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ALTIS BULKY RETAIL PTY LTD AS TRUSTEE FOR ALTIS ARET SUB TRUST 20 ("ALTIS")

Acid Sulfate Soil Management Plan

28 Elizabeth Street, Liverpool NSW

E24175.E14_Rev0
27 October 2021

Document Control

Report Title: Acid Sulfate Soil Management Plan

Report No: E24175.E14_Rev0

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Revision	Details	Date	Amended By
-	Draft	16 July 2021	-
-	Draft	23 July 2021	ES
0	Final	27 October 2021	AB

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1. Introduction

1.1 Background

Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20 (Altis; the 'client') engaged EI Australia (EI) to prepare an Acid Sulfate Soils Management Plan (ASSMP) for the property located at 28 Elizabeth Street, Liverpool NSW ('the site').

The site is legally identified as Lot 1 in DP 1261270 and located within the Local Government Authority of Liverpool City Council (**Figure 1**, **Appendix A**). The site, covers an area of approximately 3,609 m^2 (**Figure 2**, **Appendix A**).

This report has been prepared as a contingency to assist with management of acid sulfate soils (ASS), should it be encountered during the proposed redevelopment of the site and will be submitted in support of a Development Application (DA) to Liverpool City Council.

1.2 Proposed Development

Based on the proposed plans (Ref. Turner Studio Architects, *28 Elizabeth Street, Liverpool*, Project No. 20089, dated 12 July 2021) provided by the client, EI understands that the site is to be redeveloped into a multi-storey, mixed-use building, including a six-level basement car parking facility, a lane way and landscaping areas. The proposed basement footprint would occupy the entire site area with no retained deep soil area(s) (**Figure 2, Appendix A**).

1.3 Project Objectives

The objective of this ASSMP is to provide the framework for the management and monitoring of the impacts of Acid Sulfate Soils (ASS), throughout the construction and operation phases of the project, in accordance with the *Acid Sulfate Soils Manual* (ASSMAC, 1998).

1.4 Scope of Works

To achieve the above objectives, the scopes of works are as follows:

- Review of relevant hydrogeological and soil landscape maps for the project area;
- Detailed site walkover inspection;
- Sub-surface inspection, involving the examination of soil profiles and collection of soil samples, from 2 locations for ASS purposes. Soil samples will be collected from each distinguishable soil horizon, or in 0.5m depth increments, down to depths of approximately 5.0m BGL (i.e. approximate refusal on rock (using an auger drill rig as part of geotechnical investigation works));
- Laboratory analysis of selected soil samples and data interpretation;
- Description of the potential impacts caused by the proposed construction activities;
- Description of the measures and procedures to be undertaken in an ASS area (if encountered) which when implemented will prevent, control or minimise the generation or escape of acid leachate into the surrounding environment;
- Focussed monitoring program covering soils, surface waters, and groundwater; and
- A description of the contingency procedures to be implemented in the case of failure of management procedures.

2. Desktop Review

2.1 Property Identification, Location and Physical Setting

The site identification details and associated information are presented in **Table 2-1**, while the site locality is shown in **Figure 1**.

Table 2-1 Site Identification, Location and Zoning

Attribute	Description
Street Address	28 Elizabeth Street, Liverpool NSW
Location Description	The site is bounded by Elizabeth Street followed by commercial properties (north), George Street followed by commercial properties (west), commercial properties (east) and commercial properties (south).
Site Coordinates	Northern corner of the site (datum GDA94-MGA56): ▪ Easting: 308226.013 ▪ Northing: 6244722.098 (Source: https://maps.six.nsw.gov.au)
Site Area	Approximately 3,609 m²
Lots and Deposited Plan (DP)	Lot 1 in DP1261270
Local Government Authority	Liverpool City Council
Current Zoning	B4 – Mixed Use (Liverpool Local Environmental Plan 2008)
Current Land Uses	At the time of this assessment the site was vacant and all structures had been demolished. The site was covered by slab on ground while the southern end of the site was unpaved and overgrown with grass and weeds.

2.2 Regional Setting

Local topography, geology, soil landscape and hydrogeological information are summarised in **Table 2-2**.

Table 2-2 Topographical, Geological, Soil Landscape and Hydrogeological Information

Attribute	Description
Topography	The regional topography consists of gently undulating plains to rolling rises with slopes usually <5%. The site was relatively flat with a slight slope downwards from west (13.8-13.9 mAHD) to east (12.9 – 13.1 mAHD) at less than 1 degree..
Site Drainage	Site drainage is likely to be consistent with the general slope of the site. Stormwater is likely to be collected by pit and pipe drainage, and drain to the municipal stormwater and then to Georges River.
Regional Geology	With reference to the 1:100 000 scale Geological Series Sheet 9030 (Penrith) the site is likely to be underlain by Bringelly Shale, a formation of the Wianamatta Group. Bringelly Shale typically comprises shale, carbonaceous claystone, claystone, laminite, fine-medium grained lithic sandstone, rare coal and tuff.
Soil Landscape	The Soil Conservation Service of NSW Soil Landscapes of the Penrith 1:100,000 Sheet (Chapman and Murphy, 2002) indicates that the site overlies a *Residual landscape – Blacktown.*

Attribute	Description
	Soils are identified as shallow to moderately deep (>100 cm) hard setting mottled texture contrast soils, red and brown Podzolic soils on crests grading to yellow Podzolic soils on lower slopes and in drainage lines (Ref: Chapman and Murphy, 2002).
Soil Profile	Based on a review of the previous geotechnical and environmental investigations (EI, 2020 and EI, 2019b), the subsurface strata typically comprises: ▪ Silty and Sandy CLAY (fill) to approximately 1.0 mBGL with the exception of fill at sampling location BH202 which extended to 3.5 mBGL; overlying ▪ Silty CLAY to approximately 1.0-6.0 mBGL; overlying ▪ SHALE from approximately 6.0-9.0 mBGL.
Depth to Groundwater	Groundwater standing water levels ranged between 2.97 and 3.76 m BGL during the GME in the DSI (EI, 2020).
Nearest Surface Water Feature	Georges River is located approximately 400m southeast of the site.
Anticipated Groundwater Flow Direction	Given the site location and noted surrounding water bodies, the groundwater flow direction is anticipated to be southeast towards Georges River.

2.3 Acid Sulfate Soil Risk Map

With reference to the Liverpool Acid Sulfate Soil Risk Map (1:25,000 scale; Murphy, 1997), the subject site lies within the land described as '*No Known Occurrences'* with regards to the Acid Sulfate Soil (ASS) risk.

With reference to the Liverpool LEP (2008) Acid Sulfate Soils Map (Sheet ASS_011) the site lies in an area of '*Class 5'* area. Class 5 areas are likely to locate ASS during works within 500 metres of adjacent Class 1, 2, 3, or 4 land which are likely to lower the water table below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land.

2.4 Geomorphic and Site Characteristics

Observations compiled from the site inspections during the current EI investigation, EI (2020) Detailed Site Investigation and EI (2019b) Geotechnical Investigation, and via aerial photography interpretation, were compared against various geomorphic and site characteristics outlined in ASSMAC (1998) indicating likely ASS occurrence. A comparison of site specific and geomorphic features with those indicative of potential ASS presence are presented in **Table 2-3**.

Table 2-3 Summary of Geomorphic and Site Features

Geomorphic Features	Presence on Site
Holocene Sediments	Not present
Soil horizons less than 5 mAHD	Not Present
Marine / estuarine sediments or tidal lakes	Not present
Coastal wetland; backwater swamps; waterlogged or scaled areas; inter-dune swales or coastal sand dunes.	Not present
Dominant vegetation is mangroves, reeds, rushes and other swamp or marine tolerant species	Not present
Underlying Geology containing sulfide bearing material	Low Risk
Deep older (Pleistocene) estuarine sediments	Not Present

3. Previous Investigations

The following reports were reviewed, and relied upon for development of this ASSMP:

- EI (2019a), "*Preliminary Site Investigation, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.E01, 29 April 2019);
- EI (2019b), "*Geotechnical Investigation Factual Report, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.G03, 22 May 2019);
- EI (2020), "*Detailed Site Investigation, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.E02, 8 December 2020);
- EI (2021a), "*Remediation Action Plan, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.E06_Rev0, 27 October 2021); and
- EI (2021b), "*Additional Geotechnical Investigation, 28 Elizabeth Street, Liverpool, NSW*", (EI Report Ref. E24175.G04, 26 October 2021).

A summary of these reports are provided in **Table 3-1**.

Table 3-1 Summary of Previous Investigation

Task	Findings
EI (2019a) Preliminary Site Investigation	
Objective	To provide a qualitative assessment of the environmental conditions of the site by appraising the potential for site contamination on the basis of field observations, historical land uses, anecdotal and documentary evidence.
Findings	▪ Land titles records and historic aerial photography indicated that the site was previously used for residential - market gardening purposes, prior to the construction of a commercial/industrial warehouse in the 1960s. Commercial/industrial site use continued at the site from the 1960s Records also indicated that former site use also included an operational petrol station. ▪ The site inspection identified potential asbestos containing materials across the ground surface, poor concrete condition, mixed aggregate, oil waste, overgrown weeds with accessible soils in the southern portion, one groundwater monitoring well in the north-eastern corner and the existence of potentially four USTs; ▪ The site has not reported as being subject to regulation in relation to environmental impacts, as documented in the EPA public registers. Further to this no other sites within 500m radius of the site have been reported. A search of the Protection of the Environment Operations (POEO) Act, did not identify any record for the site although three sites were identified within a 500 m radius; ▪ Records from SafeWork NSW did not indicate historical storage of chemicals and underground storage tanks at the site. Anecdotal information, however, indicated UPSS to be present and USTs likely remained in-situ; ▪ Records from Liverpool Council identified potential activities, such as demolition of existing structures that could lead to potential contamination of shallow surface soils at site; ▪ The presence of a number of contaminating sources at the site, including imported filling, former commercial/industrial uses (i.e. service station), pesticides from market garden use, as well as hazardous building materials from former demolitions, etc., indicate a potential for contamination to be present. In light of this, the CSM developed identified a number of potential exposure pathways which may present a risk to future users of the site and to workers during construction and maintenance activities.
Conclusions	EI concluded that there is potential for contamination to be present on site. With

	consideration given to the nature of the proposed land use and potential risk of exposure to end users of the site from possible contamination, an intrusive detailed site investigation should be completed to understand the quality of site soils and groundwater.
EI (2019b) Geotechnical Investigation Factual Report	
Objective	The objective of the GI was to assess existing site surface and subsurface conditions at five borehole locations, and to provide geotechnical investigation results and laboratory results
Findings	Based on the logs for five, mechanically augured boreholes and standard penetration testing (identified as BH1M, BH2, BH3, BH4 and BH5), the sub-surface conditions of the site were generalised as: ▪ Fill (0.55-1.0m thickness), comprised of gravelly to silty sand, and clayey sand to clay; overlying ▪ Residual Soil (2.98-5.95m thickness), further classified as very soft to very stiff silty clay of medium to high plasticity; overlying ▪ Very Low to Low Strength Shale/Sandstone (0.95-2.7m thickness), further classified as distinctly to slightly weathered, very low to low strength sandstone/shale; overlying ▪ Medium Strength Shale/Sandstone (3.96-12.3m thickness), further classified as slightly weathered to fresh shale interbedded with sandstone; overlying ▪ Medium to High Strength Shale/Sandstone (observed at termination depths in all boreholes), further classified as fresh, medium to high strength shale interbedded with sandstone.
EI (2020) Detailed Site Investigation	
Objective	▪ Establish the degree of any site contamination, by means of intrusive sampling and laboratory analysis for the potential contaminants; ▪ Provide conclusions regarding suitability of the site for the proposed development; and ▪ Make recommendations for the appropriate management of any contaminated soils and/or groundwater (if identified).
Findings	▪ Four underground storage tanks (USTs) were located in situ by ground penetrating radar (GPR) survey at the northern area of the site near Elizabeth Street. Field inspection also identified UST fill points and bowser footings. One UST was located in the centre of the site near footprint of the former building. This indicates that infrastructure associated with an underground petroleum storage system (UPSS) remains in place at the site; ▪ A total of 12 subsurface assessment locations (BH201 to BH212) were drilled and soil samples were collected. Monitoring wells were installed in three of these locations (BH201M, BH202M and BH205M). ▪ The sub-surface comprised a layer of silty clay and sandy clay fill to 1.0m below ground level (BGL), overlying natural residual clays then weathered shale bedrock. Sand fill, to a depth of 3.5m BGL, was identified at BH202M located near the UST area. Standing water levels of groundwater ranged between 2.97 and 3.76 m BGL. ▪ The field data indicated that the groundwater was slightly acidic to slightly alkaline (pH 6.59 to 7.61), saline (EC: 25,794 to 42,060 µS/cm) and oxidising (Redox 183 to 329 mV) but anoxic (DO: 0-0.68 mg/L). ▪ Laboratory analytical results for the representative soil samples all complied with the adopted SILs except for heavy metals nickel (87 mg/kg) in sample BH209_0.2-0.3 and zinc (250 mg/kg) in sample BH203_0.1-0.2 and asbestos was detected in shallow fill in samples BH207_0.2-0.3, BH209_0.2-0.3 and BH201_0.2-0.3. ▪ Laboratory analytical results for the groundwater samples all complied with the adopted groundwater investigation levels (GILs), except for chromium in BH202M (120 µg/L), copper in BH201M (120 µg/L), nickel in BH205M (13 µg/L) and zinc in BH201M (17 µg/L), BH202M (51 µg/L), and BH205M (63 µg/L).
Conclusions	EI consider that the Site can be made suitable for proposed land use equivalent to a setting of residential with minimal opportunities for soil access, provided the recommendations below are implemented:

	▪ Preparation and implementation of a Remedial Action Plan (RAP). ▪ Undertake remediation and validation works for the site, as outlined in the RAP. ▪ Any material being imported to the Site (i.e. for landscaping or levelling purposes) should be assessed for potential contamination in accordance with NSW EPA guidelines as being suitable for the intended use or be classified as VENM; and ▪ Preparation of a final Site Validation Report certifying Site suitability of soils and groundwater for the proposed land use.
EI (2021a) Remediation Action Plan	
Objectives	▪ Identify the required remedial works (including any additional investigations); ▪ Establish a sequential process of contaminated soil remediation, with particular focus on any asbestos impacted soils and the UST areas; ▪ Outline the required validation program; and ▪ Provide measures ensuring all works occur in a safe and acceptable manner, in compliance with relevant guidelines and minimal adverse effects on human health and the environment.
Remediation Sequence	The site remediation works will therefore include (though not necessarily be limited to): ▪ **Stage 1** – Site establishment; ▪ **Stage 2** – Surface (clearance) inspection for evidence of contamination (e.g. ACM); ▪ **Stage 3** – UST removal and validation. ▪ **Stage 4** – Additional groundwater investigations to close data gaps; ▪ **Stage 5** – Impact delineation, hotspot excavation and waste classification; and ▪ **Stage 6** – Validation.
EI (2021b) Additional Geotechnical Investigation	
Objective	▪ Determine the in-situ bedrock conditions; and ▪ Provide advice and recommendations to assist in the preparation of designs for the proposed development
Findings	The sub-surface conditions of the site were generalised as: ▪ Fill (0.55 to 1.0m thickness), comprised of sands and clays; overlying ▪ Residual Soil (2.98 to 5.95m thickness), further classified as silty clay of medium to high plasticity; overlying ▪ Very Low to Low Strength Shale/Sandstone (0.96 to 2.7m thickness), further classified as distinctly to slightly weathered, very low to low strength sandstone/shale; overlying ▪ Medium to High Strength Shale (3.96 to 15m thickness), further classified as distinctly to fresh, medium to high strength shale; overlying ▪ High Strength Shale (observed at termination depth in all boreholes), further classified as fresh, high strength shale.
Main Issues	The following geotechnical issues were applicable to the proposed development: ▪ Basement excavation and retention to limit lateral deflections and ground loss as a result of excavations, resulting in damage to nearby structures; ▪ Rock excavation; and ▪ Foundation design for building loads.

4. Acid Sulfate Soil Results

4.1 Laboratory Results

A sub-surface inspection and associated soil sampling was conducted at two borehole locations (BH101 and BH103) on 23 June 2021. Borehole locations onsite are presented in **Figure 2**. Intrusive investigation was performed by the use of a track mounted drill rig (Hanjin DB 8D) fitted with solid flight augers. Boreholes were extended to a maximum depth of 16.6mBGL (target depth exceeded). Soil samples were collected at approximately 0.5 m intervals in the natural, silty clay material. Sulfurous odours were not observed at either sampling location. Detailed borehole logs pertaining to this additional ASS investigation are presented in **Appendix D**.

Grab/dry methods (stainless steel knife and dedicated nitrile gloves) were used to transfer soil samples from the auger into laboratory-supplied, glass jars and plastic zip-lock bags. Each jar and zip-lock bag was filled to minimise the headspace air volume and sealed. Upon sealing, the sample was immediately stored in an insulated chest containing freeze packs, before transportation to the designated NATA-accredited laboratory.

All samples were transported under refrigerated conditions to SGS Australia Pty Ltd (SGS), using strict Chain-of-Custody procedures. A copy of the completed Chain-of-Custody certificate is presented in **Appendix E**.

All laboratory analyses were conducted on discrete samples using NATA-registered methods. Laboratory results are summarised in **Appendix B**, with laboratory analytical certificates provided in **Appendix F**.

Twelve samples (within natural material) were taken during the investigation from boreholes BH101 and BH103. All samples were analysed for pH and pH_{fox} to assess the possible presence of acid sulfate soils (ASS). Suspension Peroxide Oxidation Combined Acidity and Sulphur (SPOCAS) analysis was conducted on six of these samples in accordance with the NSW ASSMAC 1998. All results for pH_f were above 4 (ranging from 4.6-6.8), indicating the general absence of actual ASS.

Analytical results from the SPOCAS analytical procedure reported (TPA) concentrations in two samples exceeding the ASSMAC 1998 action criteria (18 moles H+/tonne):

- BH101_1.9-2.0: 27 moles H+/tonne
- BH103_2.9-3.0: 30 moles H+/tonne

Analytical results from the SPOCAS analytical procedure reported titratable sulfidic acidity (TSA) concentrations below the ASSMAC 1998 action criteria (18 moles H+/tonne).

Analytical results from the SPOCAS analytical procedure reported Peroxide Oxidisable Sulphur (SPOS) concentrations below the ASSMAC 1998 action criteria (0.03 %w/w).

4.2 Summary of Results

Visual indicators of actual acid sulfate soils (AASS), (i.e. soils containing pale yellow deposits/coatings of jarosite) were not observed. Indicators of potential acid sulfate soils (PASS) including, hydrogen sulfide odours, shell fragments, and waterlogged soils (potentially indicative of unripe muds, estuarine silty sands or sands, and bottom sediments of estuaries or tidal lakes) were also not observed during sampling.

It is well known that various natural constituents other than sulfide (e.g. organic matter, iron and manganese minerals) are also able to react with the peroxide, leading to the generation of acid.

Indeed, such constituents, especially organic matter and iron minerals, were expected to be present in the examined soils, which may have accounted for the observed reduction in pH levels following oxidation (Sullivan *et al.*, 2018; ASSMAC, 1998; EPA, 1995).

Based on the peroxide oxidisable sulfur (S_{POS}) concentrations being below the adopted *Action Criterion* (0.03% w/w, where more than 1000 tonnes of coarse textured soil are to be excavated), reflective TPA concentrations above the action criteria are likely indicative of organic acidity within the soils actual acidity rather than those derived from sulfur considering the TSA results were reported less than the action criteria.

These results indicated that unoxidised sulfides (i.e. potential ASSs), if present, are only so in small quantities and/or are poorly reactive in the tested soils. The lowering of pH levels following peroxide digestion was thus primarily due to non-sulfidic constituents (e.g. organic matter, iron and manganese minerals).

Based on multiple lines of evidence, AASS or PASS were not considered to be present on the site.

5. Acid Sulfate Soil Management

Based on the findings of the assessment phase, site soils do not present a risk from unoxidised sulfur compounds (i.e. from AASS or PASS). As such, **Sections 5-6** have been prepared as a contingency.

5.1 Contingency Planning

A contingency plan is detailed below in **Table 5-1**. The plan provides a list of potential events that may arise during bulk excavation and the actions to be undertaken if unexpected conditions occur.

Table 5-1 Contingency Plan

Unexpected Condition	Action
Potential ASS identified at unexpected depths	Stop excavations; Have material assess by an environmental consultant for the presence of ASS; and Follow management procedures adopted in the ASSMP.
Neutralisation of ASS was not effective	Re-assess liming rates and add additional lime to material; and Re-test material to check neutralisation.
Neutralisation of ASS indicates that too much lime has been added and soils are alkaline	Remediate soils before use; Remediation comprises mixing additional ASS with the material, i.e. use excess lime to neutralise more ASS; and Re-test material to check neutralisation.
Bunded PASS treatment area is damaged	Repair bund as soon as practicable; Clean-up any PASS that escaped the treatment area and place back into the treatment area; and Check surrounding area for impact from the PASS or leachate, and undertake remedial action as required.
Soil materials defined as containing PASS	Stop dewatering; Review PASS exposure by checking the ASS and Non-ASS interface in the affected area; Determine potential causes by reviewing construction practises, weather, baseline groundwater monitoring data, and performing additional groundwater monitoring as necessary on groundwater monitoring present at the site; Review and confirm mitigation measures to be implemented, including: Maintain PASS soil moisture levels through targeted groundwater recharge; Adjusting the construction activities or schedule; and Treatment of additional PASS in treatment area.

5.2 Overview

The extent of any associated adverse impacts will depend on the following factors:

- Volume of excavated soil identified as being ASS;
- Physical characteristics of the ASSs, such as grain size and natural buffering capacity;
- Time that ASSs are exposed to air; and
- Rate of oxidation and transport of the oxidation products.

Soils identified as ASS require appropriate management to minimise environmental impacts that are likely caused by soil and groundwater disturbance during the construction activities.

All disturbed/excavated natural materials identified as ASS/PASS require disposal to a waste handling facility and placed below the water table, or where required, neutralised and disposed off-site to landfill. Several licensed landfill facilities are able to receive PASS and retain in saturated horizons including Holt Land Rehabilitation Centre at Kurnell NSW or Dunmore Sand and Soil Pty Ltd. No ASS should be used for structural or general filling above the groundwater table.

The length of time that ASS (both the excavated and remaining surface materials) will be exposed to air is likely to be of short duration (within 12 hours). The shortest possible time of air exposure will be permitted, to minimise the extent of oxidation and transport of reaction products.

EI understand that Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20 shall be responsible for the implementation and actioning of this ASSMP (if required).

5.3 Disposal of Potential Acid Sulfate Soils below the Water Table

In accordance with the EPA (2014) *Waste Classification Guidelines Part 4: Acid Sulfate Soils*, potential ASS may be disposed of in water below the permanent water table, provided:

- This occurs before they have had a chance to oxidise, i.e. within 24 hours of excavation;
- They meet the definition of 'virgin excavated natural material' (VENM) under the *Protection of the Environment Operations Act 1997*, even though they contain sulfidic ores or soils; and
- Landfills must be licensed by NSW EPA to dispose of potential ASS below the water table.

Potential ASS must be disposed of within 8 hours of their receipt at a landfill and kept wet at all times until their burial at least 2.0 metres below the lowest historical level of the water table at the disposal site. It is understood that PASS shall be disposed below the water table at the receiving landfill facility, as required.

5.3.1 Process for Excavation of PASS

Excavation (including foundation and utility pit/trench excavations) shall proceed in stages, as follows:

- The site surface shall be stripped and prepared; any existing fill materials (containing asbestos) shall be excavated and removed or stored separately in covered stockpiles;
- Surface fill shall be stripped and removed and care must be taken to ensure that no surface fill material is mixed with PASS material below;
- Once fill material is removed, the surface shall be inspected by a qualified environmental consultant and a representative of the receiving landfill facility, prior to excavation of PASS;

- When surface clearance is granted, PASS materials shall be excavated to the required depth and loaded directly onto waiting trucks. Each truckload shall be inspected and verification testing for pH shall be carried out to confirm soil pH does not fall below pH 5.5 prior to leaving the site; and
- Verification testing is required to demonstrate that materials with existing acidity are not being reburied. Should field pH fall below pH 5.5, the materials from that truck are to remain on-site and lime neutralisation techniques are to be implemented, as discussed in **Section 4.4**.

5.3.2 Transportation

Transport of PASS material to the receiving landfill facility shall take place immediately. If this is not possible, PASS soils shall be stockpiled and immediately covered. Stockpiled PASS materials must leave the site within 12 hours of excavation otherwise lime neutralisation techniques shall proceed as discussed in **Section 4.4**.

5.3.3 Documentation

Documentation must be provided to the occupier of the landfill for each truckload of PASS received, indicating that the soil excavation, transport and handling have been in accordance with ASSMAC (1998), thus preventing the generation of acid.

The occupier of the disposal site must also test the pH of each load of soil received immediately prior to its placement under water using the test method(s) in ASSMAC (1998) (Methods 21A and/or 21AF). These details, together with the pH of the soil recorded at the time of its extraction, must be retained by the occupier of the landfill site.

Soil that has dried out, undergone any oxidation of its sulfidic minerals, or which has a pH of less than pH 5.5 must be treated by neutralisation and disposed of at a landfill that can lawfully accept it.

The pH of the water at the landfill into which the potential ASS is placed must not be less than pH 5.5 at any time. Landfill licence conditions require the occupiers of potential ASS disposal sites to regularly monitor the pH of ground and surface waters at their premises.

5.4 Management of In-situ Acid Sulfate Soils

Potential ASS which becomes exposed (oxidised) on excavation surfaces may produce acid. For every day that such an excavated surface is in an exposed state, pH values shall be monitored from representative samples. Field pH testing should be completed at the surface of the excavation (sample depths of 0-0.1 m BGL) at a frequency of 1 sample per 250m^2 evenly spaced. Plastic sheeting can be placed over the corresponding surface (where possible) to reduce the oxidation rate.

Where soil pH levels falls below pH 5.5, lime will be applied to the potential ASS horizon(s). The quantity of lime required to neutralise the theoretical maximum amount of acid that could be generated from complete oxidation of the ASS is approximately 2.4 kg $CaCO_3$ per tonne of soil.

Sulfuric acid can attack concrete and steel, slowly destroying pipes and building foundations. Should acidic soils be produced, a structural engineer should be consulted to assess the potential impact to structural elements of the new building.

5.5 Groundwater Management and Disposal

5.5.1 Groundwater Management

Field data collected in previous investigations (EI, 2020) indicated that the groundwater was slightly acidic to slightly alkaline (pH 6.59 to 7.61), saline (EC: 25,794 to 42,060 µS/cm) and oxidising (Redox 183 to 329 mV) but anoxic (DO: 0-0.68 mg/L).

The removal (pumping) of any groundwater from an excavation area may cause alterations to the existing groundwater table. Extracted groundwater should be pumped to a holding vessel for assessment of pH characteristics during the dewatering process. Extracted water should be treated with hydrated lime to display a pH level of pH 6-8, prior to off-site disposal. Powdered agricultural lime should be added to the water by hand and/or excavator bucket and mixed. Field pH testing on representative samples should be performed to ensure that sufficient neutralisation has occurred, prior to disposal.

In addition to the above, an appropriately designed truck wash area will be required to capture liquids and solids generated, prior to vehicles exiting the site. Treatment and neutralisation of solids and liquids shall be in accordance with **Section 4.4** and above, respectively.

5.5.2 Groundwater Disposal

It is anticipated that extracted groundwater from the dewatering process will be disposed to the municipal stormwater system. Any permits / licences from Council and WaterNSW shall be obtained prior to discharging to the municipal stormwater system.

Water for disposal will be tested routinely (weekly intervals) for the duration of dewatering activities, to ensure that no change to the quality of water entering the stormwater system, with the results made available to Council or WaterNSW on request. Should it be found that groundwater quality is not suitable for disposal to the stormwater system, groundwater treatment or a Sydney Water permit to dispose to sewer shall be required prior to disposal.

Water quality monitoring for disposal to the municipal stormwater system shall include the following:

- Daily monitoring of field parameters (pH, electrical conductivity, dissolved oxygen, temperature and turbidity) in the treated discharge water using data logging equipment;
- Weekly sampling and laboratory analysis of treated groundwater water for a range of relevant analytical parameters (i.e. to be specified in the Dewatering Management Plan). Laboratory results should be compared to marine water trigger values provided in Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) for slightly - moderately disturbed systems to provide a 95% level of species protection.
- Weekly sampling shall be performed by a suitably qualified Environmental Consultant and submitted to a NATA accredited laboratory for analysis of the above parameters, depending on the time frame required to complete the works.

5.6 Risk Management

This management plan has been prepared as a contingency as PASS is not expected to be encountered during the proposed development.Should ASS or PASS be encountered, management techniques may need to be revised.

All contractors must employ best practices in managing any off-site water and soil quality impacts during site redevelopment. All waste materials must be chemically assessed and waste classified under the EPA (2014) *Waste Classification Guidelines*, prior to off-site disposal to appropriate landfill facilities.

6. Consultation and Records

During ASS management (if required), regard must be given to the needs of the following organisations:

- NSW Environment Protection Authority, concerning their requirements with respect to the various contamination control issues associated with the project and the detail required in the ASSMP;
- EPA accredited site auditor (if required);
- WaterNSW, for dewatering conditions and permit; and
- Liverpool City Council, for DA compliance and the handling requirement for ASS situations.

A file will be established to store all hard copy records associated with ASS management for the project. All analysis and monitoring information will be stored electronically to permit ease of access and data interpretation.

7. Statement of Limitations

The findings presented in this plan are derived from previous site investigations, which included borehole drilling and sampling and analysis of site soils. Due to the nature of bore drilling and soil sampling from point locations, it is considered likely that all variations in subsurface conditions across a site cannot be fully defined, no matter how comprehensive the field investigation program.

While normal assessments of data reliability have been made, EI assumes no responsibility or liability for errors in any data obtained from previous assessments conducted on site, regulatory agencies (e.g. Council, EPA), statements from sources outside of EI, or developments resulting from situations outside the scope of works of this project.

Despite all reasonable care and diligence, the ground conditions encountered and concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. In addition, site characteristics may change at any time in response to variations in natural conditions, chemical reactions and other events (e.g. groundwater movement and/or spillages of contaminating substances). These changes may occur subsequent to EI's investigations and assessment.

Neither EI, nor any other reputable consultant, can provide unqualified warranties nor does EI assume any liability for site conditions not observed or accessible during the time of the investigations.

This plan was prepared for the above named client and no responsibility is accepted for use of any part of this report in any other context or for any other purpose or by other third parties. This report does not purport to provide legal advice.

This plan and associated documents remain the property of EI subject to payment of all fees due for this assessment. The plan shall not be reproduced except in full and with prior written permission by EI.

REFERENCES

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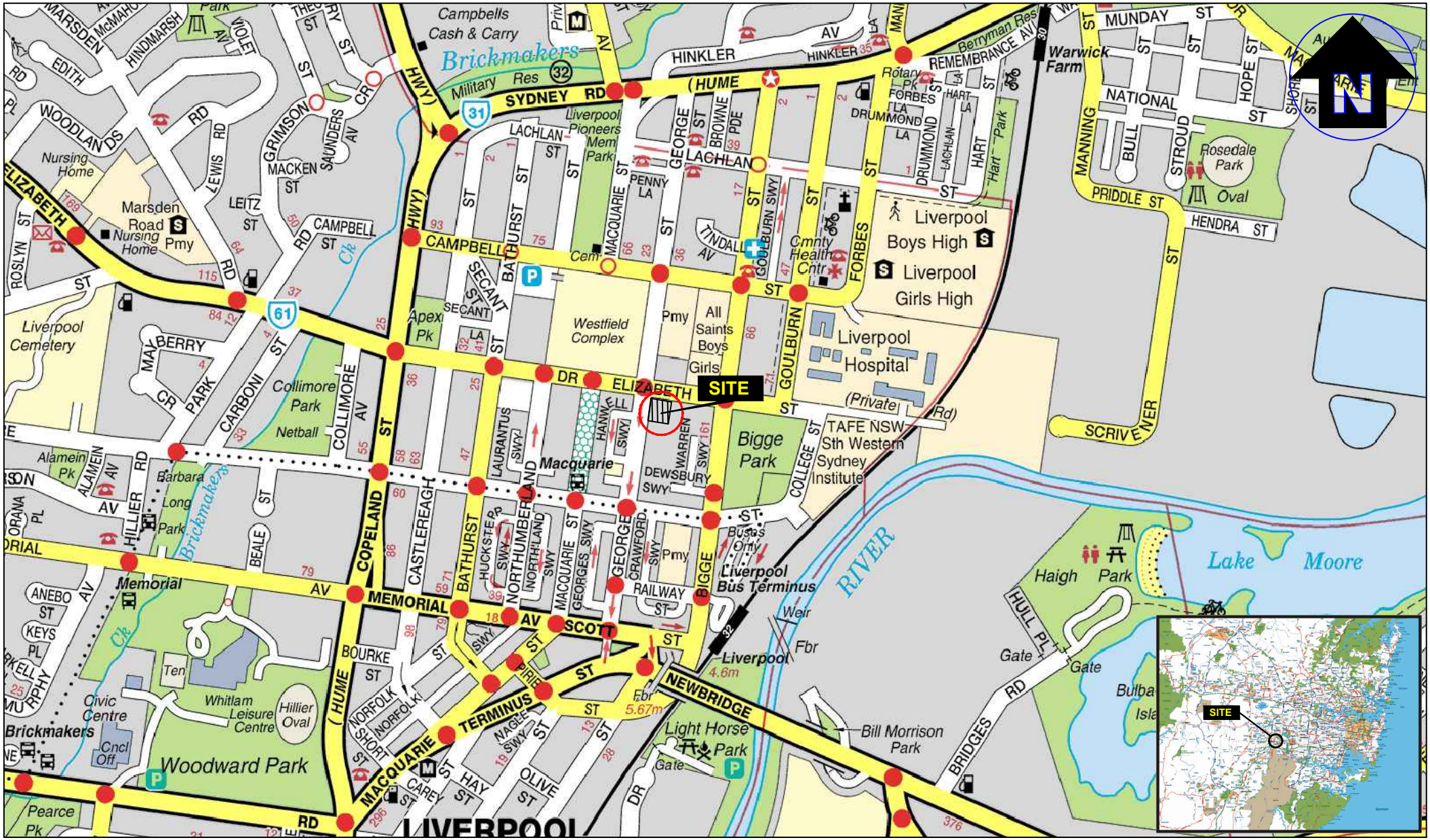
ABBREVIATIONS

AASS	Actual acid sulfate soils
AHD	Australian Height Datum
ASS	Acid sulfate soils
ASSMAC	Acid Sulfate Soil Management Advisory Committee (ASSMAC)
BGL	Below Ground Level
BEGL	Below Existing Ground Level
BH	Borehole
COC	Chain of Custody
DA	Development Application
DP	Deposited Plan
EI	EI Australia
EPA	Environmental Protection Authority
km	Kilometres
m	Metres
mAHD	Metres relative to Australian Height Datum
mBGL	Metres below ground level
mBEGL	Metres below existing ground level
NATA	National Association of Testing Authorities, Australia
NSW	New South Wales
PASS	Potential acid sulfate soils
pH	Measure of the acidity or basicity of an aqueous solution
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance / Quality Control
SRA	Sample receipt advice (document confirming laboratory receipt of samples)

Appendix A – Figures



eiaustralia Practical Solutions for Built Environments Suite 6.01, 55 Miller Street, PYRMONT 2009 Ph (02) 9516 0722 Fax (02) 9518 5088	Drawn:	AM.H.	**Altis Bulky Retail Pty Ltd as Trustee for Altis Aret Sub Trust 20** Acid Sulfate Soil Management Plan 28 Elizabeth Street, Liverpool NSW Site Locality Plan
	Approved:	E.S.	
	Date:	21-07-21	
	Scale:	Not To Scale	

Figure:
1

Project: E24175.E14

LEGEND (All Locations are Approximate)

- Site boundary
- Borehole location
- Borehole/monitoring well location
- Previous borehole location (EI, 2020)
- Previous borehole/monitoring well location (EI, 2020)

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Drawn:	AM.H.
Approved:	E.S.
Date:	21-07-21

Altis Bulky Retail Pty Ltd as Trustee for Altis Aret Sub Trust 20
Acid Sulfate Soil Management Plan
28 Elizabeth Street, Liverpool NSW
Borehole Location Plan

Figure: 2

Project: E24175.E14

Appendix B – Tables

Sample ID	Material	ASS (Lab) Assessment				ASS/PASS Laboratory Results						
		pH_f	pH_{fox}	pH Difference (pH_f - pH_{fox})	Strength of Reaction	pH KCl	TPA (moles H+/tonne)	TSA (moles H+/tonne)	TAA (moles H+/tonne)	S_{POS} (as %w/w)	Net Acidity (moles H+/tonne)	Liming Rate (kg $CaCO_3$/t)
BH101_0.9-1.0	Silty CLAY	6.5	4.7	1.7	X	5.3	12	<5	12	0.015	22	1.7
BH101_1.4-1.5		5.6	4.6	1.0	X	NT	NT	NT	NT	NT	NT	NT
BH101_1.9-2.0		5.3	4.4	0.9	X	4.8	27	<5	25	0.010	31	2.3
BH101_2.4-2.5		5.4	4.1	1.3	X	5.4	15	<5	12	0.018	23	1.8
BH101_2.9-3.0		6.2	6.1	0.1	X	NT	NT	NT	NT	NT	NT	NT
BH101_3.4-3.5		6.2	6	0.2	X	NT	NT	NT	NT	NT	NT	NT
BH103_0.9-1.0		6.8	5.8	0.9	X	6.5	<5	<5	<5	0.011	7	NT
BH103_1.4-1.5		5.6	4.9	0.7	X	NT	NT	NT	NT	NT	NT	NT
BH103_1.9-2.0		4.6	4.2	0.4	X	NT	NT	NT	NT	NT	NT	NT
BH103_2.4-2.5		6.8	5.7	1.1	XX	6.6	<5	<5	<5	0.016	<5	<0.1
BH103_2.9-3.0		6.1	5.1	1.0	X	4.6	30	<5	25	0.010	31	2.4
BH103_3.4-3.5		5.8	5.1	0.7	X	NT	NT	NT	NT	NT	NT	NT
Statistical Analysis												
Minimum		4.6	4.1	0.1	X	4.6	12	<5	<5	0.010	7	1.7
Maximum		6.8	6.1	1.7	XX	6.6	30	<5	25.0	0.018	31	2.4
SILs												
ASSMAC (1998) Action Criteria	**Action Criteria >1,000 tonnes disturbed (Coarse Texture - Sand)**						**≥18**	**≥18**		**≥0.03**		
	Field pH Indicator of AASS	**≤ 4 actual ASS are present**										
		>4 - <5.5 are acidic, but limited. Not confirmatory of actual ASS										
	Field Indicator of PASS		**pHfox <3 and a strong reaction to peroxide, indicates a high level of certainty.**									
			pHFOX >3 and ≤4, less positive and SPOCAS test required to confirm									
			pHFOX >4 and ≤5, neither positive or negative, SPOCAS test required to confirm									
			pHFOX >5 and little or no drop in pH, sulfur trail in SPOCAS should be used.									
	Field Indicator of PASS			**>1 (May indicate PASS)**								

Notes:

All concentrations are recorded in mg/kg (unless otherwise stated)

NT = 'Not Tested' i.e. the sample was not analysed.

NR = No reference criteria available in current regulatory tools.

Strength of Reaction KEY:

1 = Slight Reaction

2 = Moderate Reaction

3 = Strong / High Reaction

4 = Extreme / Vigorous Reaction (gas evolution and heat generation)

PH Field Indicators (ASSMAC 1998)

pHF<=4, indicates that actual acid sulfate soil are present with sulphides being oxidised in the past resulting in acid soil (and soil pore water) conditions.

pHF values >4 and <5.5 are acid and may be the result of some previous or limited oxidation of sulfides but is not confirmatory of actual ASS.

If pHFOX is more than one pH unit below the pHF, it may indicate potential acid sulfate soils.

pHFOX <3 and a strong reaction to peroxide, indicates a high level of certainty of a potential acid sulfate soils.

pHFOX >3 and <=4 is less positive for presence of actual acid sulfate soils and laboratory analyses is need to confirm if sulphides are present.

pHFOX >4 and <=5 is neither positive or negative for presence of actual acid sulfate soils. Laboratory analyses by SPOCAS is need to confirm if oxidisable sulphides are present.

pHFOX >5 and little or no drop in pH from the field value indicates little net acid generating ability. The sulfur trail in the SPOCAS method should be used to check for absence of oxidisable sulfides.

SCR – Chromium reducible sulfur

SPOS – Peroxide oxidisable sulfur

pHF – Field pH

pHKCL – Potassium chloride pH

pHFOX – Peroxide oxidised pH

TAA – Titratable actual acidity

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Appendix C – Proposed Development Plans

DEP DEVELOPMENT APPLICATION, ILLOURA PLACE LIVERPOOL

Mixed Use Development

28 Elizabeth Street, Liverpool 2170

October 2021

Drawing List

Series	Drawing No.	Drawing Name	Scale	Rev	Size
GENERAL					
	DA-001-001	Title Sheet		S1	A1
	DA-001-110	Architectural Design Story - Massing Development		S1	A1
	DA-001-111	Architectural Design Story - Facade Composition		S1	A1
	DA-001-112	Architectural Design Story - Facade Character		S1	A1
Siteworks					
	DA-010-010	Context Plan		S1	A1
	DA-010-011	Site Plan	1:250	S1	A1
	DA-010-012	Current Site Condition		S1	A1
	DA-010-013	Site Analysis		S1	A1
GA Plans					
	DA-110-001	Basement 06	1:150	S1	A1
	DA-110-002	Basement 04-05	1:150	S1	A1
	DA-110-003	Basement 03	1:150	S1	A1
	DA-110-004	Basement 02	1:150	S1	A1
	DA-110-005	Basement 01	1:150	S1	A1
	DA-110-009	Ground Level	1:150	S1	A1
	DA-110-010	Mezzanine	1:150	S1	A1
	DA-110-011	Level 01	1:150	S1	A1
	DA-110-012	Level 02	1:150	S1	A1
	DA-110-013	Level 03	1:150	S1	A1
	DA-110-014	Level 04	1:150	S1	A1
	DA-110-015	Level 05	1:150	S1	A1
	DA-110-016	Typical Level A Lowrise (Level 6/10)	1:150	S1	A1
	DA-110-017	Typical Level B Lowrise (Level 7/11)	1:150	S1	A1
	DA-110-018	Typical Level C Lowrise (Level 8/12)	1:150	S1	A1
	DA-110-019	Typical Level D Lowrise (Level 9/13)	1:150	S1	A1
	DA-110-120	Typical Level A Highrise (Level 14/18/22/26/30)	1:150	S1	A1
	DA-110-121	Typical Level B Highrise (Level 15/19/23/27/31)	1:150	S1	A1
	DA-110-122	Typical Level C Highrise (Level 16/20/24/28/32)	1:150	S1	A1
	DA-110-123	Typical Level D Highrise (Level 17/21/25/29)	1:150	S1	A1
	DA-110-330	Level 33	1:150	S1	A1
	DA-110-340	Roof Level	1:150	S1	A1
GA Elevations					
	DA-210-101	North Elevation - Elizabeth Street	1:200	S1	A1
	DA-210-201	East Elevation - Through Site Link	1:200	S1	A1
	DA-210-301	South Elevation - Service Laneway	1:200	S1	A1
	DA-210-401	West Elevation - George Street	1:200	S1	A1
GA Sections					
	DA-310-101	Section AA	1:200	S1	A1
	DA-310-102	Section BB	1:200	S1	A1
	DA-310-201	Carpark Entry & Loading Dock Section	1:100	S1	A1
	DA-310-202	Pool & Level 5 Section	1:50	S1	A1
Shadow Diagrams					
	DA-700-001	June 21st 9am - 2pm	1:2250	S1	A1
	DA-700-002	June 21st 3pm	1:2250	S1	A1
	DA-700-011	December 21st 9am - 2pm	1:2250	S1	A1
	DA-700-012	December 21st 3pm	1:2250	S1	A1
	DA-700-021	March / September 21st 9am - 2pm	1:2250	S1	A1
	DA-700-022	March / September 21st 3pm	1:2250	S1	A1
Sun Eye Diagrams					
	DA-710-001	Sun Eye Diagram 21st 9am - 2pm	1:1000	S1	A1
	DA-710-002	Sun Eye Diagram 21st 3pm	1:1000	S1	A1
Apartment Amenity (ADG)					
	DA-720-001	Cross Ventilation Diagram Level 05 - 08	1:400	S1	A1
	DA-720-002	Solar Diagram Level 05 - 33	1:400	S1	A1
Building Amenity					
	DA-730-001	Communal Open Space	1:250	S1	A1
	DA-730-002	Communal Open Space Solar	1:250	S1	A1
	DA-730-201	Landscape Area	1:400	S1	A1
	DA-730-301	Through Site Link	1:250	S1	A1
Storage Compliance Diagrams					
	DA-740-001	Storage Compliance - Typical Levels	1:150	S1	A1
	DA-740-002	Storage Compliance - Typical Levels	1:150	S1	A1
Apartment Amenity					
	DA-750-001	Apartment Depth - Typical Levels	1:150	S1	A1
	DA-750-002	Apartment Depth - Typical Levels	1:150	S1	A1
GFA Diagrams					
	DA-770-001	GFA Ground Level - Level 5	1:400	S1	A1
	DA-770-002	GFA Typical Level A Lowrise - Typical Level B Hig...	1:400	S1	A1
	DA-770-003	GFA Typical Level C Highrise - Level 33	1:400	S1	A1
Adaptable Plan Layouts (DA Stage)					
	DA-810-001	Adaptable & Livable Apartments	1:100	S1	A1
Waste Strategy					
	DA-820-001	Waste Strategy Diagrams	1:300	S1	A1
Materials & Finishes Board					
	DA-890-001	External Material Finishes		S1	A1
3D VIEWS					
	DA-910-101	Perspective - Elizabeth Street - Site Through Link		S1	A1
	DA-910-102	Perspective - Corner of Elizabeth Street and Rear ...		S1	A1
	DA-910-103	Perspective - Aerial View Along Elizabeth Street		S1	A1
	DA-910-104	Perspective - Corner of Elizabeth Street and Geor...		S1	A1

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Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20
14/60 Castlereagh Street,
Sydney, NSW, 2000

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ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GENERAL
Title Sheet

Scale: @A1, 50%@A3
Project No.: 20089
Drawn by: JL
North
Status: Development Application
Dwg No.: DA-001-001
Rev: S1

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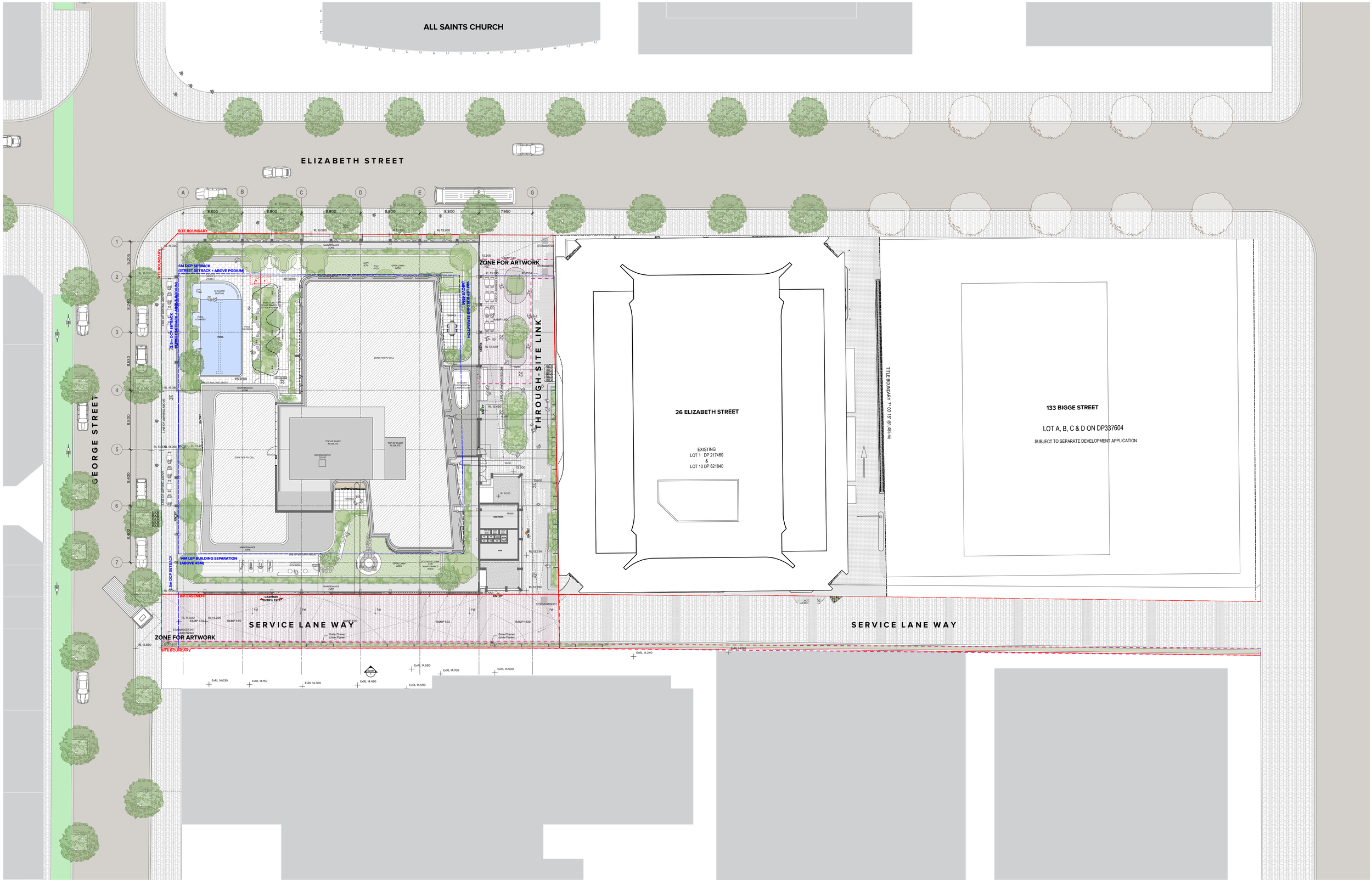

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DLCS Quality Endorsed Company ISO 9001:2015, Registration Number 20476
Nominated Architect: Nicholas Turner 6685, ABN 86 064 084 911

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ILLOURA PLACE

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S1	20.10.21	JMC	Issued for Development Application

ILLOURA PLACE

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
Siteworks
Site Plan

Scale: 1:250 @A1, 50%@A3
Status: **Development Application**
Project No.: **20089**
Dwg No.: **DA-010-011**
Drawn by: **SE**
Rev: **S1**
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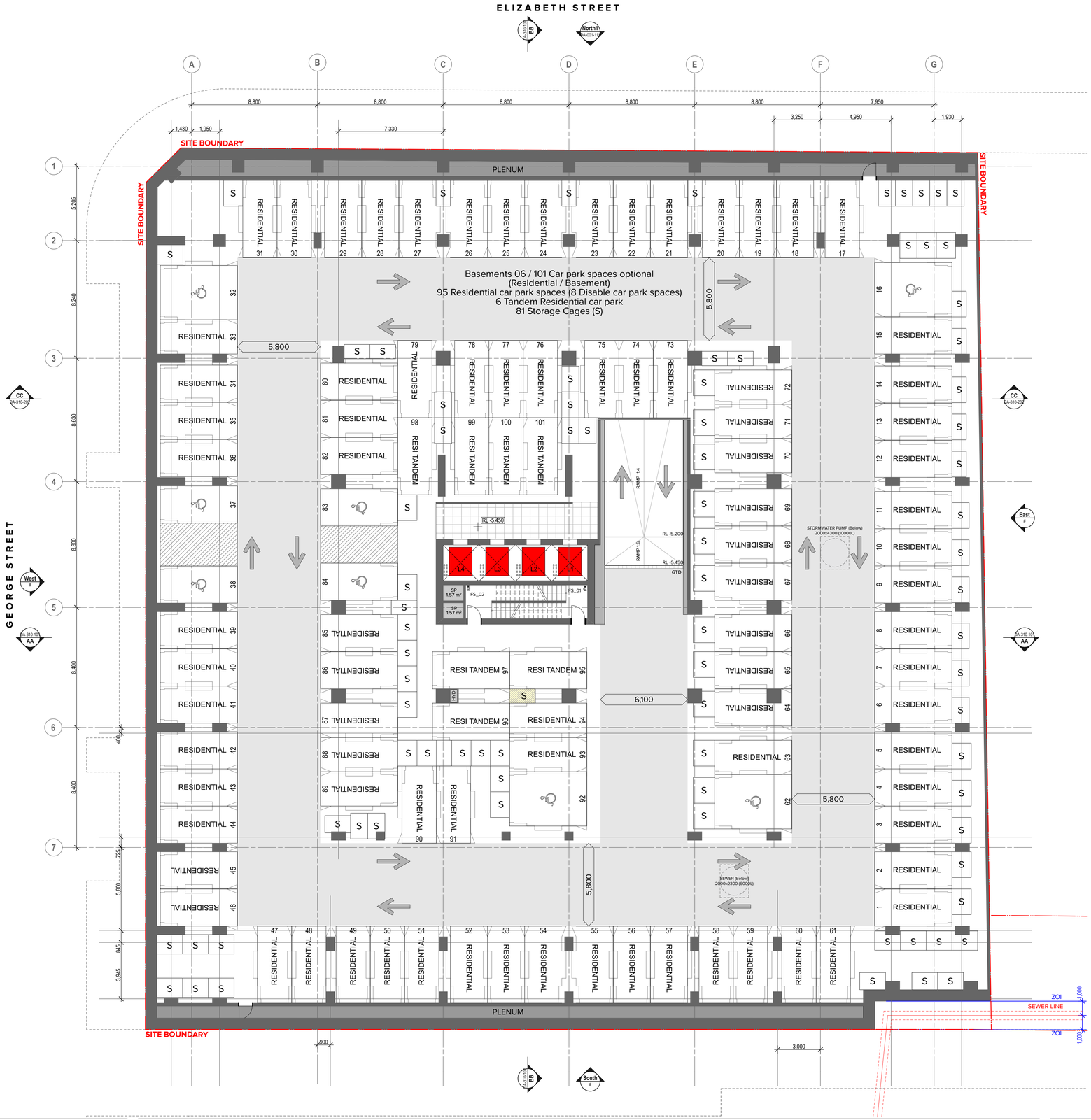

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces
- MBK Motorbike Park Spaces
- BKR Bicycle Park Spaces

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Sydney, NSW, 2000

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ILLOURA PLACE

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S1	20.10.21	JMC	Issued for Development Application

Project Title
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Drawing Title
GA Plans
Basement 06

Scale	Project No.	Drawn by	North
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Status	Dwg No.	Rev	
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ELIZABETH STREET

GEORGE STREET

SITE BOUNDARY

PLENUM

PUMP PIT FOR CAR WASH

HYD

Basements 04-05 / 98 Car park spaces
(Residential / Basement)
92 Residential car park spaces (8 Disable car park spaces)
6 Tandem Residential car park
80 Storage Cages (S)

RESIDENTIAL

RESI TANDEM

RAMP 1:8

RAMP 1:4

RL 0.550

RL 0.300

RL 0.800

GTD

L1 L2 L3 L4

FS_01 FS_02

SP

6,100

5,800

ZOI

SEWER LINE

1,000

3,000

900

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces

MBK	Motorbike Park Spaces
BKR	Bicycle Park Spaces

NOTES

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Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20
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S1	20.10.21	JMC	Issued for Development Application

Project Title
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28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 04-05

Scale	Project No.	Drawn by	North
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Status	Dwg No.	Rev	
Development Application	DA-110-002	S1	

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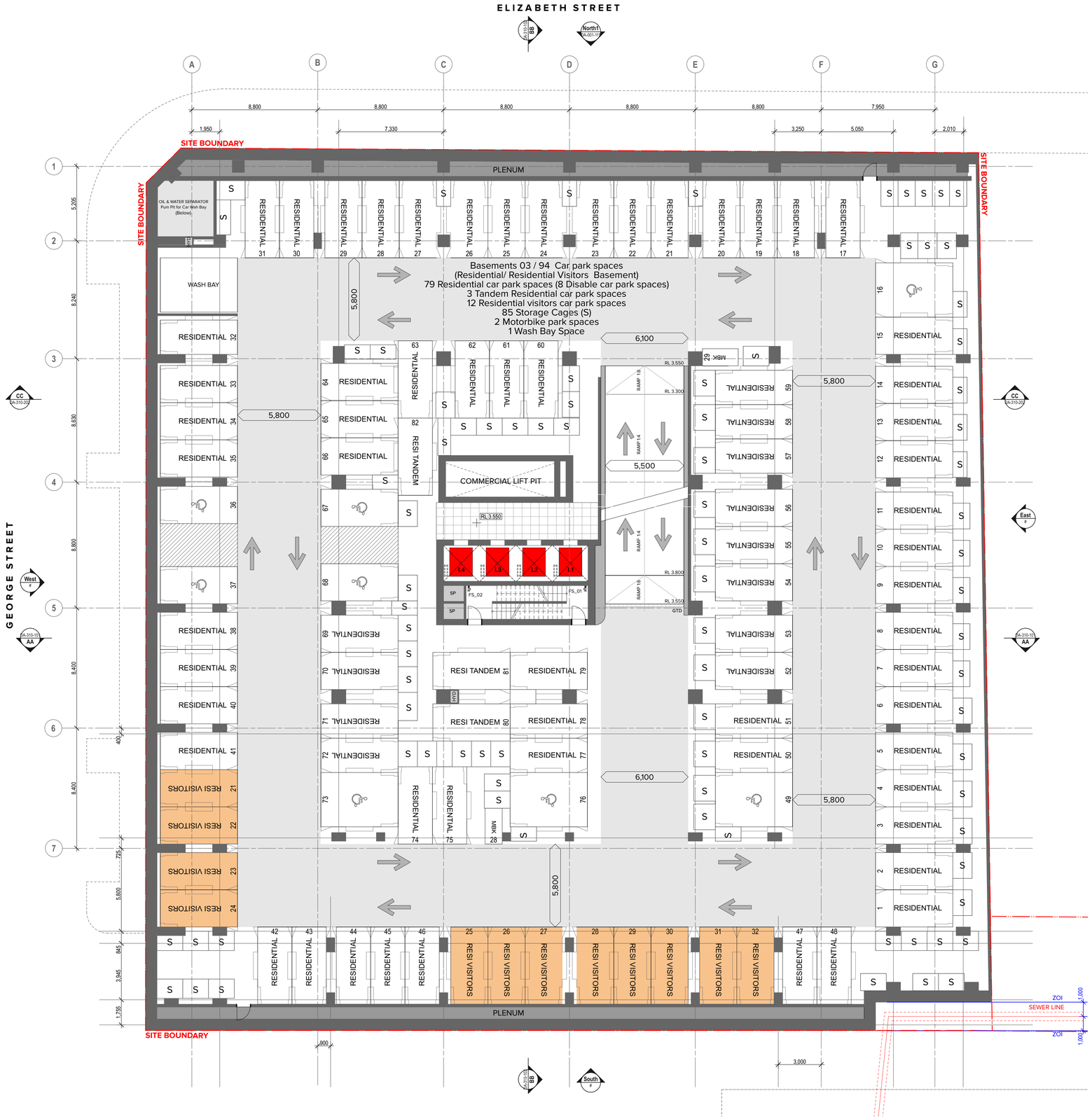

GENERAL ARRANGEMENT BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces
- MBK Motorbike Park Spaces
- BKR Bicycle Park Spaces

NOTES

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ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 03

Scale	Project No.	Drawn by	North
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Status	Dwg No.	Rev	
Development Application	DA-110-003	S1	

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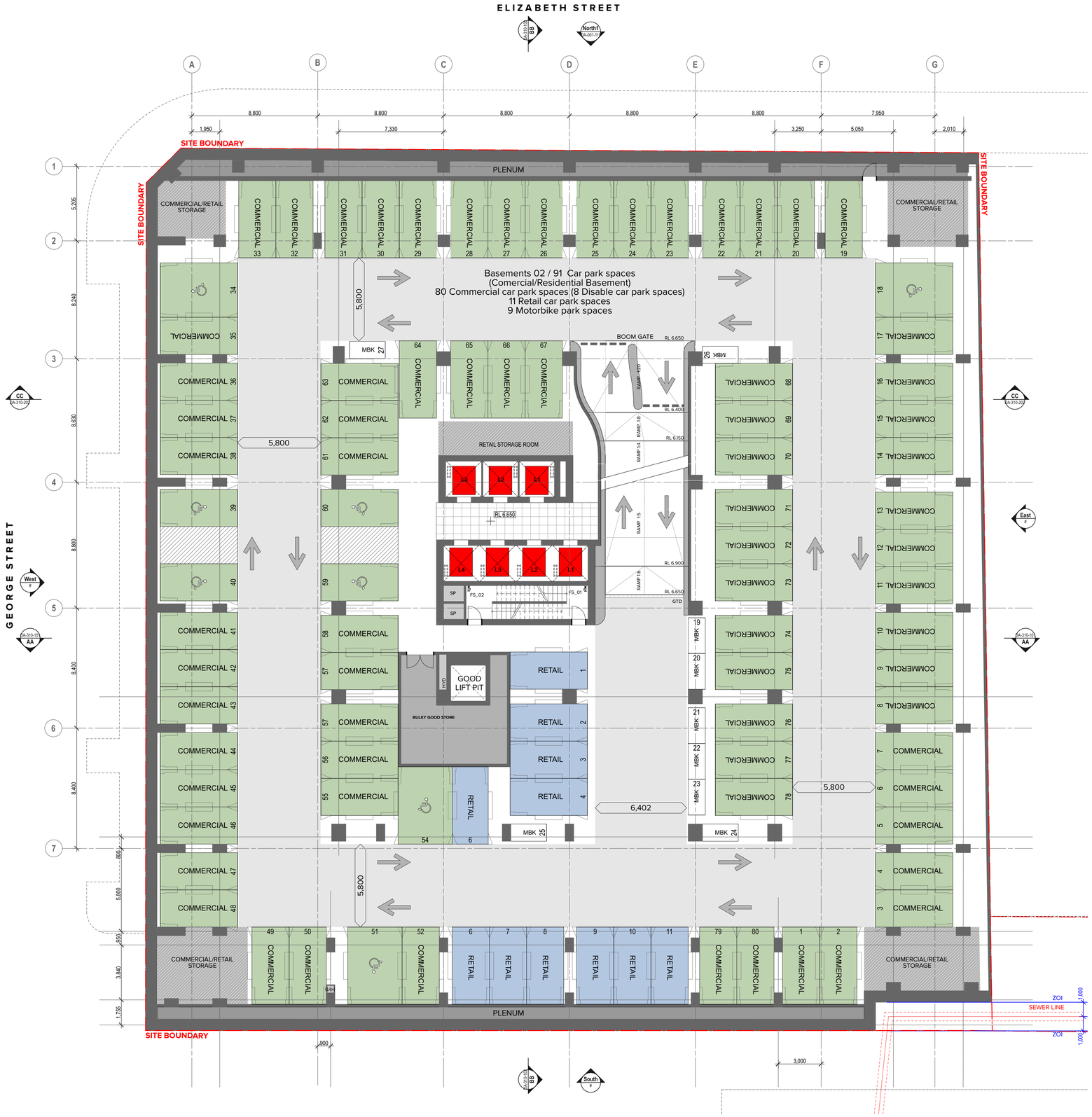

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

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CPE	Carpark Exhaust
CPSA	Carpark Supply Air
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GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
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S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces

MBK	Motorbike Park Spaces
BKR	Bicycle Park Spaces

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ILLOURA PLACE

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Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 02

Scale	Project No.	Drawn by	North
1:150 @A1, 50%@A3	20089	JC	
Status	Dwg No.	Rev	
Development Application	DA-110-004	S1	

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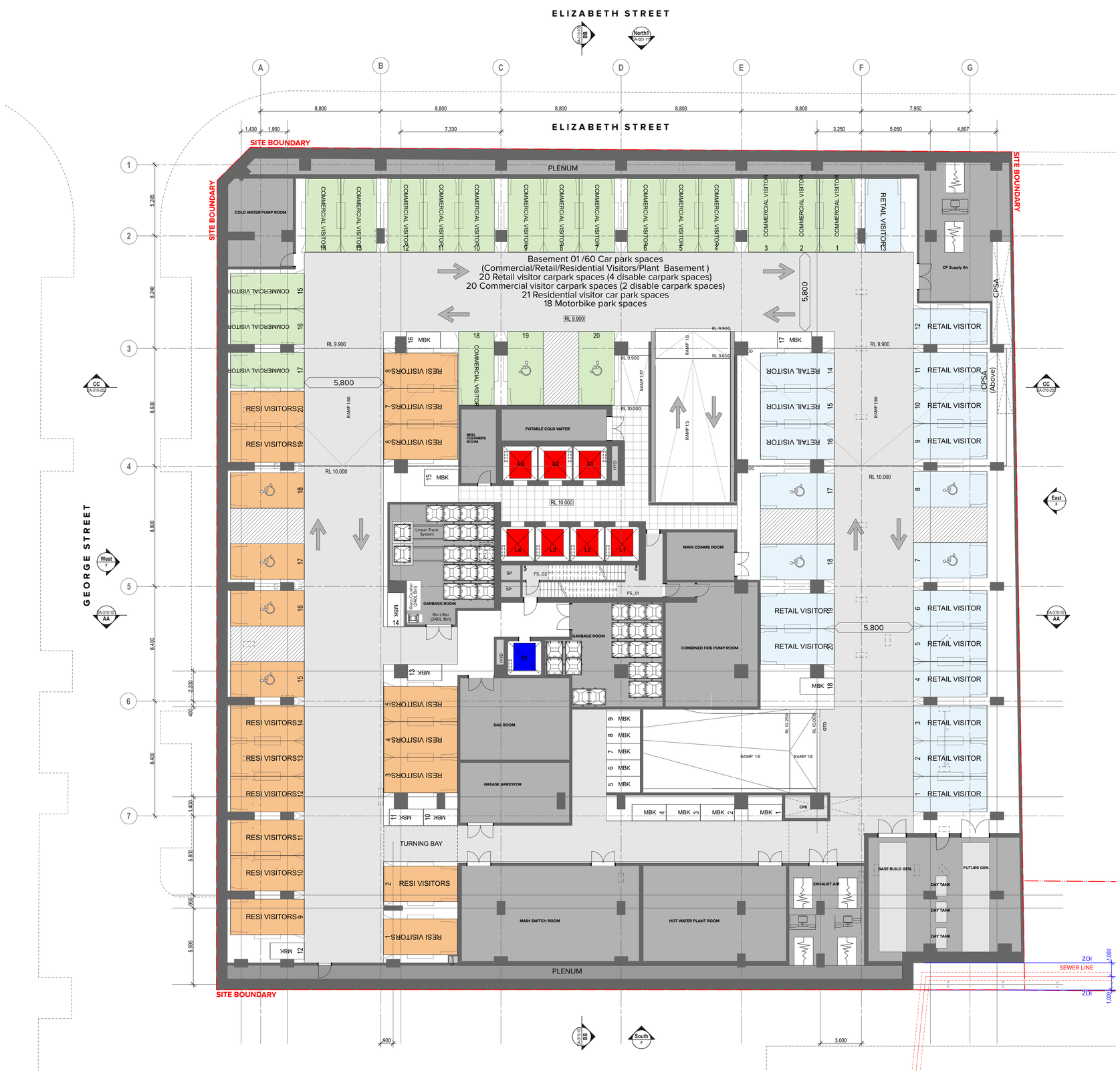

GENERAL ARRANGEMENT
BASEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC.

CPE	Carpark Exhaust
CPSA	Carpark Supply Air
FS	Fire Stair
GEN	Generator
GTD	Grated Drain
HYD	Hydraulic Services
L	Lift
RL	Relative Level to AHD
S	Storage
SP	Stair Pressurisation
ZOI	Zone of Influence

CARPARK SPACES

- Residential
- Residential Visitors
- Retail
- Retail Visitors
- Commercial
- Commercial Visitors
- Disable Carpark Spaces
- MBK Motorbike Park Spaces
- BKR Bicycle Park Spaces

NOTES

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Altis Bulky Retail Pty Ltd as trustee for Altis ARET Sub Trust 20
14/60 Castlereagh Street,
Sydney, NSW, 2000

ALTIS PROPERTY PARTNERS

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Basement 01

Scale: 1:150 @A1, 50%@A3
Project No.: 20089
Drawn by: JC
Status: Development Application
Dwg No.: DA-110-005
Rev: S1

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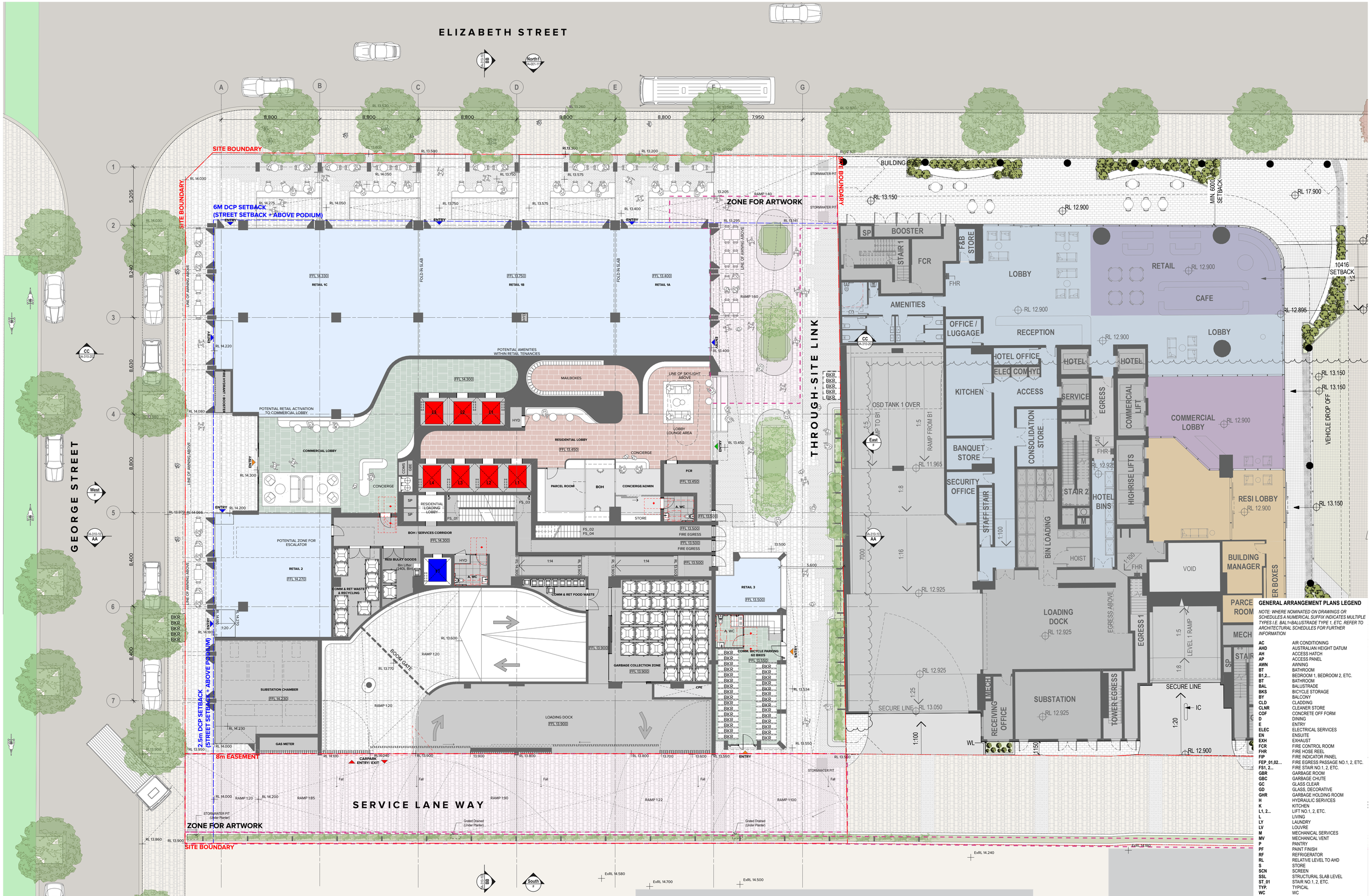

GENERAL ARRANGEMENT PLANS LEGEND

NOTE: WHERE NOMINATED ON DRAWINGS OR SCHEDULES A NUMERICAL SUFFIX INDICATES MULTIPLE TYPES I.E. BAL1=BALUSTRADE TYPE 1, ETC. REFER TO ARCHITECTURAL SCHEDULES FOR FURTHER INFORMATION

AC	AIR CONDITIONING
AHD	AUSTRALIAN HEIGHT DATUM
AH	ACCESS HATCH
AP	ACCESS PANEL
AWN	AWNING
BT	BATHROOM
B1,2...	BEDROOM 1, BEDROOM 2, ETC.
BT	BATHROOM
BAL	BALUSTRADE
BKS	BICYCLE STORAGE
BY	BALCONY
CLD	CLADDING
CLNR	CLEANER STORE
COF	CONCRETE OFF FORM
D	DINING
E	ENTRY
ELEC	ELECTRICAL SERVICES
EN	ENSUITE
EXH	EXHAUST
FCR	FIRE CONTROL ROOM
FHR	FIRE HOSE REEL
FIP	FIRE INDICATOR PANEL
FEP_01,02...	FIRE EGRESS PASSAGE NO.1, 2, ETC.
FS1, 2...	FIRE STAIR NO.1, 2, ETC.
GBR	GARBAGE ROOM
GBC	GARBAGE CHUTE
GC	GLASS CLEAR
GD	GLASS, DECORATIVE
GHR	GARBAGE HOLDING ROOM
H	HYDRAULIC SERVICES
K	KITCHEN
L1, 2...	LIFT NO.1, 2, ETC.
L	LIVING
LY	LAUNDRY
LV	LOUVRE
M	MECHANICAL SERVICES
MV	MECHANICAL VENT
P	PANTRY
PF	PAINT FINISH
RF	REFRIGERATOR
RL	RELATIVE LEVEL TO AHD
S	STORE
SCN	SCREEN
SSL	STRUCTURAL SLAB LEVEL
ST_01	STAIR NO.1, 2, ETC.
TYP.	TYPICAL
WC	WC

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LEGEND:

- RETAIL TENANCY ENTRY
- RESIDENTIAL LOBBY ENTRY
- COMMERCIAL LOBBY / EOT FACILITY ENTRY
- CARPARK ENTRY / EXIT

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Plans
Ground Level

Scale	Project No.	Drawn by	North
1:150 @A1, 50%@A3	20089	AP	
Status	Dwg No.	Rev	
Development Application	DA-110-009	S1	

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ALTIS PROPERTY PARTNERS

ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Sections
Section AA

Scale **1:200 @A1, 50%@A3**
Status **Development Application**
Project No. **20089**
Dwg No. **DA-310-101**
Drawn by **JL/JE**
Rev **S1**
North

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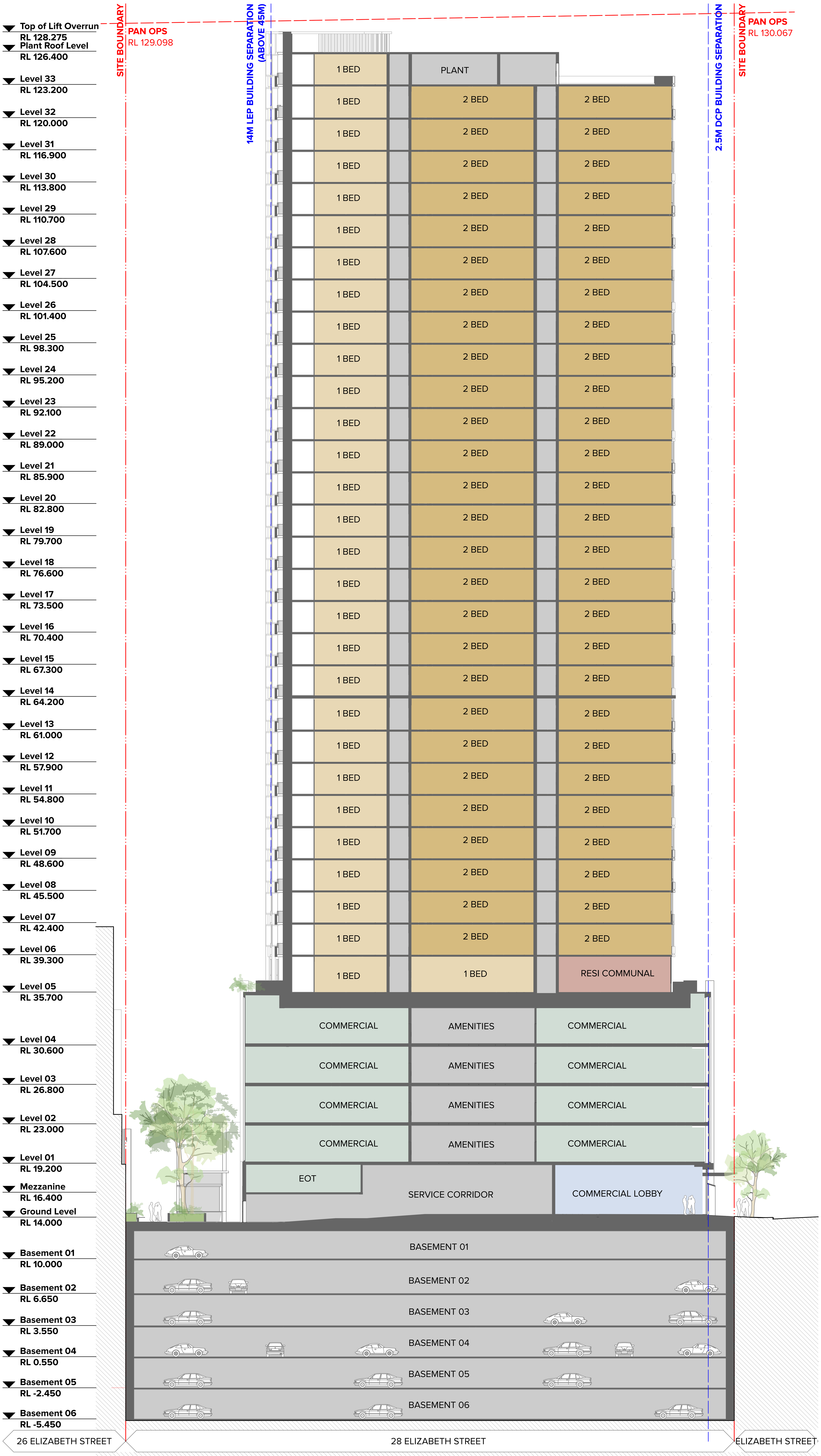

NOTES

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DLCS Quality Endorsed Company - ISO 9001:2015, Registration Number 30476
Nominated Architect: Nicholas Turner 6695 ABN 86 064 994 911

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ILLOURA PLACE

Rev	Date	Approved by	Revision Notes
S1	20.10.21	JMC	Issued for Development Application

Project Title
Illoura Place
28 Elizabeth Street, Liverpool, NSW 2170, Australia

Drawing Title
GA Sections
Section BB

Scale: **1:200 @A1, 50%@A3**
Status: **Development Application**
Project No.: **20089**
Dwg No.: **DA-310-102**
Rev: **S1**
Drawn by: **JL/JE**
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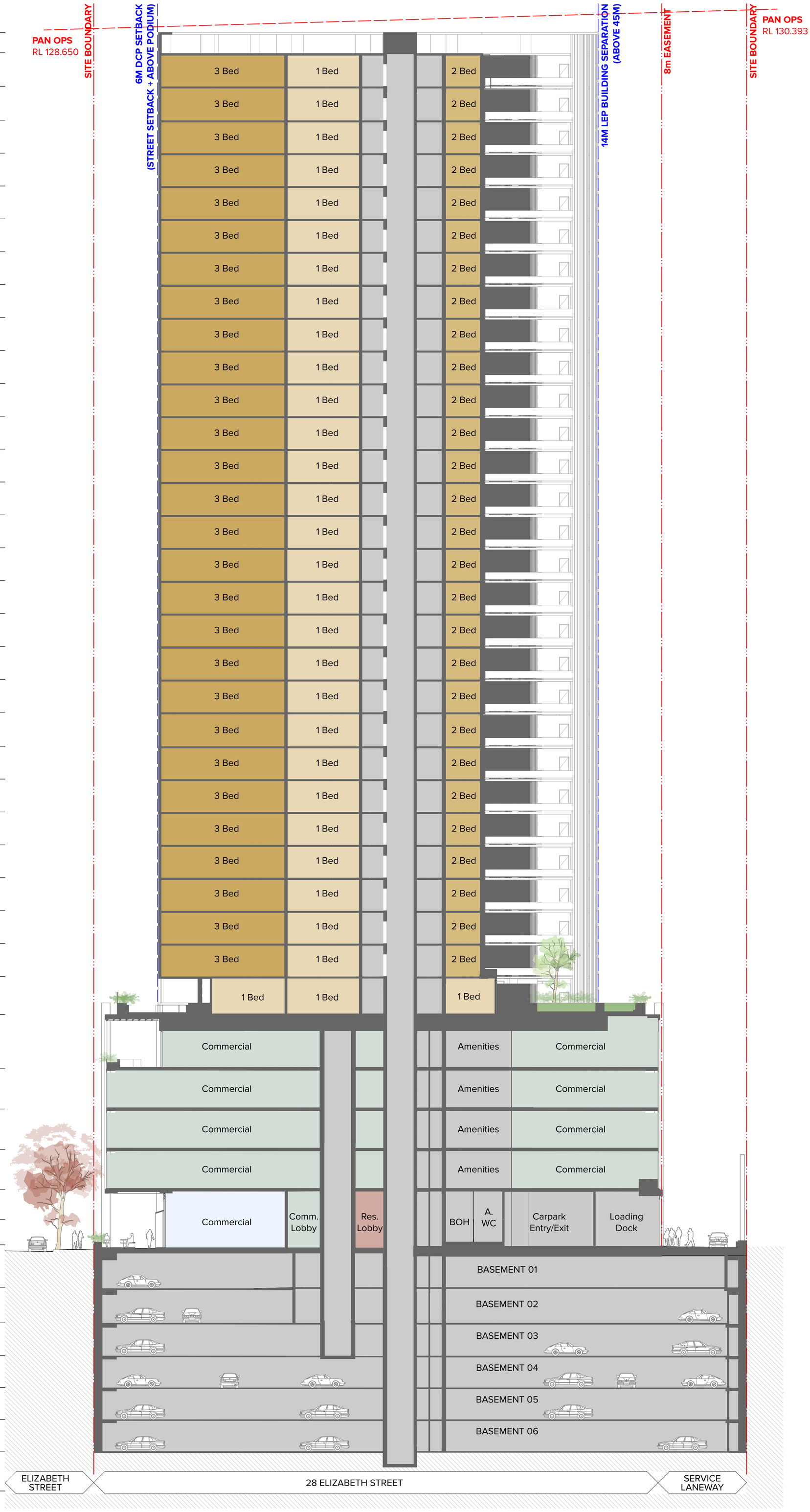
- Top of Lift Overrun — RL 128.275
- Plant Roof Level — RL 126.400
- Level 33 — RL 123.200
- Level 32 — RL 120.000
- Level 31 — RL 116.900
- Level 30 — RL 113.800
- Level 29 — RL 110.700
- Level 28 — RL 107.600
- Level 27 — RL 104.500
- Level 26 — RL 101.400
- Level 25 — RL 98.300
- Level 24 — RL 95.200
- Level 23 — RL 92.100
- Level 22 — RL 89.000
- Level 21 — RL 85.900
- Level 20 — RL 82.800
- Level 19 — RL 79.700
- Level 18 — RL 76.600
- Level 17 — RL 73.500
- Level 16 — RL 70.400
- Level 15 — RL 67.300
- Level 14 — RL 64.200
- Level 13 — RL 61.000
- Level 12 — RL 57.900
- Level 11 — RL 54.800
- Level 10 — RL 51.700
- Level 09 — RL 48.600
- Level 08 — RL 45.500
- Level 07 — RL 42.400
- Level 06 — RL 39.300
- Level 05 — RL 35.700
- Level 04 — RL 30.600
- Level 03 — RL 26.800
- Level 02 — RL 23.000
- Level 01 — RL 19.200
- Mezzanine — RL 16.400
- Ground Level — RL 14.000
- Basement 01 — RL 10.000
- Basement 02 — RL 6.650
- Basement 03 — RL 3.550
- Basement 04 — RL 0.550
- Basement 05 — RL -2.450
- Basement 06 — RL -5.450



Appendix D – Borehole Logs

BOREHOLE: BH101

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Contamination | Remediation | Geotechnical

Project	Acid Sulfate Soil Management Plan			Sheet	1 OF 3
Location	28 Elizabeth Street, Liverpool NSW			Date Started	23/6/21
Position	Refer to Figure 2	Surface RL	13.06 m	Date Completed	24/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee for Altis ARET Sub Trust 20	Drill Rig	Hanjin DB 8D	Checked	Date:
		Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
DT			0	0.10 12.96				-	CONCRETE; 100 mm thick.	-	-	PAVEMENT
								-	FILL: Sandy CLAY; low plasticity, dark brown, with angular gravels, brick fragments, no odour.			FILL
					ES 0.40-0.50 m					-	-	
				0.80 12.26				CI	Silty CLAY; medium plasticity, grey mottled grey, no odour.			RESIDUAL SOIL
			1		ES 0.90-1.00 m							
					ES 1.40-1.50 m							
			2		ES 1.90-2.00 m					M (>PL)	VSt	
AD/T		GWNE			ES 2.40-2.50 m							
			3		ES 2.90-3.00 m							
				3.50 9.56	ES 3.40-3.50 m				From 3.5 m, grading to extremely weathered sandstone, with ironstone bands, no odour.			
				3.80 9.26	ES 3.90-4.00 m			-	SANDSTONE; fine to medium grained, grey, very low strength, distinctly weathered, no odour.			BEDROCK
			4									
				4.70 8.36					From 4.7 m, medium strength, slightly weathered, no odour.			
	-		5									
			6							-	-	
			7									
PCD		-		7.70 5.36				-	SHALE; dark grey, no odour.			
			8									
			9							-	-	
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH101

Project	Acid Sulfate Soil Management Plan 28			Sheet	2 OF 3
Location	Elizabeth Street, Liverpool NSW Refer			Date Started	23/6/21
Position	to Figure 2	Surface RL	13.06 m	Date Completed	24/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee	Drill Rig	Hanjin DB 8D	Checked	Date:
	for Altis ARET Sub Trust 20	Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PCD	-	-	10					-	SHALE; dark grey, no odour.	-	-	
			11									
			12									
			13									
			14									
			15									
			16									
				16.55								
				-3.49				-	Continued as Cored Borehole			
NMLC	-	-	17						SHALE; dark grey, with pale grey laminations, medium bedded, no odour.	-	-	
				18.00								
			18	-4.94					From 18.0 m, thinly bedded, no odour.			
			19									
			20									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH101

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Contamination | Remediation | Geotechnical

Project	Acid Sulfate Soil Management Plan 28			Sheet	3 OF 3
Location	Elizabeth Street, Liverpool NSW Refer			Date Started	23/6/21
Position	to Figure 2	Surface RL	13.06 m	Date Completed	24/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee	Drill Rig	Hanjin DB 8D	Checked	Date:
	for Altis ARET Sub Trust 20	Inclination	-90°		

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
NMLC	-	-	20					-	SHALE; dark grey, with pale grey laminations, medium bedded, no odour.	-	-	
			21									
			22	*22.00*					Hole Terminated at 22.00 m Target Depth Reached.			
			23									
			24									
			25									
			26									
			27									
			28									
			29									
			30									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH102M

Project	Acid Sulfate Soil Management Plan 28			Sheet	1 OF 3
Location	Elizabeth Street, Liverpool NSW Refer			Date Started	24/6/21
Position	to Figure 2	Surface RL	13.24 m	Date Completed	24/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee	Drill Rig	Hanjin DB 8D	Checked	Date:
	for Altis ARET Sub Trust 20	Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID / Static Water Level
DT			0	13.21				-	ASPHALT; 30 mm thick.	-	-	BH102M
								-	FILL: Gravelly SAND; fine to coarse grained, dark grey, fine to coarse, sub-angular to sub-rounded gravels, with clay, no odour.	M	-	
				0.60 12.64				CI-CH	Silty CLAY; medium to high plasticity, pale brown-grey mottled red-brown, no odour.			
			1									
			2							M (>PL)	St	
			3	*3.40* 9.84					From 3.4 m, with fine to coarse, sub-angular to sub-rounded ironstone gravels, no odour.			
AD/T		GWNE		*3.60* 9.64					From 3.6 m, grading to extremely weathered material, no odour.			
			4	*4.50* 8.74				-	SANDSTONE; fine to medium grained, pale grey-brown, very low strength, distinctly weathered, no odour.			
	-		5									
			6							-	-	
PCD		-	7									
			8									Grout
			9	*9.00* 4.24				-	SHALE; dark grey, no odour.	-	-	
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH102M

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Contamination | Remediation | Geotechnical

Project	Acid Sulfate Soil Management Plan 28
Location	Elizabeth Street, Liverpool NSW Refer
Position	to Figure 2
Job No.	E24175.E14
Client	Altis Bulky Retail Pty Ltd as Trustee for Altis ARET Sub Trust 20

Surface RL	13.24 m
Contractor	BG Drilling Pty Ltd
Drill Rig	Hanjin DB 8D
Inclination	-90°

Sheet	2 OF 3
Date Started	24/6/21
Date Completed	24/6/21
Logged KX	Date:
Checked	Date:

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID Static Water Level
PCD	-	-	10					-	SHALE; dark grey, no odour.	-	-	BH102M
			11									
			12									
			13									
			14									uPVC 50 mm Casing
			15									
			16									Bentonite
				16.60 -3.36								
NMLC	-	-	17					-	Continued as Cored Borehole SHALE; dark grey, with pale grey laminations, medium bedded, no odour.	-	-	
			18									
			19									Sand
			20									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH102M

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Contamination | Remediation | Geotechnical

Project	Acid Sulfate Soil Management Plan 28			Sheet	3 OF 3
Location	Elizabeth Street, Liverpool NSW Refer to			Date Started	24/6/21
Position	Figure 2	Surface RL	13.24 m	Date Completed	24/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee for	Drill Rig	Hanjin DB 8D	Checked	Date:
	Altis ARET Sub Trust 20	Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	PIEZOMETER DETAILS ID Static Water Level
NMLC	-	-	20					-	SHALE; dark grey, with pale grey laminations, medium bedded, no odour.	-	-	BH102M
			21									uPVC 50 mm Screen
			22									
			23	23.00					Hole Terminated at 23.00 m Target Depth Reached.			
			24									
			25									
			26									
			27									
			28									
			29									
			30									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH103

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Project	Acid Sulfate Soil Management Plan 28			Sheet	1 OF 3
Location	Elizabeth Street, Liverpool NSW Refer to			Date Started	24/6/21
Position	Figure 2	Surface RL	13.08 m	Date Completed	25/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee for	Drill Rig	Hanjin DB 8D	Checked	Date:
	Altis ARET Sub Trust 20	Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	-	GWNE	0	13.08				-	FILL: Silty SAND; fine grained, dark brown, with gravels and brick fragments, with clay, no odour.			FILL
					ES 0.40-0.50 m					M	-	
			1	*1.00*	ES 0.90-1.00 m							
				12.08				CH	Silty CLAY; high plasticity, grey mottled red, no odour.			RESIDUAL SOIL
					ES 1.40-1.50 m							
			2		ES 1.90-2.00 m							
					ES 2.40-2.50 m					M (>PL)	St	
			3		ES 2.90-3.00 m							
				3.50	ES 3.40-3.50 m							
				9.58					From 3.5 m, grading to extremely weathered material, no odour.			
			4	*4.00*								
				9.08				-	SANDSTONE; pale grey, very low strength, distinctly weathered, with ironstaining, no odour.			BEDROCK
			5									
PCD		-	6							-	-	
			7									
				7.70								
				5.38				-	SHALE; dark grey, no odour.			
			8									
			9							-	-	
			10									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH103

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Contamination | Remediation | Geotechnical

Project	Acid Sulfate Soil Management Plan 28			Sheet	2 OF 3
Location	Elizabeth Street, Liverpool NSW Refer to			Date Started	24/6/21
Position	Figure 2	Surface RL	13.08 m	Date Completed	25/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee for	Drill Rig	Hanjin DB 8D	Checked	Date:
	Altis ARET Sub Trust 20	Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PCD	-	-	10					-	SHALE; dark grey, no odour.	-	-	
			11									
			12									
			13									
			14									
			15									
			16									
				16.60								
				-3.52				-	Continued as Cored Borehole			
NMLC	-	-	17						SHALE; dark grey, with pale grey laminations, very thinly bedded, no odour.	-	-	
				17.61								
				-4.53					From 17.61 m, thinly bedded, no odour.			
			18									
			19									
			20									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

BOREHOLE: BH103

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Contamination | Remediation | Geotechnical

Project	Acid Sulfate Soil Management Plan 28			Sheet	3 OF 3
Location	Elizabeth Street, Liverpool NSW Refer			Date Started	24/6/21
Position	to Figure 2	Surface RL	13.08 m	Date Completed	25/6/21
Job No.	E24175.E14	Contractor	BG Drilling Pty Ltd	Logged KX	Date:
Client	Altis Bulky Retail Pty Ltd as Trustee	Drill Rig	Hanjin DB 8D	Checked	Date:
	for Altis ARET Sub Trust 20	Inclination	-90°		

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
NMLC	-	'	20					-	SHALE; dark grey, with pale grey laminations, very thinly bedded, no odour.	-	-	
				20.72								
									Hole Terminated at 20.72 m Target Depth Reached.			
			21									
			22									
			23									
			24									
			25									
			26									
			27									
			28									
			29									
			30									

This borehole log should be read in conjunction with Environmental Investigations Australia's accompanying standard notes.

EXPLANATION OF NOTES, ABBREVIATIONS & TERMS USED ON BOREHOLE AND TEST PIT LOGS

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DRILLING/EXCAVATION METHOD

HA	Hand Auger	RD	Rotary blade or drag bit	NQ	Diamond Core - 47 mm
DTC	Diatube Coring	RT	Rotary Tricone bit	NMLC	Diamond Core - 52 mm
NDD	Non-destructive digging	RAB	Rotary Air Blast	HQ	Diamond Core - 63 mm
AS*	Auger Screwing	RC	Reverse Circulation	HMLC	Diamond Core - 63mm
AD*	Auger Drilling	PT	Push Tube	BH	Tractor Mounted Backhoe
*V	V-Bit	CT	Cable Tool Rig	EX	Tracked Hydraulic Excavator
*T	TC-Bit, e.g. ADT	JET	Jetting	EE	Existing Excavation
ADH	Hollow Auger	WB	Washbore or Bailer	HAND	Excavated by Hand Methods

PENETRATION/EXCAVATION RESISTANCE

L **Low resistance.** Rapid penetration/ excavation possible with little effort from equipment used.

M **Medium resistance.** Penetration/ excavation possible at an acceptable rate with moderate effort from equipment used.

H **High resistance.** Penetration/ excavation is possible but at a slow rate and requires significant effort from equipment used.

R **Refusal/ Practical Refusal.** No further progress possible without risk of damage or unacceptable wear to equipment used.

These assessments are subjective and are dependent on many factors, including equipment power and weight, condition of excavation or drilling tools and experience of the operator.

WATER

Water level at date shown

Water inflow

Partial water loss

Complete water loss

GROUNDWATER NOT OBSERVED — Observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave-in of the borehole/ test pit.

GROUNDWATER NOT ENCOUNTERED — Borehole/ test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/ test pit been left open for a longer period.

SAMPLING AND TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11 N=18	4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 150mm
seating 30/80mm	Where practical refusal occurs, the blows and penetration for that interval are reported
RW	Penetration occurred under the rod weight only
HW	Penetration occurred under the hammer and rod weight only
HB	Hammer double bouncing on anvil
Sampling	
DS	Disturbed Sample
BDS	Bulk disturbed Sample
GS	Gas Sample
WS	Water Sample
U63	Thin walled tube sample - number indicates nominal sample diameter in millimetres
Testing	
FP	Field Permeability test over section noted
FVS	Field Vane Shear test expressed as uncorrected shear strength (sv = peak value, sr = residual value)
PID	Photoionisation Detector reading in ppm
PM	Pressuremeter test over section noted
PP	Pocket Penetrometer test expressed as instrument reading in kPa
WPT	Water Pressure tests
DCP	Dynamic Cone Penetrometer test
CPT	Static Cone Penetration test
CPTu	Static Cone Penetration test with pore pressure (u) measurement

RANKING OF VISUALLY OBSERVABLE CONTAMINATION AND ODOUR (for specific soil contamination assessment

R = 0	No visible evidence of contamination	R = A	No non-natural odours identified
R = 1	Slight evidence of visible contamination	R = B	Slight non-natural odours identified
R = 2	Visible contamination	R = C	Moderate non-natural odours identified
R = 3	Significant visible contamination	R = D	Strong non-natural odours identified

ROCK CORE RECOVERY

TCR = Total Core Recovery (%)

$$= \frac{\text{Length of core recevered}}{\text{Lengh of core run}} \text{ x } 100$$

SCR = Solid Core Recovery (%)

$$= \frac{\Sigma \text{ Length ofcylindrical core recevered}}{\text{Lengh of core run}} \text{ x } 100$$

RQD = Rock Quality Designation (%)

$$= \frac{\Sigma \text{Axial Lenghts of core} > 100\text{mm}}{\text{Lengh of core run}} \text{ x } 100$$

MATERIAL BOUNDARIES

———— = inferred boundary

- - - - - - - - = probable boundary

— ?— ?— ?— ?— ? = possible boundary

METHOD OF SOIL DESCRIPTION USED ON BOREHOLE AND TEST PIT LOGS

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FILL	ORGANIC SOILS (OL, OH or Pt)	CLAY (CL, CI or CH)
COUBLES or BOULDERS	SILT (ML or MH)	SAND (SP or SW)
GRAVEL (GP or GW)	Combinations of these basic symbols may be used to indicate mixed materials such as sandy clay	

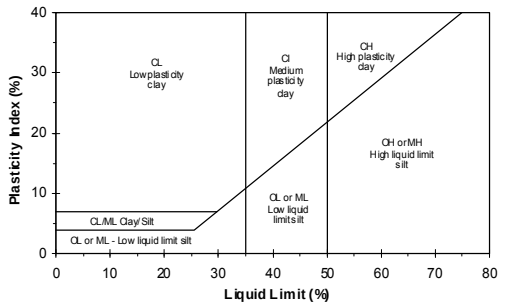
CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil is broadly classified and described in Borehole and Test Pit Logs using the preferred method given in AS1726 – 1993, (Amdt1 – 1994 and Amdt2 – 1994), Appendix A. Material properties are assessed in the field by visual/tactile methods.

PARTICLE SIZE CHARACTERISTICS

Major Division	Sub Division	Particle Size
BOULDERS		>200 mm
COBBLES		63 to 200 mm
GRAVEL	Coarse	20 to 63 mm
	Medium	6 to 20 mm
	Fine	2 to 6 mm
SAND	Coarse	0.6 to 2 mm
	Medium	0.2 to 0.6 mm
	Fine	0.075 to 0.2mm
SILT		0.002 to 0.075 mm
CLAY		<0.002 mm

PLASTICITY PROPERTIES



USCS SYMBOLS

Major Divisions		Symbol	Description
COARSE GRAINED SOILS More than 50% by dry mass less than 63mm is greater than 0.075mm	More than 50% of coarse grains are >2.36mm	GW	Well graded gravel and gravel-sand mixtures, little or no fines.
		GP	Poorly graded gravel and gravel-sand mixtures, little or no fines.
		GM	Silty gravel, gravel-sand-silt mixtures.
		GC	Clayey gravel, gravel-sand-clay mixtures.
	More than 50% of coarse grains are <2.36mm	SW	Well graded sand and gravelly sand, little or no fines.
		SP	Poorly graded sand and gravelly sand, little or no fines.
		SM	Silty sand, sand-silt mixtures.
		SC	Clayey sand, sandy-clay mixtures.
FINE GRAINED SOILS More than 50% by dry mass less than 63mm is less than 0.075mm	Liquid Limit less < 50%	ML	Inorganic silts of low plasticity, very fine sands, rock flour, silty or clayey fine sands.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
		OL	Organic silts and organic silty clays of low plasticity.
	Liquid Limit > than 50%	MH	Inorganic silts of high plasticity.
		CH	Inorganic clays of high plasticity.
		OH	Organic clays of medium to high plasticity.
		PT	Peat muck and other highly organic soils.

MOISTURE CONDITION

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays & Silts may be brittle or friable and powdery.
M	Moist	Soils are darker than in the dry condition & may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

Moisture content of cohesive soils may also be described in relation to plastic limit (WP) or liquid limit (WL) [» much greater than, > greater than, < less than, « much less than].

CONSISTENCY

Symbol	Term	Undrained Shear Strength
VS	Very Soft	0. to 12 kPa
S	Soft	12 to 25 kPa
F	Firm	25 to 50 kPa
St	Stiff	50 to 100 kPa
VSt	Very Stiff	100 to 200 kPa
H	Hard	Above 200 kPa

DENSITY

Symbol	Term	Density Index %	SPT "N" #
VL	Very Loose	< 15	0 to 4
L	Loose	15 to 35	4 to 10
MD	Medium Density	35 to 65	10 to 30
D	Dense	65 to 85	30 to 50
VD	Very Dense	Above 85	Above 50

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.
SPT correlations are not stated in AS1726 – 1993, and may be subject to corrections for overburden pressure and equipment type.

MINOR COMPONENTS

Term	Assessment Guide	Proportion by Mass
Trace	Presence just detectable by feel or eye but soil properties little or no different to general properties of primary component	Coarse grained soils: ≤ 5% Fine grained soil: ≤15%
Some	Presence easily detectable by feel or eye but soil properties little or no different to general properties of primary component	Coarse grained soils: 5 - 12% Fine grained soil: 15 - 30%

Appendix E – Chain of Custody Certificate & Sample Receipt Form

Sheet ___ of

Site: 28 Elizabeth St, Liverpool NSW

Project No: E24175

Laboratory: SGS Australia
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: WATER	SOIL	OTHER
BH101_0.4-0.5		ZLB	23/6/21	AM/PM		X	
0.9-1.0	1						
1.4-1.5	2						
1.9-2.0	3						
2.4-2.5	4						
2.9-3.0	5						
3.4-3.5	6						
3.9-4.0							
BH103_0.4-0.5							
_0.9-1.0	7						
_1.4-1.5	8						
_1.9-2.0	9						

Analysis

HM[A] /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM[A] /TRH/BTEX/PAHs	HM[A] /TRH/BTEX	BTEX	VOCs	Asbestos	Asbestos Quantification	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	Dewatering Suite	sPOCAS	PFAS	Sulphates	Chlorides	#1/pH for x	TCLP HM A/ / PAH
										X				X	
										X					
										X					
										X				X	
										X					
										X					

Comments

HM[A]
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Zinc

HM[B]
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

Dewatering Suite
pH & EC
TDS / TDU
Hardness
Total Cyanide
Metals (Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
TRH (F1, F2, F3, F4)
BTEX
PAH

LABORATORY TURNAROUND

- ☐ Standard
- ☒ 24 Hours
- ☐ 48 Hours
- ☐ 72 Hours
- ☐ Other____

Container Type:
J = solvent washed, acid rinsed, Tefton sealed glass jar
S = solvent washed, acid rinsed glass bottle
P = natural HDPE plastic bottle
VC = glass vial, Tefton Septum
ZLB = Zip-Lock Bag

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Report with EI Waste Classification Table ☐

Sampler's Name (EI): Kaiyu Xu	Received by (SGS):
Print: Alejandra Beltran	Print: George Zhi
Signature: AB	Signature:
Date: 28/06/21	Date: 28/6/21 @ 10:45am

Sampler's Comments: please cc Emily Scanlon

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street,
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

SGS EHS Sydney COC
SE221112

Sheet 2 of 2

Site: 28 Elizabeth St, Liverpool NSW

Project No: E24175

Laboratory: **SGS Australia**
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: WATER	SOIL	OTHER	Analysis: HM [A] /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM [A] /TRH/BTEX/PAHs	HM [A] /TRH/BTEX	BTEX	VOCs	Asbestos	Asbestos Quantification	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	Dewatering Suite	sPOCAS	PFAS	Sulphates	Chlorides	pH (pH fox)	TCLP HM A / PAH
BH103_2.4-2.5	10	ZLB	24/06/21	AM/PM		X																X	
↓ -2.9-3.0	11	↓	↓	↓		↓												X				X	
↓ -3.4-3.5	12	↓	↓	↓		↓																X	

Comments

HM [A]
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Zinc

HM [B]
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

Dewatering Suite
pH & EC
TDS / TDU
Hardness
Total Cyanide
Metals (Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
TRH (F1, F2, F3, F4)
BTEX
PAH

LABORATORY TURNAROUND

- [ ] Standard
- [x] 24 Hours
- [ ] 48 Hours
- [ ] 72 Hours
- [ ] Other_____

Container Type:
J = solvent washed, acid rinsed, Tefton sealed glass jar
S = solvent washed, acid rinsed glass botlle
P = natural HDPE plastic bottle
VC = glass vial, Tefton Septum
ZLB = Zip-Lock Bag

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Report with EI Waste Classification Table ☐

Sampler's Name (EI): Kaiyu Xu	Received by (SGS):
Print: Alejandra Beltran	Print: George Zhi
Signature: AB	Signature:
Date: 28/06/2021	Date: 28/6/21 @ 10:45am

Sampler's Comments: please cc Emily Scanlon

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

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Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street,
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

AU.Environmental.Sydney (Sydney)

From: Alejandra Beltran - EIAustralia <alejandra.beltran@eiaustralia.com.au>
Sent: Monday, 28 June 2021 11:56 AM
To: AU.SampleReceipt.Sydney (Sydney); AU.Environmental.Sydney (Sydney)
Cc: Emily Scanlon - EIAustralia
Subject: [EXTERNAL] E24175 - Liverpool
Attachments: 28062021115529-0001.pdf

Hi SGS,

Pelase find attached the COC for the samples picked up from Liverpool this morning.

Would we be able to please have the pH/pHfox on 24hrs and the SPOCAs on 3 dayTAT?

You can place the SPOCAs testing as an A job.

Best regards,

Alejandra Beltran
BEng. (Civil)
Civil/Environmental Engineer – Project Coordinator

T 02 9516 0722 M 0475 554 383
E alejandra.beltran@eiaustralia.com.au

Suite 6.01, 55 Miller Street
Pyrmont, NSW 2009

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SAMPLE RECEIPT ADVICE

SE221112

CLIENT DETAILS

Contact	Kaiyu Xu
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 9516 0722
Facsimile	(Not specified)
Email	kaiyu.xu@eiaustralia.com.au
Project	**E24175 28 Elizabeth St, Liverpool NSW**
Order Number	**E24175**
Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Mon 28/6/2021
Report Due	Tue 29/6/2021
SGS Reference	**SE221112**

SUBMISSION DETAILS

This is to confirm that 12 samples were received on Monday 28/6/2021. Results are expected to be ready by COB Tuesday 29/6/2021. Please quote SGS reference SE221112 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	Client	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	12 Soil
Date documentation received	28/6/2021	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	15°C	Sufficient sample for analysis	Yes
Turnaround time requested	Next Day		

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

3 samples have been placed on hold as no tests have been assigned for them by the client. These samples will not be processed.
SPOCAS to be reported SE221112A.

SAMPLE RECEIPT ADVICE

SE221112

CLIENT DETAILS

Client EI AUSTRALIA

Project E24175 28 Elizabeth St, Liverpool NSW

SUMMARY OF ANALYSIS

No.	Sample ID	Field pH for Acid Sulphate Soil
001	BH101_0.9-1.0	4
002	BH101_1.4-1.5	4
003	BH101_1.9-2.0	4
004	BH101_2.4-2.5	4
005	BH101_2.9-3.0	4
006	BH101_3.4-3.5	4
007	BH103_0.9-1.0	4
008	BH103_1.4-1.5	4
009	BH103_1.9-2.0	4
010	BH103_2.4-2.5	4
011	BH103_2.9-3.0	4
012	BH103_3.4-3.5	4

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 .

Sheet ___ of

Site: 28 Elizabeth St, Liverpool NSW

Project No: E24175

Laboratory: SGS Australia
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	WATER	SOIL	OTHER
BH101_0.4-0.5		ZLB	23/6/21	AM/PM		X	
0.9-1.0	1						
1.4-1.5	2						
1.9-2.0	3						
2.4-2.5	4	✓					
2.9-3.0	5	X					
3.4-3.5	6						
3.9-4.0	7						
BH103_0.4-0.5							
_0.9-1.0	8						
_1.4-1.5	9						
_1.9-2.0	10	X					

Analysis

HM A /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM A /TRH/BTEX/PAHs	HM A /TRH/BTEX	BTEX	VOCs	Asbestos	Asbestos Quantification	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	Dewatering Suite	sPOCAS	PFAS	Sulphates	Chlorides	pH (Lab)	TCLP HM A/ / PAH
										X				X	
										X					
										X					
										X					
										X					
										X				X	
										X					

SGS EHS Alexandria Laboratory

SE221112A COC

Received: 28 – Jun – 2021

Comments

HM A
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Zinc

HM B
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

Dewatering Suite
pH & EC
TDS / TDU
Hardness
Total Cyanide
Metals (Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
TRH (F1, F2, F3, F4)
BTEX
PAH

LABORATORY TURNAROUND

- ☐ Standard
- ☒ 24 Hours
- ☐ 48 Hours
- ☐ 72 Hours
- ☐ Other_____

Container Type:
J = solvent washed, acid rinsed, Tefton sealed glass jar
S = solvent washed, acid rinsed glass bottle
P = natural HDPE plastic bottle
VC = glass vial, Tefton Septum
ZLB = Zip-Lock Bag

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Report with EI Waste Classification Table ☐

Sampler's Name (EI): Kaiyu Xu	Received by (SGS):
Print c/- Alexandra Beltran	Print
Signature	Signature
Date 28/06/21	Date 28/6 12pm.

Sampler's Comments:
please cc Emily Scanlon.

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street,
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

Sheet 2 of 2

Site: 28 Elizabeth St, Liverpool NSW

Project No: E24175

Laboratory: SGS Australia
Unit 16, 33 Maddox Street,
ALEXANDRIA NSW 2015
P: 02 8594 0400 F: 02 8594 0499

Sample ID	Laboratory ID	Container Type	Sampling Date	Sampling Time	Sample Matrix: WATER	SOIL	OTHER	Analysis: HM A /TRH/BTEX/PAHs OCP/OP/PCB/Asbestos	HM A /TRH/BTEX/PAHs	HM A /TRH/BTEX	BTEX	VOCs	Asbestos	Asbestos Quantification	pH / CEC (cation exchange)	pH / EC (electrical conductivity)	Dewatering Suite	sPOCAS	PFAS	Sulphates	Chlorides	24 Hr TAT	TCLP HM A/ / PAH
BH103_2.4-2.5	10	ZLB	24/06/21	AM/PM		X																X	
-2.9-3.0	11	✓	↓	↓		↓												X				X	
↓ -3.4-3.5	12	↓	↓	↓		↓																X	

Comments

HM A
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Zinc

HM B
Arsenic
Cadmium
Chromium
Lead
Mercury
Nickel

Dewatering Suite
pH & EC
TDS / TDU
Hardness
Total Cyanide
Metals (Al, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
TRH (F1, F2, F3, F4)
BTEX
PAH

LABORATORY TURNAROUND

- ☐ Standard
- ☒ 24 Hours
- ☐ 48 Hours
- ☐ 72 Hours
- ☐ Other_____

Container Type:
J = solvent washed, acid rinsed, Tefton sealed glass jar
S = solvent washed, acid rinsed glass bottle
P = natural HDPE plastic bottle
VC = glass vial, Tefton Septum
ZLB = Zip-Lock Bag

Investigator: I attest that these samples were collected in accordance with standard EI field sampling procedures.

Report with EI Waste Classification Table ☐

Sampler's Name (EI): Kaiyu Xu	Received by (SGS):
Print: Kaiyu Xu (c/- Alejandra Beltran)	Print: Emily
Signature: AB	Signature:
Date: 28/06/2021	Date: 29/6 @ 10.45

Sampler's Comments: please cc Emily Scanlon

IMPORTANT:
Please e-mail laboratory results to: lab@eiaustralia.com.au

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street,
PYRMONT NSW 2009
Ph: 9516 0722
lab@eiaustralia.com.au

Yin, Emily (Sydney)

From: Alejandra Beltran - EIAustralia <alejandra.beltran@eiaustralia.com.au>
Sent: Tuesday, 29 June 2021 4:10 PM
To: AU.SampleReceipt.Sydney (Sydney); Emily Scanlon - EIAustralia; AU.Environmental.Sydney (Sydney)
Subject: [EXTERNAL] RE: Report Job SE221112, your reference E24175 28 Elizabeth St, Liverpool NSW, order number E24175

Apologies, please ignore the below email, and complete the following highlighted in yellow:

For the A job, would we be able to please cancel the SPOCAs test on the following samples only:

1. BH101_2.9-3.0 (sample 5)
2. BH103_1.9-2.0 (sample 9)

And instead test for SPOCAS on the following additional samples:

1. BH101_2.4-2.5 (sample 4)
2. BH103_2.4-2.5 (sample 10)

Also please note that sample 10 has been reported as BH101_2.9-3.0, but it needs to be corrected to BH103_2.4-2.5 in report SE221112 and in SE221112A.

With thanks,

Alejandra Beltran
BEng. (Civil)
Civil/Environmental Engineer – Project Coordinator

T 02 9516 0722 M 0475 554 383
E alejandra.beltran@eiaustralia.com.au

Suite 6.01, 55 Miller Street
Pyrmont, NSW 2009

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From: Alejandra Beltran - EIAustralia
Sent: Tuesday, 29 June 2021 4:05 PM
To: 'AU.Samplereceipt.Sydney@SGS.com'; Emily Scanlon - EIAustralia; 'AU.Environmental.Sydney (Sydney)'
Subject: RE: Report Job SE221112, your reference E24175 28 Elizabeth St, Liverpool NSW, order number E24175

SAMPLE RECEIPT ADVICE

SE221112A

CLIENT DETAILS

Contact	Kaiyu Xu
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 9516 0722
Facsimile	(Not specified)
Email	kaiyu.xu@eiaustralia.com.au
Project	**E24175 28 Elizabeth St, Liverpool NSW**
Order Number	**E24175**
Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Mon 28/6/2021
Report Due	Thu 1/7/2021
SGS Reference	**SE221112A**

SUBMISSION DETAILS

This is to confirm that 12 samples were received on Monday 28/6/2021. Results are expected to be ready by COB Thursday 1/7/2021. Please quote SGS reference SE221112A when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	Client	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	6 Soil
Date documentation received	28/6/2021	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	15°C	Sufficient sample for analysis	Yes
Turnaround time requested	Three Days		

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

SAMPLE RECEIPT ADVICE

SE221112A

CLIENT DETAILS

Client EI AUSTRALIA

Project E24175 28 Elizabeth St, Liverpool NSW

SUMMARY OF ANALYSIS

No.	Sample ID	Moisture Content	SPOCAS Net Acidity Calculations	TAA (Titratable Actual Acidity)	TPA (Titratable Peroxide Acidity)
001	BH101_0.9-1.0	1	6	7	21
003	BH101_1.9-2.0	1	6	7	21
004	BH101_2.4-2.5	1	6	7	21
007	BH103_0.9-1.0	1	6	7	21
010	BH103_2.4-2.5	1	6	7	21
011	BH103_2.9-3.0	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 .

Appendix F – Analytical Reports

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Kaiyu Xu
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 9516 0722
Facsimile	(Not specified)
Email	kaiyu.xu@eiaustralia.com.au
Project	**E24175 28 Elizabeth St, Liverpool NSW**
Order Number	**E24175**
Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE221112 R0**
Date Received	28/6/2021
Date Reported	29/6/2021

COMMENTS

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

SIGNATORIES

Shane MCDERMOTT
Inorganic/Metals Chemist

Field pH for Acid Sulphate Soil [AN104] Tested: 29/6/2021

PARAMETER	UOM	LOR	BH101_0.9-1.0 SOIL - 23/6/2021 SE221112.001	BH101_1.4-1.5 SOIL - 23/6/2021 SE221112.002	BH101_1.9-2.0 SOIL - 23/6/2021 SE221112.003	BH101_2.4-2.5 SOIL - 23/6/2021 SE221112.004	BH101_2.9-3.0 SOIL - 23/6/2021 SE221112.005
pHf	pH Units	-	6.5	5.6	5.3	5.4	6.2
pHfox	pH Units	-	4.7	4.6	4.4	4.1	6.1
Reaction Rate*	No unit	-	X	X	X	X	X
pH Difference*	pH Units	-10	1.7	1.0	0.9	1.3	0.1

PARAMETER	UOM	LOR	BH101_3.4-3.5 SOIL - 23/6/2021 SE221112.006	BH103_0.9-1.0 SOIL - 23/6/2021 SE221112.007	BH103_1.4-1.5 SOIL - 23/6/2021 SE221112.008	BH103_1.9-2.0 SOIL - 23/6/2021 SE221112.009	BH103_2.4-2.5 SOIL - 24/6/2021 SE221112.010
pHf	pH Units	-	6.2	6.8	5.6	4.6	6.8
pHfox	pH Units	-	6.0	5.8	4.9	4.2	5.7
Reaction Rate*	No unit	-	X	X	X	X	XX
pH Difference*	pH Units	-10	0.2	0.9	0.7	0.4	1.1

PARAMETER	UOM	LOR	BH103_2.9-3.0 SOIL - 24/6/2021 SE221112.011	BH103_3.4-3.5 SOIL - 24/6/2021 SE221112.012
pHf	pH Units	-	6.1	5.8
pHfox	pH Units	-	5.1	5.1
Reaction Rate*	No unit	-	X	X
pH Difference*	pH Units	-10	1.0	0.7

METHOD	METHODOLOGY SUMMARY
AN104	pHF is determined on an extract of approximately 2g of as received sample in approximately 10 mL of deionised water with pH determined after standing 30 minutes.
AN104	pHFox is determined on an extract of approximately 2g of as received sample with a few mLs of 30% hydrogen peroxide (adjusted to pH 4.5 to 5.5) with the extract reaction being rated from slight to extreme, with pH determined after reaction is complete and extract has cooled. Referenced to ASS Laboratory Methods Guidelines , method 23Af-Bf, 2004. 0 No Reaction 1 Slight Reaction 2 Moderate Reaction 3 Strong/High Reaction 4 Extreme/Vigorous Reaction (gas evolution and heat generation)

FOOTNOTES

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

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

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

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

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

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

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

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

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

STATEMENT OF QA/QC PERFORMANCE

SE221112 R0

CLIENT DETAILS

Contact	Kaiyu Xu
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 9516 0722
Facsimile	(Not specified)
Email	kaiyu.xu@eiaustralia.com.au
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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	**SE221112 R0**
Date Received	28 Jun 2021
Date Reported	29 Jun 2021

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

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	Client	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	12 Soil
Date documentation received	28/6/2021	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	15°C	Sufficient sample for analysis	Yes
Turnaround time requested	Next Day		

HOLDING TIME SUMMARY

SE221112 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

Field pH for Acid Sulphate Soil — **Method: ME-(AU)-[ENV]AN104**

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH101_0.9-1.0	SE221112.001	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH101_1.4-1.5	SE221112.002	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH101_1.9-2.0	SE221112.003	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH101_2.4-2.5	SE221112.004	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH101_2.9-3.0	SE221112.005	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH101_3.4-3.5	SE221112.006	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH103_0.9-1.0	SE221112.007	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH103_1.4-1.5	SE221112.008	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH103_1.9-2.0	SE221112.009	LB227744	23 Jun 2021	28 Jun 2021	21 Jul 2021	29 Jun 2021	21 Jul 2021	29 Jun 2021
BH103_2.4-2.5	SE221112.010	LB227744	24 Jun 2021	28 Jun 2021	22 Jul 2021	29 Jun 2021	22 Jul 2021	29 Jun 2021
BH103_2.9-3.0	SE221112.011	LB227744	24 Jun 2021	28 Jun 2021	22 Jul 2021	29 Jun 2021	22 Jul 2021	29 Jun 2021
BH103_3.4-3.5	SE221112.012	LB227744	24 Jun 2021	28 Jun 2021	22 Jul 2021	29 Jun 2021	22 Jul 2021	29 Jun 2021

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

Field pH for Acid Sulphate Soil — **Method: ME-(AU)-[ENV]AN104**

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE221112.010	LB227744.012	pHf	pH Units	-	6.8	7.0	30	3
		pHfox	pH Units	-	5.7	6.9	30	19

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.

Sample Number	Parameter	Units	LOR

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

SE221112 R0

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

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

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

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Kaiyu Xu
Client	EI AUSTRALIA
Address	SUITE 6.01 55 MILLER STREET PYRMONT NSW 2009
Telephone	61 2 9516 0722
Facsimile	(Not specified)
Email	kaiyu.xu@eiaustralia.com.au
Project	**E24175 28 Elizabeth St, Liverpool NSW**
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Samples	12

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE221112A R0**
Date Received	28/6/2021
Date Reported	6/7/2021

COMMENTS

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

SPOCAS subcontracted to SGS Cairns, 2/58 Comport St, Portsmith QLD 4870, NATA Accreditation Number: 2562, Site Number: 3146. Report Number CE153560 and CE153500

SIGNATORIES

Moisture Content [AN002] Tested: 2/7/2021

PARAMETER	UOM	LOR	BH101_0.9-1.0 SOIL - 23/6/2021 SE221112A.001	BH101_1.9-2.0 SOIL - 23/6/2021 SE221112A.003	BH101_2.4-2.5 SOIL - 23/6/2021 SE221112A.004	BH103_0.9-1.0 SOIL - 23/6/2021 SE221112A.007	BH103_2.4-2.5 SOIL - 24/6/2021 SE221112A.010
% Moisture	%w/w	0.5	30	21	16	22	18

PARAMETER	UOM	LOR	BH103_2.9-3.0 SOIL - 24/6/2021 SE221112A.011
% Moisture	%w/w	0.5	20

TAA (Titratable Actual Acidity) [AN219] Tested: 2/7/2021

PARAMETER	UOM	LOR	BH101_0.9-1.0 SOIL - 23/6/2021 SE221112A.001	BH101_1.9-2.0 SOIL - 23/6/2021 SE221112A.003	BH101_2.4-2.5 SOIL - 23/6/2021 SE221112A.004	BH103_0.9-1.0 SOIL - 23/6/2021 SE221112A.007	BH103_2.4-2.5 SOIL - 24/6/2021 SE221112A.010
pH KCl*	pH Units	-	5.3	4.8	5.4	6.5	6.6
Titratable Actual Acidity	kg H2SO4/T	0.25	0.61	1.2	0.61	<0.25	<0.25
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	12	25	12	<5	<5
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	0.02	0.04	0.02	<0.01	<0.01
Sulphur (SKCl)	%w/w	0.005	<0.005	0.029	0.023	0.035	0.050
Calcium (CaKCl)	%w/w	0.005	0.11	0.13	0.025	0.11	0.18
Magnesium (MgKCl)	%w/w	0.005	0.11	0.14	0.088	0.11	0.099

PARAMETER	UOM	LOR	BH103_2.9-3.0 SOIL - 24/6/2021 SE221112A.011
pH KCl*	pH Units	-	4.6
Titratable Actual Acidity	kg H2SO4/T	0.25	1.2
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	25
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	0.04
Sulphur (SKCl)	%w/w	0.005	0.037
Calcium (CaKCl)	%w/w	0.005	0.17
Magnesium (MgKCl)	%w/w	0.005	0.19

TPA (Titratable Peroxide Acidity) [AN218] Tested: 2/7/2021

PARAMETER	UOM	LOR	BH101_0.9-1.0 SOIL - 23/6/2021 SE221112A.001	BH101_1.9-2.0 SOIL - 23/6/2021 SE221112A.003	BH101_2.4-2.5 SOIL - 23/6/2021 SE221112A.004	BH103_0.9-1.0 SOIL - 23/6/2021 SE221112A.007	BH103_2.4-2.5 SOIL - 24/6/2021 SE221112A.010
Peroxide pH (pH Ox)	pH Units	-	5.7	5.8	5.8	6.1	7.2
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	0.61	1.3	0.74	<0.25	<0.25
TPA as moles H+/tonne	moles H+/T	5	12	27	15	<5	<5
TPA as S % W/W	%w/w S	0.01	0.02	0.04	0.02	<0.01	<0.01
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	<5	<5	<5	<5
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01	<0.01	<0.01	0.30
ANCE as moles H+/tonne	moles H+/T	5	<5	<5	<5	<5	60
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01	<0.01	<0.01	0.10
Peroxide Oxidisable Sulphur (Spos)*	%w/w	0.005	0.015	0.010	0.018	0.011	0.016
Peroxide Oxidisable Sulphur as moles H+/tonne*	moles H+/T	5	10	6	11	7	10
Sulphur (Sp)	%w/w	0.005	0.020	0.039	0.041	0.046	0.066
Calcium (Cap)	%w/w	0.005	0.16	0.038	0.028	0.20	0.26
Reacted Calcium (CaA)*	%w/w	0.005	0.054	<0.005	<0.005	0.096	0.082
Reacted Calcium (CaA)*	moles H+/T	5	27	<5	<5	48	41
Magnesium (Mgp)	%w/w	0.005	0.12	0.15	0.096	0.12	0.13
Reacted Magnesium (MgA)*	%w/w	0.005	<0.005	0.007	0.008	<0.005	0.032
Reacted Magnesium (MgA)*	moles H+/T	5	<5	6	6	<5	26
Net Acid Soluble Sulphur as % w/w*	%w/w	0.005	-	-	-	-	-
Net Acid Soluble Sulphur as moles H+/tonne*	moles H+/T	5	-	-	-	-	-

PARAMETER	UOM	LOR	BH103_2.9-3.0 SOIL - 24/6/2021 SE221112A.011
Peroxide pH (pH Ox)	pH Units	-	5.5
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	1.5
TPA as moles H+/tonne	moles H+/T	5	30
TPA as S % W/W	%w/w S	0.01	0.05
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)*	%w/w	0.005	0.010
Peroxide Oxidisable Sulphur as moles H+/tonne*	moles H+/T	5	6
Sulphur (Sp)	%w/w	0.005	0.047
Calcium (Cap)	%w/w	0.005	0.010
Reacted Calcium (CaA)*	%w/w	0.005	<0.005
Reacted Calcium (CaA)*	moles H+/T	5	<5
Magnesium (Mgp)	%w/w	0.005	0.18
Reacted Magnesium (MgA)*	%w/w	0.005	<0.005
Reacted Magnesium (MgA)*	moles H+/T	5	<5
Net Acid Soluble Sulphur as % w/w*	%w/w	0.005	-
Net Acid Soluble Sulphur as moles H+/tonne*	moles H+/T	5	-

SPOCAS Net Acidity Calculations [AN220] Tested: 2/7/2021

PARAMETER	UOM	LOR	BH101_0.9-1.0 SOIL - 23/6/2021 SE221112A.001	BH101_1.9-2.0 SOIL - 23/6/2021 SE221112A.003	BH101_2.4-2.5 SOIL - 23/6/2021 SE221112A.004	BH103_0.9-1.0 SOIL - 23/6/2021 SE221112A.007	BH103_2.4-2.5 SOIL - 24/6/2021 SE221112A.010
s-Net Acidity	%w/w S	0.005	0.035	0.050	0.038	0.011	<0.005
a-Net Acidity	moles H+/T	5	22	31	23	7	<5
Liming Rate*	kg CaCO3/T	0.1	1.7	2.3	1.8	NA	<0.1
Verification s-Net Acidity*	%w/w S	-20	0.01	0.00	0.01	0.00	-0.06
a-Net Acidity without ANCE*	moles H+/T	5	22	31	23	7	10
Liming Rate without ANCE*	kg CaCO3/T	0.1	1.7	2.3	1.8	NA	NA

PARAMETER	UOM	LOR	BH103_2.9-3.0 SOIL - 24/6/2021 SE221112A.011
s-Net Acidity	%w/w S	0.005	0.050
a-Net Acidity	moles H+/T	5	31
Liming Rate*	kg CaCO3/T	0.1	2.4
Verification s-Net Acidity*	%w/w S	-20	0.00
a-Net Acidity without ANCE*	moles H+/T	5	31
Liming Rate without ANCE*	kg CaCO3/T	0.1	2.4

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.
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	SPOCAS 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.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
***	Indicates that both * and ** apply.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

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

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

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

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

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

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

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

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

STATEMENT OF QA/QC PERFORMANCE

SE221112A R0

CLIENT DETAILS

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Order Number	**E24175**
Samples	12

LABORATORY DETAILS

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SGS Reference	**SE221112A R0**
Date Received	28 Jun 2021
Date Reported	06 Jul 2021

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

HOLDING TIME SUMMARY

SE221112A R0

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

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

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

No holding time data is available for this job.

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

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

No surrogates were required for this job.

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

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

No method blanks were required for this job.

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

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

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

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

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

No duplicates were required for this job.

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

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

No laboratory control standards were required for this job.

Matrix 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

SE221112A R0

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

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

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

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