5.1	5.0	6.1

PARAMETER	UOM	LOR	TP8 SOIL 0.5-0.7 12/9/2018 SE183973.016	TP9 SOIL 0.4-0.6 12/9/2018 SE183973.017	TP9 SOIL 0.8-1.0 12/9/2018 SE183973.018	TP10 SOIL 0.2-0.4 12/9/2018 SE183973.019	TP10 SOIL 0.6-0.8 12/9/2018 SE183973.020
pH	pH Units	0.1	5.6	5.7	5.4	6.1	5.9

PARAMETER	UOM	LOR	TP11 SOIL 0.1-0.3 12/9/2018 SE183973.021	TP11 SOIL 0.6-0.8 12/9/2018 SE183973.022	TP12 SOIL 0.2-0.4 12/9/2018 SE183973.023	TP12 SOIL 0.8-1.0 12/9/2018 SE183973.024	TP13 SOIL 0.2-0.4 12/9/2018 SE183973.025
pH	pH Units	0.1	5.3	5.3	5.7	5.6	5.5

PARAMETER	UOM	LOR	TP13 SOIL 0.8-1.0 12/9/2018 SE183973.026	TP14 SOIL 0.4-0.6 12/9/2018 SE183973.027	TP14 SOIL 0.8-1.0 12/9/2018 SE183973.028	TP15 SOIL 0.1-0.3 12/9/2018 SE183973.029	TP15 SOIL 0.5-0.7 12/9/2018 SE183973.030
pH	pH Units	0.1	5.5	5.3	5.0	6.4	5.9

PARAMETER	UOM	LOR	TP16 SOIL 0.1-0.3 12/9/2018 SE183973.031	TP16 SOIL 0.5-0.8 12/9/2018 SE183973.032	TP17 SOIL 0.3-0.5 12/9/2018 SE183973.033	TP17 SOIL 1.0-1.3 12/9/2018 SE183973.034	TP18 SOIL 0.2-0.5 12/9/2018 SE183973.035
pH	pH Units	0.1	5.9	5.2	5.5	5.3	6.2

pH in soil (1:5) [AN101] Tested: 20/9/2018 (continued)

PARAMETER	UOM	LOR	TP18 SOIL 0.7-1.0 12/9/2018 SE183973.036	TP19 SOIL 0.2-0.4 12/9/2018 SE183973.037	TP19 SOIL 0.6-0.8 12/9/2018 SE183973.038	TP20 SOIL 0.1-0.3 12/9/2018 SE183973.039	TP20 SOIL 0.6-0.8 12/9/2018 SE183973.040
pH	pH Units	0.1	5.7	5.6	5.4	6.1	5.0

PARAMETER	UOM	LOR	TP21 SOIL 0.2-0.4 12/9/2018 SE183973.041	TP22 SOIL 0.2-0.4 12/9/2018 SE183973.042	TP22 SOIL 0.4-0.6 12/9/2018 SE183973.043	TP23 SOIL 0.4-0.6 12/9/2018 SE183973.044	TP23 SOIL 1.5-1.8 12/9/2018 SE183973.045
pH	pH Units	0.1	6.2	5.8	5.6	4.9	4.2

PARAMETER	UOM	LOR	TP24 SOIL 0.2-0.4 12/9/2018 SE183973.046	TP24 SOIL 1.0-1.2 12/9/2018 SE183973.047	TP25 SOIL 0.3-0.5 12/9/2018 SE183973.048	TP25 SOIL 0.8-1.0 12/9/2018 SE183973.049	TP26 SOIL 0.2-0.4 12/9/2018 SE183973.050
pH	pH Units	0.1	5.9	5.9	5.7	5.9	6.4

PARAMETER	UOM	LOR	TP26 SOIL 0.7-1.0 12/9/2018 SE183973.051	TP27 SOIL 0.3-0.5 12/9/2018 SE183973.052	TP27 SOIL 0.7-0.9 12/9/2018 SE183973.053	TP28 SOIL 0.2-0.4 12/9/2018 SE183973.054	TP28 SOIL 0.5-0.7 12/9/2018 SE183973.055
pH	pH Units	0.1	6.1	5.7	5.4	5.5	5.6

PARAMETER	UOM	LOR	TP29 SOIL 0.5-0.7 12/9/2018 SE183973.056	TP29 SOIL 1.0-1.3 12/9/2018 SE183973.057	TP30 SOIL 0.2-0.4 12/9/2018 SE183973.058	TP30 SOIL 0.8-1.0 12/9/2018 SE183973.059	TP31 SOIL 0.2-0.4 12/9/2018 SE183973.060
pH	pH Units	0.1	6.3	5.4	6.1	4.9	5.5

PARAMETER	UOM	LOR	TP31 SOIL 0.8-1.0 12/9/2018 SE183973.061	TP32 SOIL 0.2-0.4 12/9/2018 SE183973.062	TP32 SOIL 0.5-0.7 12/9/2018 SE183973.063	TP33 SOIL 0.5-0.7 12/9/2018 SE183973.064	TP33 SOIL 1.3-1.5 12/9/2018 SE183973.065
pH	pH Units	0.1	5.5	5.6	6.1	5.9	5.8

PARAMETER	UOM	LOR	TP34 SOIL 0.2-0.4 12/9/2018 SE183973.066	TP34 SOIL 0.5-0.7 12/9/2018 SE183973.067
pH	pH Units	0.1	5.5	5.4

Conductivity and TDS by Calculation - Soil [AN106] Tested: 20/9/2018

PARAMETER	UOM	LOR	TP1 SOIL 0.1-0.3 12/9/2018 SE183973.001	TP1 SOIL 0.5-0.7 12/9/2018 SE183973.002	TP2 SOIL 0.2-0.5 12/9/2018 SE183973.003	TP2 SOIL 1.0-1.2 12/9/2018 SE183973.004	TP3 SOIL 0.4-0.6 12/9/2018 SE183973.005
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	6	13	21	29	27

PARAMETER	UOM	LOR	TP3 SOIL 1.0-1.3 12/9/2018 SE183973.006	TP4 SOIL 0.3-0.5 12/9/2018 SE183973.007	TP4 SOIL 1.0-1.2 12/9/2018 SE183973.008	TP5 SOIL 0.2-0.4 12/9/2018 SE183973.009	TP5 SOIL 0.8-1.0 12/9/2018 SE183973.010
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	34	58	89	8	25

PARAMETER	UOM	LOR	TP6 SOIL 0.2-0.4 12/9/2018 SE183973.011	TP6 SOIL 0.8-1.0 12/9/2018 SE183973.012	TP7 SOIL 0.5-0.7 12/9/2018 SE183973.013	TP7 SOIL 1.0-1.3 12/9/2018 SE183973.014	TP8 SOIL 0.1-0.3 12/9/2018 SE183973.015
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	15	110	35	29	17

PARAMETER	UOM	LOR	TP8 SOIL 0.5-0.7 12/9/2018 SE183973.016	TP9 SOIL 0.4-0.6 12/9/2018 SE183973.017	TP9 SOIL 0.8-1.0 12/9/2018 SE183973.018	TP10 SOIL 0.2-0.4 12/9/2018 SE183973.019	TP10 SOIL 0.6-0.8 12/9/2018 SE183973.020
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	41	39	56	9	34

PARAMETER	UOM	LOR	TP11 SOIL 0.1-0.3 12/9/2018 SE183973.021	TP11 SOIL 0.6-0.8 12/9/2018 SE183973.022	TP12 SOIL 0.2-0.4 12/9/2018 SE183973.023	TP12 SOIL 0.8-1.0 12/9/2018 SE183973.024	TP13 SOIL 0.2-0.4 12/9/2018 SE183973.025
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	20	38	110	150	88

PARAMETER	UOM	LOR	TP13 SOIL 0.8-1.0 12/9/2018 SE183973.026	TP14 SOIL 0.4-0.6 12/9/2018 SE183973.027	TP14 SOIL 0.8-1.0 12/9/2018 SE183973.028	TP15 SOIL 0.1-0.3 12/9/2018 SE183973.029	TP15 SOIL 0.5-0.7 12/9/2018 SE183973.030
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	110	27	29	14	41

PARAMETER	UOM	LOR	TP16 SOIL 0.1-0.3 12/9/2018 SE183973.031	TP16 SOIL 0.5-0.8 12/9/2018 SE183973.032	TP17 SOIL 0.3-0.5 12/9/2018 SE183973.033	TP17 SOIL 1.0-1.3 12/9/2018 SE183973.034	TP18 SOIL 0.2-0.5 12/9/2018 SE183973.035
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	21	89	63	110	67

Conductivity and TDS by Calculation - Soil [AN106] Tested: 20/9/2018 (continued)

PARAMETER	UOM	LOR	TP18 SOIL 0.7-1.0 12/9/2018 SE183973.036	TP19 SOIL 0.2-0.4 12/9/2018 SE183973.037	TP19 SOIL 0.6-0.8 12/9/2018 SE183973.038	TP20 SOIL 0.1-0.3 12/9/2018 SE183973.039	TP20 SOIL 0.6-0.8 12/9/2018 SE183973.040
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	130	35	51	14	250

PARAMETER	UOM	LOR	TP21 SOIL 0.2-0.4 12/9/2018 SE183973.041	TP22 SOIL 0.2-0.4 12/9/2018 SE183973.042	TP22 SOIL 0.4-0.6 12/9/2018 SE183973.043	TP23 SOIL 0.4-0.6 12/9/2018 SE183973.044	TP23 SOIL 1.5-1.8 12/9/2018 SE183973.045
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	24	31	83	250	560

PARAMETER	UOM	LOR	TP24 SOIL 0.2-0.4 12/9/2018 SE183973.046	TP24 SOIL 1.0-1.2 12/9/2018 SE183973.047	TP25 SOIL 0.3-0.5 12/9/2018 SE183973.048	TP25 SOIL 0.8-1.0 12/9/2018 SE183973.049	TP26 SOIL 0.2-0.4 12/9/2018 SE183973.050
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	28	32	36	38	40

PARAMETER	UOM	LOR	TP26 SOIL 0.7-1.0 12/9/2018 SE183973.051	TP27 SOIL 0.3-0.5 12/9/2018 SE183973.052	TP27 SOIL 0.7-0.9 12/9/2018 SE183973.053	TP28 SOIL 0.2-0.4 12/9/2018 SE183973.054	TP28 SOIL 0.5-0.7 12/9/2018 SE183973.055
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	100	37	53	23	45

PARAMETER	UOM	LOR	TP29 SOIL 0.5-0.7 12/9/2018 SE183973.056	TP29 SOIL 1.0-1.3 12/9/2018 SE183973.057	TP30 SOIL 0.2-0.4 12/9/2018 SE183973.058	TP30 SOIL 0.8-1.0 12/9/2018 SE183973.059	TP31 SOIL 0.2-0.4 12/9/2018 SE183973.060
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	39	120	19	33	9

PARAMETER	UOM	LOR	TP31 SOIL 0.8-1.0 12/9/2018 SE183973.061	TP32 SOIL 0.2-0.4 12/9/2018 SE183973.062	TP32 SOIL 0.5-0.7 12/9/2018 SE183973.063	TP33 SOIL 0.5-0.7 12/9/2018 SE183973.064	TP33 SOIL 1.3-1.5 12/9/2018 SE183973.065
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	60	16	28	160	290

PARAMETER	UOM	LOR	TP34 SOIL 0.2-0.4 12/9/2018 SE183973.066	TP34 SOIL 0.5-0.7 12/9/2018 SE183973.067
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	9	130

Soluble Anions (1:5) in Soil by Ion Chromatography [AN245] Tested: 20/9/2018

PARAMETER	UOM	LOR	TP1 SOIL 0.1-0.3 12/9/2018 SE183973.001	TP1 SOIL 0.5-0.7 12/9/2018 SE183973.002	TP4 SOIL 0.3-0.5 12/9/2018 SE183973.007	TP4 SOIL 1.0-1.2 12/9/2018 SE183973.008	TP7 SOIL 0.5-0.7 12/9/2018 SE183973.013
Sulfate	mg/kg	5	<5.0	13	35	50	39

PARAMETER	UOM	LOR	TP7 SOIL 1.0-1.3 12/9/2018 SE183973.014	TP11 SOIL 0.1-0.3 12/9/2018 SE183973.021	TP11 SOIL 0.6-0.8 12/9/2018 SE183973.022	TP14 SOIL 0.4-0.6 12/9/2018 SE183973.027	TP14 SOIL 0.8-1.0 12/9/2018 SE183973.028
Sulfate	mg/kg	5	35	5.3	39	28	29

PARAMETER	UOM	LOR	TP23 SOIL 0.4-0.6 12/9/2018 SE183973.044	TP23 SOIL 1.5-1.8 12/9/2018 SE183973.045	TP27 SOIL 0.3-0.5 12/9/2018 SE183973.052	TP27 SOIL 0.7-0.9 12/9/2018 SE183973.053	TP30 SOIL 0.8-1.0 12/9/2018 SE183973.059
Sulfate	mg/kg	5	70	8.9	43	51	34

PARAMETER	UOM	LOR	TP31 SOIL 0.2-0.4 12/9/2018 SE183973.060	TP34 SOIL 0.2-0.4 12/9/2018 SE183973.066	TP34 SOIL 0.5-0.7 12/9/2018 SE183973.067
Sulfate	mg/kg	5	<5.0	<5.0	27

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 20/9/2018

PARAMETER	UOM	LOR	TP1 SOIL 0.1-0.3 12/9/2018 SE183973.001	TP1 SOIL 0.5-0.7 12/9/2018 SE183973.002	TP4 SOIL 0.3-0.5 12/9/2018 SE183973.007	TP4 SOIL 1.0-1.2 12/9/2018 SE183973.008	TP7 SOIL 0.5-0.7 12/9/2018 SE183973.013
Exchangeable Sodium, Na	mg/kg	2	15	78	250	290	100
Exchangeable Sodium, Na	meq/100g	0.01	0.06	0.34	1.1	1.2	0.44
Exchangeable Sodium Percentage*	%	0.1	5.7	10.6	16.0	23.5	9.4

PARAMETER	UOM	LOR	TP7 SOIL 1.0-1.3 12/9/2018 SE183973.014	TP11 SOIL 0.1-0.3 12/9/2018 SE183973.021	TP11 SOIL 0.6-0.8 12/9/2018 SE183973.022	TP14 SOIL 0.4-0.6 12/9/2018 SE183973.027	TP14 SOIL 0.8-1.0 12/9/2018 SE183973.028
Exchangeable Sodium, Na	mg/kg	2	82	58	140	120	80
Exchangeable Sodium, Na	meq/100g	0.01	0.36	0.25	0.59	0.52	0.35
Exchangeable Sodium Percentage*	%	0.1	11.9	10.0	10.2	9.9	15.0

PARAMETER	UOM	LOR	TP23 SOIL 0.4-0.6 12/9/2018 SE183973.044	TP23 SOIL 1.5-1.8 12/9/2018 SE183973.045	TP27 SOIL 0.3-0.5 12/9/2018 SE183973.052	TP27 SOIL 0.7-0.9 12/9/2018 SE183973.053	TP30 SOIL 0.8-1.0 12/9/2018 SE183973.059
Exchangeable Sodium, Na	mg/kg	2	420	130	230	300	65
Exchangeable Sodium, Na	meq/100g	0.01	1.8	0.58	1.0	1.3	0.28
Exchangeable Sodium Percentage*	%	0.1	22.0	15.1	23.9	24.7	9.5

PARAMETER	UOM	LOR	TP31 SOIL 0.2-0.4 12/9/2018 SE183973.060	TP34 SOIL 0.2-0.4 12/9/2018 SE183973.066	TP34 SOIL 0.5-0.7 12/9/2018 SE183973.067
Exchangeable Sodium, Na	mg/kg	2	24	18	200
Exchangeable Sodium, Na	meq/100g	0.01	0.11	0.08	0.89
Exchangeable Sodium Percentage*	%	0.1	8.8	5.9	19.9

Moisture Content [AN002] Tested: 19/9/2018

PARAMETER	UOM	LOR	TP1 SOIL 0.1-0.3 12/9/2018 SE183973.001	TP1 SOIL 0.5-0.7 12/9/2018 SE183973.002	TP2 SOIL 0.2-0.5 12/9/2018 SE183973.003	TP2 SOIL 1.0-1.2 12/9/2018 SE183973.004	TP3 SOIL 0.4-0.6 12/9/2018 SE183973.005
% Moisture	%w/w	0.5	3.6	10	16	14	14

PARAMETER	UOM	LOR	TP3 SOIL 1.0-1.3 12/9/2018 SE183973.006	TP4 SOIL 0.3-0.5 12/9/2018 SE183973.007	TP4 SOIL 1.0-1.2 12/9/2018 SE183973.008	TP5 SOIL 0.2-0.4 12/9/2018 SE183973.009	TP5 SOIL 0.8-1.0 12/9/2018 SE183973.010
% Moisture	%w/w	0.5	11	17	14	3.6	15

PARAMETER	UOM	LOR	TP6 SOIL 0.2-0.4 12/9/2018 SE183973.011	TP6 SOIL 0.8-1.0 12/9/2018 SE183973.012	TP7 SOIL 0.5-0.7 12/9/2018 SE183973.013	TP7 SOIL 1.0-1.3 12/9/2018 SE183973.014	TP8 SOIL 0.1-0.3 12/9/2018 SE183973.015
% Moisture	%w/w	0.5	7.3	7.2	13	8.4	6.2

PARAMETER	UOM	LOR	TP8 SOIL 0.5-0.7 12/9/2018 SE183973.016	TP9 SOIL 0.4-0.6 12/9/2018 SE183973.017	TP9 SOIL 0.8-1.0 12/9/2018 SE183973.018	TP10 SOIL 0.2-0.4 12/9/2018 SE183973.019	TP10 SOIL 0.6-0.8 12/9/2018 SE183973.020
% Moisture	%w/w	0.5	13	11	6.4	6.2	17

PARAMETER	UOM	LOR	TP11 SOIL 0.1-0.3 12/9/2018 SE183973.021	TP11 SOIL 0.6-0.8 12/9/2018 SE183973.022	TP12 SOIL 0.2-0.4 12/9/2018 SE183973.023	TP12 SOIL 0.8-1.0 12/9/2018 SE183973.024	TP13 SOIL 0.2-0.4 12/9/2018 SE183973.025
% Moisture	%w/w	0.5	4.6	10	12	8.1	12

PARAMETER	UOM	LOR	TP13 SOIL 0.8-1.0 12/9/2018 SE183973.026	TP14 SOIL 0.4-0.6 12/9/2018 SE183973.027	TP14 SOIL 0.8-1.0 12/9/2018 SE183973.028	TP15 SOIL 0.1-0.3 12/9/2018 SE183973.029	TP15 SOIL 0.5-0.7 12/9/2018 SE183973.030
% Moisture	%w/w	0.5	11	13	9.5	5.1	15

PARAMETER	UOM	LOR	TP16 SOIL 0.1-0.3 12/9/2018 SE183973.031	TP16 SOIL 0.5-0.8 12/9/2018 SE183973.032	TP17 SOIL 0.3-0.5 12/9/2018 SE183973.033	TP17 SOIL 1.0-1.3 12/9/2018 SE183973.034	TP18 SOIL 0.2-0.5 12/9/2018 SE183973.035
% Moisture	%w/w	0.5	3.6	9.5	16	12	13

Moisture Content [AN002] Tested: 19/9/2018 (continued)

PARAMETER	UOM	LOR	TP18 SOIL 0.7-1.0 12/9/2018 SE183973.036	TP19 SOIL 0.2-0.4 12/9/2018 SE183973.037	TP19 SOIL 0.6-0.8 12/9/2018 SE183973.038	TP20 SOIL 0.1-0.3 12/9/2018 SE183973.039	TP20 SOIL 0.6-0.8 12/9/2018 SE183973.040
% Moisture	%w/w	0.5	12	10	9.8	4.1	9.5

PARAMETER	UOM	LOR	TP21 SOIL 0.2-0.4 12/9/2018 SE183973.041	TP22 SOIL 0.2-0.4 12/9/2018 SE183973.042	TP22 SOIL 0.4-0.6 12/9/2018 SE183973.043	TP23 SOIL 0.4-0.6 12/9/2018 SE183973.044	TP23 SOIL 1.5-1.8 12/9/2018 SE183973.045
% Moisture	%w/w	0.5	8.0	16	8.7	15	11

PARAMETER	UOM	LOR	TP24 SOIL 0.2-0.4 12/9/2018 SE183973.046	TP24 SOIL 1.0-1.2 12/9/2018 SE183973.047	TP25 SOIL 0.3-0.5 12/9/2018 SE183973.048	TP25 SOIL 0.8-1.0 12/9/2018 SE183973.049	TP26 SOIL 0.2-0.4 12/9/2018 SE183973.050
% Moisture	%w/w	0.5	17	14	7.1	13	14

PARAMETER	UOM	LOR	TP26 SOIL 0.7-1.0 12/9/2018 SE183973.051	TP27 SOIL 0.3-0.5 12/9/2018 SE183973.052	TP27 SOIL 0.7-0.9 12/9/2018 SE183973.053	TP28 SOIL 0.2-0.4 12/9/2018 SE183973.054	TP28 SOIL 0.5-0.7 12/9/2018 SE183973.055
% Moisture	%w/w	0.5	7.2	10	7.6	11	8.4

PARAMETER	UOM	LOR	TP29 SOIL 0.5-0.7 12/9/2018 SE183973.056	TP29 SOIL 1.0-1.3 12/9/2018 SE183973.057	TP30 SOIL 0.2-0.4 12/9/2018 SE183973.058	TP30 SOIL 0.8-1.0 12/9/2018 SE183973.059	TP31 SOIL 0.2-0.4 12/9/2018 SE183973.060
% Moisture	%w/w	0.5	15	6.9	7.7	11	5.5

PARAMETER	UOM	LOR	TP31 SOIL 0.8-1.0 12/9/2018 SE183973.061	TP32 SOIL 0.2-0.4 12/9/2018 SE183973.062	TP32 SOIL 0.5-0.7 12/9/2018 SE183973.063	TP33 SOIL 0.5-0.7 12/9/2018 SE183973.064	TP33 SOIL 1.3-1.5 12/9/2018 SE183973.065
% Moisture	%w/w	0.5	6.6	3.6	11	9.1	8.6

PARAMETER	UOM	LOR	TP34 SOIL 0.2-0.4 12/9/2018 SE183973.066	TP34 SOIL 0.5-0.7 12/9/2018 SE183973.067
% Moisture	%w/w	0.5	6.2	8.9

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode and is calibrated against 3 buffers purchased commercially. For soils, sediments and sludges, an extract with water (or 0.01M CaCl2) is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN122	Exchangeable Cations, CEC and ESP: Soil sample is extracted in 1M Ammonium Acetate at pH=7 (or 1M Ammonium Chloride at pH=7) with cations (Na, K, Ca & Mg) then determined by ICP OES/ICP MS and reported as Exchangeable Cations. For saline soils, these results can be corrected for water soluble cations and reported as Exchangeable cations in meq/100g or soil can be pre-treated (aqueous ethanol/aqueous glycerol) prior to extraction. Cation Exchange Capacity (CEC) is the sum of the exchangeable cations in meq/100g.
AN122	The Exchangeable Sodium Percentage (ESP) is calculated as the exchangeable sodium divided by the CEC (all in meq/100g) times 100. ESP can be used to categorise the sodicity of the soil as below: ESP < 6% non-sodic ESP 6-15% sodic ESP >15% strongly sodic Method is referenced to Rayment and Lyons, 2011, sections 15D3 and 15N1.-
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B

FOOTNOTES

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

Samples analysed as received.
Solid samples expressed on a dry weight basis.

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

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

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

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

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

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

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/ Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE183973 R0

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329-1 430 Douglas Park Drive**
Order Number	(Not specified)
Samples	67

LABORATORY DETAILS

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Laboratory	SGS Alexandria Environmental
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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE183973 R0**
Date Received	14 Sep 2018
Date Reported	21 Sep 2018

COMMENTS

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

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	Conductivity and TDS by Calculation - Soil	67 items
	pH in soil (1:5)	67 items
	Soluble Anions (1:5) in Soil by Ion Chromatography	18 items
Analysis Date	Conductivity and TDS by Calculation - Soil	67 items

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	None
Samples received in correct containers	Yes	Sample counts by matrix	67 Soil
Date documentation received	14/09/18@10:47am	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	18.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

HOLDING TIME SUMMARY

SE183973 R0

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

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

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Conductivity and TDS by Calculation - Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE183973.001	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP1	SE183973.002	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP2	SE183973.003	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP2	SE183973.004	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP3	SE183973.005	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP3	SE183973.006	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP4	SE183973.007	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP4	SE183973.008	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP5	SE183973.009	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP5	SE183973.010	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP6	SE183973.011	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP6	SE183973.012	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP7	SE183973.013	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP7	SE183973.014	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP8	SE183973.015	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP8	SE183973.016	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP9	SE183973.017	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP9	SE183973.018	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP10	SE183973.019	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP10	SE183973.020	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP11	SE183973.021	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP11	SE183973.022	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP12	SE183973.023	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP12	SE183973.024	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP13	SE183973.025	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP13	SE183973.026	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP14	SE183973.027	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP14	SE183973.028	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP15	SE183973.029	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP15	SE183973.030	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	20 Sep 2018†
TP16	SE183973.031	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP16	SE183973.032	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP17	SE183973.033	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP17	SE183973.034	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP18	SE183973.035	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP18	SE183973.036	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP19	SE183973.037	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP19	SE183973.038	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP20	SE183973.039	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP20	SE183973.040	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP21	SE183973.041	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP22	SE183973.042	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP22	SE183973.043	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP23	SE183973.044	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP23	SE183973.045	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP24	SE183973.046	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP24	SE183973.047	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP25	SE183973.048	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP25	SE183973.049	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP26	SE183973.050	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP26	SE183973.051	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP27	SE183973.052	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP27	SE183973.053	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP28	SE183973.054	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP28	SE183973.055	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP29	SE183973.056	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP29	SE183973.057	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP30	SE183973.058	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP30	SE183973.059	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP31	SE183973.060	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†

HOLDING TIME SUMMARY

SE183973 R0

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

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

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Conductivity and TDS by Calculation - Soil (continued)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP31	SE183973.061	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP32	SE183973.062	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP32	SE183973.063	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP33	SE183973.064	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP33	SE183973.065	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP34	SE183973.066	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†
TP34	SE183973.067	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	19 Sep 2018	21 Sep 2018†

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE183973.001	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP1	SE183973.002	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP4	SE183973.007	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP4	SE183973.008	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP7	SE183973.013	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP7	SE183973.014	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP11	SE183973.021	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP11	SE183973.022	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP14	SE183973.027	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP14	SE183973.028	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP23	SE183973.044	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP23	SE183973.045	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP27	SE183973.052	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP27	SE183973.053	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP30	SE183973.059	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP31	SE183973.060	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP34	SE183973.066	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018
TP34	SE183973.067	LB157157	12 Sep 2018	14 Sep 2018	10 Oct 2018	20 Sep 2018	10 Oct 2018	21 Sep 2018

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE183973.001	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP1	SE183973.002	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP2	SE183973.003	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP2	SE183973.004	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP3	SE183973.005	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP3	SE183973.006	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP4	SE183973.007	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP4	SE183973.008	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP5	SE183973.009	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP5	SE183973.010	LB157042	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP6	SE183973.011	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP6	SE183973.012	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP7	SE183973.013	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP7	SE183973.014	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP8	SE183973.015	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP8	SE183973.016	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP9	SE183973.017	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP9	SE183973.018	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP10	SE183973.019	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP10	SE183973.020	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP11	SE183973.021	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP11	SE183973.022	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP12	SE183973.023	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP12	SE183973.024	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP13	SE183973.025	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP13	SE183973.026	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP14	SE183973.027	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP14	SE183973.028	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP15	SE183973.029	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018
TP15	SE183973.030	LB157043	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	20 Sep 2018

HOLDING TIME SUMMARY

SE183973 R0

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

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

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Moisture Content (continued)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP16	SE183973.031	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP16	SE183973.032	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP17	SE183973.033	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP17	SE183973.034	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP18	SE183973.035	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP18	SE183973.036	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP19	SE183973.037	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP19	SE183973.038	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP20	SE183973.039	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP20	SE183973.040	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP21	SE183973.041	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP22	SE183973.042	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP22	SE183973.043	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP23	SE183973.044	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP23	SE183973.045	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP24	SE183973.046	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP24	SE183973.047	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP25	SE183973.048	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP25	SE183973.049	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP26	SE183973.050	LB157044	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP26	SE183973.051	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP27	SE183973.052	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP27	SE183973.053	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP28	SE183973.054	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP28	SE183973.055	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP29	SE183973.056	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP29	SE183973.057	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP30	SE183973.058	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP30	SE183973.059	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP31	SE183973.060	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP31	SE183973.061	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP32	SE183973.062	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP32	SE183973.063	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP33	SE183973.064	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP33	SE183973.065	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP34	SE183973.066	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018
TP34	SE183973.067	LB157083	12 Sep 2018	14 Sep 2018	26 Sep 2018	19 Sep 2018	24 Sep 2018	21 Sep 2018

pH in soil (1:5)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE183973.001	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP1	SE183973.002	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP2	SE183973.003	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP2	SE183973.004	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP3	SE183973.005	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP3	SE183973.006	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP4	SE183973.007	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP4	SE183973.008	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP5	SE183973.009	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP5	SE183973.010	LB157146	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP6	SE183973.011	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP6	SE183973.012	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP7	SE183973.013	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP7	SE183973.014	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP8	SE183973.015	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP8	SE183973.016	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP9	SE183973.017	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP9	SE183973.018	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP10	SE183973.019	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP10	SE183973.020	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018

HOLDING TIME SUMMARY

SE183973 R0

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

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

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

pH in soil (1:5) (continued)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP11	SE183973.021	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP11	SE183973.022	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP12	SE183973.023	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP12	SE183973.024	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP13	SE183973.025	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP13	SE183973.026	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP14	SE183973.027	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP14	SE183973.028	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP15	SE183973.029	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP15	SE183973.030	LB157147	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP16	SE183973.031	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP16	SE183973.032	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP17	SE183973.033	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP17	SE183973.034	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP18	SE183973.035	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP18	SE183973.036	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP19	SE183973.037	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP19	SE183973.038	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP20	SE183973.039	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP20	SE183973.040	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP21	SE183973.041	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP22	SE183973.042	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP22	SE183973.043	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP23	SE183973.044	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP23	SE183973.045	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP24	SE183973.046	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP24	SE183973.047	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP25	SE183973.048	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP25	SE183973.049	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP26	SE183973.050	LB157188	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	20 Sep 2018
TP26	SE183973.051	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP27	SE183973.052	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP27	SE183973.053	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP28	SE183973.054	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP28	SE183973.055	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP29	SE183973.056	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP29	SE183973.057	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP30	SE183973.058	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP30	SE183973.059	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP31	SE183973.060	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP31	SE183973.061	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP32	SE183973.062	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP32	SE183973.063	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP33	SE183973.064	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP33	SE183973.065	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP34	SE183973.066	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018
TP34	SE183973.067	LB157189	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	21 Sep 2018	21 Sep 2018

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP1	SE183973.001	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP1	SE183973.002	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP4	SE183973.007	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP4	SE183973.008	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP7	SE183973.013	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP7	SE183973.014	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP11	SE183973.021	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP11	SE183973.022	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP14	SE183973.027	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP14	SE183973.028	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018

HOLDING TIME SUMMARY

SE183973 R0

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

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

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

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

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
TP23	SE183973.044	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP23	SE183973.045	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP27	SE183973.052	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP27	SE183973.053	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP30	SE183973.059	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP31	SE183973.060	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP34	SE183973.066	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018
TP34	SE183973.067	LB157128	12 Sep 2018	14 Sep 2018	19 Sep 2018	20 Sep 2018†	18 Oct 2018	21 Sep 2018

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

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

No surrogates were required for this job.

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

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

Conductivity and TDS by Calculation - Soil

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

Sample Number	Parameter	Units	LOR	Result
LB157146.001	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	0.27
LB157147.001	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	0
LB157188.001	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	0
LB157189.001	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	0

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

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

Sample Number	Parameter	Units	LOR	Result
LB157157.001	Exchangeable Sodium, Na	mg/kg	2	0

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

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

Sample Number	Parameter	Units	LOR	Result
LB157128.001	Sulfate	mg/kg	5	<5.0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

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

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

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

Conductivity and TDS by Calculation - Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183973.001	LB157146.026	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	6	5.7144032258	63	13
SE183973.010	LB157146.025	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	25	27.5408993576	38	8
SE183973.015	LB157147.026	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	17	15.2300411522	42	11
SE183973.025	LB157147.027	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	88	88.3629242819	32	0
SE183973.041	LB157188.026	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	24	24.3559663865	38	1
SE183973.050	LB157188.025	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	40	37.3583529411	35	7
SE183973.060	LB157189.014	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	9	9.7459797116	51	6
SE183973.067	LB157189.022	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	130	31.644366197	32	1

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183973.001	LB157042.011	% Moisture	%w/w	0.5	3.6	3.7	57	5
SE183973.010	LB157042.021	% Moisture	%w/w	0.5	15	16	36	7
SE183973.020	LB157043.011	% Moisture	%w/w	0.5	17	15	36	14
SE183973.030	LB157043.022	% Moisture	%w/w	0.5	15	16	36	3
SE183973.040	LB157044.011	% Moisture	%w/w	0.5	9.5	12	39	25
SE183973.050	LB157044.022	% Moisture	%w/w	0.5	14	13	38	9
SE183973.060	LB157083.011	% Moisture	%w/w	0.5	5.5	6.2	47	12
SE183973.067	LB157083.019	% Moisture	%w/w	0.5	8.9	7.9	42	13

pH in soil (1:5)

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183973.001	LB157146.026	pH	pH Units	0.1	5.6	5.448	32	2
SE183973.010	LB157146.025	pH	pH Units	0.1	5.4	5.5	32	0
SE183973.015	LB157147.026	pH	pH Units	0.1	6.1	6.2	32	2
SE183973.025	LB157147.027	pH	pH Units	0.1	5.5	5.121	32	7
SE183973.041	LB157188.026	pH	pH Units	0.1	6.2	6.275	32	1
SE183973.050	LB157188.025	pH	pH Units	0.1	6.4	6.4	32	1
SE183973.060	LB157189.014	pH	pH Units	0.1	5.5	5.5	32	1
SE183973.067	LB157189.022	pH	pH Units	0.1	5.4	5.4	32	0

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

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE183973.001	LB157128.004	Sulfate	mg/kg	5	<5.0	0.8815322580	200	0
SE183973.067	LB157128.023	Sulfate	mg/kg	5	27	23	50	15

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

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

Conductivity and TDS by Calculation - Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB157146.002	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	NA	303	85 - 115	101
LB157147.002	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	NA	303	85 - 115	93
LB157188.002	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	NA	303	85 - 115	96
LB157189.002	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	NA	303	85 - 115	95

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB157157.002	Exchangeable Sodium, Na	mg/kg	2	NA	72.68	80 - 120	112

pH in soil (1:5)

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB157146.003	pH	pH Units	0.1	7.4	7.415	98 - 102	100
LB157147.003	pH	pH Units	0.1	7.5	7.415	98 - 102	100
LB157188.003	pH	pH Units	0.1	7.4	7.415	98 - 102	100
LB157189.003	pH	pH Units	0.1	7.4	7.415	98 - 102	100

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB157128.002	Sulfate	mg/kg	5	95	100	70 - 130	95

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

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

No matrix spikes were required for this job.

MATRIX SPIKE DUPLICATES

SE183973 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

E-MAILED
14/9/18 @ 10:57 a

GEOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

P O Box 880
PENRITH NSW 2751

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

TO: SGS ENVIRONMENTAL SERVICES
UNIT 16
33 MADDOX STREET
ALEXANDRIA NSW 2015

PH: 02 8594 0400 FAX: 02 8594 0499
ATTN: Ms Emily Yin

Sampling By: MT Job No 14329/1
Project: Proposed Cemetary Development
Project Manager: IJ Location: 430 Douglas Park Drive, Douglas Park

	Sampling details					Results required by:								
	Location	Depth	Soil	Water	EC (1:5)	pH	Sulphate	ESP					Notes	Keep Sample
1	TP1	0.1-0.3	DSP		✓	✓	✓	✓						✓
2	TP1	0.5-0.7	DSP		✓	✓	✓	✓					ESP=Exchangable Sodium Percentage	✓
3	TP2	0.2-0.5	DSP		✓	✓								✓
4	TP2	1.0-1.2	DSP		✓	✓								✓
5	TP3	0.4-0.6	DSP		✓	✓								✓
6	TP3	1.0-1.3	DSP		✓	✓								✓
7	TP4	0.3-0.5	DSP		✓	✓	✓	✓						✓
8	TP4	1.0-1.2	DSP		✓	✓	✓	✓						✓
9	TP5	0.2-0.4	DSP		✓	✓								✓
10	TP5	0.8-1.0	DSP		✓	✓								✓
11	TP6	0.2-0.4	DSP		✓	✓								✓
12	TP6	0.8-1.0	DSP		✓	✓								✓
13	TP7	0.5-0.7	DSP		✓	✓	✓	✓						✓
14	TP7	1.0-1.3	DSP		✓	✓	✓	✓						✓
15	TP8	0.1-0.3	DSP		✓	✓								✓
16	TP8	0.5-0.7	DSP		✓	✓								✓
17	TP9	0.4-0.6	DSP		✓	✓								✓
18	TP9	0.8-1.0	DSP		✓	✓								✓
19	TP10	0.2-0.4	DSP		✓	✓								✓
20	TP10	0.6-0.8	DSP		✓	✓								✓
21	TP11	0.1-0.3	DSP		✓	✓	✓	✓						✓
22	TP11	0.6-0.8	DSP		✓	✓	✓	✓						✓
23	TP12	0.2-0.4	DSP		✓	✓								✓
24	TP12	0.8-1.0	DSP		✓	✓								✓
25	TP13	0.2-0.4	DSP		✓	✓								✓
26	TP13	0.8-1.0	DSP		✓	✓								✓
27	TP14	0.4-0.6	DSP		✓	✓	✓	✓						✓
28	TP14	0.8-1.0	DSP		✓	✓	✓	✓						✓
29	TP15	0.1-0.3	DSP		✓	✓								✓
30	TP15	0.5-0.7	DSP		✓	✓								✓
31	TP16	0.1-0.3	DSP		✓	✓								✓
32	TP16	0.5-0.8	DSP		✓	✓								✓
33	TP17	0.3-0.5	DSP		✓	✓								✓
34	TP17	1.0-1.3	DSP		✓	✓								✓
35	TP18	0.2-0.5	DSP		✓	✓								✓
36	TP18	0.7-1.0	DSP		✓	✓								✓
37	TP19	0.2-0.4	DSP		✓	✓								✓
38	TP19	0.6-0.8	DSP		✓	✓								✓
39	TP20	0.1-0.3	DSP		✓	✓								✓
40	TP20	0.4-0.6	DSP		✓	✓								✓
41	TP21	0.2-0.4	DSP		✓	✓								✓
42	TP22	0.2-0.4	DSP		✓	✓								✓
43	TP22	0.4-0.6	DSP		✓	✓								✓
44	TP23	0.4-0.6	DSP		✓	✓	✓	✓						✓
45	TP23	1.5-1.8	DSP		✓	✓	✓	✓						✓
46	TP24	0.2-0.4	DSP		✓	✓								✓
47	TP24	1.0-1.2	DSP		✓	✓								✓
48	TP25	0.3-0.5	DSP		✓	✓								✓
49	TP25	0.8-1.0	DSP		✓	✓								✓
50	TP26	0.2-0.4	DSP		✓	✓								✓
51	TP26	0.7-1.0	DSP		✓	✓								✓
52	TP27	0.3-0.5	DSP		✓	✓	✓	✓						✓
53	TP27	0.7-0.9	DSP		✓	✓	✓	✓						✓
54	TP28	0.2-0.4	DSP		✓	✓								✓
55	TP28	0.5-0.7	DSP		✓	✓								✓
56	TP29	0.5-0.7	DSP		✓	✓								✓
57	TP29	1.0-1.3	DSP		✓	✓								✓
58	TP30	0.2-0.4	DSP		✓	✓								✓
59	TP30	0.8-1.0	DSP		✓	✓	✓	✓						✓
60	TP31	0.2-0.4	DSP		✓	✓	✓	✓						✓
61	TP31	0.8-1.0	DSP		✓	✓								✓
62	TP32	0.2-0.4	DSP		✓	✓								✓
63	TP32	0.5-0.7	DSP		✓	✓								✓
	TP32	0.2-0.4	DSP		✓	✓								✓
64	TP33	0.5-0.7	DSP		✓	✓								✓
65	TP33	1.3-1.5	DSP		✓	✓								✓
66	TP34	0.2-0.4	DSP		✓	✓	✓	✓						✓
67	TP34	0.5-0.7	DSP		✓	✓	✓	✓						✓

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	
Mrigesh		12/09/2018	SUBA		14/09/18 1:50

Legend

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

Form No 4 7F2-5 SGS

SGS EHS Alexandria Laboratory

SE183973 COC
Received: 14 – Sep – 2018

SAMPLE RECEIPT ADVICE

SE183973

CLIENT DETAILS

Contact	Indra Jworchan
Client	Geotechnique
Address	P.O. Box 880 NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	indra.jworchan@geotech.com.au
Project	**14329-1 430 Douglas Park Drive**
Order Number	(Not specified)
Samples	67

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Fri 14/9/2018
Report Due	Fri 21/9/2018
SGS Reference	**SE183973**

SUBMISSION DETAILS

This is to confirm that 67 samples were received on Friday 14/9/2018. Results are expected to be ready by COB Friday 21/9/2018. Please quote SGS reference SE183973 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	None
Samples received in correct containers	Yes	Sample counts by matrix	67 Soil
Date documentation received	14/09/18@10:47am	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	18.5°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

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

COMMENTS

SAMPLE RECEIPT ADVICE

SE183973

CLIENT DETAILS

Client Geotechnique

Project 14329-1 430 Douglas Park Drive

SUMMARY OF ANALYSIS

No.	Sample ID	Conductivity and TDS by Calculation - Soil	Exchangeable Cations and Cation Exchange Capacity	Moisture Content	pH in soil (1:5)	Soluble Anions (1:5) in Soil by Ion Chromatography
001	TP1 0.1-0.3	1	3	1	1	1
002	TP1 0.5-0.7	1	3	1	1	1
003	TP2 0.2-0.5	1	-	1	1	-
004	TP2 1.0-1.2	1	-	1	1	-
005	TP3 0.4-0.6	1	-	1	1	-
006	TP3 1.0-1.3	1	-	1	1	-
007	TP4 0.3-0.5	1	3	1	1	1
008	TP4 1.0-1.2	1	3	1	1	1
009	TP5 0.2-0.4	1	-	1	1	-
010	TP5 0.8-1.0	1	-	1	1	-
011	TP6 0.2-0.4	1	-	1	1	-
012	TP6 0.8-1.0	1	-	1	1	-
013	TP7 0.5-0.7	1	3	1	1	1
014	TP7 1.0-1.3	1	3	1	1	1
015	TP8 0.1-0.3	1	-	1	1	-
016	TP8 0.5-0.7	1	-	1	1	-
017	TP9 0.4-0.6	1	-	1	1	-
018	TP9 0.8-1.0	1	-	1	1	-
019	TP10 0.2-0.4	1	-	1	1	-
020	TP10 0.6-0.8	1	-	1	1	-
021	TP11 0.1-0.3	1	3	1	1	1
022	TP11 0.6-0.8	1	3	1	1	1
023	TP12 0.2-0.4	1	-	1	1	-
024	TP12 0.8-1.0	1	-	1	1	-

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE183973

CLIENT DETAILS

Client Geotechnique

Project 14329-1 430 Douglas Park Drive

SUMMARY OF ANALYSIS

No.	Sample ID	Conductivity and TDS by Calculation - Soil	Exchangeable Cations and Cation Exchange Capacity	Moisture Content	pH in soil (1:5)	Soluble Anions (1:5) in Soil by Ion Chromatography
025	TP13 0.2-0.4	1	-	1	1	-
026	TP13 0.8-1.0	1	-	1	1	-
027	TP14 0.4-0.6	1	3	1	1	1
028	TP14 0.8-1.0	1	3	1	1	1
029	TP15 0.1-0.3	1	-	1	1	-
030	TP15 0.5-0.7	1	-	1	1	-
031	TP16 0.1-0.3	1	-	1	1	-
032	TP16 0.5-0.8	1	-	1	1	-
033	TP17 0.3-0.5	1	-	1	1	-
034	TP17 1.0-1.3	1	-	1	1	-
035	TP18 0.2-0.5	1	-	1	1	-
036	TP18 0.7-1.0	1	-	1	1	-
037	TP19 0.2-0.4	1	-	1	1	-
038	TP19 0.6-0.8	1	-	1	1	-
039	TP20 0.1-0.3	1	-	1	1	-
040	TP20 0.6-0.8	1	-	1	1	-
041	TP21 0.2-0.4	1	-	1	1	-
042	TP22 0.2-0.4	1	-	1	1	-
043	TP22 0.4-0.6	1	-	1	1	-
044	TP23 0.4-0.6	1	3	1	1	1
045	TP23 1.5-1.8	1	3	1	1	1
046	TP24 0.2-0.4	1	-	1	1	-
047	TP24 1.0-1.2	1	-	1	1	-
048	TP25 0.3-0.5	1	-	1	1	-

CONTINUED OVERLEAF

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SAMPLE RECEIPT ADVICE

SE183973

CLIENT DETAILS

Client Geotechnique

Project 14329-1 430 Douglas Park Drive

SUMMARY OF ANALYSIS

No.	Sample ID	Conductivity and TDS by Calculation - Soil	Exchangeable Cations and Cation Exchange Capacity	Moisture Content	pH in soil (1:5)	Soluble Anions (1:5) in Soil by Ion Chromatography
049	TP25 0.8-1.0	1	-	1	1	-
050	TP26 0.2-0.4	1	-	1	1	-
051	TP26 0.7-1.0	1	-	1	1	-
052	TP27 0.3-0.5	1	3	1	1	1
053	TP27 0.7-0.9	1	3	1	1	1
054	TP28 0.2-0.4	1	-	1	1	-
055	TP28 0.5-0.7	1	-	1	1	-
056	TP29 0.5-0.7	1	-	1	1	-
057	TP29 1.0-1.3	1	-	1	1	-
058	TP30 0.2-0.4	1	-	1	1	-
059	TP30 0.8-1.0	1	3	1	1	1
060	TP31 0.2-0.4	1	3	1	1	1
061	TP31 0.8-1.0	1	-	1	1	-
062	TP32 0.2-0.4	1	-	1	1	-
063	TP32 0.5-0.7	1	-	1	1	-
064	TP33 0.5-0.7	1	-	1	1	-
065	TP33 1.3-1.5	1	-	1	1	-
066	TP34 0.2-0.4	1	3	1	1	1
067	TP34 0.5-0.7	1	3	1	1	1

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
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Testing as per this table shall commence immediately unless the client intervenes with a correction .

APPENDIX C

Plan Showing Burial Zones/Area

Stage 1 Cut and Fill Plan

MITCHELL PLACE

HUME MOTORWAY

DOUGLAS PARK DRIVE

375m³ RETENTION BASIN

6000m³ RETENTION BASIN

BURIAL ZONE I SECTION 1 3,138m²

BURIAL ZONE I SECTION 2 3,245m²

BURIAL ZONE J SECTION 1 2,169m²

CRYPTS FFL141.40

BURIAL ZONE J SECTION 2 2,283m²

BURIAL ZONE H SECTION 2 4,003m²

BURIAL ZONE H SECTION 1 4,050m²

SUBJECT TO FUTURE DETAILED APPLICATIONS

BURIAL ZONE G SECTION 1 2,322m²

BURIAL ZONE G SECTION 2 2,140m²

BURIAL ZONE F SECTION 2 919m²

CREMATORIUM FFL147.63

BURIAL ZONE F SECTION 1 803m²

BURIAL ZONE B SECTION 1 2,017m²

BURIAL ZONE B SECTION 2 2,285m²

REFLECTION PONDS

CHAPEL FFL145.80

ADMIN FFL147.50

BURIAL ZONE C SECTION 1 1,495m²

BURIAL ZONE D SECTION 1 3,088m²

BURIAL ZONE D SECTION 2 3,079m²

BURIAL ZONE D SECTION 3 3,034m²

BURIAL ZONE D SECTION 4 3,327m²

BURIAL ZONE A SECTION 1 3,087m²

BURIAL ZONE A SECTION 2 2,967m²

BURIAL ZONE A SECTION 3 3,096m²

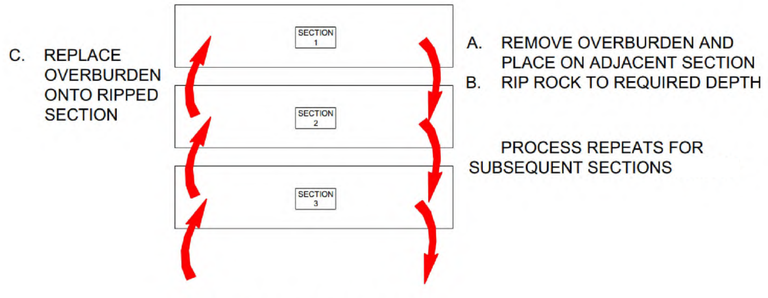
BURIAL ZONE E SECTION 1 308m²

STORAGE SHED/GARAGE FFL143.700

BURIAL SECTIONS ARRANGEMENT PLAN

20 10 0 20 40 60 80 100

LENGTHS ARE IN METRES
SCALE 1 : 1000



C. REPLACE OVERBURDEN ONTO RIPPED SECTION

A. REMOVE OVERBURDEN AND PLACE ON ADJACENT SECTION
B. RIP ROCK TO REQUIRED DEPTH

PROCESS REPEATS FOR SUBSEQUENT SECTIONS

SCHEMATIC DIAGRAM OF EARTHWORK SEQUENCING

EARTHWORKS STAGES

BURIAL ZONE	TOTAL AREA	SECTION	SECTION AREA
A	9,150m²	1	3,087m²
		2	2,967m²
		3	3,096m²
B	4,303m²	1	2,017m²
		2	2,285m²
C	1,495m²		
D	12,528m²	1	3,088m²
		2	3,079m²
		3	3,034m²
		4	3,327m²
E	308m²		
F	1,723m²	1	803m²
		2	919m²
G	4,462m²	1	2,322m²
		2	2,140m²
H	8,053m²	1	4,050m²
		2	4,003m²
I	6,383m²	1	3,138m²
		2	3,245m²
J	4,452m²	1	2,169m²
		2	2,283m²

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CONTRACTOR MUST DIAL 1100 TO CONFIRM LOCATION OF EXISTING SERVICES AND COMPLY WITH ANY AUTHORITY REQUIREMENTS REGARDING EXISTING SERVICES PRIOR TO COMMENCEMENT OF ANY WORKS.

NO	REVISION	DATE
A	PLANNING ISSUE	16/05/25
P1	PRELIMINARY ISSUE	28/04/25

DATUMS USED FOR THIS DESIGN/DRAWING
VERTICAL: AHD – REFER BENCH MARKS ON PLAN
PM 25154 RL 226.451 VIDE SCIMS
HORIZONTAL: ....
SURVEYED BY: JOHN M. DALY & ASSOCIATES PTY LTD
DATED: OCT 2017
REF No: 16116DS

Lanigan Civil
Patama Pty Ltd (ABN: 79 108 035 463)
Trading as Lanigan Civil
Consulting Civil Engineers
Unit 4, 7-9 Hall Street, Braeside VIC 3195
Tel: 03 9558 4380 Fax: 03 9587 9707
Email: admin@lancivil.com.au

PROPOSED MULTI - DENOMINATIONAL CEMETERY AT LOT 2 DOUGLAS PARK DRIVE, DOUGLAS PARK, NSW

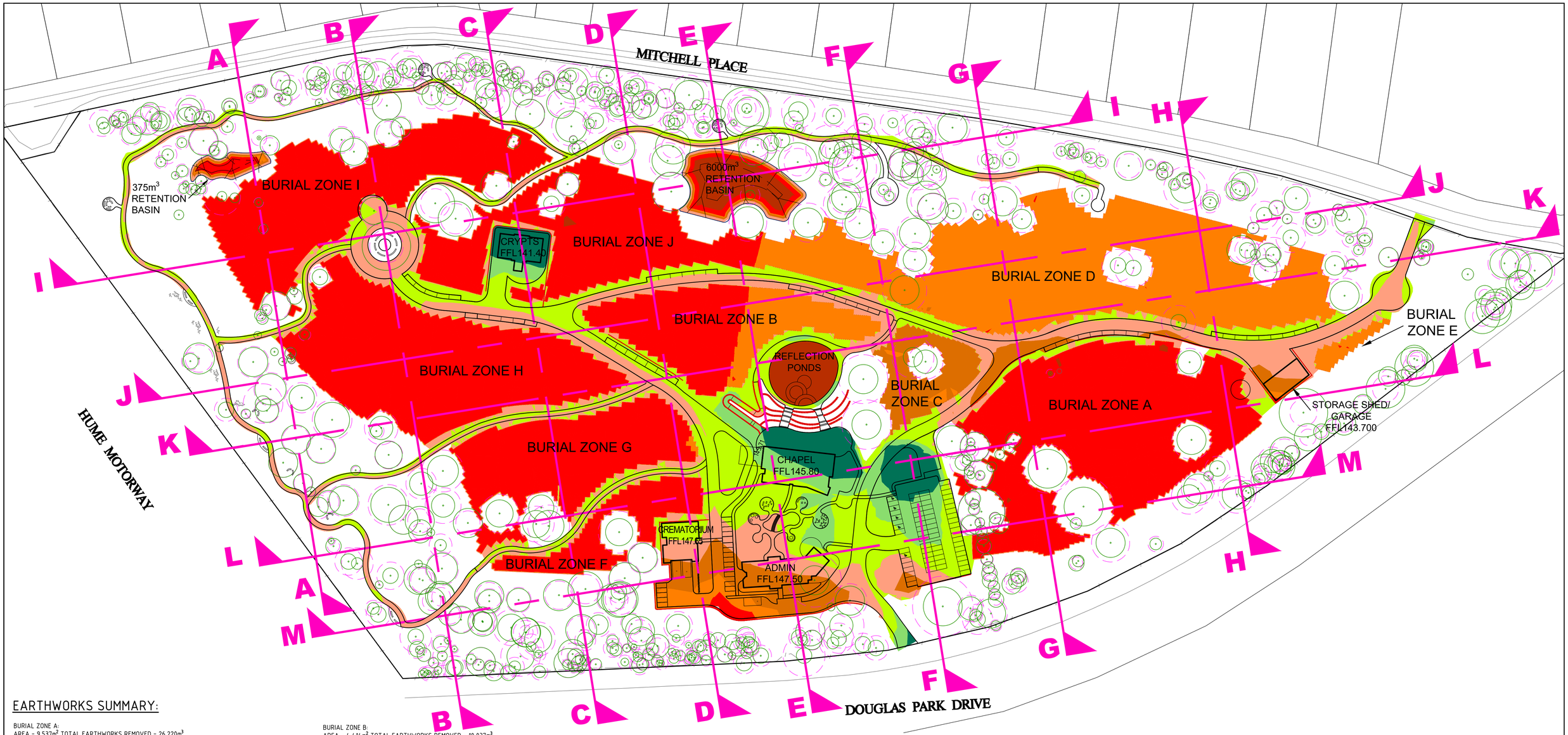
BURIAL SECTIONS ARRANGEMENT PLAN

NORTH

DESIGNED	DRAWN	CHECKED
MJL	MJL	NJC

DATE	SCALE/S
23-04-25	AS NOTED

DRG NO	ISSUE
LC2996-TP01	A



EARTHWORKS SUMMARY:

BURIAL ZONE A:
AREA = 9,537m² TOTAL EARTHWORKS REMOVED = 26,220m³
BURIALS = 7,866 (7,079m³) TOPSOIL = 1431m³ CAPPING MATERIAL = 1431m³ WON FILL MATERIAL = 16,279m³
THEREFORE 9,941m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE B:
AREA = 4,414m² TOTAL EARTHWORKS REMOVED = 10,037m³
BURIALS = 2,914 (2,623m³) TOPSOIL = 662m³ CAPPING MATERIAL = 662m³ WON FILL MATERIAL = 6,090m³
THEREFORE 3,947m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE C:
AREA = 1,507m² TOTAL EARTHWORKS REMOVED = 1,580m³
BURIALS = 424 (382m³) TOPSOIL = 226m³ CAPPING MATERIAL = 226m³ WON FILL MATERIAL = 746m³
THEREFORE 834m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE D:
AREA = 11,741m² TOTAL EARTHWORKS REMOVED = 15,792m³
BURIALS = 3,421 (3,079m³) TOPSOIL = 1,761m³ CAPPING MATERIAL = 1,761m³ WON FILL MATERIAL = 9,191m³
THEREFORE 6,601m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE E:
AREA = 313m² TOTAL EARTHWORKS REMOVED = 419m³
BURIALS = 91 (82m³) TOPSOIL = 47m³ CAPPING MATERIAL = 47m³ WON FILL MATERIAL = 234m³
THEREFORE 185m³ TO BE STOCKPILED AND REPLACED.

BURIAL ZONE F:
AREA = 1,895m² TOTAL EARTHWORKS REMOVED = 5,011m³
BURIALS = 1,512 (1,361m³) TOPSOIL = 284m³ CAPPING MATERIAL = 284m³ WON FILL MATERIAL = 3,082m³
THEREFORE 1,929m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE G:
AREA = 4,691m² TOTAL EARTHWORKS REMOVED = 12,806m³
BURIALS = 3,786 (3,407m³) TOPSOIL = 704m³ CAPPING MATERIAL = 704m³ WON FILL MATERIAL = 7,991m³
THEREFORE 4,815m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE H:
AREA = 8,298m² TOTAL EARTHWORKS REMOVED = 23,090m³
BURIALS = 6,918 (6,226m³) TOPSOIL = 1,245m³ CAPPING MATERIAL = 1,245m³ WON FILL MATERIAL = 14,374m³
THEREFORE 8,716m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE I:
AREA = 6,653m² TOTAL EARTHWORKS REMOVED = 18,299m³
BURIALS = 5,496 (4,946m³) TOPSOIL = 998m³ CAPPING MATERIAL = 998m³ WON FILL MATERIAL = 11,357m³
THEREFORE 6,942m³ TO BE STOCKPILED AND REPLACED

BURIAL ZONE J:
AREA = 5,499m² TOTAL EARTHWORKS REMOVED = 14,956m³
BURIALS = 4,644 (4,180m³) TOPSOIL = 825m³ CAPPING MATERIAL = 825m³ WON FILL MATERIAL = 9,126m³
THEREFORE 5,830m³ TO BE STOCKPILED AND REPLACED

TOTAL EARTHWORKS:

CUT = 142,366m³ FILL = 6,762m³ TOTAL SITE WON MATERIAL = 78,470m³

NET = 57,104m³ CUT (TO BE STOCKPILED AND REPLACED)

ASSUMPTIONS:
- ALL VOLUMES ARE STATIC, THEREFORE NO COMPACTION FACTORS HAVE BEEN ALLOWED FOR.
- ROAD, FOOTPATH AND BUILDING CUT LEVELS HAVE NOT BEEN ALLOWED FOR.
- REFER TO SHEET EW04 FOR TYPICAL BURIAL SECTIONS

Earthworks Depth Table			
Min. Depth	Max. Depth	Colour	
-7.50	-2.90		CUT
-2.90	-2.85		
-1.36	-1.35		
-1.10	-0.50		
-0.50	0.00		
0.00	0.50		FILL
0.50	1.00		
1.00	2.25		

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NO	REVISION	DATE	NO	REVISION	DATE
A	PLANNING ISSUE	16/05/25			
P1	PRELIMINARY ISSUE	24/04/25			

DATUMS USED FOR THIS DESIGN/DRAWING
VERTICAL: AHD - REFER BENCH MARKS ON PLAN
PM 25154 RL 226.451 VIDE SCIMS
HORIZONTAL: ....
SURVEYED BY: JOHN M. DALY & ASSOCIATES PTY LTD
DATED: OCT 2017
REF No: 16116DS

Lanigan Civil
Patama Pty Ltd (ABN: 79 108 035 463)
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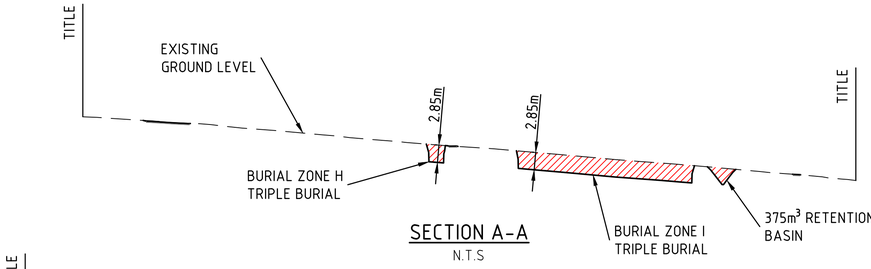
Email: admin@lancivil.com.au

PROPOSED MULTI - DENOMINATIONAL CEMETERY AT LOT 2 DOUGLAS PARK DRIVE, DOUGLAS PARK, NSW

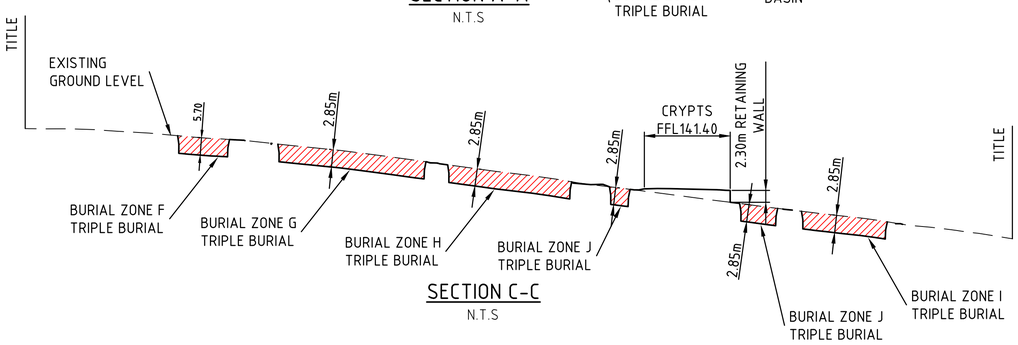
BURIAL EARTHWORKS PLAN

NORTH

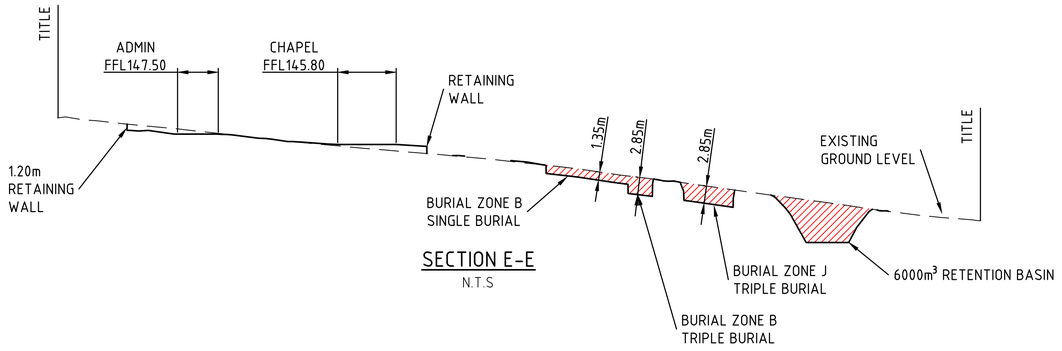
DESIGNED	DRAWN	CHECKED
MJL	MJL	NJC
DATE	SCALE/S	
23-04-25	AS NOTED	
DRG NO		ISSUE
LC2996-EW01		A



SECTION A-A
N.T.S

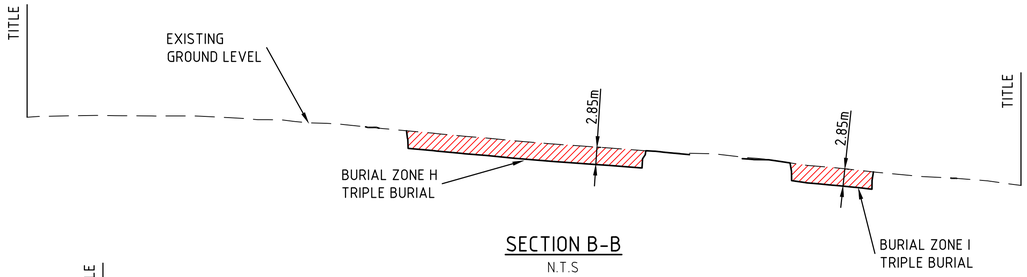


SECTION C-C
N.T.S

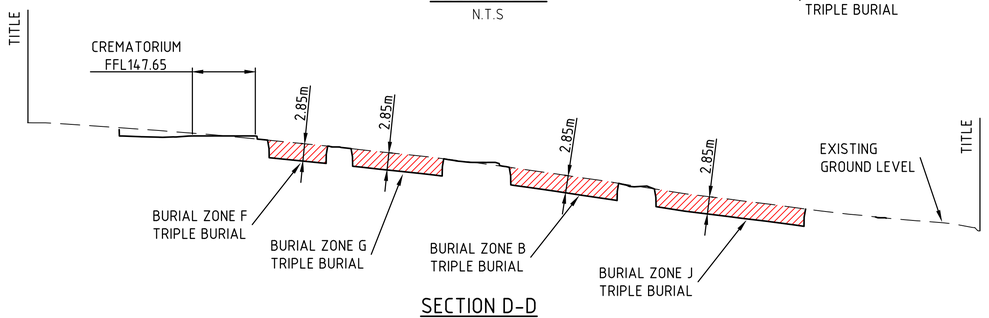


SECTION E-E
N.T.S

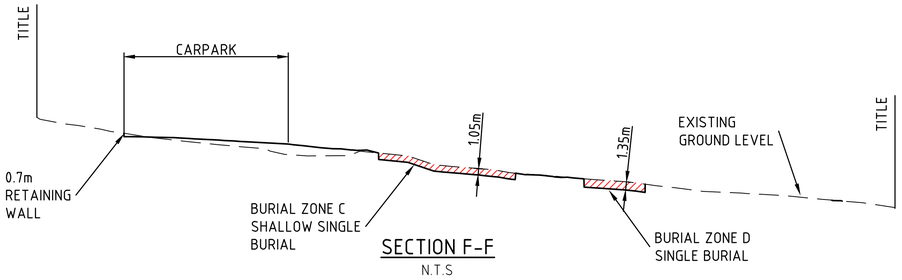
SECTION G-G
N.T.S



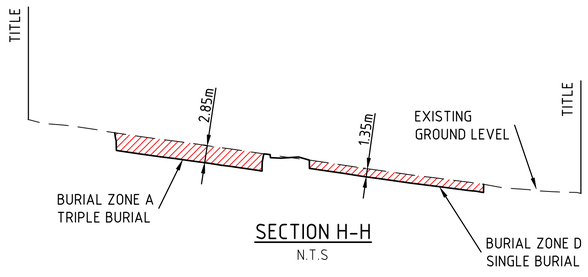
SECTION B-B
N.T.S



SECTION D-D
N.T.S



SECTION F-F
N.T.S



SECTION H-H
N.T.S

HOR. (1 : 1000) 20 10 0 20 40 60 80 100
VER. (1 : 50) 10 5 0 10 20 30 40 50
LENGTHS ARE IN METRES

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NO	REVISION	DATE	NO	REVISION	DATE
A	PLANNING ISSUE	14/06/25			
P1	PRELIMINARY ISSUE	24/04/25			

DATUMS USED FOR THIS DESIGN/DRAWING
VERTICAL: AHD - REFER BENCH MARKS ON PLAN
PM 25154 RL 226.451 VIDE SCIMS
HORIZONTAL: ....
SURVEYED BY: JOHN M. DALY & ASSOCIATES PTY LTD
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REF No: 16116DS

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Tel: 03 9558 4380 Fax: 03 9587 9707
Email: admin@lancivil.com.au

PROPOSED MULTI - DENOMINATIONAL CEMETERY AT LOT 2 DOUGLAS PARK DRIVE, DOUGLAS PARK, NSW

BURIAL EARTHWORKS PLAN

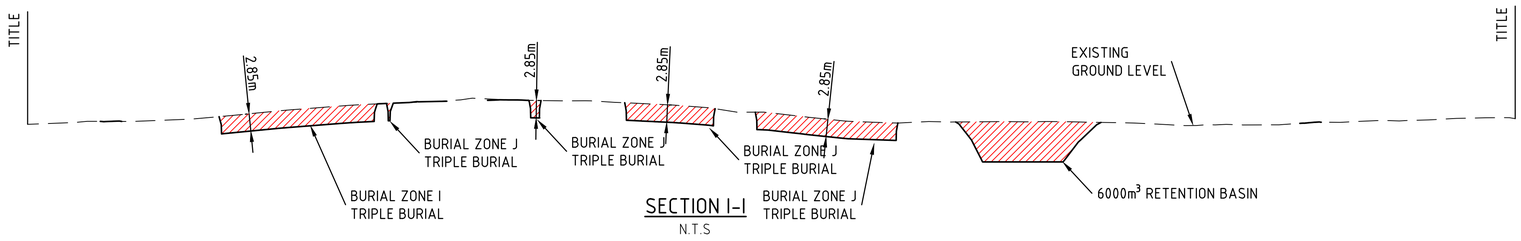
TYPICAL SECTIONS
SHEET 1 OF 2

NORTH

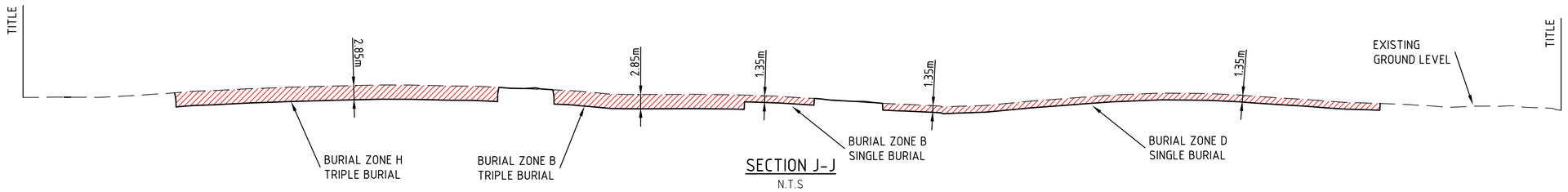
DESIGNED	DRAWN	CHECKED
MJL	MJL	NJC

DATE	SCALE/S
23-04-25	AS NOTED

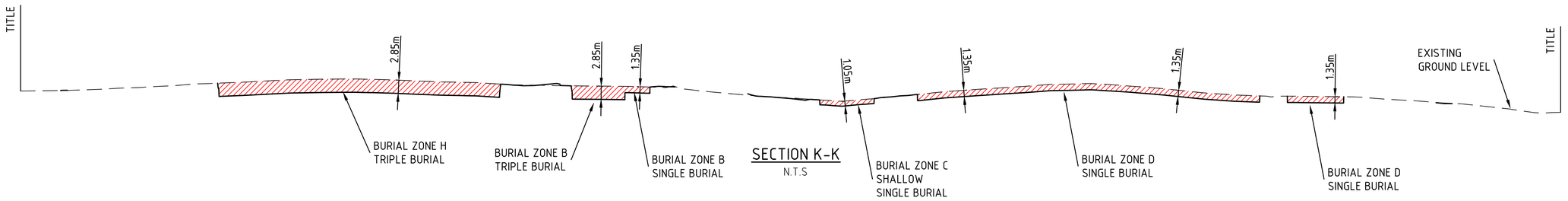
DRG NO	ISSUE
LC2996-EW02	A



SECTION I-I
N.T.S



SECTION J-J
N.T.S



SECTION K-K
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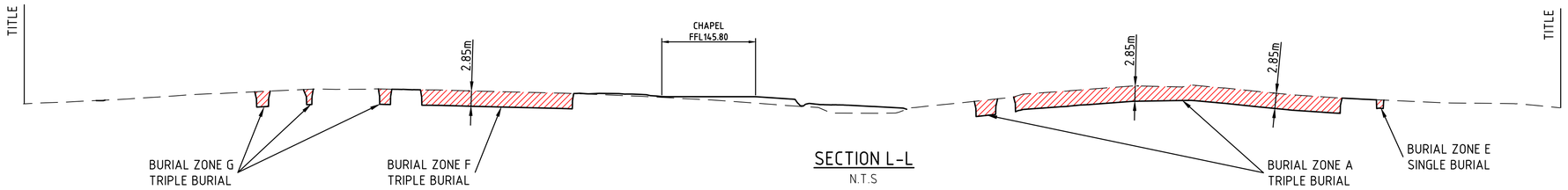

SECTION L-L
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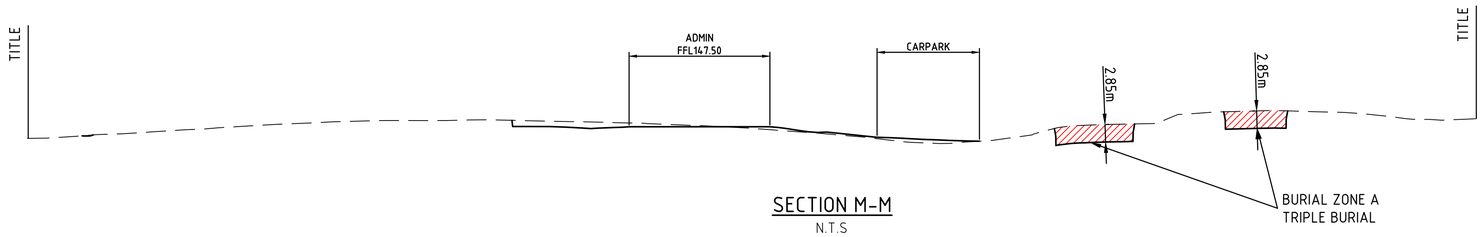
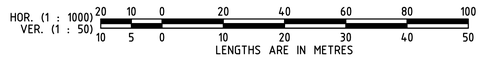


SECTION M-M
N.T.S



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CONTRACTOR MUST DIAL 1100 TO CONFIRM LOCATION OF EXISTING SERVICES AND COMPLY WITH ANY AUTHORITY REQUIREMENTS REGARDING EXISTING SERVICES PRIOR TO COMMENCEMENT OF ANY WORKS.

NO	REVISION	DATE	NO	REVISION	DATE
A	PLANNING ISSUE	16/05/25			
P1	PRELIMINARY ISSUE	24/04/25			

DATUMS USED FOR THIS DESIGN/DRAWING
VERTICAL: AHD - REFER BENCH MARKS ON PLAN
PM 25154 RL 226.451 VIDE SCIMS
HORIZONTAL: ....
SURVEYED BY: JOHN M. DALY & ASSOCIATES PTY LTD
DATED: OCT 2017
REF No: 16116DS

Lanigan Civil
Patama Pty Ltd (ABN: 79 108 035 463)
Trading as Lanigan Civil
Consulting Civil Engineers
Unit 4, 7-9 Hall Street, Braeside VIC 3195
Tel: 03 9558 4380 Fax: 03 9587 9707
Email: admin@lancivil.com.au

PROPOSED MULTI - DENOMINATIONAL CEMETERY AT LOT 2 DOUGLAS PARK DRIVE, DOUGLAS PARK, NSW

BURIAL EARTHWORKS PLAN

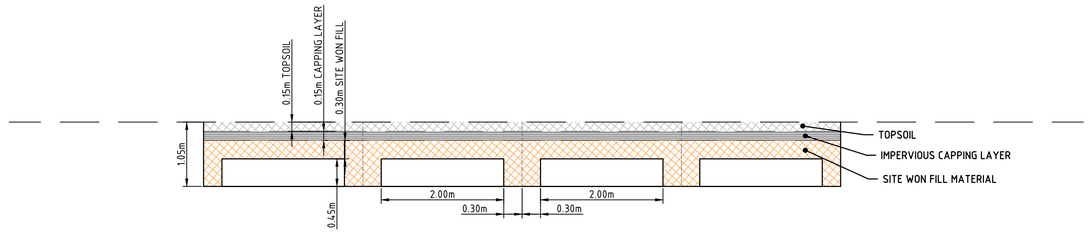
TYPICAL SECTIONS
SHEET 2 OF 2

NORTH

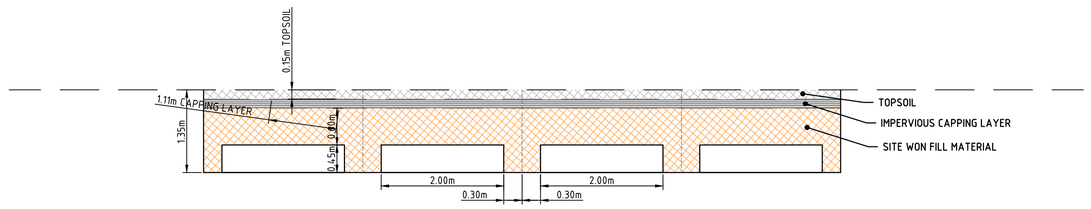
DESIGNED	DRAWN	CHECKED
MJL	MJL	NJC

DATE	SCALE/S
23-04-25	AS NOTED

DRG NO	ISSUE
LC2996-EW03	A



SHALLOW SINGLE BURIAL



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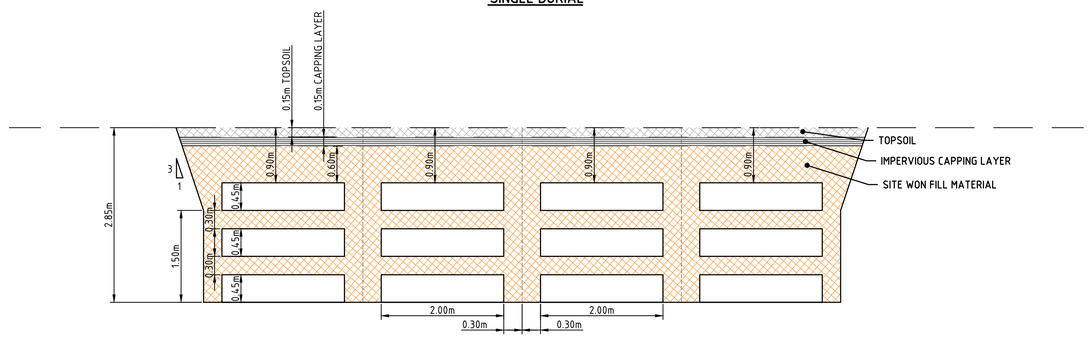

TRIPLE BURIAL

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BURIAL EARTHWORKS PLAN

TYPICAL BURIAL SECTIONS

NORTH

DESIGNED	DRAWN	CHECKED
MJL	MJL	NJC

DATE	SCALE/S
23-04-25	AS NOTED

DRG NO	ISSUE
LC2996-EW04	A

CUT/FILL PLAN

20 10 0 20 40 60 80 100

LENGTHS ARE IN METRES
SCALE 1 : 1000

Earthworks Depth Table			
	Min. Depth	Max. Depth	Colour
	-7.50	0.05	
	-0.05	2.50	

STAGE 1 EARTHWORKS:

CUT: 12,300m³ FILL: 5,400m³ NET: 6900m³ (CUT)

ASSUMPTION:
1. CUT/FILL PLAN IS BASED ON THE COMPARISON BETWEEN THE EXISTING GROUND LEVELS VS THE PROPOSED FINISHED SURFACE LEVELS FOR STAGE 1 ONLY.

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PROPOSED MULTI - DENOMINATIONAL CEMETERY AT LOT 2 DOUGLAS PARK DRIVE, DOUGLAS PARK, NSW

STAGE 1
CUT/FILL PLAN

NORTH

DESIGNED	DRAWN	CHECKED
MJL	MJL	NJC
DATE	SCALE/S	
23-04-25	AS NOTED	
DRG NO.		ISSUE
LC2996-EW100		A