Block 20a, Edmondson Park

GEOTECHNICAL ENGINEERING CONSULTANT REPORT

5 August 2026

Prepared By Geotechnique Pty Ltd for Landcom

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Climate Active Carbon Neutral ORGANISATION

LANDCOM

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1 Introduction

This geotechnical investigation report has been prepared by Geotechnique Pty Ltd to accompany an application for a State Significant Development (SSD-99909708) for infill Affordable Housing at part Lot 40 DP1286151, Edmondson Park also known as Block 20a. Block 20a is subject to development approval (DA-421/2025) which will subdivide Lot 40 into several smaller allotments. The development will be constructed on Lot 401 and relies on Lot 402 which is dedicated to becoming a future laneway.

This geotechnical investigation report has been prepared by Geotechnique Pty Ltd to accompany an application for a State Significant Development (SSD-77211717) for infill Affordable Housing at Lot 303 Croatia Avenue, Edmondson Park.

1.1 Project Overview

As the NSW Government's land and property development organisation, Landcom has a mandate to take a lead role in improving the supply, diversity, and affordability of new housing in NSW.

Landcom aims to create innovative and productive places that demonstrate global standards of liveability, resilience, inclusion, affordability, and environmental quality, and uses its sites and close working relationships with the private sector to deliver quality, socially inclusive community places, where people can grow and thrive regardless of income levels and stages of life.

In response to the NSW Government's commitment to increasing the supply of Affordable Housing under the National Housing Accord, Landcom has committed to delivering 1,800 affordable rental housing dwellings by 2029. As part of this commitment, Block 20a at Edmondson Park has been earmarked as a suitable site for infill affordable housing.

1.2 Project Objectives

Landcom's objectives for the project are:

- Delivery of sustainable high quality affordable accommodation.
- Provide a sense of place within the development to ensure good high-quality accommodation.
- The use of robust materials that allow for long service life of the building.
- Create a building that meets the needs of the community and serves the requirements of the area.
- To establish seamless integration of cultural and sustainable objectives that align to Landcom's key principles.

1.3 Proposed Development

Landcom is seeking development consent to construct an infill affordable housing development. Development consent is sought for:

- Site preparation works;
- Earthworks and associated site works;

- Construction of:
  - One (1) level of basement car parking comprising of 58 car parking spaces, bicycle parking, storage and associated services;
  - Three (3) inter-connected buildings across the site comprising;
    - One, fifteen (15) storey building located along the north-eastern corner of the site;
    - One, nine (9) storey building located along the eastern side of the site;
    - Four, two-storey attached terraces.
  - Ground floor includes five (5) at grade parking spaces including three (3) dedicated car share spaces and two (2) retail car parking spaces;
  - Two main lobby areas which are designed to be adaptable and cater for co-working;
  - A retail unit;
  - A landscaped plaza along the eastern side of the site;
  - Small office space for a Community Housing Provider;
  - Communal room for residents on the second floor;
  - Large area of communal open space located on Level 2;
  - Associated amenities for services and waste
- A total of 172 affordable housing units are to be delivered.

The proposed development has an estimated development cost that exceeds $30million and 100% of the gross floor area of the development will be used for the purposes of affordable housing. Accordingly, the proposal is SSD for the purposes of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP).

1.4 Report Purpose

This Report has been prepared to address the following 'Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Industry on 26 November 2025.

Table 1: Secretary's Environmental Assessment Requirements

SEARs Requirements	Report Section
1. Statutory Context • Address all relevant legislation, environmental planning instruments (EPIs) (including drafts), plans, policies, guidelines and planning circulars • Identify compliance with applicable development standards and provide a detailed justification for any non-compliances. • Provide an explanation of how the development as described in the EIS is consistent with the development as was described in the request for SEARs (including any components that were not SSD) and provide a justification for any differences. • Address the requirements of any approvals applying to the site, including any concept approval, any endorsed or draft master plan, precinct plan or any recommendation from Gateway determination. • Provide an accurate summary of the detailed assessment of the impacts of the project and integrate the findings and recommendations of technical reports into the justification and evaluation of the project as a whole.	

- If affordable housing is being proposed, provide the name and ABN of the registered community housing provider that will be responsible for managing the affordable housing component, along with documentation confirming the provider's agreement to this responsibility.

2. Estimated Development Cost and Employment

- Provide the estimated development cost (EDC) of the development prepared in accordance with the relevant planning circular using the Standard Form of EDC Report.
- As applicable, the EDC Report must separately specify the EDC of:
  - o the residential component of the development.
  - o the tenant component of the built-to-rent development.
  - o the seniors housing component of the development.

3. Contributions and Public Benefit

- Address the requirements any relevant contribution plan(s), planning agreement or EPI requiring a monetary contribution, dedication of land and/or works-in-kind agreement. and include details of any proposal for further material public benefit.
- Where a voluntary planning agreement is proposed, prepare a draft planning agreement in accordance with the Planning agreements – Practice note- February 2021.

4. Engagement

- Demonstrate that engagement and consultation activities have been undertaken in accordance with the Undertaking Engagement Guidelines for State Significant Projects and identify how issues raised and feedback received have been considered in the design of the project.
- If the development would have required an approval or authorisation under another Act but for the application of s 4.41 of the EP&A Act or requires an approval or authorisation under another Act to be applied consistently by s 4.42 of the EP&A Act, the agency relevant to that approval or authorisation must be consulted.

5. Design Quality

- Demonstrate how the development will achieve:
  - o design excellence in accordance with any applicable EPI provisions
  - o good design in accordance with the seven objectives for good design in *Better Placed*.
- Demonstrate that the development:
  - o where required or proposed, has been subject to a competitive design process carried out in accordance with an endorsed brief and Design Excellence Strategy, or
  - o in other instances, has been reviewed by the State Design Review Panel (SDRP) where required.
- Address recommendations of the design jury, Design Integrity Panel or the SDRP prior to lodgement.

6. Built Form and Urban Design

- Demonstrate how the proposed built form (layout, height, bulk, scale, separation, setbacks, interface and articulation) responds to the context, site characteristics, streetscape and existing and future character of the locality.
- Where relevant, explain and illustrate the application of any bonuses under an EPI.

- Where relevant, assess the development against:
  – seniors housing design principles in Schedule 8 of the Housing SEPP and the Seniors Housing Design Guide
  – residential apartment design principles in Schedule 9 of the Housing SEPP and the Apartment Design Guide (including a dwelling-by-dwelling compliance table).
- If affordable housing is proposed, provide a floor plan outlining the gross floor area and dwellings provided as affordable housing

7. Environmental Amenity

- Assess amenity impacts on the surrounding locality including solar access, visual privacy, view loss and sharing, wind, lighting and reflectivity impacts.
- Demonstrate a high level of environmental amenity for surrounding sensitive land uses.
- Provide a solar access analysis of overshadowing impacts (winter solstice) at hourly intervals between 9am and 3pm, comparing proposed, existing and no-bonus scenarios

8. Visual Impact

- Provide a visual analysis from key viewpoints, including photomontages or perspectives showing the proposed and likely future development.
- Where significant visual impacts are not anticipated by planning controls, provide a visual impact assessment addressing impacts on the existing catchment.

9. Transport

- Provide a Transport Impact Assessment (TIA) in accordance with the Guide to Transport Impact Assessment (GITA) published by TfNSW.
- If construction would interrupt pedestrian or transport routes, prepare a preliminary Construction Traffic (or Transport) Management Plan as part of the TIA.

10. Noise and Vibration

- Provide a noise and vibration impact assessment in accordance with relevant NSW EPA guidelines, detailing construction and operational impacts and mitigation measures.

11. Water Management

- Detail proposed drainage design and servicing infrastructure (stormwater and wastewater).
- Demonstrate compliance with council drainage requirements and identify stormwater treatment and water quality management measures.

12. Ground and Groundwater Conditions

- Assess potential impacts on soil resources and related infrastructure and riparian lands on and near the site and including soil erosion.
- Where required provide a Groundwater Impact Assessment in accordance with relevant Groundwater Guidelines. If the proposed development is on land identified as having high salinity or acid sulfate soil potential in an EPI provide a Salinity Management Plan or Acid Sulfate Soil Management Plan that includes appropriate management measures and strategies.

13. Contamination and Remediation

- In accordance with Chapter 4 of the State Environmental Planning Policy (Resilience and Hazards) 2021, assess and quantify any soil and groundwater contamination and demonstrate that the site is suitable (or will be suitable, after remediation) for the development.

- In accordance with Chapter 4 of the State Environmental Planning Policy (Resilience and Hazards) 2021, assess and quantify soil and groundwater contamination and demonstrate site suitability (or suitability after remediation).

14. Trees and Landscaping

- Provide a landscape plan, that:
  - details the proposed site planting, including location, number and species of plantings, heights of trees at maturity and proposed canopy coverage (as a percentage of the site area).
  - provides evidence that opportunities to retain significant trees have been explored and/or inform the plan.
- If the proposal involves impacts to trees, provide an Arboricultural Impact assessment that assesses the number, location, condition and significance of trees to be removed and retained including:
  - any existing canopy coverage to be retained on-site.
  - tree root mapping if the proposal involves significant impacts to tree-protection zones of retained trees identified as being significant.

15. Ecologically Sustainable Development (ESD)

- Identify how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.
- Where relevant, provide an assessment of the development against the standards for non-residential development set out in Chapter 3 of State Environmental Planning Policy (Sustainable Buildings) 2022..

16. Biodiversity

- Unless a waiver has been granted, provide a Biodiversity Development Assessment Report (BDAR) that assesses any biodiversity impacts associated with the development in accordance with the Biodiversity Conservation Act 2016 and the Biodiversity Assessment Method 2020.

  OR
- If the development is on biodiversity certified land, provide information to identify the site (using associated mapping) and demonstrate the proposed development is consistent with the relevant biodiversity measure conferred by the biodiversity certification. E

17. Waste Management

- Provide the measures to be implemented to manage, reuse, recycle and safely dispose of waste, including in accordance with any council waste management requirements.
- Identify appropriately sited waste storage areas, collection access paths/roads, and appropriate servicing arrangements for the site.

18. Social Impact

- The EIS must consider social impacts and, should any significant social impacts be identified, a Social Impact Assessment must be prepared in accordance with the Social Impact Assessment Guideline for State Significant Projects.

19. Flood Risk

- Identify the flood planning area and level as set out in the relevant EPI and other supporting documents to determine;
  - The flood extent and velocity up to the Probable Maximum Flood and risk on-site having regard to adopted flood studies and, floodplain risk management studies and plans

- The site access and egress routes
- the potential effects of climate change,
- any relevant provisions of the NSW Flood Risk Management Manual, and any other relevant guidelines

- Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01. When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered.
- Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).

20. Bush Fire Risk

- If the development is on mapped bush fire prone land, or a bush/grass fire threat is identified on adjoining the site, provide a bush fire assessment that details proposed bush fire protection measures and demonstrates compliance with Planning for Bush Fire Protection.

21. Aboriginal Cultural Heritage

- Where there is known, or reasonably likely, to be Aboriginal cultural heritage on or near the site demonstrate that impacts have been adequately investigated and assessed by:
  - Identifying that an appropriate prior planning process has already considered these impacts, e.g. a rezoning or development application, or
  - Providing an initial assessment of the potential impacts.
- If potential impacts are significant, provide an Aboriginal Cultural Heritage Assessment Report (ACHAR) which:
  - Identifies, describes and assesses any impacts to Aboriginal cultural heritage sites or values associated with the site.
  - Is prepared in accordance with relevant guidelines.

22. Environmental Heritage

- Where there is potential for direct or indirect impacts on environmental heritage, provide a Statement of Heritage Impact and Archaeological Assessment (where required), in accordance with the relevant guidelines.

23. Public Space

- If public space is proposed as part of the development, demonstrate how the development:
  - maximises the amount, access to and quality of public spaces (including open space, public facilities and streets/plazas within and surrounding the site), reflecting relevant design guidelines and advice from the local council and the Department.
  - provides accessible public space.
  - maximises permeability and connectivity.
  - maximises the amenity of public spaces in line with their intended use, such as through adequate facilities, solar access, shade and wind protection.
  - maximises street activation.
  - minimises potential vehicle, bicycle and pedestrian conflicts.

24. Hazards and Risks

- If the development is affected by above ground dangerous goods storages from the surrounding developments and/or underground high-pressure dangerous goods pipelines in the vicinity of proposal location:
  - Report on any consultation outcomes with operators.
  - Consider whether the development would cause these storages non-compliance with Australian Standards.
- Where applicable, provide a Hazard Analysis in line with relevant guidelines and planning circular.

2 Site Information

The proposed development site is in the Liverpool Local Government Area within the Town Centre North precinct of Edmondson Park South. Edmondson Park South is identified in the Western City District Plan as a Local Centre in recognition of its proximity to the Southwest Rail Line and the Edmondson Park Railway Station. It borders the motorway intersection of the M31, M5 and M7 with Camden Valley Way, providing excellent road access to a large extent of the Greater Sydney Metropolitan Area.

The proposed development site is a 3,385m2 parcel of land currently known as Block 20a and part of Lot 40 in Lot 40 DP1286151, Croatia Avenue, Edmondson Park (Figure 1). A Site Plan (aerial view) is provided at Figure 2.

Figure 1 Site location in the broader context highlighting the Edmondson Park precinct boundaries

Figure 2 Aerial view of the subject site

Figure 3 Site Image

Table 2 summarises the key features of the site which have the potential to impact or be impacted by the proposed development.

Table 2 – Key Features of the Site and Surrounds

Attribute	Site details
Land ownership	• The site is owned by Landcom.
Land configuration	• The site has an approximate area of 3,385m2. • The site forms part of Lot 40 Lot 40 DP1286151 and is subject to development approval to create two new allotments (Lots 401 and 402). • The site is irregular in shape and has frontages of: • Approximately 42 metres to Buchan Avenue. • Approximately 84 metres to new Macdonald Road. • The site includes a splay of approximately 7.36m along the north-western corner. • Approximately 48m combined frontage width to the southern future laneway (Lot 402).
Topography and geology	• The site is vacant and generally level with a slight slope and fall from west to east with a crossfall of some 2.5m
Existing features	• The site is currently vacant.
Easements and covenants	• The site is currently unencumbered of easements and covenants.
Local context	• The site and its surrounds are generally made up of large super lots comprising remnant vegetation, cleared areas, grassed paddocks and scattered, which are undergoing progressive development.
Regional context	• The site is strategically positioned between the Western Sydney Aerotropolis and the regional centres of Liverpool and Campbelltown/Macarthur. • The site is approximately 10km from Liverpool CBD, 14km from Campbelltown CBD and 25km the future Western Sydney International Airport (WSI) and Aerotropolis, which is earmarked to become Sydney's third CBD • The site is accordingly well placed to leverage off the growth and job opportunities from these strategic centres and the WSI and Aerotropolis. The Region Plan and District Plan show that these strategic centres will play a critical role in attracting investment, business activity and jobs across Greater Sydney. • The site and broader Edmondson Park Town Centre are anchored by the Edmondson Park Train Station and Southwest Railway Line. These public transport corridors will act as a gateway which will integrate the site with the broader Western Parkland City, the WSI and Aerotropolis.
Infrastructure	• Civil works for future Macdonald Road are underway.
Site access	• Vehicular access to the site is proposed via the rear laneway (future Lot 402). Pedestrian access to the site
Services	• Services will be provided through DA1098/2021 including sewer, potable water, recycles water, electrical and communications. The site will be independently serviced with appropriate metering to the apartments.

Attribute	Site details
	• Service will enter the site from the Northeast.
Contamination	• A Site Audit Statement issued for the site confirms it is suitable for the purposes of 'residential with gardens and accessible soil'. • No further potential sources of contamination have been identified to date.
Stormwater and flooding	• The site is situated to the south of Maxwell Creek – a tributary of Cabramatta Creek and Georges River. • Liverpool City Council's online flood mapping tool indicates the site is not flood prone.
Bushfire risk	• The site is no longer mapped as Bushfire prone.
Biodiversity	• Edmondson Park South has been Biodiversity Certified under the now repealed Threatened Species Conservation Act 1995. It is also covered by a Conservation Agreement under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
Aboriginal heritage	• No Aboriginal heritage items, Aboriginal objects, or areas of archaeological potential are considered likely to be present within the site. • AHIP No.C0001134 (AHIMS 3849) has been issued for Edmondson Park South, Southwest Growth Centre which approved salvage works.
European heritage	• The site does not contain any mapped items of non-Aboriginal heritage. • There are no heritage items or conservation areas within the immediate vicinity of the site.

3 Project Background

3.1 Concept Plan Approval

The Edmondson Park Concept Plan (MP 10_0118), initially approved in August 2011 under the former Part 3A of the EP&A Act, provides for a new diverse and sustainable urban community covering an area of 605.4 hectares. Once complete, Edmondson Park South is expected to accommodate a mix of land uses, a diversity of housing, a new town centre incorporating retail, business and commercial floor space with employment opportunities, multi-purpose community and education facilities, a new 150-hectare regional park, several other local parks, and environmental conservation areas.

The Concept Plan has been modified several times to date. Since the Concept Plan's approval, staged development applications have also been determined and constructed, with Edmondson Park now comprising a growing local centre with shops and supporting community services, residential dwellings and open space and public domain.

3.2 Modification No.5 to the Concept Approval

Modification No.5 relates to Town Centre North (TCN) and Precinct 3 within Edmondson Park South (Figure 4) and approval was granted for the following:

- Amend the Concept Approval boundary to include 2.5ha of land owned by Office of Strategic Lands (OSL).
- Establish a maximum gross floor area (GFA) of 140,389sqm for the TCN Station Precinct which is to be distributed across four quadrants.
- An increase to building heights from 12m-24m to 12m-50m (with one 67m landmark building).
- Reduce the size of the school site from 8ha to 6ha.
- Amend the road network and bushfire asset protection zones.
- Establish TCN design guidelines (the Design Guidelines) and a Design Excellence Strategy (DES)
- Enter into a planning agreement with Liverpool City Council and amend the Statement of Commitments.

The proposed development aims to satisfy the maximum height and Gross Floor Area provisions and is generally consistent with the Design Guidelines.

Figure 4 Extract from the Concept Masterplan approved under MOD 5 (*courtesy: Edmondson Park Town Centre North Design Guidelines, October 2024)*

4 Methodology

Geotechnical investigation to address geotechnical engineering aspects of the 'Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Industry on 26 November 2025 involved the following scope of works.

- Review of available relevant geotechnical information
- Field works involving drilling of boreholes and collection of representative soils and rock core samples
- Laboratory tests.
- Measure depth to ground water levels in boreholes within standpipes
- Collation and analyses of field and laboratory test results and preparation of report detailing assessment of geotechnical information and geotechnical recommendations for the design of proposed building.

Geotechnical investigation was carried out in general accordance with Australian Standard AS1726 (Reference 1).

4.1 Information Review

Reference to the Geological Map of Penrith (scale 1:100,000) indicates that the bedrock at the site is Bringelly Shale, belonging to the Wianamatta Group of rocks and comprising shale, carbonaceous claystone, laminite, fine to medium grained lithic sandstone, and rare coal (Reference 2).

Reference to the Soil Landscape Map of Penrith (scale 1:100,000) indicates that the landscape at the site belongs to Blacktown Group, which is characterised with gently undulating rises on Wianamatta Group shales, with local relief to 30.0m, ground slope of less than 5 percent and broad rounded crests. The sub-surface soil within this landscape is likely to be up to 3.0m thick, moderately reactive, highly plastic and with poor drainage (Reference 3).

The Salinity Potential map for Western Sydney (2002) indicates that the landscape across the northern and western portions of the site has High salinity potential. However, the landscape across the southern and eastern had High salinity potential (Reference 4).

Acid Sulphate Soil Risk Map (Edition 2, 1:25,000) of Liverpool prepared by Department of Land and Water Conservation indicates there are no known occurrence of acid sulphate soil materials within the soil profiles at the site (Reference 5). There is no known occurrence of acid sulphate soil within distance of about 500.0m from the site. In addition, ground surface elevation (at least RL52.0m AHD) across the site is higher than areas with occurrence of acid sulphate soils. Therefore, acid sulphate or potential acid sulphate soils are unlikely to be encountered across the site.

4.2 Field Works

Field work for a geotechnical investigation was carried out during 20 and 21 November 2025 and consisted of the following:

- Site inspection to assess existing site conditions and confirm that the site is accessible to carry out proposed scope of field works for the geotechnical investigation.

- Obtain services plans from "Before You Dig Australia" and review these plans to identify the locations of services across the site.

- Prepare Work Methodology for Geotechnical Investigation and Safe Work Method Statement (SWMS) detailing work procedure to complete geotechnical investigation safely and within minimal impact on environment.

- Carry out a walk-over inspection / survey of the site to identify significant geological (landforms and types of soils and rocks) and hydro-geological (streams, dams, water wells, catchments and drainage) features and nominate three borehole locations based on site access and locations of existing services.

- Scan the proposed borehole locations with aim of avoiding damages to existing underground services during field works.

- Drill three boreholes (designated as BH1 to BH3) using a truck mounted drilling rig fully equipped for a geotechnical investigation. Boreholes were initially drilled to TC-bit refusal in bedrock at depths of about 4.16m to 5.7m from existing ground surface and then continued to depths of about 16.2m to 20.0m using rock coring technique. Approximate borehole locations are indicated on Drawing No 20806/1-AA1 presented in Attachment A. Borehole logs and rock core photographs are also presented in Attachment A.

- Conduct Standard Penetration Tests (SPT) in the boreholes to assess the strength of the subsurface soils. SPT results are included in appropriate logs.

- Collect representative soil samples and rock cores from boreholes indicated on Drawing No 20806/1-AA1 for visual assessments and laboratory tests.

- Install standpipes in two boreholes BH1 and BH2 for future monitoring of groundwater levels.

- Measure depths to groundwater levels in boreholes with standpipes, on three occasions once immediately after installation of standpipes and then about one and six weeks after installation of standpipes. Water levels in standpipes were lowered after each measurement and intervals between consecutive measurements are assessed to be sufficient to recover the water levels to naturally standing levels. Details of groundwater monitoring well logs are also presented in Attachment A.

- Locate borehole locations with our inhouse GPS.

Field works were supervised by a geotechnical engineer from this company, responsible for checking site access, walk over survey, nominating borehole locations, supervising drilling, SPT and standpipe installation, recovering samples, preparation of field logs and monitoring of groundwater levels.

4.3 Site Conditions

The site is of approximately triangular shape and measures about 3,385m^2 in plan area. The site is bound by Buchan Avenue, Edmondson Park, to the south, and vacant lots on the remaining sides.

Currently, the site is vacant and mostly cleared, with grass cover present near the southern and north-western boundaries. In general, the ground surface across the site dips gently towards the northern side at an approximate gradient of 1 to 2 degrees.

Sub-surface profiles encountered in borehole are detailed in the borehole logs and summarised below in Table 3.

Table 3 - Sub-surface Profiles encountered in Boreholes

Borehole No	Ground Surface RL (m AHD)	Termination Depth (m)	Depth Range for Topsoil/ Fill (m)	Depth Range for Natural Soil (m)	Depth to Bedrock (m)	RL at Top Surface of Bedrock (m AHD)
BH1	54.95	17.6	0.0-2.2	2.2-3.2	3.2	~51.7
BH2	53.85	20.0	0.0-3.3	3.3-4.0	4.0	~49.8
BH3	54.39	16.2	0.0-2.8	2.8-3.1	3.1	~51.3

*Depths are approximate from the existing ground surface

Based on information presented in Table 3, the sub-surface profile across the site is anticipated to comprise a sequence of fill and natural soils underlain by bedrock. Natural soils are assessed to be residual soils. The RL of the top surface of bedrock is dipping gently towards the north/north-east. Subsurface materials encountered in boreholes may in general be described as follows:

Fill Silty CLAY, medium to high plasticity, red-orange-brown mottled grey, trace fine to medium grained gravel.

Gravelly Silty Clay, medium plasticity, pale brown-pale grey

Silty Sandy Clay, low to medium plasticity, brown-dark grey, with fine grained angular gravel

Silty Clay, medium to high plasticity, brown-orange mottled grey, trace fine grained angular gravel

Silty Clay, medium to high plasticity, brown mottled dark grey, with medium to coarse grained sub-angular to angular gravel

Silty Clay, medium plasticity, brown mottled pale grey, trace gravel

Silty Clay, medium plasticity, brown -dark grey, with fine to medium grained sub-angular gravel

Residual Soil Silty CLAY, medium to high plasticity, red-brown mottled grey

Silty CLAY, low to medium plasticity, pale grey mottled dark grey, with shale gravels.

Silty CLAY, low plasticity, orange mottled pale grey, with shale/ironstone gravels.

Bedrock SHALE, brown-grey, very low to low strength, extremely to highly weathered

SHALE / SILTSTONE, dark grey/grey-brown, moderately to slightly weathered, medium to high strength.

SHALE / SILTSTONE, grey, moderately to slightly weathered, high to very high strength.

SHALE / SILTSTONE, grey, slightly weathered to fresh, high to very high strength.

Groundwater seepage was not encountered in any of the boreholes up to the TC-bit refusal depths, which ranged from 4.16m to 5.7m below existing ground level. Water used during rock coring precluded measurement of groundwater

levels at the time of coring completion. Upon completion of coring, the groundwater was pumped out and the groundwater level was measured at the completion of fieldwork, followed by two additional readings taken at approximately one week and six weeks thereafter. Accordingly, groundwater measurements were carried out on three occasions. The results of these measurements are presented in Table 4 below.

Table 4 - Sub-surface Profiles encountered in Boreholes

Borehole No	Ground Surface RL (m AHD)	Drilling Date	Depth to Groundwater Level (m) and RL (~m AHD)		
			21 Nov 25	28 Nov 25	7 Jan 26
BH1	54.95	20 Nov 25	5.23 (RL49.7m)	5.06 (RL49.9m)	5.18 (RL49.8m)
BH2	53.85	20 Nov 25	4.21 (RL49.6m)	3.92 (RL49.9m)	4.07 (RL49.8m)
BH3	54.39	21 Nov 25	4.61(RL49.8m)	4.56 (RL49.8m)	4.52(RL49.9m)

*Depths are approximate from the existing ground surface

Table 4 indicates that the depth to groundwater across the site is likely to vary from approximately 3.9m in BH2 to about 5.0m in BH1. The recorded groundwater levels indicate that groundwater occurs within the shale bedrock and at the base of the residual soils, ranging between RL49.8m and RL49.9m AHD during the monitoring period.

It should be noted that the groundwater level might vary due to rainfall and other factors not evident during field work. In the absence of long-term monitoring results, we recommend adopting a design groundwater level at 0.5m above the observed levels for design purposes, to account for seasonal natural fluctuations under both wet and dry conditions.

4.4 Laboratory Test

Representative soil samples recovered from boreholes were tested in NATA Accredited laboratories in accordance with relevant Australian Standards to determine the following:

- Physical properties to determine assess erodibility, reactivity, and Atterberg Limits.
- Chemical properties to assess soil salinity and aggressivity in terms of Electrical Conductivity (EC), pH, chloride, Sulphate, and resistivity.
- Chemical properties to assess acid sulphate soils in terms of pH of KCl extract (pHkcl), Total Actual Acidity (TAA),) and Chromium Reducible Sulphur (Scr).

Detailed test results are presented in Attachment B, and summaries are presented below in Tables 5, 6 and 7.

Table 5 - Results of Physical Properties Tests

Location ID	Sample Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Maximum Dry Density (t/m^3)	Optimum Moisture Content (%)	Natural Moisture Content (%)	CBR (%)	Swell (%)
BH1	0.5-1.0	45	20	25	1.88	13.0	11.5	4.5	1.5
BH1	1.5-1.95	48	19	19	-	-	-	-	-
BH2	2.0-2.3	46	18	28	-	-	-	-	-
BH2	3.0-3.45	41	15	26	-	-	-	-	-
BH3	0.5-1.0	17	43	26	1.86	14.5	12.6	4.5	1.5
BH3	2.8-3.0	42	16	26	-	-	-	-	-

Table 6– Results of Chemical Properties Tests

Borehole No	Depth (m)	EC (µS/cm)	pH	Chloride (mg/kg)	Sulphate (mg/kg)	Resistivity (ohm-cm)	Exchangeable Sodium Percentage (%)
BH1	0.5-0.95	730	6.5	290	230	1400	14.1
BH1	1.5-1.95	570	5.9	220	120	1800	14.5
BH1	3.0-3.45	520	4.6	180	62	1900	-
BH2	0.5-0.95	720	7.8	180	260	1400	-
BH2	1.5-1.95	600	7.7	100	130	1700	11.8
BH2	4.0-4.2	680	6.3	240	110	1500	19.1
BH3	0.5-0.95	470	7.4	92	100	2100	14.0
BH3	1.5-1.95	470	6.2	92	150	2200	-
BH3	2.8-3.0	450	5.6	110	49	2200	16.9

Table 7– Results of Chemical Properties Tests for Acid Sulphate Soils

Test Location	Depth (m)	pH_{KCl}	TAA (pH6.5)	Scr (% w/w)
BH1	2.4-2.6	4.6	27	<0.005
BH2	4.0-4.2	6.0	<5	<0.005
BH3	2.8-3.0	5.2	15	<0.005

Notes

pH_{KCl} = pH of filtered 1:20, 1M K_{Cl} extract, overnight shake

TAA = Total Actual Acidity (mol H^+/tonne)

S_{cr} = Chromium Reducible Sulphur (% w/w)

Limit of Reporting for TAA is 5 moles H^+/tonne, and for S_{cr} is 0.005% w/w.

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 8.

Table 8 - 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
BH 1	4.19	0.49	1.61	Medium	High
BH 1	7.77	0.24	0.55	Low	Medium
BH 1	8.52	0.41	0.59	Medium	Medium
BH 1	11.85	0.65	1.63	Medium	High
BH 1	15.89	1.42	3.66	High	High
BH 2	6.14	0.03	0.32	Very Low	Medium
BH 2	7.76	4.08	3.96	Very High	Very High
BH 2	9.17	0.11	2.75	Low	High
BH 2	13.43	0.19	0.88	Low	Medium
BH 2	18.20	0.58	1.45	Medium	High
BH 2	19.09	0.21	1.76	Low	High
BH 3	6.54	0.65	0.87	Medium	Medium
BH 3	9.78	0.04	0.94	Very Low	Medium
BH 3	11.43	0.27	1.39	Low	High
BH 3	15.97	1.04	2.38	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 8 indicates the upper limits of rock strengths.

Based on rock strengths and rock discontinuities shown in the borehole logs, bedrock from the proposed development site is classified for foundation design in accordance with Pells et al (Reference 6) in the following Table 9.

Table 9 - Rock Classification for Foundation Design

Borehole No	Termination Depth (m)	Depth Range for Class V Rock (m)	Depth Range for Class IV Rock (m)	Depth Range for Class III Rock (m)
BH1	17.6	3.2-4.2	4.2-7.7	5.4->8.3
BH2	20.0	4.0-6.0	6.0-7.8	5.9-8.2
BH3	16.2	4.0-5.9	5.9-8.2	7.5->8.5

4.1 Existing Fill

All boreholes encountered fill to depths range of 2.2m to 3.3m. The existing fill predominantly comprises silty clay of medium to high plasticity with varying composition of sand and gravel along the depth. The Atterberg limits of on four representative soil samples indicate that the Liquid Limits and Plastic Limits values vary from about 43.0% to 48.0% and 19.0% to 26.0% respectively. Although information on the placement of the fill including field density and compaction control is not available at the time of writing this report, the fill is accessed to be “moderately to well compacted” based on Standard Penetration Test (SPT) results.

4.5 Soil Reactivity

Atterberg limits testing on representative soil samples indicates that the Liquid Limit and Plastic Limit values range from approximately 41.0% to 48.0% and 15.0% to 20.0%, respectively. The presence of gravels hindered the collection of undisturbed samples within the fill and natural soils. However, swell measurements obtained from CBR testing of representative soil samples indicate a swelling of approximately 1.5%.

Accordingly, based on the Atterberg limits and CBR test results, it is our assessment that the subsurface soils across the site are likely to be moderately reactive and susceptible to moderate shrink–swell movements.

4.6 Soil Erodibility

Dispersibility of the soils determines the erodibility of soils. Dispersibility of soils is usually assessed using physical properties such as Emerson Class Number and Pinhole Class and chemical properties such as Exchangeable Sodium Percentage (ESP). However, only ESP of representative soil samples were determined during the present investigation. Soils with ESP values of 5% or more are considered sodic and those with ESP more than 15% are considered highly sodic (Reference 7). Sodic soils are dispersive and susceptible to excessive erosion.

Table 6 indicates that the Exchangeable Sodium Percentage (ESP) of six representative soil samples vary from 11.8% to 19.1%. That means the soils across the site are sodic to very sodic.

Therefore, based on ESP results, it is our assessment that soils across the site are considered dispersive and susceptible to excessive erosion. Therefore, it is our assessment that the earthworks for the proposed development works should be carried out in accordance with a Soil Management Plan (SMP) to minimise the risk of excessive erosion. Landcom provides recommendations on development of SMP (References 8 and 9).

4.7 Soil Salinity

Salinity refers to the presence of excess salt in the environment, either in soil or water. Soil salinity is generally assessed by measuring Electrical Conductivity (EC) of a soil sample made up of 1:5 soil water suspension and thus determined 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 (Reference 10). Alternatively, ECe may be directly measured in soil saturation extracts. Soils are classified as saline if ECe of the saturated extracts exceed 4.0dS/m. The criteria for assessment of soil salinity classes are shown in the following Table 10 (Reference 10).

Table 10 - Criteria for Soil Salinity Classification

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

Table 6 presents Electrical conductivity (EC) values for nine representative soil samples. Fill and natural soils encountered across the site are predominantly clayey. Based on soil texture a multiplying factor of 8 to 9 is deemed appropriate for clayey soils and estimates of ECe values for representative soil samples vary from 4.1dS/m to 6.6dS/m. Therefore, it is our assessment that the soils across the site are generally moderately saline.

Therefore, it is recommended that earthworks for the proposed development involving disturbance and excavation within fill and natural should be carried with an appropriate Saline Soil Management Plan (SSMP) to ensure the salinity at the site does not get worsened.

4.8 Exposure Classifications

Australian Standard AS2870 (Reference 11) provides guidelines to determine Exposure Classification for saline and sulphate soils. Table 11 below provides salinity and Exposure Classification based on salinity (EC_e) and Table 12 provides Exposure Classification for sulphate soils.

Table 11 - 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 12 - 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

*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

As stated above in this report, soils across the site are predominantly clayey soils. Predominantly the soils across the site are assessed to be of low permeability and therefore appropriate site condition for the predominant soils is assessed to be "Condition B". Therefore, based on laboratory test results presented in Table 6 and guidelines on Exposure Classifications, it is our assessments that the subsurface soils across the site in general belong to Exposure Classifications A2 in accordance with Australian Standard AS2870 (Reference 9).

Therefore, we recommend that the proposed development works use construction materials, such as concrete, steel, brick etc, and construction techniques that are appropriate for Exposure Classification A2 (Reference 9).

4.9 Aggressivity Classifications

The Aggressivity Classification of soil and groundwater applicable to iron/steel and concrete piles, in accordance with Australian Standard AS2159 (Reference 12), are given below in Tables 13 and 14.

Table 13 - Aggressivity Classification for Steel/Iron

Chloride		pH	Resistivity (ohm cm)	Soil Condition A*	Soil Condition B#
In Soil (ppm)	In Water (ppm)				
<5000	<1000	>5.0	>5000	Non-aggressive	Non-aggressive
5000-20000	1000-10000	4.0-5.0	2000-5000	Mild	Non-aggressive
20000-50000	10000-20000	3.0-4.0	1000-2000	Moderate	Mild
>50000	>20000	<3.0	<1000	Severe	Moderate

*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

Table 14 - Aggressivity Classification for Concrete

Sulphate expressed as SO_4		pH	Chloride in Water (ppm)	Soil Condition A	Soil Condition B
In Soil (ppm)	In Groundwater (ppm)				
<5000	<1000	>5.5	<6000	Mild	Non-aggressive
5000-10000	1000-3000	4.5-5.5	6000-12000	Moderate	Mild
10000-20000	3000-1000	4.0-4.5	12000-30000	Severe	Moderate
>20000	>10000	<4.0	>30000	Very Severe	Severe

As indicated above in this report, appropriate Soil Conditions is “Soil Conditions B”. Therefore, based on laboratory test results presented in Table 6 and guidelines on Aggressivity Classifications, the subsurface soils across the site are assessed to be Non-aggressive to Mildly Aggressive to concrete and steel.

Therefore, it is recommended that the proposed development works use steel and concrete piles appropriate to Mildly Aggressive sites (Reference 12).

4.2 Acid Sulphate Soil Assessment

The Acid Sulphate Management Advisory Committee of New South Wales recommends that 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 – Chemical analysis to confirm Acid Sulphate Soil and action level.

Review of available information indicates the following:

- The Acid Sulphate Soil Risk Map (https://www.environment.nsw.gov.au/eSpade2Webapp/) indicates that there are no known occurrence of acid sulphate soils at the site.
- The sub-surface profile across the site comprises a sequence of fill and residual soils to a maximum depth of 4.0m from the existing ground surface. The ground surface elevation across the site is more than 50.0m AHD. Therefore, geomorphology and site conditions indicate acid sulphate soils are unlikely to be encountered across the site.

- No soil or water indicators of acid sulphate soils were observed during field work. Groundwater was encountered in boreholes at depths of 3.9m to 5.1m from existing ground surface. Therefore, even if level of groundwater might fluctuate due to variations in rainfall and/or other factors not evident during drilling, it is unlikely that proposed development works will significantly lower the groundwater level to expose the acid sulphate or potentially acid sulphate soils to atmosphere.

The above assessments are based on review of available information and indicate acid sulphate or potentially acid sulphate soils are unlikely to be encountered across the site.

Representative soil samples obtained from various depths were tested for acid sulphate or potentially acid sulphate soils. The laboratory test results summarised in Table 7 indicate the following:

- The pH_{kcl} (field pH) values are in the range of 6.2 to 6.6, indicating actual acid sulphate soils are absent at the site, but does not give an indication whether potential acid sulphate soils are present or not.

Review of results of laboratory tests on representative soil samples also indicates acid sulphate or potentially acid sulphate soils are unlikely to be encountered across the site.

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. The New South Wales Acid Sulphate Soils Management Advisory Committee (NSW Government & NSW Department of Climate Change. 2009) recommends "Action Criteria" (Table 15) 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 (ASSMP).

Table 15 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	**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 borehole logs indicate soils likely to be disturbed or excavated during the proposed development are predominantly clayey soils, assessed to belong to "Fine Texture". Even if the volume of soils likely to be disturbed/excavated during the proposed development exceed 1000 tonnes, the laboratory test results presented in Table 7 indicate the following:

- TAA of samples are less than 62.0 mol H^+/tonne. Therefore, “Acid Trail” indicates that the soils across the site do not exceed "Action Criteria".
- S_{POS}/ S_{cr} values are less than instrument detectable limits of 0.005%. This indicates that the soil does not contain sulphides/oxidisable sulphur to produce adequate acid. Therefore, “Sulphur Trail” also indicates that the soils across the site do not exceed "Action Criteria".

Therefore, it is our assessment that the soils likely to be disturbed or excavated during the proposed development are not acid sulphate or potential acid sulphate soils, and disturbance/excavation of the soils for the proposed development can be carried out without an ASSMP.

4.10 Geotechnical Model

Based on site observation and information obtained from boreholes drilled during the geotechnical investigation, a Geotechnical Model, constituting five Geotechnical Units, is suggested for the proposed development site. Each Geotechnical Unit represents a specific nature of soil and/or bedrock encountered across the site. Recommended Geotechnical Model is provided in Table 16.

Table 16- Recommended Geotechnical Model

Geotechnical Unit	Material Description	Depth Range in Boreholes (m BGL)		
		BH1	BH2	BH3
Unit 1	Fill	0.0-2.2	0.0-3.3	0.0-2.8
Unit 2	Residual Soils	2.2-3.2	3.3-4.0	2.8-3.1
Unit 3	Shale/Siltsone - Class V	3.2-4.2	4.0-6.0	3.1-5.9
Unit 4	Shale/Silstone – Class IV	4.2-7.7	6.0-7.8	5.9-8.2
Unit 5	Shale/Silstone - Class III or better	7.7->17.6	7.8->20.0	8.2->16.2

* Depth ranges are approximate only from existing ground surface

If any controlled fill is placed in accordance with recommendation provided in this report, the controlled fill may also be included in Unit 1. In describing bedrock shale/siltstone encountered across the site, the Geotechnical Units and rock classifications in accordance with Reference 5 are used interchangeably. Assessed strength parameters, in terms of cohesion and internal friction angle, as well as modulus for each Geotechnical Unit are presented below in Table 17.

Table 17- Recommended Strength Parameters and Modulus

Geotechnical Unit	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (deg)	Effective Young’s Modulus (MPa)	Poisson’s Ratio
Unit 1	19.0	3.0	27.0	15.0	0.30
Unit 2	19.0	5.0	28.0	25.0	0.3
Unit 3	21.0	10.0	28.0	75.0	0.3
Unit 4	22.0	20.0	30.0	150.0	0.3
Unit 5	23.0	150.0	30.0	700.0	0.25

4.11 Basement Excavation

Based on the bulk earthworks plans provided, we understand that the proposed development will comprise one basement level. The proposed bulk excavation level is approximately RL52.82m AHD, extending locally to approximately

RL52.05m AHD at the proposed OSD tank. These excavation levels are approximately 2.15m to 2.92m above the highest recorded groundwater level.

Accordingly, the materials to be excavated are anticipated to comprise fill (Unit 1) and residual soils (Unit 2). However, shale/siltstone bedrock (Unit 3) may be encountered locally due to natural variations in subsurface conditions.

It is our assessment that excavation of the fill (Unit 1), residual soils (Unit 2) and, where encountered, shale/siltstone bedrock (Unit 3), can generally be undertaken using conventional earthmoving equipment, such as excavators and dozers. However, excavation of Class IV to Class III shale bedrock, although considered unlikely, would be more difficult and may require larger plant, such as rock saws, Caterpillar D9/D10 (or equivalent) dozers, or hydraulic rock hammers. The selection of excavation equipment should consider site access, the required finish of the excavation surface, rock strength, defect spacing, and acceptable ground vibration levels.

Based on the groundwater monitoring results, the groundwater level across the site is assessed to vary from approximately 3.9m to 5.0m below the existing ground surface, corresponding to groundwater levels of approximately RL49.8m to RL49.9m AHD. Allowing for seasonal groundwater fluctuations, a design groundwater level of RL50.4m AHD (approximately 0.5m above the highest observed groundwater level) is recommended for design purposes.

As the proposed bulk excavation levels range from RL52.05m AHD to RL52.82m AHD, the groundwater level is expected to remain below the anticipated basement excavation level and, as such, significant groundwater inflows into the excavation are not anticipated. Any seepage into the excavation should be relatively minor and is expected to be controllable by periodic pumping from sumps in the excavation.

As the bulk earthworks design has not yet been finalised, the above assessment should be reviewed once the basement layout and final excavation levels have been confirmed. It is noted that deeper localised excavations for footings, service trenches, crane pads and lift pits may extend closer to the design groundwater level and, therefore, may increase the potential for localised groundwater ingress.

Ground vibration during excavation is generally assessed in terms of peak particle velocity (PPV). The site is currently vacant, and no existing structures are located in the immediate vicinity of the proposed excavation. Residential and commercial buildings located some distance from the site can generally tolerate ground vibrations in the order of 5.0mm/s to 10.0mm/s. We anticipate that excavation of the fill, residual soils and any locally encountered shale/siltstone bedrock (Unit 3) will generate ground vibrations within tolerable limits for the stability and serviceability of surrounding structures.

4.12 Fill Placement

Site preparation for construction of proposed building is anticipated to involve placement of some fill. We recommend the following procedures for placement of controlled fill if required:

- Strip existing topsoil/fill and stockpile separately for possible future uses or disposal off site. This operation is anticipated to expose natural soils.

- Undertake proof rolling of the exposed natural soils using an 8 to 10 tonne roller, to detect potential weak spots (ground heave). Excavate areas of localised heaving to a depth of about 300mm and replace with granular fill/crushed sandstone and then compact as described below.

- Undertake proof rolling of soft spots backfilled with granular fill, as described above. If the backfilled area shows movement during proof rolling, this office should be contacted for further recommendations.

- Place suitable controlled fill materials on proof rolled surface of natural soils. Controlled fill materials should be placed in horizontal layers of 200mm to 250mm loose thickness and compacted to a Minimum Dry Density Ratio (MDDR) of 98% Standard, at moisture content within 2% of Optimum Moisture Content (OMC) (Reference 13). However, upper 400mm of controlled fill forming subgrade for internal roads or car parks should be compacted to a Minimum Dry Density Ratio (MDDR) of 100% Standard, at moisture content within 2% of Optimum Moisture Content (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 natural soil and bedrock obtained from excavations within the site are assessed to be suitable for use in controlled fill after removal of unsuitable materials (high plasticity clay layers), crushing to sizes finer than 75mm and moisture conditioning.

- Fill placement should be supervised to ensure that material quality, layer thickness, testing frequency and compaction criteria conform to the specifications. We recommend "Level 1" supervision, in accordance with AS3798 (Reference 14).

4.13 Batter Slopes and Retaining Structures

We anticipate one level of basement excavation to about 3.5m below the existing ground surface will be limited within fill (unit 1), natural soils (unit 2) and shale/siltstone bedrock (Unit 3) . Cut and fill slopes for the proposed development works 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 18.

Table 18- Recommended Batter Slopes for Excavation Faces

Material	Temporary (Horizontal : Vertical)		Permanent (Horizontal : Vertical)	
	Exposed	Protected	Exposed	Protected
Unit 1/2 - Natural Soil/ Fill	2.0:1.0	1.0:1.0	3.0:1.0	2.0:1.0
Unit 3 – Shale Class V	1:0.75		2.0:1.0	1.0:1.0

Surface protection of the slopes can be provided by shotcreting which may be reinforced.

For the long-term stability of battered slopes, appropriate protection should be provided in the form of vegetation for clayey soils or shotcreting for bedrock.

Vertical excavations in bedrock shale Unit 3 or better (if encountered) 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 faces at depth intervals of about 1.5m to ascertain if localised rock bolting or shotcreting are required.

If cut and fill slopes steeper than those recommended above in Table 18 are required for whatever reason, the cut and fill slopes would need to be retained by engineered retaining structures. The design of retaining structures will depend on whether a drained basement or tanked basement is preferred.

Based on the regional geology, site topography and groundwater monitoring results, groundwater is expected to remain below the proposed basement level. Accordingly, a drained basement is considered feasible. Subfloor and subwall

drainage should be provided to intercept seepage and surface-water infiltration and prevent the build-up of hydrostatic pressure.

Appropriate retaining structures for the proposed basement excavation would comprise bored pile walls at intervals of 3 times the diameter or closer or cantilever walls or gravity walls. Active earth pressure distribution on such retaining walls may be assumed to be triangular in shape and estimated using following equation:

$p_h = \gamma kH$

Where,

p_h = Horizontal pressure (kN/m^2)

γ = Total unit weight of retained materials (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 horizontal deformation of retaining structure is not desirable, 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 17.

Table 19– 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)
Unit 1 - Fill	19.0	0.35	-	0.55
Unit 2 - Residual Soils	19.0	0.30	-	0.50
Unit 3 – Shale/Siltstone Class V/IV	21.0	0.20	250.0	0.40
Unit 4 – Shale /Siltstone Class IV	22.0	0.15	500.0	0.35
Unit 5 - Class III or better Shale/Siltstone	23.0	-	1500.0	-

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 $0.25\gamma H$ at depth of 0.25H, where γ = Equivalent unit weight of retained materials say $19.0kN/m^3$ and H= Depth of retained excavation

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

p_h is decreasing from $0.25\gamma H$ at depth of 0.75H to zero the base of excavation

The above coefficients are based on the assumptions that the ground level behind the retaining structure is horizontal, and the retained material is drained. Additional earth pressures resulting from surcharge loads (buildings, infrastructures, etc) on retained materials and groundwater, if any, should also be allowed for in design of retaining structures. No groundwater pressure need be considered if the basement is drained in accordance with recommendations provided in this report. But water proofing of the retaining walls is recommended.

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

4.14 Site Classification

Australian Standard AS 2870 (Reference 11) recommends that building sites be classified based on the thickness of clayey foundation soils and the reactivity (shrink–swell potential) of the foundation soils, as well as consideration of the presence of trees, fill and existing structures that may cause abnormal moisture conditions.

Based on the architectural drawings provided to us, the basement floor level (RL 52.78 m to RL 53.2 m AHD) is assessed to be within the existing fill. Information regarding the placement of the fill, including field density testing and compaction control, is not available at the time of writing this report. However, the fill is assessed to be "moderately to well compacted" based on Standard Penetration Test (SPT) results and is therefore considered likely to be "controlled fill".

As discussed in Section 4.5, based on the Atterberg limits and CBR test results, and adopting the existing fill as controlled for the purpose of classification, it is our assessment that the subsurface fill and natural soils across the site are likely to be moderately reactive and susceptible to moderate shrink–swell movements. Accordingly, the site may be classified as Class M for ground-bearing slabs at the basement level.

4.15 Floor Slabs of the Building

The proposed building is anticipated to have have ground bearing slabs at about RL 52.82m AHD. The foundation material at the basement level across the building footprint is anticipated to be fill (Unit 1). However, removal of softer soils (if encountered) during site preparation may mean some fill placement may also be required. It is our assessment that the floor slabs for the proposed building may be constructed ground bearing slabs on controlled fill or suspended slabs supported by footings designed in accordance with recommendations provided in this report.

For design of ground bearing slabs on (Unit 1) at the base of proposed basement excavation and/or filled subgrade, we recommend that the foundation is prepared in accordance with the recommendations provided below and ground bearing slabs are designed for a Modulus of Subgrade Reaction Value of 25.0kPa/mm or Site Class M in accordance with Australian Standard AS2870 (Reference 11).

- For construction of ground bearing slab on natural soils, if encountered, we recommend that the upper 300mm of natural soils be compacted to a Minimum Dry Density Ratio (MDDR) of 100% Standard. Then a layer of bedding sand of at least 30mm thickness should be provided under the slabs.

- For construction of ground slabs on controlled fill placed in accordance with recommendations provided in this report, we recommend that the upper 400mm of fill be placed in two layers and compacted to a Minimum Dry Density Ratio (MDDR) of 100% Standard. Then a layer of bedding sand of at least 30mm thickness should be provided under the slabs.

4.16 Footings of the Building

Loading conditions from the proposed building are not known at this stage. However, we consider that the appropriate footings would comprise shallow footings (pad and strip) or deep footings (bored piers) founded on bedrock below the basement level. Deep footings might be preferable if footings are to support significant lateral and/or uplift pressures. We also anticipate footings founded at depths shallower than the base of the basement excavation may be required for

ancillary structures. The recommended allowable bearing pressures for design of shallow and deep footings are presented in the following Table 20.

Table 20- Recommended Allowable Bearing Pressures

Founding Material	Founding Depth from Existing Ground Surface (m)	Ultimate Bearing Pressure (kPa)	Ultimate Shaft Adhesion (kPa)	Allowable Bearing Pressure (kPa)	Allowable Shaft Adhesion (kPa)
Unit 1 & 2 - Natural Soil/Fill	0.0-3.3	400	100	150	Ignore
Unit 2 - Shale Class V	3.3-6.0	2000	200	700	70.0
Unit 4- Shale Class IV	6.0-8.2	3000	300	1000	100
Unit 5 – Shale Class III or better	≥8.2	10000.0	500.0	3000.0	300.0

The following should be noted:

- The ultimate bearing pressure and shaft adhesion are based on the ultimate capacities mobilised at large displacements, about 5.0% to 10.0% of pile diameter or minimum footing width. These values assume a clean rock socket with a roughness Category of R2 or better (Reference 15).
- The allowable bearing pressure and shaft adhesion are based on the capacities mobilised at displacements of about 1.0% of pile diameter or minimum footing width.
- The ultimate and allowable bearing pressures for Units 2 and 3 are based on the assumptions that the piers are socketed at last 0.3m into appropriate rock units.
- Differential settlements are estimated to be about halves the estimated total settlements.
- The shaft adhesions against uplift pressures are halves the shaft adhesions for compressive loads presented in above table.
- For limit state design, geotechnical strength reduction factor ϕg of 0.50 to 0.55 is recommended in accordance with AS2159 (Reference 12). However, reduction factor ϕg can be increased up to 0.7 to 0.8 if pile design is verified by analyses of pile load tests and sufficient construction monitoring is carried out.

If footings are founded above the 1 Horizontal to 1 Vertical line projected from the edge at the base of basement excavation (the zone of influence), the recommended allowable bearing pressures presented in Table 20 are not applicable and appropriate allowable bearing pressure will have to be determined by reassessment of materials exposed in the excavation face.

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

4.17 Rock Anchors

It is likely that retaining walls may require anchorage or tie-back in order to resist lateral pressure. We suggest that all anchors are socketed in bedrock (Units 3 and 4). The allowable grout to rock stress for use in rock anchorage design

may be taken as 10.0% of the allowable bearing pressure presented in Table 20. However, the anchors should have sufficient bond length outside the 1 Vertical to 1 Horizontal line drawn from the edge at the base of basement excavation.

4.18 Design for Earthquake

Australian Standard AS1170.4 (Reference 16) sets out procedures for determining earthquake actions and detailing requirements for structures and component to be used in the design of structures. In accordance with Reference 10, the recommended earthquake design parameters for the proposed development site are as follows:

- Earthquake Hazard Factor (Z) = 0.08
- The Subsoil Class = Ce - Shallow Soil

4.19 Pavement Design

Design of road pavements depends on traffic load and strength of subgrade, which is usually represented by CBR value.

Based on anticipation that the natural soils or controlled fill containing natural soils obtained from excavations within the site will be used as subgrade, we recommend an indicative design CBR of 4.5%.

We also recommend for determination of actual design CBR value of subgrade material after completion of subgrade preparation. This becomes important especially if external sources fill materials are used for subgrade preparation.

5 Assessment

This report has been prepared to address geotechnical aspects (Ground and Water Conditions) of the 'Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Industry on 28 November 2025.

The geotechnical investigation indicates the following.

- The sub-surface profile across the site comprises a sequence of fill and natural soils underlain by bedrock. The fill is predominantly silty clay low to high plasticity with granular soils as a minor component of various proportions. Natural residual soils are predominantly silty clay of low to high plasticity and bedrock is interbedded shale and siltstone, encountered at depths of 3.1m to 4.0m from existing ground surface.
- The depth to groundwater level across the site varies from about 3.9m to 5.0m from existing ground surface or RL 49.8 to 49.9.
- The soils across the site are moderately reactive and therefore susceptible to moderate shrink swell.
- The soils across the site are generally moderately saline.
- The soils across the site are dispersive and therefore susceptible to erosion.
- The soils across the site are unlikely to be acid sulphate or potential acid sulphate soils.

Therefore, the following are our assessments.

- The subsurface soils across the site are not acid sulphate soils. However, the subsurface soils are reactive, dispersive/erodible and saline. Therefore, reactivity, erodibility and salinity of soils impose some limitations on the proposed development. However, these limitations are minor and can be managed if ground bearing slabs and pavement are designed to suit ground reactivity and earthworks involving disturbance and excavation of soils are carried out in accordance with appropriate dispersive and saline soil management plans.
- The groundwater level is assessed to vary from approximately RL48.9m to RL49.8m AHD. Based on the bulk excavation levels of RL52.05m to RL52.82m AHD, and allowing for possible groundwater level fluctuations of 0.5m, the groundwater level is assessed to remain below the proposed basement level. Therefore, provided the excavation is limited to a single basement level at the reduced levels noted above, groundwater is unlikely to impact the basement excavation.

6 Recommendations

Geotechnical investigation indicates that the potential geotechnical constraints or risk on proposed development include presence of reactive, salinity and erodible soils. Possibility of groundwater at depths shallower than the proposed basement level may also be considered once the proposed excavation levels are known. Table 21 below presents recommended mitigation measures to address these geotechnical constraints or risks so that the residual risks are "Low" and therefore the site is suitable for the proposed development.

Table 21 – Recommended Mitigation Measures to Manage Geotechnical Risks

Geotechnical Risk	Mitigation Measure	Reason for Mitigation Measure
Reactive Soil	The designer should ascertain that the ground bearing slabs of the proposed building are designed for recommended site classification and suitable for the proposed building so that the building can safely tolerate anticipated shrink swell movements. It is desirable that the foundation materials after construction of the building platforms are tested to ascertain that the design of the ground bearing slabs is appropriate for anticipated shrink swell movements of the foundation. The designer should recognise that the shrink swell movement of foundation varies across the site.	To reduce the risk or uncertainties due to variation in reactivity of foundation material so that appropriate, economical and reliable design of building slabs can be achieved, and potential variation claims during construction stage can be minimised.
Dispersive Soil	Earthworks, including disturbance and excavation of soils, for the proposed development should be carried out in accordance with an appropriate Soil Management Plan (SMP), developed in accordance with the Landcom Guidelines (References 8 and 9), to manage and minimize impacts from dispersive soils to the proposed development and vice versa. The designer should recognise that the subsurface soils across the site are dispersive and susceptible to excessive erosion. The cost for management of dispersive soil should be considered in project costing.	To manage adverse impacts from dispersive soils to the proposed development and vice versa and to reduce variation claims during construction stage
Saline Soil	Earthworks, including disturbance and excavation of soils, during proposed activity should be carried out in accordance with an appropriate Saline Soil Management Plan (SSMP) presented in Attachment E to manage and minimize impacts from saline soils to the proposed development and vice versa. The designer should recognise that the subsurface soils across the site are saline. The cost for management of saline soil should be considered in project costing.	To manage adverse impacts from saline soils to the proposed development and vice versa and to reduce variation claims during construction stage

Geotechnical Risk	Mitigation Measure	Reason for Mitigation Measure
	It is possible that non-saline soil may be encountered in some portions of the site. Unless additional testing is carried out to delineate non-saline soil, disturbance and excavation of localised non-saline soil should also be carried in accordance with an appropriate SSMP.	
Groundwater	Under normal conditions, the groundwater level is anticipated to be deeper than the proposed basement level (>2.1m). Therefore, groundwater is unlikely to impact the proposed development, and vice versa. However, under adverse weather conditions, infiltrated surface water may seep behind the basement walls. To prevent the build-up of hydrostatic pressure and minimise impacts on structural performance, perimeter drainage should be provided behind the basement walls to collect and safely dispose of seepage water in accordance with the recommendations provided in this report.	To manage potential adverse impacts associated with surface water seepage during adverse weather conditions

Based on nature of potential geotechnical risks or issues at the site, it is our assessment that the recommended mitigation measures detailed in Table 21 can ensure that the impacts from the potential geotechnical risk to the proposed development is “Low to moderate”.

7 Conclusion

Based on results of geotechnical investigation, it is our assessment that the Block 20a, Edmondson Park, is suitable for proposed development from geotechnical engineering considerations provided: (1) geotechnical constraints imposed by presence of reactive, saline and erodible soils are addressed in accordance with mitigation measures provided in this report; (2) site preparation and design of basement, retaining walls, floor slabs and footings of proposed buildings and other structures (3) groundwater management are carried out in accordance with geotechnical recommendations provided in this report.

8 References

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Attachment A
Drawing 20611/1-AA1 Borehole Location Plan
Borehole Logs, Core Photos & Monitoring Well Logs

Imagery © NearMap.com

LEGEND

Boundary of Proposed Lot 401

Borehole

0 10 20 30 40 50m

Scale 1:1000

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Landcom
Proposed Edmondson Park Block 20A
Lot 401 Buchan Avenue
Edmondson Park

Site Layout

Drawing No: 20806/1-AA1
Job No: 20806/1
Drawn By: MH
Date: 24 November 2025
Checked By: BJ

File No: 20806-1
Layers: 0, AA1

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 1
Date : 20/11/2025
Logged/Checked by: BJ/AT

drill model and mounting : Comacchio Geo 205 **slope :** 90 **deg.** **R.L. surface :** 54.950

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	G+P			N=20 7,10,10	0 0.5 1			FILL: Silty Clay, medium to high plasticity, red-orange-brown mottled grey, trace fine to medium grained gravel				Well compacted
		G+P			N=14 2,6,8	1.5 2							
		G+P G				2.5		CI-CH	Silty CLAY, medium to high plasticity, red-brown mottled grey	M<PL	St-VSt		Residual
					N=24 4,10,14	3 3.5			@ 3.0m, grey SHALE, dark grey, very low to low strength, extremely to highly weathered				Bedrock
						4			@ 4.0m, low to medium strength, highly to moderately weathered				
						4.5			Started coring at 4.16m				

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engineering log
cored borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 1
Date : 20/11/2025
Logged/Checked by : BJ/AT

drill model and mounting : Comacchio Geo 205 **slope :** 90 **deg.** **R.L. surface :** 54.950
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 spacing (mm) 2000 1000 500 300 100 50	DEFECT DETAILS DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
				Started coring at 4.16m					
		4							
				SHALE / SILTSTONE, dark grey-brown	MW-SW	M-H			4.29m: Bp=10°, St, Vnr 4.37m: Bp=7°, Ir 4.54m: Bp=5° 4.59m: Jo=5°, Ir 4.65m: Bp=0°, Ir 4.72m: Bp=0°, Ir 4.78m: Bp=0°, Ir, Sn 4.81m: Bp=3°, Ir 4.93m: Bp=0° 4.95m: Bp=0°, Ir 5.04m: Bp=3° 5.09-5.16m: FS=70mm 5.23m: Bp=0°, Ir 5.33m: Bp=5°, Cu 5.38-5.42m: FS=40mm 5.48m: Jo=80° 5.53m: Jo=85° 5.56m: Bp=5° 5.59m: Bp=3° 5.61-5.63m: FS=20mm 5.64m: Bp=3° 5.67m: Jo=15°, Ir 5.7m: Jo=75° 5.75-5.78m: FS=30mm 5.89m: Bp=3°, Ir, Sn 6.12m Bp=0° 6.13m: Jo=90° 6.15m: Bp=0° 6.2m: Bp=3° 6.31m: Bp=5° 6.36m: Bp=0°
		5							
		6							
		7							
		8		@ 8.1m, grey					6.56-6.59m: FS=30mm 6.68-6.685m: CS=5mm 6.85m: Bp=0° 6.92m: Jo=15°, Ir 6.97m: Bp=5° 7.08m: Bp=3° 7.17m: Jo=35°, Ir 7.23m: Jo=45°, Ir 7.25m: Jo=25°, Cu 7.35m: Jo=75° 7.36m: Bp=15°, Pr 7.47m: Bp=5°, Ir 7.51m: Jo=60°, Ir 7.56m: Bp=0° 7.68m: Bp=0°
		9							
		10							7.71m: Bp=0° 7.76m: Jo=25° 7.93m: Bp=0°, Ir 8.0-8.03m: FS=30mm 8.06-8.08m: FS=20mm 8.31m: Bp=0°, Ir 8.72m: Bp=3°, Ir 8.92m: Bp=0° 9.55m: Bp=3°
		11							10.05m: Jo=25°, Ir 10.08m: Bp=3°, Ir 10.09m: Bp=3°, Ir 10.12m: Bp=5°, Ir 10.63m: Jo=85°, Ir 10.81m: Jo=60°, Ir 11.07m: Bp=0°, Ir
		12				H-VH			11.18m: Jo=75°, Ir 11.2m: Bp=5° 11.24m: Jo=85°, Ir 11.28m: Jo=15°, Ir 11.32m: Jo=75°, Ir 11.54m: Bp=5°

GEOTECHNIQUE
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engineering log
cored borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 1
Date : 20/11/2025
Logged/Checked by : BJ/AT

drill model and mounting : Comacchio Geo 205 **slope :** 90 **deg.** **R.L. surface :** 54.950
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 600 300 100 50	DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
		13							11.55m: Bp=3° 11.6m: Bp=3°, Ir 11.73m: Jo=75° 11.76m: Bp=5° 11.88m: Bp=5° 12.0m: Jo=45°, Ir 12.27m: Bp=5° 12.32m: Bp=5°
		14							12.33-12.35m: CS=20mm 12.35-12.37m: XWS=20mm 12.63m: Bp=0° 12.76m: Bp=0°, Ir 12.89m: Jo=45° 12.92m: Bp=5°, Ir 13.17m: Jo=5°, Ir 13.2m: Jo=75°, Ir 13.26m: Jo=25°, Ir 13.36m: Jo=5°, Ir
		15			FR				13.78m: Jo=35°, Ir 14.03m: Jo=45°, Cu 14.07m: Jo=45°, Ir 14.1m: Bp=0° 14.15m: Bp=3° 14.27m: Bp=0°
		16							14.55-14.63m: FS=80mm 14.7-14.73m: FS=30mm 14.76m: Jo=25°, Ir 14.93m: Bp=0° 15.04m: Jo=8°, Ir 15.1m: Jo=3°, Ir 15.17m: Bp=5° 15.22m: Jo=0°, Ir 15.38m: Bp=3°
		17							15.5m: Bp=5° 15.65m: Bp=0° 15.73m: Bp=3° 15.88m: Bp=0° 16.25m: Jo=8° 16.42m: Bp=0° 16.73m: Bp=10° 16.78m: Bp=10° 17.37m: Bp=3°
				Borehole terminated at 17.6m					
		18							
		19							
		20							
		21							

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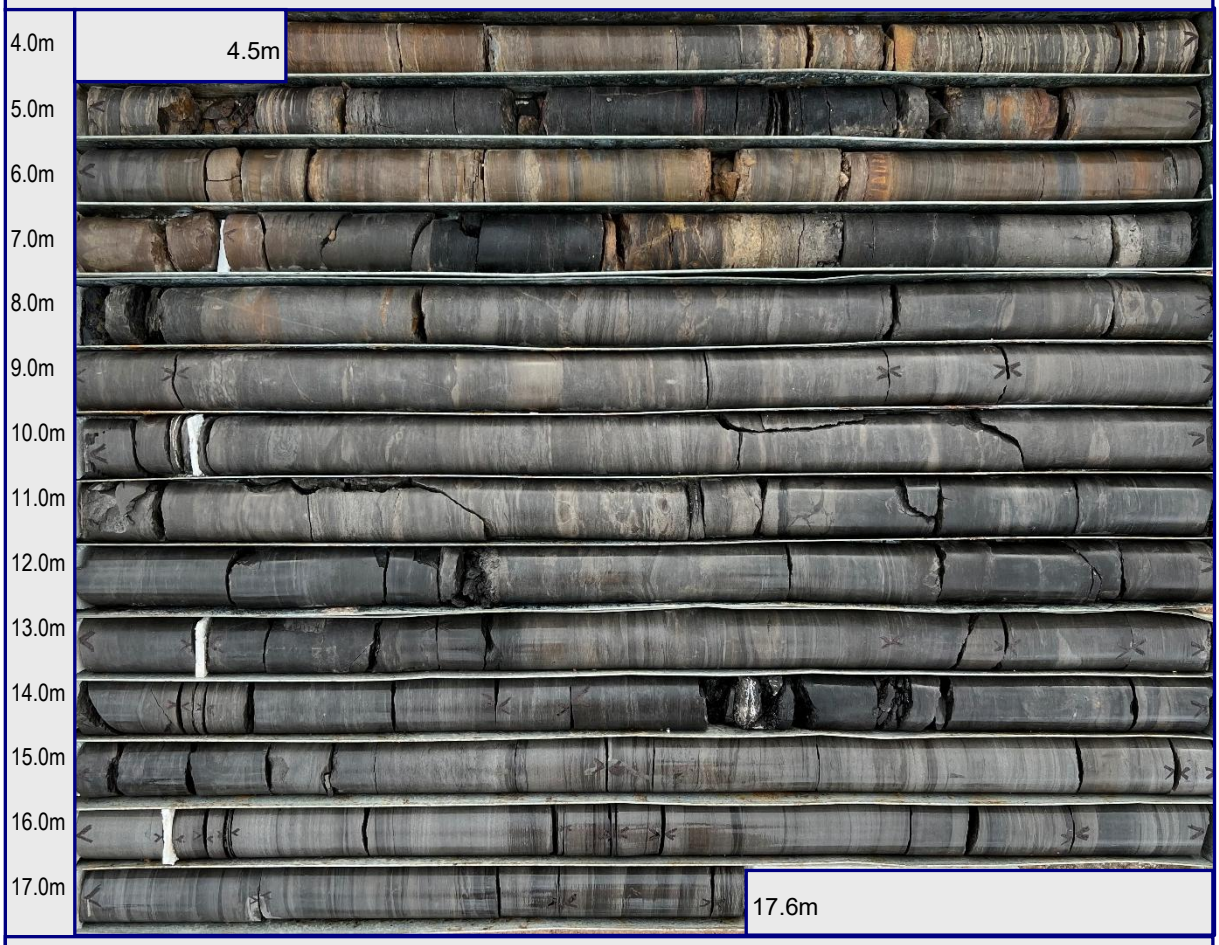
Job No 20806/1 BH1 Started Coring at 4.16m



BH1 terminated at 17.6m

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 2
Date : 20/11/2025
Logged/Checked by: JH/AT

drill model and mounting : Comacchio Geo 305 **slope :** 90 **deg.** **R.L. surface :** 53.853

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		G+P			N=31 11,14,17	0 0.5			FILL: Gravelly Silty Clay, low plasticity, pale brown-pale grey	M<PL			Well compacted
		G+P			N=24 6,9,15	1 1.5			FILL: Silty Sandy Clay, low plasticity, brown-dark grey, with fine grained angular gravel				
		G+P		DS		2 2.5			FILL: Silty Clay, medium to high plasticity, brown-orange mottled grey, trace fine grained angular gravel				
					N=45 11,19,26	3			@ 3.0m, brown mottled dark grey, with medium to coarse grained sub-angular to angular gravel				
		G				3.5		CL-CI	Silty CLAY, low to medium plasticity, pale grey mottled dark grey, with weathered shale fragments	M≤PL	H		Residual
				DS		4			SHALE, brown-pale grey, low strength, highly weathered				Bedrock
					N=R 13,19/80	4.5			@ 4.5m, low to medium strength, highly to moderately weathered				

GEOTECHNIQUE
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engineering log - borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 2
Date : 20/11/2025
Logged/Checked by: JH/AT

drill model and mounting : Comacchio Geo 305 **slope :** 90 **deg.** **R.L. surface :** 53.853

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
	Dry					5 5.5							
						6 6.5 7 7.5 8 8.5 9			Started coring at 5.6m				

GEOTECHNIQUE
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engineering log
cored borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 2
Date : 20/11/2025
Logged/Checked by : JH/AT

drill model and mounting : Comacchio Geo 305 **slope :** 90 **deg.** **R.L. surface :** 53.853

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 spacing (mm) 2000 1000 500 300 100 50	DEFECT DETAILS DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
				Started coring at 5.6m					
				Core loss					5.6-5.97m: Core loss=370mm
		6		SHALE / SILTSTONE, grey-brown	MW-SW	M			6.04-6.09m:2xBp=3°,50mm 6.1m: Bp=15°, Ir 6.17-6.2m:2xBp=3°,30mm 6.23-6.42m:4xBp=0°,63.3mm 6.5-6.52m:2xBp=3°,20mm 6.56-6.64m: FS=80mm 6.65m: Jo=75°, Ir 6.66m: Bp=5°, Ir 6.69m: Jo=75°, Ir 6.71m: Jo=45° 6.75m: Jo=75°, Ir 6.79m: Jo=35° 6.85m: Jo=25°, Ir 6.96m: Jo=45°
		7							
						H-VH			7.1m: Jo=5°, Ir 7.2m: Bp=2°
		8							7.27m: Bp=0°, Ir 7.37m: Bp=0°, Pr 7.59m: Bp=0°, Pr 7.79m: Bp=3° 7.84m: Bp=3° 7.95m: Bp=5°, Ir 7.98m: Jo=45°, Ir
		9							8.14m: Bp=3°, Ir 8.23m: Bp=5° 8.24m: Jo=45° 8.26m: Bp=0° 8.3m: Bp=3°, Ir 8.4m: Jo=60°, Ir 8.43-8.45m:2xBp=5°,20mm 8.49m: Jo=10°, Ir 8.56m: Bp=25°, Ir
		10		Core loss SHALE / SILTSTONE, grey	MW-SW	M-H			8.63m: Bp=0° 8.7m: Jo=25° 8.71m: Bp=10°, Ir 8.72m: Bp=5° 8.75m: Jo=10°
					HW-MW				8.82m: Bp=10°, Pr 8.88m: Bp=5°, Pr 8.89m: Jo=85°
		11			SW				8.92m: Bp=3° 9.16m: Bp=0° 9.21m: Bp=0° 9.25m: Bp=2° 9.27m: Jo=85° 9.29m: Bp=3° 9.37m: Jo=75°, Ir 9.53-9.73m:3xBp=3°,100mm
		12							9.79m: Jo=25° 9.89m: Bp=3° 9.95m: Jo=45°, Ir 9.97-10.0m: Core loss=30mm 10.18m: Jo=85°, Ir 10.21m Bp=0° 10.53m: Bp=3°
		13							10.55-10.65m: FZ=100mm 10.67m: Jo=45° 10.7m: Bp=0° 10.71m: Jo=45° 10.73m: Bp=0° 10.78m: Bp=0° 10.8m: Jo=45° 10.83m: Bp=3° 11.0-11.17m: FZ=170mm
		14							11.17-11.22m: XWS=50mm 11.38m: Jo=60° 11.56-11.94m:6xBp=5°,76mm 12.29m: Jo=10°, Ir 12.36m: Bp=3°

GEOTECHNIQUE
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engineering log
cored borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 2
Date : 20/11/2025
Logged/Checked by : JH/AT

drill model and mounting : Comacchio Geo 305 **slope :** 90 **deg.** **R.L. surface :** 53.853

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
		15							12.49m: Bp=3°
									12.56m: Jo=15°, Ir
									12.75-12.86m:3xBp=5°,55mm
									12.93-12.96m: FS=30mm
									13.33m: Bp=5°
									13.58m: Bp=8°
									13.76m: Jo=85°, Ir
									13.95m: Jo=3°, Ir
									14.18-14.21m:3xBp=3°,15mm
									14.25m: Bp=3°
									14.47m: Jo=35°, Cu
		16							14.67m: Bp=3°
									14.69m: Jo=10°
									14.75m: Jo=35°
									14.82m: Jo=15°
									15.07m: Bp=0°
									15.54m: Bp=3°
									15.93m: Bp=0°
									15.99-16.12m: FZ=130mm
		17							16.15m: Bp=0°
									16.2m: Jo=10°, Ir
									16.27m: Bp=0°, Ir
									16.36m: Bp=0°
									16.4m: Jo=45°
									16.53m: Bp=3°
									16.68-16.77m:3xBp=3°,45mm
									16.88m: Jo=5°, Ir
		18			SW-FR	H-VH	×		16.94-16.99m:4xBp=0°,16.7mm
									17.03-17.25m:7xBp=3°,36.7mm
									17.39m: Bp=5°
									17.45m: Jo=75°
									17.72m: Jo=80°
									17.85-17.88m: CS=30mm
									17.88-17.95m: XWS=70mm
									17.95-18.0m: CS=50mm
		19					×		18.06m: Bp=5°, Ir
									18.09m: Jo=25°
									18.13m: Bp=0°, Ir
									18.17m: Bp=5°
									18.36m: Jo=5°
									18.57m: Jo=75°
									18.66-18.67m:2xBp=3°,10mm
									18.78m: Bp=3°
		20		Borehole terminated at 20.0m					18.84m: Bp=5°
									19.11m: Bp=3°
									19.36m: Jo=75°, Ir
									19.43m: Bp=5°
									19.61m: Bp=10°, Pr
									19.62m: Bp=15°, Ir
									19.68m: Jo=25°, Ir
									19.87m: Bp=0°
		21							
		22							
		23							

GEOTECHNIQUE
PTY LTD

Job No 20806/1 BH2 Started Coring at 5.6m

5.0m	5.6m	Core loss
6.0m		
7.0m		
8.0m		
9.0m		
10.0m		
11.0m		
12.0m		
13.0m		
14.0m		
15.0m		
16.0m		
17.0m		
18.0m		
19.0m		

BH2 terminated at 20.0m

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 3
Date : 21/11/2025
Logged/Checked by: JH/AT

drill model and mounting : Comacchio Geo 305 **slope :** 90 **deg.** **R.L. surface :** 54.389

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		G+P				0			FILL: Silty Clay, low plasticity, brown mottled pale grey, trace gravel				Well compacted
				DS	N=27 5,11,16	0.5							
		G				1			FILL: Silty Clay, low plasticity, brown -dark grey, with fine to medium grained sub-angular gravel				
		G+P											
					N=15 6,9,6	1.5							
		G+P				2							
						2.5							
		G		DS				CI	Silty CLAY, low plasticity, orange mottled pale grey, trace of ironstone shale	M≤PL	VSt		
		G				3							
		G			N=50 4,16,34				SHALE, brown-grey, very low to low strength, extremely to highly weathered				Bedrock
						3.5							
						4							
						4.5			@ 4.5m, dark grey, medium strength, highly to moderately weathered,				

GEOTECHNIQUE
PTY LTD

engineering log - borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 3
Date : 21/11/2025
Logged/Checked by: JH/AT

drill model and mounting : Comacchio Geo 305 **slope :** 90 **deg.** **R.L. surface :** 54.389

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
	Dry					5 5.5							
						6 6.5 7 7.5 8 8.5 9			Started coring at 5.7m				

GEOTECHNIQUE
PTY LTD

engineering log
cored borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 3
Date : 21/11/2025
Logged/Checked by : JH/AT

drill model and mounting : Comacchio Geo 305 **slope :** flat **deg.** **R.L. surface :** 54.389

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 spacing (mm) 2000 1000 500 300 100 50	DEFECT DETAILS DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
				Start coring at 5.7m					
		6		SHALE / SILTSTONE, grey-brown	XW	EL			5.7-5.81m: XWZ=110mm
					HW	L			5.86m: Bp=0°, Ir 5.9m: Jo=80°, Ir 5.93m: Bp=0°
					MW	M-H			5.94m: Bp=0°, Ir 5.97m: Jo=75° 6.0-6.05m: FS=50mm 6.08-6.1m: CS=20mm 6.11m: Jo=3° 6.15m: Jo=3°
		7							6.16-6.17m: FS=10mm 6.21-6.23m: FS=20mm 6.27m: Jo=3°, Ir 6.3m: Bp=5°, Ir 6.34m: Jo=85° 6.38m: Bp=3° 6.42m: Jo=75°, Ir 6.47m: Bp=5°, Ir, Sn
		8			XW-HW	L			6.48m: Jo=85° 6.5m: Bp=0°, Sn 6.56m: Bp=3°
					MW-SW	M-H			6.59m: Bp=15°, Ir 6.63m: Bp=0°, Pr 6.74-6.78m:2xBp=0°,40mm 6.86m: Jo=85° 6.91m: Jo=0°, Ir
		9							7.05m: Bp=0° 7.16-7.18m:2xBp=3°,20mm 7.26m: Bp=5° 7.31m: Bp=0°, Pr 7.37m: Jo=90°, Ir 7.44-7.46m: FS=20mm 7.58m: Jo=75°, Ir 7.6m: Jo=80°, Ir
		10			SW				7.67m: Jo=10°, Ir 7.79m: Jo=3°, Ir 7.91-7.99m:4xBp=3°,26.7mm 8.0-8.07m: FS=70mm 8.14m: Bp=0° 8.15-8.3m: XWZ=150mm 8.39-8.41m: FS=20mm 8.5m: Jo=45°, Ir, Co
		11				H-VH			8.52m: Bp=0° 8.54m: Jo=25°, Ir 8.61-8.65m: FS=40mm 8.66m: Bp=0° 8.73m: Bp=0° 8.86m: Bp=0° 8.91-8.92m: FS=10mm
		12							9.03m: Jo=5° 9.13m: Jo=5°, Ir 9.18m: Bp=0° 9.19-9.2m: FS=10mm 9.28m: Bp=0°, Ir 9.37m: Jo=25° 9.43m: Jo=10° 9.55-9.63m:3xBp=3°,40mm 9.72-9.9m:3xBp=5°,90mm
		13							10.02m: Bp=0° 10.09m: Bp=0° 10.13-10.14m:2xBp=0°,10mm 10.18m: Bp=5° 10.2m: Jo=85° 10.22m: Bp=5° 10.29m: Jo=60°, Ir 10.34m: Bp=3°
		14							10.53m: Bp=0°, Ir 10.73m: Bp=3° 10.74m: Jo=45° 10.76m: Bp=3° 10.84m: Jo=60°, Ir 11.23-11.27m:2xBp=3°,40mm

GEOTECHNIQUE
PTY LTD

engineering log
cored borehole

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 3
Date : 21/11/2025
Logged/Checked by : JH/AT

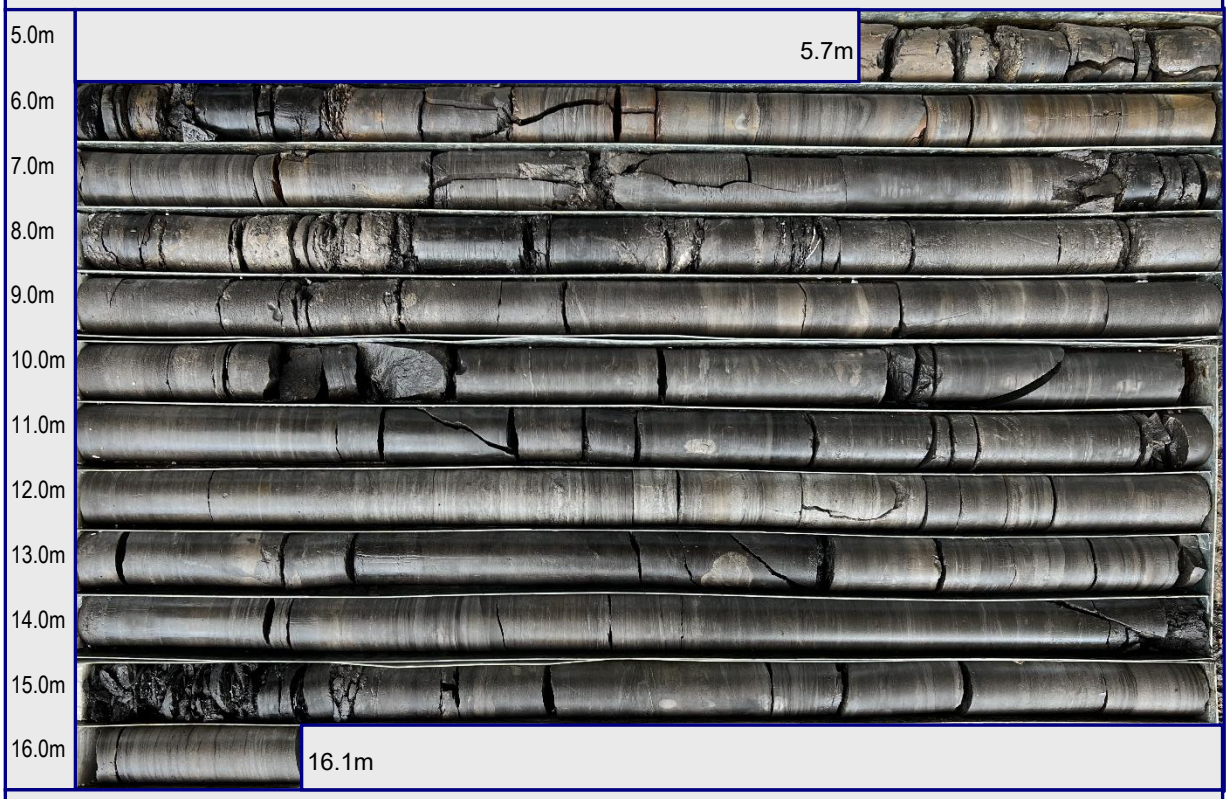
drill model and mounting : Comacchio Geo 305 **slope :** flat **deg.** **R.L. surface :** 54.389

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 600 300 100 50	DESCRIPTION type, inclination, thickness, planarity, roughness, coating. Specific / General
		15							11.35m: Jo=60°, Ir 11.39-11.5m:3xBp=3°,55mm 11.66m: Bp=3° 11.75m: Jo=30° 11.78m: Bp=5° 11.8m: Bp=0° 11.9m: Bp=0° 11.95m: Bp=0° 11.96-11.97m: FS=10mm 12.12-12.22m:2xJo=3°,100mm 12.31-12.44m:2xBp=3°,130mm 12.49m: Bp=0°, Pr 12.53m: Bp=3° 12.64m: Bp=0° 12.68m: Jo=75°, Ir 12.75-12.86m:4xBp=3°,36.7m 12.93m: Jo=15°, Ir 13.04m: Bp=3° 13.18-13.24m:2xBp=0°,60mm 13.31m: Jo=15°, Ir 13.5m: Jo=25° 13.55m: Jo=45° Ir 13.63m: Jo=60° 13.67m: Bp=3° 13.77m: Bp=0° 13.83m: Jo=15° 13.9m: Bp=3° 13.98m: Bp=3° 14.05m: Jo=15° 14.17-14.19m:2xBp=3°,20mm 14.27-14.32m:2xBp=0°,50mm 14.38m: Jo=5°, Ir 14.47m: Bp=0° 14.53m: Bp=3°, Ir 14.92m: Jo=70° 14.96m: Bp=0°, Ir 15.0-15.2m: FZ=200mm 15.22-15.24m: FS=20mm 15.32m: Bp=0° 15.33m: Jo=85° 15.34m: Bp=3° 15.42m: Bp=5° 15.68m: Bp=10° 15.79m: Bp=0° 15.91m: Bp=0° 16.03m: Bp=0°
		16							
				Borehole terminated at 16.2m					
		17							
		18							
		19							
		20							
		21							
		22							
		23							

GEOTECHNIQUE
PTY LTD

Job No 20806/1 BH3 Started Coring at 5.7m



BH3 terminated at 16.1m

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 1
Date : 20/11/2025
Logged/Checked by: BJ/AT

drill rig : Comacchio Geo 205

R.L. surface : 54.950 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	Description
								-0.88 to 2.12m: Casing 2.12 to 17.12m: Screen
			0			FILL: Silty Clay, medium to high plasticity, red-orange-brown mottled grey, trace fine to medium grained gravel		0.0 to 0.8m: Backfill
			1					0.8 to 1.5m: Bentonite
			2					1.5 to 17.6m: Sand
					CI-CH	Silty CLAY, medium to high plasticity, red-brown mottled grey		
			3			@ 3.0m, grey		
						SHALE, dark grey, very low to low strength, extremely to highly weathered		
			4			@ 4.0m, low to medium strength, highly to moderately weathered		
						SHALE / SILTSTONE, dark grey-brown, medium to high strength, moderately to slightly weathered		
			5					
			6					
			7					
			8					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 1
Date : 20/11/2025
Logged/Checked by: BJ/AT

drill rig : Comacchio Geo 205

R.L. surface : 54.950 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			9			@ 8.1m, grey		
			10					
			11					
			12					
			13					
			14					
			15					
			16					
			17					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 1
Date : 20/11/2025
Logged/Checked by: BJ/AT

drill rig : Comacchio Geo 205

R.L. surface : 54.950 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			18			Borehole terminated at 17.6m		
			19					
			20					
			21					
			22					
			23					
			24					
			25					
			26					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 2
Date : 20/11/2025
Logged/Checked by: JH/AT

drill rig : Comacchio Geo 305

R.L. surface : 53.853 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	Description
								-0.54 to 2.58m: Casing 2.58 to 20.0m: Screen
			0			FILL: Gravelly Silty Clay, low plasticity, pale brown-pale grey		0.0 to 1.5m: Backfill
			1			FILL: Silty Sandy Clay, low plasticity, brown-dark grey, with fine grained angular gravel		1.5 to 2.0m: Bentonite
			2			Silty Clay, medium to high plasticity, brown-orange mottled grey, trace fine grained angular gravel		2.0 to 20.0m: Sand
			3			@ 3.0m, brown mottled dark grey, with medium to coarse grained sub-angular to angular gravel		
					CL-CI	Silty CLAY, low to medium plasticity, pale grey mottled dark grey, with weathered shale fragments		
			4			SHALE, brown-pale grey, low strength, highly weathered		
			5			@ 4.5m, low to medium strength, highly to moderately weathered		
			6			SHALE / SILTSTONE, grey-brown, medium strength, moderately to slighlty weathered		
			7					
			8					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 2
Date : 20/11/2025
Logged/Checked by: JH/AT

drill rig : Comacchio Geo 305

R.L. surface : 53.853 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			9 10 11 12 13 14 15 16 17					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 2
Date : 20/11/2025
Logged/Checked by: JH/AT

drill rig : Comacchio Geo 305

R.L. surface : 53.853 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			18					
			19					
			20					
						Borehole terminated at 20.0m		
			21					
			22					
			23					
			24					
			25					
			26					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 3
Date : 21/11/2025
Logged/Checked by: JH/AT

drill rig : Comacchio Geo 305

R.L. surface : 54.389 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	Description
								-0.45 to 2.55m: Casing 2.55 to 16.1m: Screen
			0			FILL: Gravelly Silty Clay, low plasticity, brown mottled pale grey, trace gravel		0.0 to 1.5m: Backfill
			1			FILL: Silty Clay, low plasticity, brown- dark grey, with fine to medium grained sub-angular gravel		1.5 to 2.0m: Bentonite
			2					2.0 to 16.2m: Sand
			3		CL	Silty CLAY, low plasticity, orange mottled pale grey, trace ironstone gravel		
						SHALE, brown-grey, very low to low strength, extremely to highly weathered		
			4					
						@ 4.5m, dark grey, medium strength, highly to moderately weathered		
			5					
			6			SHALE / SILTSTONE, grey-brown, low strength, extremely to highly weathered @ 6.23m, medium to high strength, moderately weathered		
			7					
			8					

GEOTECHNIQUE
PTY LTD

engineering log - monitoring well

Client : Landcom
Project : Proposed Edmondson Park Block 20A
Location : Lot 401 Buchan Avenue, Edmondson Park

Job No. : 20806/1
Borehole No. : 3
Date : 21/11/2025
Logged/Checked by: JH/AT

drill rig : Comacchio Geo 305

R.L. surface : 54.389 **AHD**

groundwater	samples	PID Reading (ppm)	depth or R.L. in meters	graphic log	classification symbol	MATERIAL DESCRIPTION soil type, plasticity or particle characteristic, colour, secondary and minor components.	MONITORING WELL Graphic Log	 Description
			9 10 11 12 13 14 15 16					
			17			Borehole terminated at 16.2m		

Attachment B
Laboratory Test Results

Material Test Report

Report Number: **20806/1-1**
Issue Number: 1
Date Issued: 09/12/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 20806/1
Project Name: Proposed Development
Project Location: Lot 401 Buchen Avenue, Edmonson Park
Client Reference: 20806/1
Work Request: 1780
Sample Number: S-1780A
Date Sampled: 25/11/2025
Dates Tested: 25/11/2025 - 05/12/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH 2, Depth: 0.5 - 1.0m**
Material: FILL: Gravelly Silty Clay, low plasticity, pale brown-grey

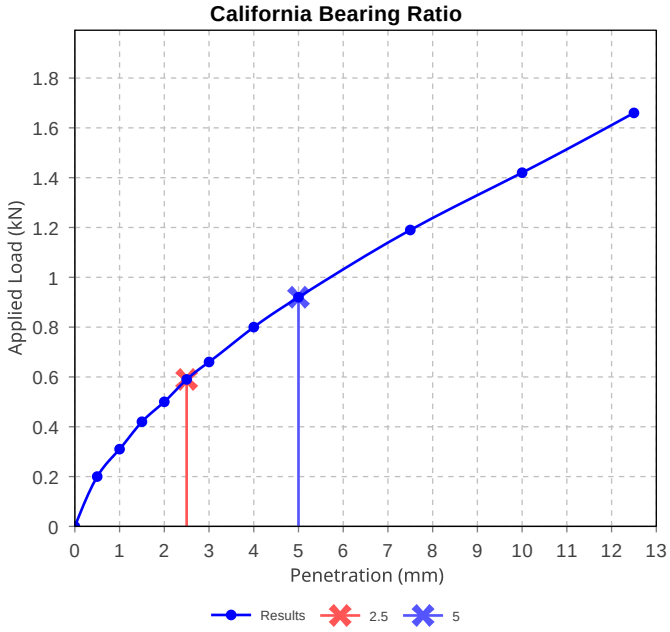
Geotech Testing Pty Ltd
Penrith Laboratory
34 Borec Road Penrith NSW 2750
Phone: (02) 4722 2744
Email: matthew@geotech.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mathew Morley
Laboratory Manager
NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**4.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.88		
Optimum Moisture Content (%)	13.0		
Laboratory Density Ratio (%)	96.5		
Laboratory Moisture Ratio (%)	101.5		
Dry Density after Soaking (t/m^3)	1.80		
Field Moisture Content (%)	11.5		
Moisture Content at Placement (%)	13.1		
Moisture Content Top 30mm (%)	22.5		
Moisture Content Rest of Sample (%)	18.5		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	75.3		
Swell (%)	1.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	45		
Plastic Limit (%)	20		
Plasticity Index (%)	**25**		



Material Test Report

Report Number: **20806/1-1**
Issue Number: 1
Date Issued: 09/12/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 20806/1
Project Name: Proposed Development
Project Location: Lot 401 Buchen Avenue, Edmonson Park
Client Reference: 20806/1
Work Request: 1780
Sample Number: S-1780B
Date Sampled: 25/11/2025
Dates Tested: 25/11/2025 - 05/12/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH 3, Depth: 0.5 - 1.0m**
Material: FILL: Gravelly Silty Clay, low plasticity medium grained sub-angular, brown mottled pale grey, trace of coarse sandstone gravel

GEOTECH TESTING PTY LTD
ABN 71 076 676 321

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

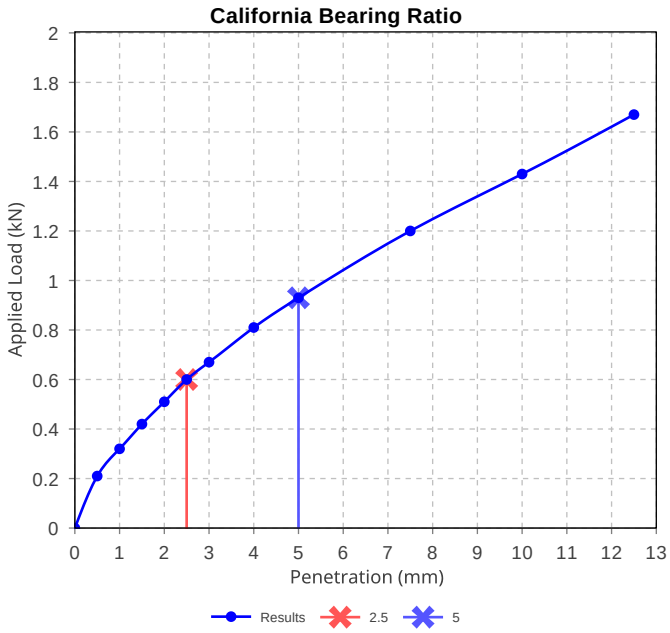
Accredited for compliance with ISO/IEC 17025 - Testing

NATA WORLD RECOGNISED ACCREDITATION

Approved Signatory: Mathew Morley
Laboratory Manager
NATA Accredited Laboratory Number: 2734

California Bearing Ratio (AS 1289 6.1.1 & 2.1.1)		Min	Max
CBR taken at	5 mm		
CBR %	**4.5**		
Method of Compactive Effort	Standard		
Method used to Determine MDD	AS 1289 5.1.1 & 2.1.1		
Method used to Determine Plasticity	Visual		
Maximum Dry Density (t/m^3)	1.86		
Optimum Moisture Content (%)	14.5		
Laboratory Density Ratio (%)	101.0		
Laboratory Moisture Ratio (%)	101.5		
Dry Density after Soaking (t/m^3)	1.86		
Field Moisture Content (%)	12.6		
Moisture Content at Placement (%)	14.5		
Moisture Content Top 30mm (%)	18.4		
Moisture Content Rest of Sample (%)	15.2		
Mass Surcharge (kg)	9		
Soaking Period (days)	4		
Curing Hours (h)	73.4		
Swell (%)	1.5		
Oversize Material (mm)	19		
Oversize Material Included	Excluded		
Oversize Material (%)	0.0		

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	43		
Plastic Limit (%)	17		
Plasticity Index (%)	**26**		



Material Test Report

GEOTECH TESTING PTY LTD
ABN 71 076 676 321

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

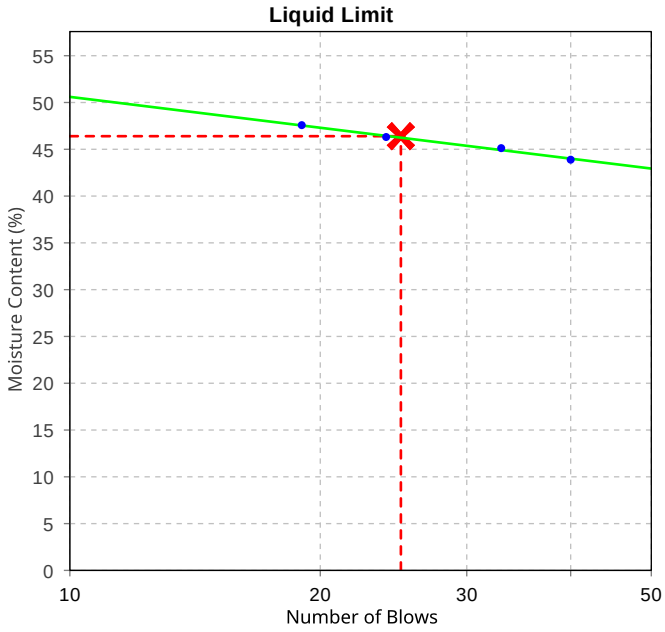
Accredited for compliance with ISO/IEC 17025 - Testing

NATA WORLD RECOGNISED ACCREDITATION

Approved Signatory: Mathew Morley
Laboratory Manager
NATA Accredited Laboratory Number: 2734

Report Number: **20806/1-1**
Issue Number: 1
Date Issued: 09/12/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 20806/1
Project Name: Proposed Development
Project Location: Lot 401 Buchen Avenue, Edmonson Park
Client Reference: 20806/1
Work Request: 1780
Sample Number: S-1780C
Date Sampled: 25/11/2025
Dates Tested: 25/11/2025 - 05/12/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH 2, Depth: 2.0 - 2.3m**
Material: FILL: Silty Clay, medium plasticity, brown-orange mottled grey, trace fine grained angular gravel

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	46		
Plastic Limit (%)	18		
Plasticity Index (%)	**28**		



Material Test Report

GEOTECH TESTING PTY LTD
ABN 71 076 676 321

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

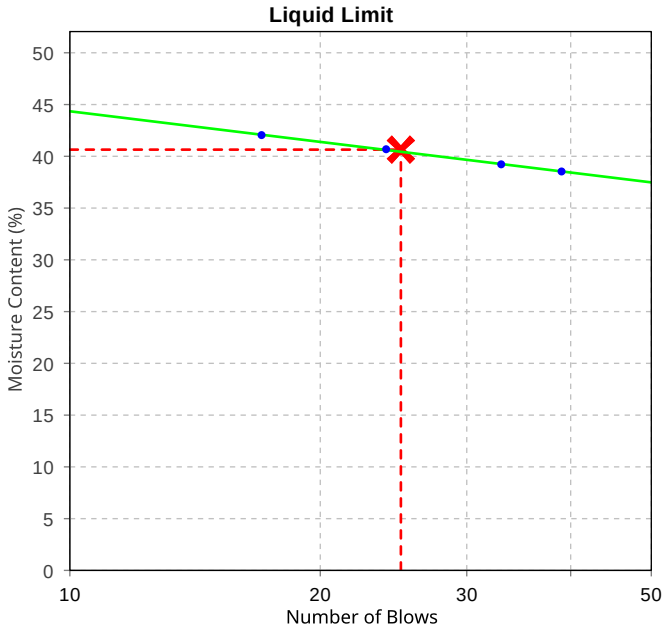
Accredited for compliance with ISO/IEC 17025 - Testing

NATA WORLD RECOGNISED ACCREDITATION

Approved Signatory: Mathew Morley
Laboratory Manager
NATA Accredited Laboratory Number: 2734

Report Number: **20806/1-1**
Issue Number: 1
Date Issued: 09/12/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 20806/1
Project Name: Proposed Development
Project Location: Lot 401 Buchen Avenue, Edmonson Park
Client Reference: 20806/1
Work Request: 1780
Sample Number: S-1780D
Date Sampled: 25/11/2025
Dates Tested: 25/11/2025 - 05/12/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH 2, Depth: 3.0 - 3.45m**
Material: FILL: Silty Clay, medium plasticity, brown mottled dark grey, with medium to coarse grained sub-angular to angular gravel

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	41		
Plastic Limit (%)	15		
Plasticity Index (%)	**26**		



Material Test Report

Report Number: **20806/1-1**
Issue Number: 1
Date Issued: 09/12/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 20806/1
Project Name: Proposed Development
Project Location: Lot 401 Buchen Avenue, Edmonson Park
Client Reference: 20806/1
Work Request: 1780
Sample Number: S-1780E
Date Sampled: 25/11/2025
Dates Tested: 25/11/2025 - 05/12/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH 1, Depth: 1.5 - 1.95m**
Material: FILL: Silty Clay, medium to high plasticity, red-orange-brown mottled grey, trace fine to medium grained gravel

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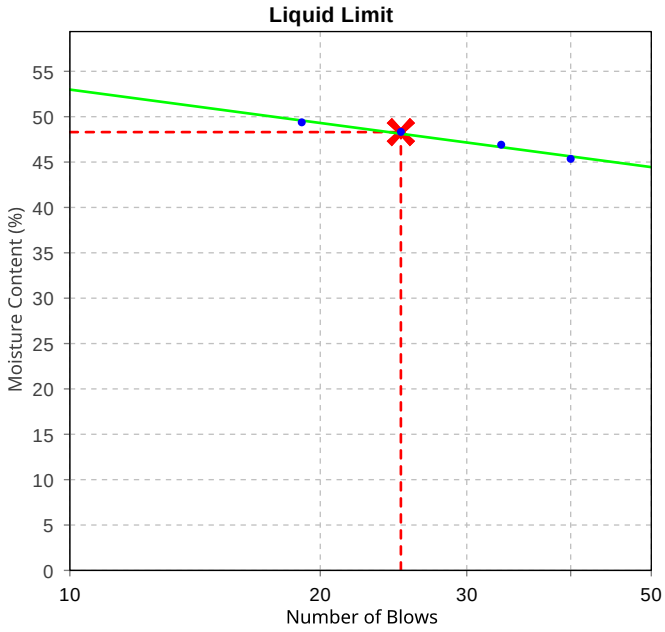
Approved Signatory: Mathew Morley
Laboratory Manager
NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	48		
Plastic Limit (%)	19		
Plasticity Index (%)	**29**		



Material Test Report

Report Number: **20806/1-1**
Issue Number: 1
Date Issued: 09/12/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 20806/1
Project Name: Proposed Development
Project Location: Lot 401 Buchen Avenue, Edmonson Park
Client Reference: 20806/1
Work Request: 1780
Sample Number: S-1780G
Date Sampled: 25/11/2025
Dates Tested: 25/11/2025 - 05/12/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH 3, Depth: 2.8 - 3.0m**
Material: Silty CLAY, low plasticity orange mottled pale grey, with extremely weathered shale partings, trace of ironstone

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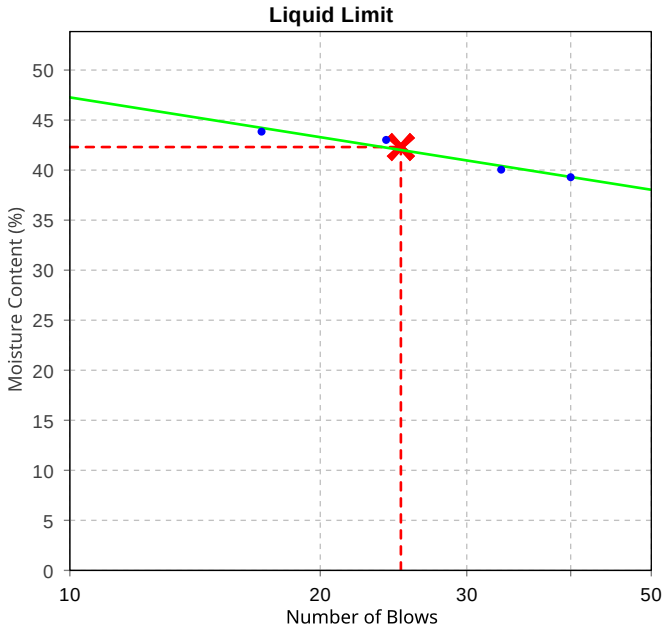
Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Mathew Morley
Laboratory Manager
NATA Accredited Laboratory Number: 2734

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	42		
Plastic Limit (%)	16		
Plasticity Index (%)	**26**		



Material Test Report

GEOTECH TESTING PTY LTD
ABN 71 076 676 321

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Penrith Laboratory
34 Borec Road Penrith NSW 2750
Phone: (02) 4722 2744
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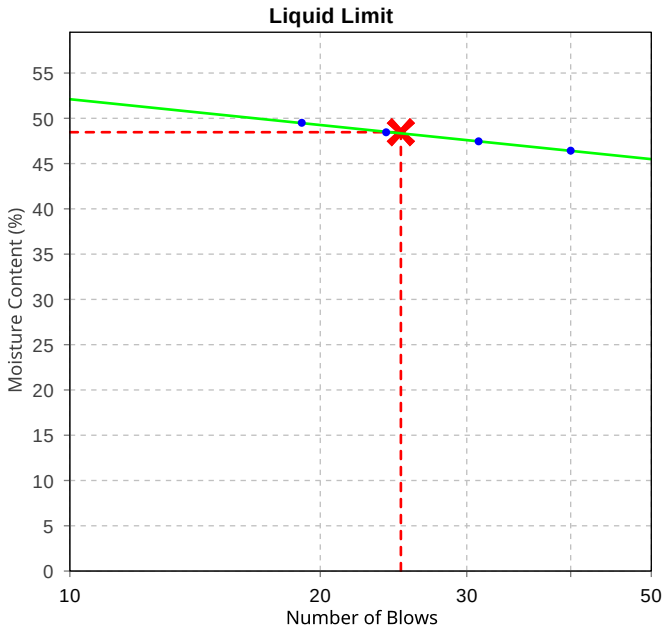
Accredited for compliance with ISO/IEC 17025 - Testing

NATA WORLD RECOGNISED ACCREDITATION

Approved Signatory: Mathew Morley
Laboratory Manager
NATA Accredited Laboratory Number: 2734

Report Number: **20806/1-1**
Issue Number: 1
Date Issued: 09/12/2025
Client: LANDCOM
P O BOX 237, PARRAMATTA NSW 2124
Contact: LANDCOM
Project Number: 20806/1
Project Name: Proposed Development
Project Location: Lot 401 Buchen Avenue, Edmonson Park
Client Reference: 20806/1
Work Request: 1780
Sample Number: S-1780H
Date Sampled: 25/11/2025
Dates Tested: 25/11/2025 - 05/12/2025
Sampling Method: AS 1289.1.2.1 6.5.3 - Power auger drilling
Preparation Method: AS 1289.1.1 - Sampling and Preparation of Soils
Sample Location: **BH 1, Depth: 2.5 - 2.7m**
Material: Silty CLAY, medium plasticity, red-brown mottled grey

Atterberg Limit (AS1289 3.1.1 & 3.2.1 & 3.3.1)		Min	Max
Sample History	Oven Dried		
Preparation Method	Dry Sieve		
Liquid Limit (%)	48		
Plastic Limit (%)	19		
Plasticity Index (%)	**29**		



ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

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Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
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Email	ameyu@geotech.com.au
Project	**20806/1 Prop Dev. Lot 401 Buchan Ave,**
Order Number	**20806/1**
Samples	9

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
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SGS Reference	**SE293611 R0**
Date Received	26/11/2025
Date Reported	1/12/2025

COMMENTS

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

SIGNATORIES

Dong LIANG
Metals/Inorganics Team Leader

Ly Kim HA
Organic Section Head

Ying Ying ZHANG
Laboratory Technician

Conductivity and TDS by Calculation - Soil [AN106] Tested: 1/12/2025

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 20/11/2025 SE293611.001	BH1 SOIL 1.5-1.95 20/11/2025 SE293611.002	BH1 SOIL 3.0-3.45 20/11/2025 SE293611.003	BH2 SOIL 0.5-0.95 20/11/2025 SE293611.004	BH2 SOIL 1.5-1.95 20/11/2025 SE293611.005
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	460	340	280	430	270
Salinity (by calculation)*	mg/kg	5	1500	1100	910	1400	860

PARAMETER	UOM	LOR	BH2 SOIL 4.0-4.2 20/11/2025 SE293611.006	BH3 SOIL 0.5-0.95 21/11/2025 SE293611.007	BH3 SOIL 1.5-1.95 21/11/2025 SE293611.008	BH3 SOIL 2.8-3.0 21/11/2025 SE293611.009
Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	380	310	250	280
Salinity (by calculation)*	mg/kg	5	1300	1000	810	900

Exchangeable Cations and Cation Exchange Capacity (CEC/ESP/SAR) [AN122] Tested: 30/11/2025

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 20/11/2025 SE293611.001	BH1 SOIL 1.5-1.95 20/11/2025 SE293611.002	BH2 SOIL 1.5-1.95 20/11/2025 SE293611.005	BH2 SOIL 4.0-4.2 20/11/2025 SE293611.006	BH3 SOIL 0.5-0.95 21/11/2025 SE293611.007
Exchangeable Calcium, Ca	mg/kg	2	1900	980	1700	840	1400
Exchangeable Calcium, Ca	meq/100g	0.01	9.5	4.9	8.3	4.2	6.9
Exchangeable Calcium Percentage*	%	0.1	49.0	37.5	46.5	28.1	42.2
Exchangeable Potassium, K	mg/kg	2	150	140	130	160	140
Exchangeable Potassium, K	meq/100g	0.01	0.39	0.36	0.33	0.41	0.36
Exchangeable Potassium Percentage*	%	0.1	2.0	2.8	1.9	2.8	2.2
Exchangeable Magnesium, Mg	mg/kg	2	830	720	870	910	820
Exchangeable Magnesium, Mg	meq/100g	0.02	6.8	5.9	7.1	7.5	6.8
Exchangeable Magnesium Percentage*	%	0.1	34.9	45.1	39.8	50.0	41.6
Exchangeable Sodium, Na	mg/kg	2	630	440	480	660	520
Exchangeable Sodium, Na	meq/100g	0.01	2.7	1.9	2.1	2.9	2.3
Exchangeable Sodium Percentage*	%	0.1	14.1	14.5	11.8	19.1	14.0
Cation Exchange Capacity	meq/100g	0.02	19	13	18	15	16

PARAMETER	UOM	LOR	BH3 SOIL 2.8-3.0 21/11/2025 SE293611.009
Exchangeable Calcium, Ca	mg/kg	2	600
Exchangeable Calcium, Ca	meq/100g	0.01	3.0
Exchangeable Calcium Percentage*	%	0.1	24.2
Exchangeable Potassium, K	mg/kg	2	150
Exchangeable Potassium, K	meq/100g	0.01	0.37
Exchangeable Potassium Percentage*	%	0.1	3.0
Exchangeable Magnesium, Mg	mg/kg	2	850
Exchangeable Magnesium, Mg	meq/100g	0.02	7.0
Exchangeable Magnesium Percentage*	%	0.1	56.0
Exchangeable Sodium, Na	mg/kg	2	480
Exchangeable Sodium, Na	meq/100g	0.01	2.1
Exchangeable Sodium Percentage*	%	0.1	16.9
Cation Exchange Capacity	meq/100g	0.02	12

pH in soil (1:2) [AN101] Tested: 1/12/2025

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 20/11/2025 SE293611.001	BH1 SOIL 1.5-1.95 20/11/2025 SE293611.002	BH1 SOIL 3.0-3.45 20/11/2025 SE293611.003	BH2 SOIL 0.5-0.95 20/11/2025 SE293611.004	BH2 SOIL 1.5-1.95 20/11/2025 SE293611.005
pH (1:2)	pH Units	-	**6.5**	**5.9**	**4.6**	**7.8**	**7.7**

PARAMETER	UOM	LOR	BH2 SOIL 4.0-4.2 20/11/2025 SE293611.006	BH3 SOIL 0.5-0.95 21/11/2025 SE293611.007	BH3 SOIL 1.5-1.95 21/11/2025 SE293611.008	BH3 SOIL 2.8-3.0 21/11/2025 SE293611.009
pH (1:2)	pH Units	-	**6.3**	**7.4**	**6.2**	**5.6**

Conductivity (1:2) in soil [AN106] Tested: 1/12/2025

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 20/11/2025 SE293611.001	BH1 SOIL 1.5-1.95 20/11/2025 SE293611.002	BH1 SOIL 3.0-3.45 20/11/2025 SE293611.003	BH2 SOIL 0.5-0.95 20/11/2025 SE293611.004	BH2 SOIL 1.5-1.95 20/11/2025 SE293611.005
Conductivity (1:2) @25 C*	µS/cm	1	730	570	520	720	600
Resistivity (1:2)*	ohm cm	-	1400	1800	1900	1400	1700

PARAMETER	UOM	LOR	BH2 SOIL 4.0-4.2 20/11/2025 SE293611.006	BH3 SOIL 0.5-0.95 21/11/2025 SE293611.007	BH3 SOIL 1.5-1.95 21/11/2025 SE293611.008	BH3 SOIL 2.8-3.0 21/11/2025 SE293611.009
Conductivity (1:2) @25 C*	µS/cm	1	680	470	470	450
Resistivity (1:2)*	ohm cm	-	1500	2100	2200	2200

Soluble Anions in Soil from 1:2 DI Extract by Ion Chromatography [AN245] Tested: 1/12/2025

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 20/11/2025 SE293611.001	BH1 SOIL 1.5-1.95 20/11/2025 SE293611.002	BH1 SOIL 3.0-3.45 20/11/2025 SE293611.003	BH2 SOIL 0.5-0.95 20/11/2025 SE293611.004	BH2 SOIL 1.5-1.95 20/11/2025 SE293611.005
Chloride	mg/kg	0.25	290	220	180	180	100
Sulfate	mg/kg	0.5	230	120	62	260	130

PARAMETER	UOM	LOR	BH2 SOIL 4.0-4.2 20/11/2025 SE293611.006	BH3 SOIL 0.5-0.95 21/11/2025 SE293611.007	BH3 SOIL 1.5-1.95 21/11/2025 SE293611.008	BH3 SOIL 2.8-3.0 21/11/2025 SE293611.009
Chloride	mg/kg	0.25	240	92	92	110
Sulfate	mg/kg	0.5	110	100	150	49

Moisture Content [AN002] Tested: 30/11/2025

PARAMETER	UOM	LOR	BH1 SOIL 0.5-0.95 20/11/2025 SE293611.001	BH1 SOIL 1.5-1.95 20/11/2025 SE293611.002	BH1 SOIL 3.0-3.45 20/11/2025 SE293611.003	BH2 SOIL 0.5-0.95 20/11/2025 SE293611.004	BH2 SOIL 1.5-1.95 20/11/2025 SE293611.005
% Moisture	%w/w	1	**10.2**	**10.8**	**8.4**	**9.3**	**12.9**

PARAMETER	UOM	LOR	BH2 SOIL 4.0-4.2 20/11/2025 SE293611.006	BH3 SOIL 0.5-0.95 21/11/2025 SE293611.007	BH3 SOIL 1.5-1.95 21/11/2025 SE293611.008	BH3 SOIL 2.8-3.0 21/11/2025 SE293611.009
% Moisture	%w/w	1	**9.0**	**12.5**	**10.3**	**8.2**

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, an extract with water is made at a ratio of 1:2 and the pH determined and reported on the extract after 1 hour extraction (pH 1:2) or after 1 hour extraction and overnight aging (pH (1:2) aged). Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos /cm or µS/cm @ 25°C. For soils, an extract of as received sample with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Salinity can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. Reference APHA 2510 B.
AN106	Resistivity of the extract is reported on the extract basis and is the reciprocal of conductivity. Salinity and TDS can be calculated from the extract conductivity and is reported back to the soil basis.
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 or extract 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			
***	Indicates that both * and ** apply.		Sample listed, but not received.		
NAD	No Asbestos Detected.	NA	Not Applicable.		

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: https://www.sgs.com/en-au/industry/environmental-health-and-safety.

STATEMENT OF QA/QC PERFORMANCE

SE293611 R0

CLIENT DETAILS

Contact	Ameyu Tucho
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
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Email	ameyu@geotech.com.au
Project	**20806/1 Prop Dev. Lot 401 Buchan Ave,**
Order Number	**20806/1**
Samples	9

LABORATORY DETAILS

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SGS Reference	**SE293611 R0**
Date Received	26 Nov 2025
Date Reported	01 Dec 2025

COMMENTS

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

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

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

Extraction Date	Conductivity (1:2) in soil	9 items
	Conductivity and TDS by Calculation - Soil	9 items
	pH in soil (1:2)	9 items
	Soluble Anions in Soil from 1:2 DI Extract by Ion Chromatography	9 items
Analysis Date	Conductivity (1:2) in soil	9 items
	Conductivity and TDS by Calculation - Soil	9 items

SAMPLE SUMMARY

Sample counts by matrix	9 Soil	Type of documentation received	COC
Date documentation received	26/11/2025	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	24.6°C
Sample container provider	SGS	Turnaround time requested	Three Days
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ambient	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE293611 R0

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

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

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

Conductivity (1:2) in soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE293611.001	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH1	SE293611.002	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH1	SE293611.003	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH2	SE293611.004	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH2	SE293611.005	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH2	SE293611.006	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH3	SE293611.007	LB370590	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	28 Nov 2025	01 Dec 2025†
BH3	SE293611.008	LB370590	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	28 Nov 2025	01 Dec 2025†
BH3	SE293611.009	LB370590	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	28 Nov 2025	01 Dec 2025†

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
BH1	SE293611.001	LB370591	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH1	SE293611.002	LB370591	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH1	SE293611.003	LB370591	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH2	SE293611.004	LB370591	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH2	SE293611.005	LB370591	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH2	SE293611.006	LB370591	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	27 Nov 2025	01 Dec 2025†
BH3	SE293611.007	LB370591	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	28 Nov 2025	01 Dec 2025†
BH3	SE293611.008	LB370591	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	28 Nov 2025	01 Dec 2025†
BH3	SE293611.009	LB370591	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	28 Nov 2025	01 Dec 2025†

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	SE293611.001	LB370522	20 Nov 2025	26 Nov 2025	18 Dec 2025	30 Nov 2025	18 Dec 2025	01 Dec 2025
BH1	SE293611.002	LB370522	20 Nov 2025	26 Nov 2025	18 Dec 2025	30 Nov 2025	18 Dec 2025	01 Dec 2025
BH2	SE293611.005	LB370522	20 Nov 2025	26 Nov 2025	18 Dec 2025	30 Nov 2025	18 Dec 2025	01 Dec 2025
BH2	SE293611.006	LB370522	20 Nov 2025	26 Nov 2025	18 Dec 2025	30 Nov 2025	18 Dec 2025	01 Dec 2025
BH3	SE293611.007	LB370522	21 Nov 2025	26 Nov 2025	19 Dec 2025	30 Nov 2025	19 Dec 2025	01 Dec 2025
BH3	SE293611.009	LB370522	21 Nov 2025	26 Nov 2025	19 Dec 2025	30 Nov 2025	19 Dec 2025	01 Dec 2025

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE293611.001	LB370512	20 Nov 2025	26 Nov 2025	04 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH1	SE293611.002	LB370512	20 Nov 2025	26 Nov 2025	04 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH1	SE293611.003	LB370512	20 Nov 2025	26 Nov 2025	04 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH2	SE293611.004	LB370512	20 Nov 2025	26 Nov 2025	04 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH2	SE293611.005	LB370512	20 Nov 2025	26 Nov 2025	04 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH2	SE293611.006	LB370512	20 Nov 2025	26 Nov 2025	04 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH3	SE293611.007	LB370512	21 Nov 2025	26 Nov 2025	05 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH3	SE293611.008	LB370512	21 Nov 2025	26 Nov 2025	05 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025
BH3	SE293611.009	LB370512	21 Nov 2025	26 Nov 2025	05 Dec 2025	30 Nov 2025	05 Dec 2025	01 Dec 2025

pH in soil (1:2)

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE293611.001	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH1	SE293611.002	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH1	SE293611.003	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH2	SE293611.004	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH2	SE293611.005	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH2	SE293611.006	LB370590	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH3	SE293611.007	LB370590	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH3	SE293611.008	LB370590	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025
BH3	SE293611.009	LB370590	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	02 Dec 2025	01 Dec 2025

Soluble Anions in Soil from 1:2 DI Extract by Ion Chromatography

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH1	SE293611.001	LB370621	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025
BH1	SE293611.002	LB370621	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025
BH1	SE293611.003	LB370621	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025
BH2	SE293611.004	LB370621	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025
BH2	SE293611.005	LB370621	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025

HOLDING TIME SUMMARY

SE293611 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

Soluble Anions in Soil from 1:2 DI Extract by Ion Chromatography (continued) — **Method: ME-(AU)-[ENV]AN245**

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH2	SE293611.006	LB370621	20 Nov 2025	26 Nov 2025	27 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025
BH3	SE293611.007	LB370621	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025
BH3	SE293611.008	LB370621	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025
BH3	SE293611.009	LB370621	21 Nov 2025	26 Nov 2025	28 Nov 2025	01 Dec 2025†	29 Dec 2025	01 Dec 2025

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

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason 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 (1:2) in soil

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

Sample Number	Parameter	Units	LOR	Result
LB370590.001	Conductivity (1:2) @25 C*	µS/cm	1	<1

Conductivity and TDS by Calculation - Soil

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

Sample Number	Parameter	Units	LOR	Result
LB370591.001	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	0.34
	Salinity (by calculation)*	mg/kg	5	<5

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

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

Sample Number	Parameter	Units	LOR	Result
LB370522.001	Exchangeable Sodium, Na	mg/kg	2	0.3757
	Exchangeable Potassium, K	mg/kg	2	0.0651
	Exchangeable Calcium, Ca	mg/kg	2	-0.7437
	Exchangeable Magnesium, Mg	mg/kg	2	0.0021

Soluble Anions in Soil from 1:2 DI Extract by Ion Chromatography

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

Sample Number	Parameter	Units	LOR	Result
LB370621.001	Chloride	mg/kg	0.25	<0.25
	Sulfate	mg/kg	0.5	<0.5

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

Conductivity (1:2) in soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE293611.009	LB370590.013	Conductivity (1:2) @25 C*	µS/cm	1	450	430	30	6
		Resistivity (1:2)*	ohm cm	-	2200	2300	30	6

Conductivity and TDS by Calculation - Soil

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE293611.009	LB370591.013	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	280	54.913043478:	31	9
		Salinity (by calculation)*	mg/kg	5	900	830	31	9

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE293611.009	LB370512.010	% Moisture	%w/w	1	8.2	7.6	43	8

pH in soil (1:2)

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE293611.009	LB370590.013	pH (1:2)	pH Units	-	5.6	5.8	32	2

Soluble Anions in Soil from 1:2 DI Extract by Ion Chromatography

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE293611.009	LB370621.013	Chloride	mg/kg	0.25	110	110	30	3
		Sulfate	mg/kg	0.5	49	58	34	17

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 (1:2) in soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB370590.002	Conductivity (1:2) @25 C*	µS/cm	1	1000	1015	85 - 115	100

Conductivity and TDS by Calculation - Soil

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB370591.002	Conductivity of Extract (1:5 dry sample basis)	µS/cm	1	NA	1015	85 - 115	100

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB370522.002	Exchangeable Sodium, Na	meq/100g	0.01	0.18	0.188	80 - 120	94
	Exchangeable Potassium, K	meq/100g	0.01	0.13	0.141	80 - 120	90
	Exchangeable Calcium, Ca	meq/100g	0.01	2.4	2.17	80 - 120	109
	Exchangeable Magnesium, Mg	meq/100g	0.02	1.3	1.53	80 - 120	85

pH in soil (1:2)

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB370590.003	pH (1:2)	pH Units	-	7.4	7.415	98 - 102	100

Soluble Anions in Soil from 1:2 DI Extract by Ion Chromatography

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB370621.002	Chloride	mg/kg	0.25	39	40	70 - 130	98
	Sulfate	mg/kg	0.5	40	40	70 - 130	100

MATRIX SPIKES

SE293611 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

SE293611 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/en-au/industry/environmental-health-and-safety

*	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.
NA	Not Applicable
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.

GEOTECHNIQUE PTY LTD

Laboratory Test Request / Chain of Custody Record

Lemko Place
PENRITH NSW 2750

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PENRITH NSW 2751

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

PH: 02 8594 0400 **FAX:** 02 8594 0499

ATTN: MS ANGELA MAMALICOS

Sampling By: JH

Job No: 20806/1

Project: Proposed Development

Project Manager: AT

Location: Lot 401 Buchen Ave, Edmonson Park

E-MAILED

Results required by: ~~25/11/2025~~ 1/12/25

	Sampling details				Sample type										
	Location	Depth (m)	Date	Time	Soil	Water	Salinity EC (1:5)	Aggressivity Suite	ESP						KEEP SAMPLE
1	BH1	0.5-0.95	20/11/2025		DS		✓	✓	✓						YES
2	BH1	1.5-1.95	20/11/2025		DS		✓	✓	✓	Aggressivity suit includes pH, SO4, Cl and Resistivity					YES
3	BH1	3.0-3.45	20/11/2025		DS		✓	✓							YES
4	BH2	0.5-0.95	20/11/2025		DS		✓	✓							YES
5	BH2	1.5-1.95	20/11/2025		DS		✓	✓	✓						YES
6	BH2	4.0-4.2	20/11/2025		DS		✓	✓	✓						YES
	BH2	4.5-4.6	20/11/2025		DS										YES
7	BH3	0.5-0.95	21/11/2025		DS		✓	✓	✓						YES
8	BH3	1.5-1.95	21/11/2025		DS		✓	✓							YES
9	BH3	2.8-3.0	21/11/2025		DS		✓	✓	✓						YES
															YES

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	Date
Justin Hofmann	J.H	24/11/2025		RW	26/11/25a 4.20

Legend:

WG	Water sample, glass bottle	USG	Undisturbed soil sample (glass jar)	DSP	Disturbed soil sample (small plastic
WP	Water sample, plastic bottle	DSG	Disturbed soil sample (glass jar)	✓	Test required

H⁺/tonne

SGS EHS Sydney COC
SE293611

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Ameyu Tucho
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
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Facsimile	02 4722 6161
Email	ameyu@geotech.com.au
Project	**20806/1, Lot 401 Buchan Ave. Edmondson**
Order Number	**20806/1**
Samples	2

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
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SGS Reference	**SE293271 R0**
Date Received	21/11/2025
Date Reported	28/11/2025

COMMENTS

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

SPOCAS and CRS subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146, CE185803

SIGNATORIES

Moisture Content [AN002] Tested: 28/11/2025

PARAMETER	UOM	LOR	BH 1 SOIL 2.4-2.6 20/11/2025 SE293271.001	BH 2 SOIL 4.0-4.2 20/11/2025 SE293271.002
% Moisture	%w/w	0.5	**11**	**10**

TAA (Titratable Actual Acidity) [AN219] Tested: 28/11/2025

PARAMETER	UOM	LOR	BH 1 SOIL 2.4-2.6 20/11/2025 SE293271.001	BH 2 SOIL 4.0-4.2 20/11/2025 SE293271.002
pH KCl*	pH Units	-	**4.6**	**6.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	**1.3**	<0.25
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**27**	<5
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.04**	<0.01
Sulphur (SKCl)	%w/w	0.005	-	-
Calcium (CaKCl)	%w/w	0.005	-	-
Magnesium (MgKCl)	%w/w	0.005	-	-

Chromium Reducible Sulfur (CRS) [AN217] Tested: 28/11/2025

PARAMETER	UOM	LOR	BH 1 SOIL 2.4-2.6 20/11/2025 SE293271.001	BH 2 SOIL 4.0-4.2 20/11/2025 SE293271.002
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5

Chromium Suite Net Acidity Calculations [AN220] Tested: 28/11/2025

PARAMETER	UOM	LOR	BH 1 SOIL 2.4-2.6 20/11/2025 SE293271.001	BH 2 SOIL 4.0-4.2 20/11/2025 SE293271.002
s-Net Acidity	%w/w S	0.005	**0.044**	<0.005
a-Net Acidity	moles H+/T	5	**27**	<5
Liming Rate*	kg CaCO3/T	0.1	**2.1**	<0.1
Verification s-Net Acidity*	%w/w S	-20	**0.00**	**0.00**
a-Net Acidity without ANCBT*	moles H+/T	5	**27**	<5
Liming Rate without ANCBT*	kg CaCO3/T	0.1	**2.1**	<0.1
s-Net Acidity without ANC	%w/w S	0.005	**0.044**	**0.008**

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.
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			
***	Indicates that both * and ** apply.		Sample listed, but not received.		
NAD	No Asbestos Detected.	NA	Not Applicable.		

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: https://www.sgs.com/en-au/industry/environmental-health-and-safety.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Ameyu Tucho
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	ameyu@geotech.com.au
Project	**20806/1 Lot 401 Buchan Ave, Edmondson**
Order Number	**20806/1**
Samples	1

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE293612 R0**
Date Received	26/11/2025
Date Reported	3/12/2025

COMMENTS

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

SPOCAS and CRS subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146, CE185840

SIGNATORIES

TAA (Titratable Actual Acidity) [AN219] Tested: 3/12/2025

PARAMETER	UOM	LOR	BH3 SOIL 2.8-3.0 25/11/2025 SE293612.001
pH KCl*	pH Units	-	**5.2**
Titratable Actual Acidity	kg H2SO4/T	0.25	**0.74**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**15**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.02**
Sulphur (SKCl)	%w/w	0.005	**0.014**
Calcium (CaKCl)	%w/w	0.005	-
Magnesium (MgKCl)	%w/w	0.005	-

Chromium Reducible Sulfur (CRS) [AN217] Tested: 3/12/2025

PARAMETER	UOM	LOR	BH3 SOIL 2.8-3.0 25/11/2025 SE293612.001
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5

Chromium Suite Net Acidity Calculations [AN220] Tested: 3/12/2025

PARAMETER	UOM	LOR	BH3 SOIL 2.8-3.0 25/11/2025 SE293612.001
s-Net Acidity	%w/w S	0.005	**0.026**
a-Net Acidity	moles H+/T	5	**16**
Liming Rate*	kg CaCO3/T	0.1	NA
Verification s-Net Acidity*	%w/w S	-20	**0.00**
a-Net Acidity without ANCBT*	moles H+/T	5	**16**
Liming Rate without ANCBT*	kg CaCO3/T	0.1	NA
s-Net Acidity without ANC	%w/w S	0.005	**0.026**

Moisture Content [AN002] Tested: 3/12/2025

PARAMETER	UOM	LOR	BH3 SOIL 2.8-3.0 25/11/2025 SE293612.001
% Moisture	%w/w	0.5	**8.1**

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.
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			
***	Indicates that both * and ** apply.		Sample listed, but not received.		
NAD	No Asbestos Detected.	NA	Not Applicable.		

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: https://www.sgs.com/en-au/industry/environmental-health-and-safety.

STATEMENT OF QA/QC PERFORMANCE

SE293612 R0

CLIENT DETAILS

Contact	Ameyu Tucho
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	ameyu@geotech.com.au
Project	**20806/1 Lot 401 Buchan Ave, Edmondson**
Order Number	**20806/1**
Samples	1

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE293612 R0**
Date Received	26 Nov 2025
Date Reported	03 Dec 2025

COMMENTS

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

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

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

SAMPLE SUMMARY

Sample counts by matrix	1 Soil	Type of documentation received	COC
Date documentation received	26/11/2025	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	24.6°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ambient	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE293612 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 SAMPLES

SE293612 R0

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

SE293612 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

SE293612 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/en-au/industry/environmental-health-and-safety

*	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.
NA	Not Applicable
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

Contact	Admin
Client	SGS I&E EHS SYDNEY
Address	52010.000.120500.10.AU201 16/33 MADDOX STREET ALEXANDRIA NSW 2015
Telephone	0285940400
Facsimile	0285940499
Email	au.environmental.sydney@sgs.com
Project	**SE293612**
Order Number	**SE293612**
Samples	1

LABORATORY DETAILS

Manager	Jon Dicker
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
SGS Reference	**CE185840 R0**
Date Received	28 Nov 2025
Date Reported	03 Dec 2025

COMMENTS

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

SIGNATORIES

Jon DICKER
Manager Northern QLD

Maristela GANZAN
Quality Manager

Parameter	Units	LOR	Sample Number CE185840.001 Sample Matrix Soil Sample Depth 2.8-3.0 Sample Date 25 Nov 2025 Sample Name SE293612.001
Moisture Content Method: AN002 Tested: 3/12/2025			
% Moisture	%w/w	0.5	**8.1**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 3/12/2025			
pH KCl	pH Units	-	**5.2**
Titratable Actual Acidity	kg H2SO4/T	0.25	**0.74**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**15**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.02**
Sulphur (SKCl)	%w/w	0.005	**0.014**
Calcium (CaKCl)	%w/w	0.005	-
Magnesium (MgKCl)	%w/w	0.005	-
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 3/12/2025			
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 3/12/2025			
s-Net Acidity	%w/w S	0.005	**0.026**
s-Net Acidity without ANC	%w/w S	0.005	**0.026**
a-Net Acidity	moles H+/T	5	**16**
Liming Rate	kg CaCO3/T	0.1	**1.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**16**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**1.2**

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)	LB147910	%	0.005	<0.005	0 - 5%	105%
Chromium Reducible Sulfur (Scr)	LB147910	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	LB147908	pH Units	-	6.1	1%	101%
Titratable Actual Acidity	LB147908	kg H2SO4/T	0.25	<0.25	0%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB147908	moles H+/T	5	<5	0%	105%
Titratable Actual Acidity (TAA) S%w/w	LB147908	%w/w S	0.01	<0.01	0%	106%
Sulphur (SKCl)	LB147908	%w/w	0.005	<0.005		96%

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.
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.
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
NAD	No Asbestos Detected.	NA	Not Applicable

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: https://www.sgs.com/en-au/industry/environmental-health-and-safety.

CHAIN OF CUSTODY RECORD

COC#: SE293612

Owner job:

Ship to: XML	Project Name:	Due date: 3/12/2025 4:20:00 PM
	Client: GEOTECH_NSW	Send Results to: AUENVSE
	Sampler Name: BJ/JH	
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	AN002_MOIS	ZCE_CHROMSUITE	ZCE_SPOCAS	
SE293612.001	BH3	11/25/2025	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
																1x Soil

SGS EHS Cairns COC

CE185840

Sample Condition Upon Receipt at Laboratory:	Cooler temperature: Chilled
Special Instructions/Comments:	
Job Booked by:RAM 28/11/2025 Job received date: 28/11/2025	
Loggin Checked byJDR 28/11/2025	

#1 Released by: (Sig)	Date:	#2 Released by: (Sig)	Date:	#3 Released by: (Sig)	Date: 01/12/25
Company Name:	Time	Company Name:	Time	Company Name:	Time 10:30 am
#1 Received by: (Sig)	Date	#2 Received by: (Sig)	Date	#3 Received by: (Sig)	Date
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:

SAMPLE RECEIPT ADVICE

CE185840

CLIENT DETAILS

Contact	Admin
Client	SGS I&E EHS SYDNEY
Address	52010.000.120500.10.AU201 16/33 MADDOX STREET ALEXANDRIA NSW 2015
Telephone	0285940400
Facsimile	0285940499
Email	au.environmental.sydney@sgs.com
Project	**SE293612**
Order Number	**SE293612**
Samples	1

LABORATORY DETAILS

Manager	Jon Dicker
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
Samples Received	Fri 28/11/2025
Report Due	Fri 5/12/2025
SGS Reference	**CE185840**

SUBMISSION DETAILS

This is to confirm that 1 sample was received on Friday 28/ 11/2025. Results are expected to be ready by COB Friday 5/12/2025. Please quote SGS reference CE185840 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	2 Soil	Type of documentation received	COC
Date documentation received	28/11/2025	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	22.6°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	Number of eskies/boxes received	

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

COMMENTS

SAMPLE RECEIPT ADVICE

CE185840

CLIENT DETAILS

Client SGS I&E EHS SYDNEY

Project SE293612

SUMMARY OF ANALYSIS

No.	Sample ID	Sampled	Acid Neutralising Capacity (ANC)	Chromium Reducible Sulfur (CRS)	Chromium Suite Net Acidity Calculations	HCl Extractable S, Ca and Mg in Soil/Solids ICP OES	Moisture Content	TAA (Titratable Actual Acidity)
001	SE293612.001 2.8-3.0	25-Nov-2025 00:00	6	2	7	1	1	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 .

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	Sampling By:	BJ/JH	Job No	20806/1
				Project:	Landcom
PH:	02 8594 0400 FAX: 02 8594 0499	Project Manager:	AT	Location:	Lot 401 Buchan Avenue, Edmondson Park
ATTN:	Ms Emily Yin				

Sampling details

Location	Depth	Soil	Water		ASS
1 BH3	2.8-3.0	DSG			✓

Results required by:

						Notes	Keep Sample
							✓
							✓
						ASS Test includes	
						pH(KCl), pH(ox), TPA, TAA, TSA	
						Spos and Scr	

SGS EHS Sydney COC
SE293612

Please Use Geotechnical Engineering Templete for Reporting

Relinquished by			Received by		
Name	Signature	Date	Name	Signature	
Justin Hofmann	JH	24/11/2025		KW	26/11/25 4.20pm

Legend:

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

Form No 4.7F2-5 SGS

SAMPLE RECEIPT ADVICE

SE293612

CLIENT DETAILS

Contact	Ameyu Tucho
Client	Geotechnique
Address	P.O. Box 880 PENRITH NSW 2751
Telephone	02 4722 2700
Facsimile	02 4722 6161
Email	ameyu@geotech.com.au
Project	**20806/1 Lot 401 Buchan Ave, Edmondson**
Order Number	**20806/1**
Samples	1

LABORATORY DETAILS

Manager	Shane McDermott
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Wed 26/11/2025
Report Due	Wed 3/12/2025
SGS Reference	**SE293612**

SUBMISSION DETAILS

This is to confirm that 1 sample was received on Wednesday 26/11/2025. Results are expected to be ready by COB Wednesday 3/12/2025. Please quote SGS reference SE293612 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	1 Soil	Type of documentation received	COC
Date documentation received	26/11/2025	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	24.6°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ambient	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 CRS subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146.

SAMPLE RECEIPT ADVICE

SE293612

CLIENT DETAILS

Client Geotechnique

Project 20806/1 Lot 401 Buchan Ave, Edmondson

SUMMARY OF ANALYSIS

No.	Sample ID	Acid Neutralising Capacity (ANC)	Chromium Reducible Sulfur (CRS)	Chromium Suite Net Acidity Calculations	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	BH3 2.8-3.0	6	2	7	1	1	6	7	21

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 .

Attachment C
Saline Soil Management Plan

Soils encountered across the site are anticipated to vary from non-saline to very saline. Saline soils are predominant. As a large number of sampling and testing will be required to delineate soils of varying salinity, it is recommended that the entire soil is considered to be saline. In addition, soils across the site are assessed to be susceptible to excessive erosion. Therefore, it is recommended that the earthworks (disturbance and excavation) of soils are carried out in accordance with a Saline Soil Management Plan (SSMP) to minimise or manage impacts from salinity and erodible soils. The objectives of SSMP should include the following:

- Minimise the disruption to natural surface water drainage
- Minimise the potential for waterlogging or surface water pooling
- Minimise the potential for raising the water table beneath the site
- Minimise the potential for cyclic wetting and drying areas
- Minimise the potential for excessive soil erosion

The following principals are recommended for adoption during the earthworks as part of SSMP:

- Erosion and Sediment Control Plans must be developed and implemented in accordance with the Landcom guidelines (References 9 and 10). All sediment and erosion controls proposed in the Erosion and Sediment Control Plan are to be installed prior to commencement of any excavation or construction works.
- Map the current primary drainage lines and incorporate these into the surface water drainage system for the development. Do not fill in or block these drainage lines unless appropriate alternative drainage is provided.
- Develop the best use of the existing topography in order to minimise cut and fill operations.
- Ensure that earthworks and construction activities do not affect the natural flow of groundwater. Where groundwater is intercepted during development works/excavation, the flow should be diverted to stormwater drains or creeks by providing appropriate surface and sub-surface drainage.
- Where the creation of building platform requires substantial cut and/or fill (i.e. on relatively steep slopes) consider the use of tiered housing and/or house slabs suspended on piers. This will minimise the obstruction of the natural surface water flow.
- Construct a V-drain behind the crest of all slopes to divert water away from the slope face.
- Minimise the use of retaining structures; use safely inclined slopes, with grass and plant cover as an alternative. Gabion walls are also a better alternative as they are free draining.
- Reduce groundwater recharge through appropriate land use and land management practices. This can be achieved by minimising deep infiltration and by maximising vegetation cover, planting deep-rooted trees and the use of salt tolerant plants.

- On-site water detention basins should be designed to prevent localised potential groundwater re-charge. Lined basins, relying solely on evaporation should be considered as an alternative.
- The finished ground surface in each lot after completion of earthworks should be provided with adequate fall to the street or stormwater manholes to allow run-off of water and prevent water ponding, waterlogging and infiltration of rainwater.
- Use constriction materials (concrete, bricks, steel etc) and technique appropriate to assessed Exposure Classification and aggressivity classification.