FOUNDATION EARTH SCIENCES

ACID SULPHATE SOIL ASSESSMENT (ASSA)

Property Address

29-31 and 41-45 Victoria Street, 27 Adelaide Street,
16 & 20 Brougham Street, East Gosford NSW

Prepared for

Bonython Elanora Pty Ltd

Date

May 2023

DOCUMENT CONTROL REGISTER

Document Information	
Job Number	E3019-2
Document Number	0
Report Title	Acid Sulphate Soil Assessment (ASSA)
Site Address	29-31 and 41-45 Victoria Street, 27 Adelaide Street, 16 & 20 Brougham Street, East Gosford NSW
Prepared for	Bonython Elanora Pty Ltd

Document Review			
Revision Number	**Date Issued**	**Description**	**Issued By**
0	24/05/2023	Initial Issue	Ben Buckley

Distribution Register		
Distribution Method	**Custodian**	**Issued to**
Electronic	B. Buckley	Foundation Earth Sciences Office
Electronic	R. Hulks	Bonython Elanora Pty Ltd

Authorisation and Release			
	Signature	**Name**	**Date**
Reviewed		Michael Silk B. Env Sc (CEnvP General)	24/05/2023
Authorised		Benjamin Buckley- Director B. Env Sc., BSc (Forensics)	24/05/2023

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF FIGURES & APPENDICES

ABBREVIATIONS

AASS	Actual Acid Sulphate Soils
AHD	Above Height Datum
ANC	Acid Neutralising Capacity
ASS	Acid Sulphate Soils
ASSMAC	Acid Sulphate Soils Management Advisory Committee
ASSMP	Acid Sulphate Soils Management Plan
BGL	Below Ground Level
DNR&M	Department of Natural resources and Mines
DO	Dissolved Oxygen
EC	Electric Conductivity
EIL	Ecological Investigation Level
EPA	Environmental Protection Authority
HIL	Health-based Investigation Level
LOR	Limit of reporting
NV	Neutralising Value
PASS	Potential Acid Sulphate Soils
POCAS	Peroxide Oxidation Combined Acidity and Sulphate
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
QASSIT	Queensland Acid Sulphate Soils Investigation Team
SPOCAS	Suspended Peroxide Oxidation Combined Acidity and Sulphate
SPOS	Peroxide Oxidisable
TAA	Total Actual Acidity
TCLP	Toxicity Characteristic Leaching Procedure
TPA	Total Potential Acidity
TSA	Total Sulfidic Acidity
TSS	Total Suspended Solids
VENM	Virgin Excavated Natural Material

1.0 INTRODUCTION

Foundation Earth Sciences (FES) was appointed by Bonython Elanora Pty Ltd to prepare an Acid Sulphate Soil Assessment (ASSA) for the property located at 29-31 and 41-45 Victoria Street, 27 Adelaide Street, 16 & 20 Brougham Street, East Gosford NSW ("the site"). The site is in the City of Gosford area.

The site is rectangular in shape and is currently occupied by several commercial entities. Lot 15 in DP1061216 is occupied by the Elanora Hotel, which is a licenced pub, restaurant, drive through bottle shop and large sealed driveway/carparking area. Lots 2, 3 & 4 in DP1016073 are occupied by a Motel, with several guest rooms and a grassed area. Lot 7 in DP658304 is occupied by a commercial dwelling, with several storefronts along Victoria Street and an external hand carwash to the rear of the Lot. Lot 7A in DP365458 is a sealed carparking area.

An ASSA assessment is required as disturbances to Potential Acid Sulphate Soil (PASS) or Actual Acid Sulphate Soils, which may occur during construction and excavation works, can result in the formation of acid. The acid, once formed, could then damage infrastructure or harm ecological systems. The results of the field parameters from this assessment should only be used as a preliminary study to determine if further investigations are required. If results exceed the criteria, then further work, including an ASS Management Plan, may be required.

2.0 OBJECTIVES

The purpose of the ASS Assessment is to determine the presence or absence of ASS at the site. In the absence of ASS, it is essential to assess for the presence of Potential Acid Sulphate Soils (PASS). If the results do not meet criteria an Acid Sulphate Soil Management Plan will be required.

This assessment reviewed the presence of ASS / PASS in the portion of the site that may require excavation.

3.0 SCOPE OF WORKS

The scope of works of the PASSA included:

- Review of previous environmental assessments;
- Site walkover;
- Targeted soil boring, sampling and testing for ASS at the site;
- Interpretation of field test analysis and findings;
- Laboratory Analysis and interpretation; and
- Reporting in accordance with relevant assessment guidelines / regulations

4.0 ASSESSMENT CRITERIA

When assessing ASS at sites in NSW, the Acid Sulphate Soils Management Advisory Committee 'Acid Sulphate Soil Manual' apply. The following national guidelines issued in June 2018 are also applicable:

- Australian Government Department of Agriculture and Water Resources (2018), National Acid Sulfate Soils Guidance – National Acid Sulfate Soil Sampling and Identification Methods Manual, June 2018.

The purpose of this report is to determine whether there is a probable risk associated with ASS or PASS and to determine whether these types of soils exist on the site.

This report has been prepared in accordance with the Acid Sulphate Soil Manual (1998) & National Acid Sulfate Soil Sampling and identification methods manual (2018).

Risk Map

A review of NSW Department of Land & Water Conservation (DLWC) Acid Sulphate Soil Risk Maps (Edition Two, December 1997, Scale 1:250,000) was undertaken**.** The risk maps do not detail the severity of the ASS, but only provide an indication that they may be present. The decision to classify certain areas as ASS is based on several geomorphic conditions and site criteria. The following points are used to determine if ASS is likely to exist (extracted from ASSMAC (1998) Acid Sulphate Soils Assessment Guidelines):

- Sediments of recent geological age (Holocene) ~ 10 000 yr.
- Soil horizons less than 5m AHD (Australian Height Datum).
- Marine or estuarine sediments and tidal lakes.
- In coastal wetlands or back swamp areas; waterlogged or scalded areas; interdune swales or coastal sand dunes.
- In areas where the dominant vegetation is mangroves, reeds, rushes and other swamp tolerant and marine vegetation.
- In areas identified in geological descriptions or in maps bearing sulphide minerals, coal deposits or former marine shales/sediments.
- Deeper older estuarine sediments >10m below the ground surface, Holocene or Pleistocene age.

Based on the above information in order to determine whether there is a potential for acid sulphate soils to be present within a site, reference was made to the NSW Department of Land & Water Conservation (DLWC) Acid Sulphate Soil Risk Maps (Edition Two, December 1997, Scale 1:250,000). A review of the “Gosford” map

indicated that the site is in "No Known Occurrences" of acid sulphate soil material within the soil profile.

A review of the "Central Coast Local Environmental Plan 2022, Acid Sulfate Soils Map", the site is in Class 5 area of acid sulphate soil material within the soil profile.

Assessment Criteria

The following soil indicators are used to determine if AASS is present on a site:

- field pH ≤4 in soils
- presence of shell
- any jarosite horizons or substantial iron oxide mottling in auger holes, in surface encrustations or in any material dredged or excavated and left exposed. Jarosite is not always found, however, in actual acid sulphate soils.

The following soil indicators are used to determine if PASS is present on a site:

- waterlogged soils, unripe muds (soft, buttery, blue grey or dark greenish grey) or estuarine silty sands or sands (mid to dark grey) or bottom sediments of estuaries or tidal lakes (dark grey to black)
- presence of shell
- soil pH usually neutral but may be acid -positive Peroxide Test (see section 7.2 Field pH results).

5.0 SITE INFORMATION

5.1 Site Identification

The site is identified as follows:

Table 1: Site Identification Review

Site Identifier	Site Details	
Site Location	29-31 and 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham St, East Gosford NSW	
Lot/DP	Lot 7 in DP658304 Lot 15 in DP1061216 Lot 2, 3 & 4 in DP1016073 Lot 7A in DP365458	
Site Coordinates #	N Corner: Latitude -33.438046, Longitude: 151.355208	
Site Area	Approximately 7686m^2	
Local Government Area (LGA)	Central Coast	
Zoning##	B2 – Local Centre	
Surrounding Land Uses	*North*	Adelaide St, Commercial then Residential
	South	Residential then Victoria St
	East	Brougham St then Residential
	West	Adelaide St then Commercial and Residential

Notes: # Six Maps
refer to NSW Planning Portal

5.2 Topography

The topography viewed on NSW ESPADE indicated the following for the Erina Landscape:

Undulating to rolling rises and low hills with local relief <60m and slopes <25%. Ridges and crests are moderately broad (100-300m) and valleys moderately narrow (300-800m). Slopes are gently to moderately inclined. Rock outcrop is rarely present. This landscape also occurs as footsteps and gently inclined crests and ridges closely associated with the steep hills of the Watagan (wn) soil landscape.

5.3 Local Geology & Surface Waters

The Geological Map of Gosford (Geological Series Sheet 9131 & Part Sheet 9231, Scale 1:100,000, 2015), published by the Geological Survey of NSW indicates the residual soils within the site to be underlain by Triassic aged interbedded laminite, shale and fine to coarse-grained quartz to quartz-lithic sandstone; minor red claystone.

The nearest downgradient watercourse is Erina creek located approximate 380m east of the site.

5.4 Proposed Development

The site is currently occupied by several commercial entities. Lot 15 in DP1061216 is occupied by the Elanora Hotel, which is a licenced pub, restaurant, drive through bottle shop and large sealed driveway/carparking area. Lots 2, 3 & 4 in DP1016073 are occupied by a Motel, with several guest rooms and a grassed area. Lot 7 in DP658304 is occupied by a commercial dwelling, with several storefronts along Victoria Street and an external hand carwash to the rear of the Lot. Lot 7A in DP365458 is a sealed carparking area.

It is proposed that the motel currently on the site will be cleared and expanded along Brougham Street. The proposed development plans indicate that the new Elanora Hotel will run through Lots 3 & 4 in DP 1016073, Lot 15 in DP1061216 and

Lot 7A in DP365458. The Hotel will be three storeys high, with each level having 15 rooms. The carparking area will be extended between the hotel and the Elanora Hotel pub, and a carparking area will be located underneath and extended outdoor eating eat. The current hand carwash dwelling will be removed to allow for more carparking spaces, which will be landscaped. The commercial dwelling along Victoria Street in Lot 7 in DP658304 will be refurbished into a bottle shop.

Refer to **Appendix B** - Proposed Development Plans.

5.5 Previous Reports

- Foundation Earth Sciences (2023), Detailed Site Investigation, 29-31 and 41-45 Victoria Street, 27 Adelaide Street, 16 & 20 Brougham Street, East Gosford NSW, prepared for Bonython Elanora Pty Ltd, dated 15th May 2023.

5.5.1 FES DSI

Foundation Earth Sciences was appointed by Bonython Elanora Pty Ltd to undertake a Detailed Site Investigation for the property situated 29-31 and 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham St, East Gosford NSW.

Soils sampled across the Site were assessed against the Site Acceptance Criteria (SAC) provided by the National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013) Table 1A – Commercial and Industrial D.

The soil data revealed the following:

- Asbestos was detected in the surface sample fragments denoted as F1 & F2. Further remediation works are required at this location.

The following lines of evidence support the low-risk groundwater conclusions in relation to site suitability:

- The elevated heavy metals of nickel and zinc are related to offsite regional contaminant concentrations and/or background levels & therefore of limited concern in relation to the GILs;
- Surface soil materials did not indicate a significant presence of the elevated groundwater analytes and therefore unlikely to be a source of the metal exceedances.
- The site is not located in a catchment with contains the water quality objectives of drinking water (i.e. beneficial use) and therefore drinking water guidelines were not applied; and
- The groundwater analysis indicated PFAS and ammonia were below the adopted guidelines.

Hazardous ground gas spot monitoring was undertaken in April to May 2023 and the data collected from the seven rounds indicates the following;

- The maximum concentration of methane recorded was 2.3% v/v from BH1 /GW1 during round six on 10th May, 2023 & round seven on the 12th May, 2023;
- The maximum concentration of carbon dioxide was recorded at 11.3% v/v from BH1 /GW1 during round five on 3RD May, 2023;
- The minimum concentration of oxygen recorded was 0% from BH1 /GW1 during round six on 10th May, 2023 & round seven on the 12th May, 2023;
- Carbon monoxide was detected at maximum concentration of 431ppm in BH3/GW3 during round one on the 19th April 2023;
- The maximum PID reading was recorded at 10.8ppm in BH3/GW3 in round one dated 19th April 2023;
- The maximum (LEL%) reading was recorded at 28% during round seven in BH1 / GW1 dated 12th May 2023;

Based on the historical review, environmental information, proposed development and laboratory results of the investigation, the site can be made ***suitable*** for the proposed development, subject to the following:

- It is considered that the site would be deemed suitable for the proposed development subject to the implementation of a Remediation Action Plan (RAP) to manage the abovementioned environmental concerns and data gaps.
- Completion of a longer-term ground gas monitoring program including continuous landfill gas monitoring and additional landfill gas monitoring wells to provide a more detailed assessment of the risk posed to the proposed development.
- Any soil requiring removal from the site, as part of future site works, should be classified in accordance with the "Waste Classification Guidelines, Part 1: Classifying Waste" NSW EPA (2014).

6.0 SOIL BORING AND SAMPLING

A soil sampling and analysis program was used to consolidate the nature and degree of Acid Sulphate Soils present in the surface and subsurface geology. Samples were collected from four (4) boreholes within the site. The borehole locations are presented in **Figure 2** – Site Borehole Location Plan.

Field analysis was performed on the collected samples for pH_f and pH_{fox} in accordance with the required sampling techniques outlined in the Acid Sulfate Soil Manual *(ASSMAC 1998).* This included the Field pH and peroxide test protocol.

6.1 Quality Assurance/Quality Control (QA/QC)

Standard QA/QC procedures were followed.

Standard sampling and analysing procedures are in accordance with and set out in the Acid Sulphate Soil Manual (1998) and Australian Government Department of Agriculture and Water Resources (2018), National Acid Sulfate Soils Guidance – National acid sulfate soil sampling and identification methods manual, June 2018.

7.0 FIELD RESULTS

7.1 Soil Observations

Based on information from all boreholes, the surface and sub-surface profile across the site is generalised as follows:

- Fill: Silty Clay, Silty Sandy Clay, Sandy Clay, Clayey Silt
- Natural: CLAY, Silty CLAY, Sandy CLAY
- Rock: SHALE and SANDSTONE

No unusual colouring or shells were detected in the soil. This suggests the presence of pyrite (iron sulphide) or jarosite was unlikely.

Refer to **Appendix A** – Borehole Logs.

7.2 Field pH Results

The results of the field pH tests are presented in the table below:

Table 2: Summary of field analysis results

Sample	Depth (m)	pH		pH		Change in pH (pH_f – pH_{fox})	Effervescence Reaction Rate
		H_2O	Soil pH_f	H_2O_2	Soil pH_{fox}		
ASSA1-1	0.4-0.5		6.7		5.1	1.5	Slight
ASSA1-2	0.9-1.0		4.9		3.9	1.0	Slight
ASSA1-3	1.4-1.5		4.8		3.7	1.1	Slight
ASSA1-4	1.9-2.0		4.3		4	0.3	Slight
ASSA1-5	2.4-2.5		4.5		4	0.3	Slight
ASSA1-6	2.9-3.0		4.4		4.2	0.2	Slight
ASSA1-7	3.4-3.5		4.4		4.3	0.1	Slight
ASSA1-8	3.9-4.0		4.4		4.3	0.1	Slight
ASSA2-0	0.1-0.2		4.5		4.4	0.1	Slight
ASSA2-1	0.5-0.6		4.5		4.8	-0.3	Slight
ASSA2-2	1.0-1.1		4.3		4.3	0	Slight
ASSA2-3	1.4-1.5		4.3		4.2	0.1	Slight
ASSA2-4	2-2.0		4.5		4.3	0.2	Slight
ASSA2-5	2.5-2.6		4.8		4.4	0.4	Moderate
ASSA2-6	3.0-3.1		4.6		4.5	0.1	Slight
ASSA2-7	3.5-3.6		4.9		4.7	0.2	Slight
ASSA2-8	3.9-4.0		4.7		4.5	0.2	Slight
ASSA3-1	0.4-0.5		5.1		4.9	0.2	Slight
ASSA3-2	1-1.1		4.5		4.5	0	Slight
ASSA3-3	1.4-1.5		4.4		4.3	0.1	Slight
ASSA3-4	1.9-2.0		4.5		4.1	0.4	Slight
ASSA3-5	2.4-2.5		4.5		4.1	0.4	Slight
ASSA3-6	2.9-3.0		4.8		3.9	0.9	Slight
ASSA3-7	3.4-3.5		4.8		4.3	0.5	Slight
ASSA3-8	3.9-4.0		4.8		4.3	0.5	Slight

ASSA4-1	0.4-0.5		6.3		6.1	0.2	Slight
ASSA4-2	0.9-1.0		4.5		5.1	-0.6	Slight
ASSA4-3	1.4-1.5		4.7		4.5	0.2	Slight
ASSA4-4	1.9-2.0		4.6		4.3	0.2	Slight
ASSA4-5	2.4-2.5		5.0		4.5	0.5	Slight
ASSA4-6	2.9-3.0		4.9		4.4	0.5	Slight
ASSA4-7	3.4-3.5		5.1		4.5	0.5	Slight
ASSA4-8	3.9-4.0		5		4.5	0.5	Slight

Notes:

- pH_f refers to pH field (soil and distilled H_2O).
- pH_{fox} refers to pH field oxidised (soil and peroxide).
- Change in pH refers to pH field minus pH field oxidised.
- **Highlighted** refers to detections.

To investigate the pH of the soils (pH_f) water was added to the soil samples. pH_f of all the investigated samples were above the pH of 4. *This indicates the soils from which the samples were collected did not contain actual Acid Sulphate Soils.*

To investigate the presence of PASS, 30% peroxide (H_2O_2) was added to soil samples and the resulting pH of the mixture was measured (field test protocols are presented in Appendix D of the ASSMAC (1998) Field pH and peroxide test protocol). The soil peroxide solution (pH_{fox}) results for all samples were above 3.5, most samples had a slight reaction rating, one had moderate and three of the samples pH did drop by more than one unit. *Based on the field analysis, further limited laboratory investigation was warranted.*

8.0 SUSPENDED PEROXIDE OXIDATION COMBINED ACIDITY & SULPHATE (SPOCAS) RESULTS

Following the field tests undertaken by FES (administered SGS Australia), five (5) soil samples from FES (collected from 13th April 2023) were submitted to the NATA certified laboratory of SGS Australia for the SPOCAS test.

The soils were assessed against the guidelines set out in Acid Sulphate Soils Management Advisory Committee (ASSMAC) (2008) *Acid Sulphate Soils Assessment Guidelines*. The action criteria selected was based on excavation of more than 1,000 tonnes of soils disturbed within the site. The results are assessed against the available criteria, those being:

All Texture Soils

- Sulphur Trail (S_{pos}) = 0.03%
- Acid Trail (TPA) = 18 mol H^+/tonne

The laboratory analysis results are presented in the following table:

Table 3: Laboratory Results - SPOCAS

Sample	Profile	Depth (m)	S-POS (%) (sulphur trail)	TAA (mol H^+/ tonne)	TPA (mol H^+/ tonne) (acid trail)	TSA (mol H^+/tonne) (Acid trail)	Lime Calculation (kg $CaCO_3$/t includes 1.5 safety factor).
Sampling dated 13th April 2023							
ASSA1-1	F- Silty Clay	0.4-0.5	<0.005	<5	<5	<5	<0.1
ASSA1-3	N- Silty CLAY	1.4-1.5	<0.005	27	**37**	10	2.2
ASSA1-6	N- Silty CLAY	2.9-3.0	<0.005	95	**130**	**35**	7.4
ASSA2-5	N- Sandy CLAY	2.5-2.6	<0.005	67	**87**	**20**	5.2
ASSA3-6	N- Silty CLAY	2.9-3.0	<0.005	85	**102**	17	6.5
ASSMAC Guidelines Fine, Medium & Coarse Texture		***-***	***0.03***	***-***	***18***	***18***	***-***

Notes:

- Guidelines follow the ASSMAC "Acid Sulphate Soils Assessment Guidelines 1998".
- Fine Texture Criteria based upon clay content of > or equal to 40%
- Medium Texture Criteria based upon clay content of 5-40%
- Criteria based upon less than 1000 tonnes disturbed
- **Bold values exceed ASSMAC guidelines**

When comparing the results summarised above in Table 3 to Table 4.4 (ASSMAC) for medium to coarse texture soils it can be determined that the percentage of oxidisable Sulphur (SPOS) in all the samples were below the action criteria. Acid trail (TPA/TSA) in some samples were above the action criteria as per the table above.

9.0 CHROMIUM REDUCIBLE SULPHUR RESULTS

Chromium Reducible sulphur method calculates the potential acidity from analysis of sulphide content. This method does not include sulphur from organics and sulphates (e.g. gypsum) and detects as low sulphide content and is therefore suitable to determine potential interferences caused by naturally occurring acidity within the soils. The laboratory results are presented in the following table:

Table 4: Laboratory Results – Chromium Reducible Sulphur

Sample	Depth	Chromium Reducible Sulphur (%)
Sampling dated 13th April 2023		
ASSA1-1	0.4-0.5	<0.005
ASSA1-3	1.4-1.5	<0.005
ASSA1-6	2.9-3.0	0.017
ASSA2-5	2.5-2.6	<0.005
ASSA3-6	2.9-3.0	<0.005
SPOS Action Criteria		**0.03**

The results from the Table 4 indicated the following:

- A lack of oxidisable sulphur compounds was detected within all the borehole locations.

10.0 DISCUSSION & RECOMMENDATION

The assessment of acid sulphate material can be quite complex and can have a lot of interferences associated with the test methods and soil matrix. The following points outline the evidence to support the site is ***NOT*** impacted to the maximum depth of sampling:

- Analysis using the pHf showed the soil indicators to be absence for AASS;
- Analysis using the pHfox field test protocol showed the soil indicators to be unlikely for AASS / PASS due to slight reaction rate in majority of field samples;
- Analysis via the SPOCAS test indicated the percentage of oxidisable Sulphur (SPOS) were below the relevant action criteria in all samples.
- Analysis using the Chromium reducible suite indicated that no inorganic sulphur sources were present above the relevant action criteria.
- FES has concluded the existing acid trail may have been consistent with organic occurring materials within the natural clays.
- The site is located at an elevation of approximately 11-14m AHD according to google earth. Acid Sulphate Soils occur in soil horizons *less than 5m AHD*.

Therefore, it has been determined that the site is ***NOT impacted by Acid*** **Sulphate Soils** within the borehole locations **ASSA1 to ASSA4** to a maximum depth of analysis. Therefore, an Acid Sulphate Soil Management plan (ASSMP) is not required for the site as it is not impacted with AASS/PASS to the maximum depth of analysis.

REFERENCES

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG) (2018).
- Australian Government Department of Agriculture and Water Resources (2018), National Acid Sulfate Soils Guidance – National Acid Sulfate Soil Sampling and Identification Methods Manual, June 2018.
- Foundation Earth Sciences (2023), Detailed Site Investigation, 29-31 and 41-45 Victoria Street, 27 Adelaide Street, 16 & 20 Brougham Street, East Gosford NSW, prepared for Bonython Elanora Pty Ltd, dated May 2023.
- Stone Y, Ahern C.R and Blunden B (1998), 'Acid Sulphate Soil Manual 1998', Acid Sulphate Soils Management Advisory Committee, Wollongbar, NSW, Australia.

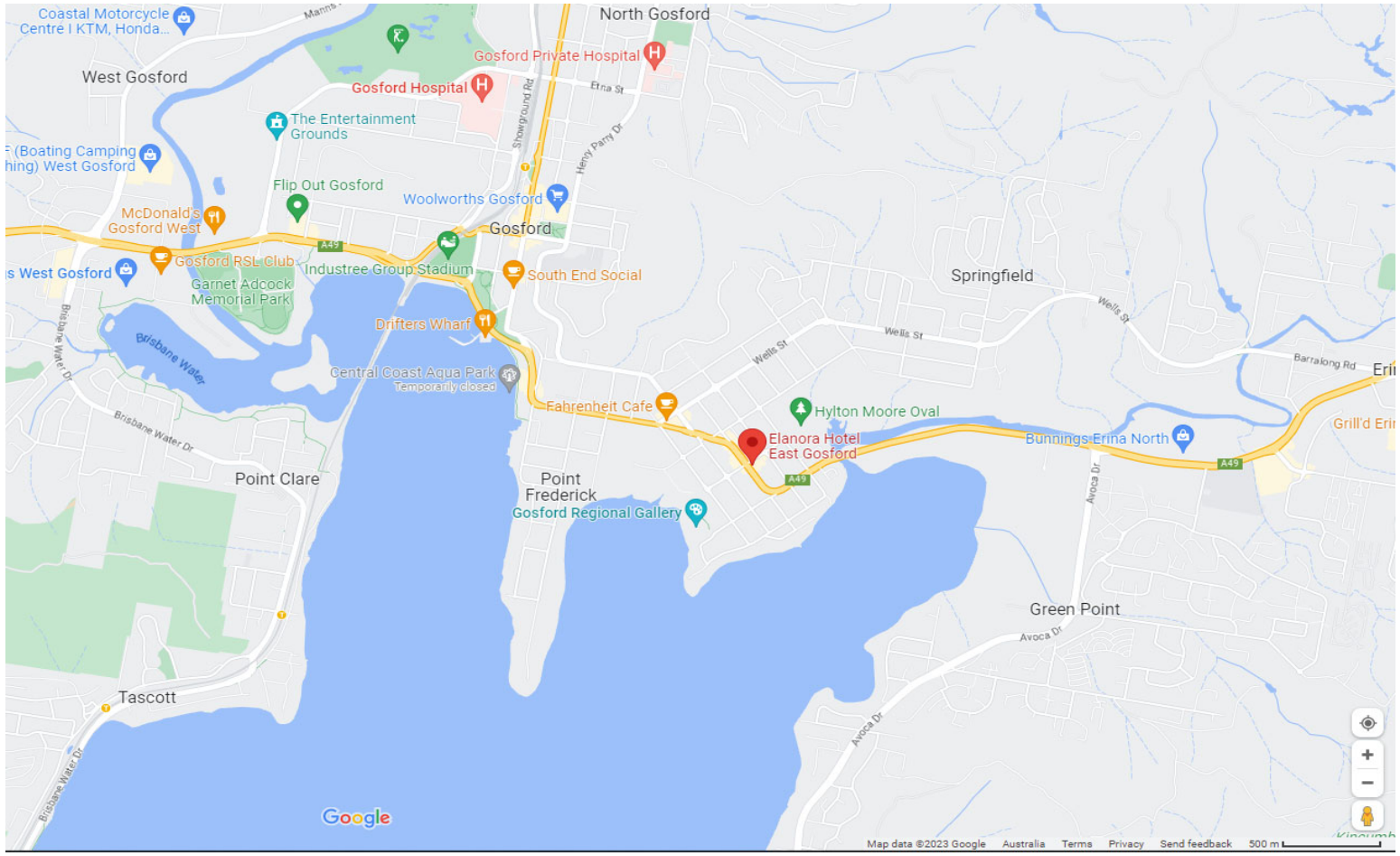
LIMITATIONS

Whilst to the best of our knowledge, information contained in this report is accurate at the date of issue, although subsurface conditions, including groundwater levels and contaminant concentrations, can change in a limited time. This should be borne in mind if the report is used after a protracted delay. There is always some disparity in subsurface conditions across a site that cannot be fully defined by investigation. Hence it is unlikely that measurements and values obtained from sampling and testing during environmental works carried out at a site will characterise the extremes of conditions that exist within the site.

There is no investigation that is thorough enough to preclude the presence of material that presently or in the future, may be considered hazardous at the site. Since regulatory criteria are constantly changing, concentrations of contaminants presently considered low may, in the future, fall under different regulatory standards that require remediation.

Opinions are judgements that are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions. Although the information provided by an Acid Sulphate Soils Assessment and Management Plan can reduce exposure to risks, no assessment, however diligently carried out, can eliminate them. It must be noted that these findings are professional findings and have limitations. Even a rigorous professional assessment may fail to detect all ASS and/or PASS on a site. Sulphates may be present in areas that were not surveyed or sampled.

FIGURE 1: LOCALITY MAP



Key Site Location	FOUNDATION EARTH SCIENCES	**DRAWN** KV	**SITE LOCATION**
		FIGURE 1	Bonython Elanora Pty Ltd
		Job # E3019-2	29-31 and 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham Street, East Gosford NSW

FIGURE 2: SITE BOREHOLE LOCATION PLAN

Key

Site Location

FES 2023 ASSA Sampling Locations

FOUNDATION EARTH SCIENCES

DRAWN KV	**Site Borehole Location Plan**
Figure 2	Acid Sulphate Soil Assessment
Job # E3019-2	29-31 and 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham Street, East Gosford NSW

APPENDIX A: BOREHOLE LOGS

BOREHOLE : BH1/ASSA1

FOUNDATION EARTH SCIENCES

CLIENT NAME: Bonython Elanora Pty Ltd **JOB NUMBER:** E3019-2

SITE ADDRESS: 29-31 & 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham Street, E.Gosford **PROJECT:** Acid Sulphate Soil Assessment

Date Started : 13/04/2023 **Completed :** 13/04/2023 **Logged By :** KV/DG **Checked By :** MS

Borehole Location : Refer to Site Plan **Surface RL :** --- **Datum :** m AHD

Equipment : Drilling Rig **Borehole Size :** 100mm **Slope :** -90°

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture	Consistence	Samples Tests Remarks	Additional Observations	Depth (m)
ADT	Seepage ▼ SWL observed @1.3m 17.04.2023 ▼			0.05			Asphalt				.	
							Fill: Silty Clay, Low to medium plasticity, dark brown, with traces of fine grained sand	M		ASSA1-1 0.4-0.5		0.5
				0.70		CL-CH	Silty CLAY, medium to high plasticity, yellow-orange-grey, with some fine grained sand	M		ASSA1-2 0.9-1.0	Seepage observed @0.7m 13.04.2023	1.0
										ASSA1-3 1.4-1.5		1.5
										ASSA1-4 1.9-2.0		2.0
				2.20		CL-CH	Silty CLAY, medium to high plasticity, yellow-orange-grey, with some fine grained sand	W		ASSA1-5 2.4-2.5	SWL observed @1.3m 17.04.2023	2.5
				3.00		CL-CH	CLAY, medium to high plasticity, orange-red-grey	W		ASSA1-6 2.9-3.0		3.0
										ASSA1-7 3.4-3.5		3.5
										ASSA1-8 3.9-4.0		4.0
				4.00			Borehole BH1/ASSA1 terminated at 4.00m					4.5
												5.0

Comments:

D - Dry, M - Moist, W - Wet

VS - Very Soft, S - Soft, F - Firm, St - Stiff, VSt - Very Stiff, H - Hard

VL - Very Loose, L - Loose, MD - Medium Dense, D - Dense, VD - Very Dense

BOREHOLE : BH2/ASSA2

FOUNDATION EARTH SCIENCES

CLIENT NAME: Bonython Elanora Pty Ltd **JOB NUMBER:** E3019-2

SITE ADDRESS: 29-31 & 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham Street, E.Gosford **PROJECT:** Acid Sulphate Soil Assessment

Date Started : 13/04/2023 **Completed :** 13/04/2023 **Logged By :** KV/DG **Checked By :** LM

Borehole Location : Refer to Site Plan **Surface RL :** --- **Datum :** m AHD

Equipment : Drilling Rig **Borehole Size :** 100mm **Slope :** -90°

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture	Consistence	Samples Tests Remarks	Additional Observations	Depth (m)
ADT				0.05		CL-CH	Asphalt Silty CLAY, medium to high plasticity, brown, with some fine to coarse grained sand	M		ASSA2-0 0.1-0.2		
				0.30		CL-CH	Silty CLAY, medium plasticity, red, with some fine to coarse grained sand	D		ASSA2-1 0.5-0.6		0.5
				1.0						ASSA2-2 1.0-1.1	SWL observed @1.05m 17.04.2023	1.0
				1.5						ASSA2-3 1.4-1.5		1.5
				2.00		CLS	Sandy CLAY, low plasticity, white	D		ASSA2-4 2.0-2.1		2.0
				2.5						ASSA2-5 2.5-2.6		2.5
				3.0						ASSA2-6 3.0-3.1		3.0
				3.50			Sandstone, red-white, Extremely weathered	D		ASSA2-7 3.5-3.6		3.5
				4.0						ASSA2-8 3.9-4.0		4.0
				4.00			Borehole BH2/ASSA2 terminated at 4.00m					
				4.5								4.5
				5.0								5.0

Comments:

D - Dry, M - Moist, W - Wet

VS - Very Soft, S - Soft, F - Firm, St - Stiff, VSt - Very Stiff, H - Hard

VL - Very Loose, L - Loose, MD - Medium Dense, D - Dense, VD - Very Dense

BOREHOLE : BH3/ASSA3

FOUNDATION EARTH SCIENCES

CLIENT NAME: Bonython Elanora Pty Ltd **JOB NUMBER:** E3019-2

SITE ADDRESS: 29-31 & 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham Street, E.Gosford **PROJECT:** Acid Sulphate Soil Assessment

Date Started : 13/04/2023 **Completed :** 13/04/2023 **Logged By :** KV/DG **Checked By :** LM

Borehole Location : Refer to Site Plan **Surface RL :** --- **Datum :** m AHD

Equipment : Drilling Rig **Borehole Size :** 100mm **Slope :** -90°

Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture	Consistence	Samples Tests Remarks	Additional Observations	Depth (m)
ADT				0.5			Fill: Silty Sandy Clay, low to medium plasticity, dark brown, with vegetable matter	M		ASSA3-1 0.4-0.5	.	0.5
				0.60		CH	Silty CLAY, high plasticity, light brown-orange, with some fine to coarse grained sand	M				
				1.0						ASSA3-2 1.0-1.1		1.0
				1.20		CH	Silty CLAY, high plasticity, red, with some fine to coarse grained sand and sandstone rocks	M				
				1.5						ASSA3-3 1.4-1.5		1.5
				2.0						ASSA3-4 1.9-2.0	SWL observed @1.7m 17.04.2023	2.0
				2.5						ASSA3-5 2.4-2.5		2.5
				3.0						ASSA3-6 2.9-3.0		3.0
				3.5						ASSA3-7 3.4-3.5		3.5
				4.0						ASSA3-8 3.9-4.0		4.0
				4.5								4.5
				4.50			Borehole BH3/ASSA3 terminated at 4.50m					
				5.0								5.0

Comments:

D - Dry, M - Moist, W - Wet

VS - Very Soft, S - Soft, F - Firm, St - Stiff, VSt - Very Stiff, H - Hard

VL - Very Loose, L - Loose, MD - Medium Dense, D - Dense, VD - Very Dense

BOREHOLE : BH16/ASSA4

FOUNDATION EARTH SCIENCES

CLIENT NAME: Bonython Elanora Pty Ltd **JOB NUMBER:** E3019-2

SITE ADDRESS: 29-31 & 41-45 Victoria St, 27 Adelaide St, 16 & 20 Brougham Street, E.Gosford **PROJECT:** Acid Sulphate Soil Assessment

Date Started : 13/04/2023 **Completed :** 13/04/2023 **Logged By :** KV/DG **Checked By :** LM

Borehole Location : Refer to Site Plan **Surface RL :** --- **Datum :** m AHD

Equipment : Drilling Rig **Borehole Size :** 100mm **Slope :** -90°

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Moisture	Consistence	Samples Tests Remarks	Additional Observations	Depth (m)
ADT			0.05			Asphalt					
						Fill: Silty Clay, low to medium plasticity, brown, with traces of fine grained sand	M		ASSA4-1 0.4-0.5		0.5
			0.60		CL-CH	Silty CLAY, medium to high plasticity, orange-brown	M		ASSA4-2 0.9-1.0		1.0
									ASSA4-3 1.4-1.5		1.5
			1.80		CL-CH	Silty CLAY, medium plasticity, red-grey-brown, with traces of fine graned sand and gravels	M		ASSA4-4 1.9-2.0		2.0
									ASSA4-5 2.4-2.5		2.5
									ASSA4-6 2.9-3.0		3.0
			3.20			SANDSTONE, Extremely Weathered, red with some gravels	D		ASSA4-7 3.4-3.5		3.5
									ASSA4-8 3.9-4.0		4.0
			4.00			Borehole BH16/ASSA4 terminated at 4.00m					4.5
											5.0

Comments:

D - Dry, M - Moist, W - Wet

VS - Very Soft, S - Soft, F - Firm, St - Stiff, VSt - Very Stiff, H - Hard

VL - Very Loose, L - Loose, MD - Medium Dense, D - Dense, VD - Very Dense

APPENDIX B: PROPOSED DEVELOPMENT PLANS

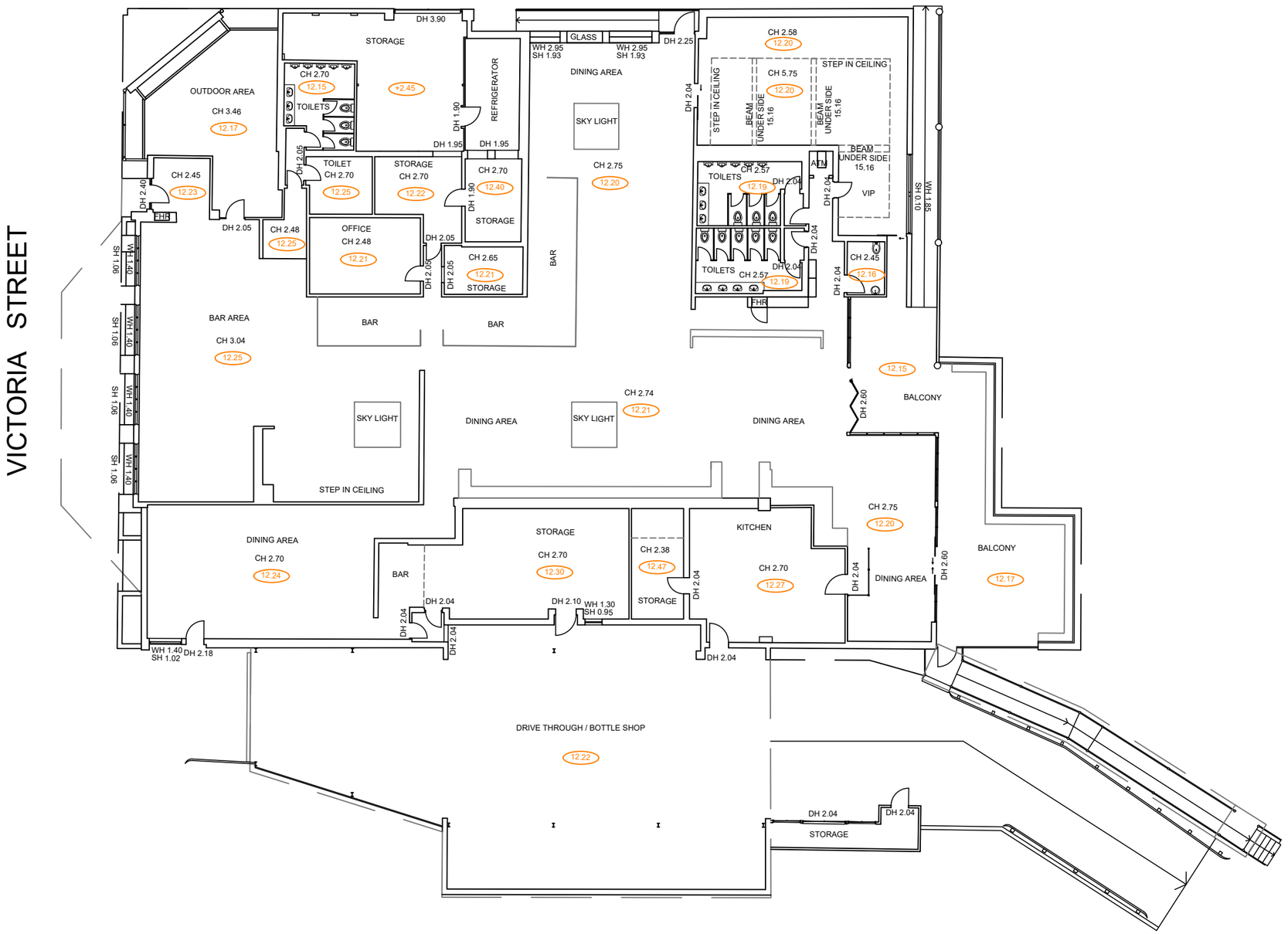
TSS TOTAL SURVEYING SOLUTIONS

LANE COVE | CAMDEN | MANLY VALE | CENTRAL COAST

PLAN SHOWING DETAIL & LEVELS UNDERGROUND

CLIENT:	Bonython Property & Investments Pty Limited
PROJECT:	Elanora Hotel
ADDRESS:	41 Victoria St, East Gosford NSW 2250

JOB No.: 190897	LGA: CITY OF GOSFORD
PLAN No.: 9000	DATUM: AHD
DATE: 17/10/2022	SCALE: 1:250@A3
DRAWN: EJ	CONT. INTERVAL: N/A
CHK: JS	SHEET 1 OF 4



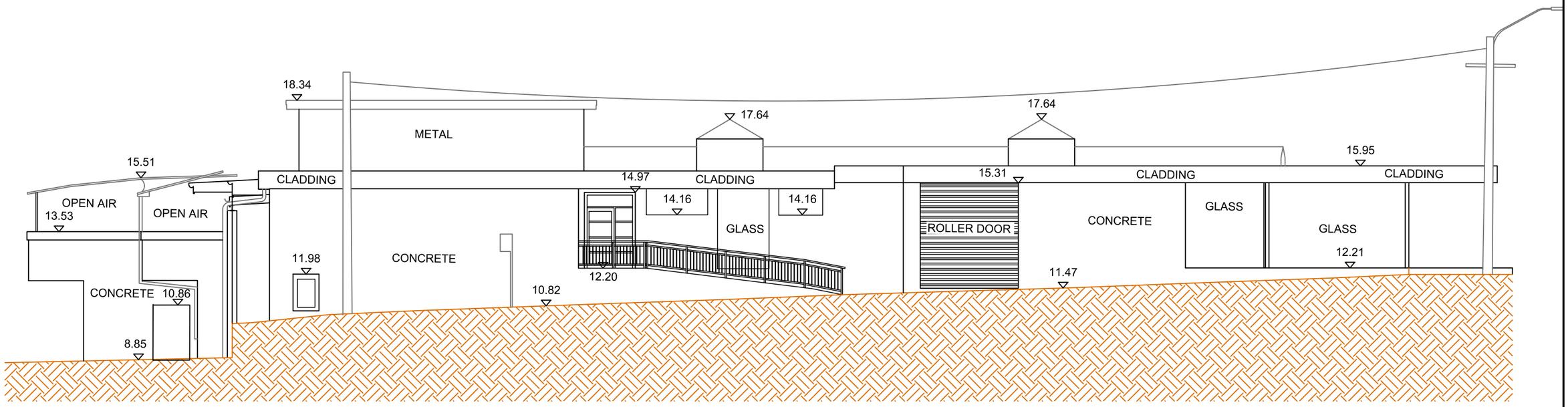
TSS TOTAL SURVEYING SOLUTIONS

LANE COVE | CAMDEN | MANLY VALE | CENTRAL COAST

NOTE:

PLAN SHOWING DETAIL & LEVELS GROUND

CLIENT:	Bonython Property & Investments Pty Limited	JOB No.: 190897	LGA: CITY OF GOSFORD
PROJECT:	Elanora Hotel	PLAN No.: 9001	DATUM: AHD
ADDRESS:	41 Victoria St, East Gosford NSW 2250	DATE: 17/10/2022	SCALE: 1:250@A3
		DRAWN: EJ	CONT. INTERVAL: N/A
		CHK: JS	SHEET 2 OF 4



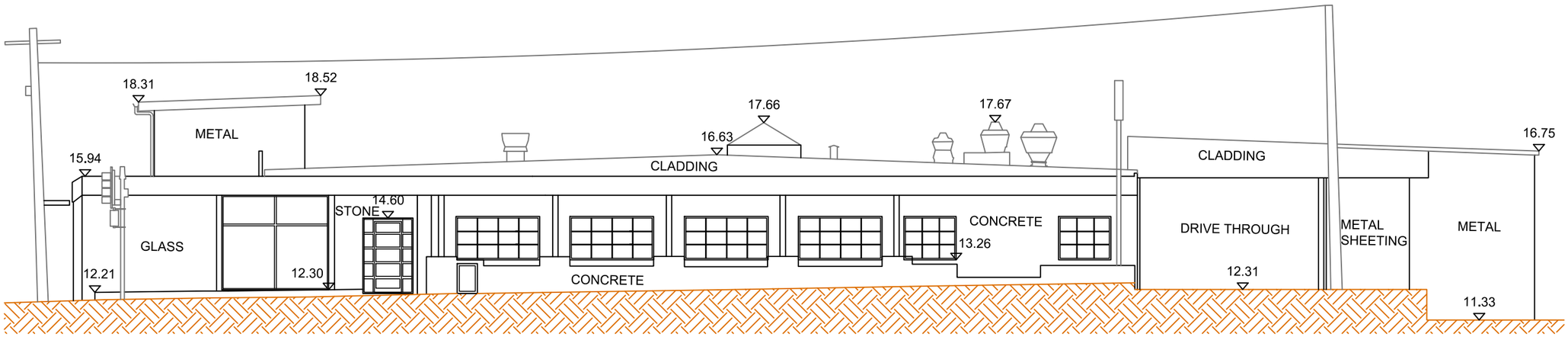
TSS TOTAL SURVEYING SOLUTIONS

LANE COVE | CAMDEN | MANLY VALE | CENTRAL COAST

ELEVATION SHOWING DETAIL & LEVELS
ADELAIDE STREET VIEW

CLIENT:	Bonython Property & Investments Pty Limited
PROJECT:	Elanora Hotel
ADDRESS:	41 Victoria St, East Gosford NSW 2250

JOB No.: 190897	LGA: CITY OF GOSFORD
PLAN No.: 9002	DATUM: AHD
DATE: 17/10/2022	SCALE: 1:150@A3
DRAWN: EJ	CONT. INTERVAL: N/A
CHK: JS	SHEET 3 OF 4



TSS TOTAL SURVEYING SOLUTIONS

LANE COVE | CAMDEN | MANLY VALE | CENTRAL COAST

ELEVATION SHOWING DETAIL & LEVELS VICTORIA STREET VIEW

CLIENT:	Bonython Property & Investments Pty Limited	JOB No.: 190897	LGA: CITY OF GOSFORD
PROJECT:	Elanora Hotel	PLAN No.: 9003	DATUM: AHD
ADDRESS:	41 Victoria St, East Gosford NSW 2250	DATE: 17/10/2022	SCALE: 1:150@A3
		DRAWN: EJ	CONT. INTERVAL: N/A
		CHK: JS	SHEET 4 OF 4


M.G.A.
VICTORIA STREET
ADELAIDE STREET
BROUGHAM STREET
STATION 3 BOLT EASTING 347025.360 NORTHING 6298883.618 LEVEL RL= 11.905 AHD
STATION 6 NAIL IN PATH EASTING 347062.473 NORTHING 6298909.687 LEVEL RL= 10.140 AHD
STATION 2 SSM 98633 EASTING 347120.142 NORTHING 6298950.510 LEVEL RL= 6.937 AHD
STATION 617 NAIL IN PATH EASTING 347045.614 NORTHING 6298854.472 LEVEL RL= 12.486 AHD
STATION 618 NAIL IN PATH EASTING 347071.236 NORTHING 6298820.016 LEVEL RL= 13.07 AHD
STATION 5 DRILL HOLE IN CONC EASTING 347115.993 NORTHING 6298872.553 LEVEL RL= 8.808 AHD
STATION 4 DRILL HOLE IN PATH EASTING 347160.868 NORTHING 6298894.096 LEVEL RL= 6.560 AHD
KEY
DENOTES COUNCIL WATER MAIN
DENOTES COUNCIL SEWER MAIN
DENOTES GAS MAIN
DENOTES TELSTRA CABLES (SCALED LOCATION ONLY)
DENOTES AERIAL ELECTRICAL CABLES
DENOTES GAS MAIN VALVES
DENOTES HYDRANT
DENOTES STOP VALVE
DENOTES POWER POLE
DENOTES NBN & TELSTRA PITS
DENOTES COUNCIL SEWER MANHOLES
DENOTES WATER SERVICE VALVE
ELANORA HOTEL
No. 41
METAL ROOF
EXISTING LOT 15
D.P. 1061216
PROPOSED LOT 151
PROPOSED AREA
2758m²
COVERED DRIVE-THROUGH BOTTLE SHOP
ELANORA MOTEL
LOT 2
D.P. 1016073
AREA 941.7m²
LOT 3
D.P. 1016073
AREA 504.5m
LOT 4
D.P. 1016073
VACANT
AREA 504.7m²
PROPOSED RIGHT OF ACCESS 6 WIDE & VAR. WIDTH
(BURDENS LOT 153 & BENEFITS LOT 151)
PROPOSED LOT 152
EXISTING CAR PARK
BOSE
EXISTING BOUNDARY DP 658304
MICHAELS
29–31 VICTORIA ST
THAI MASSAGE
LOT 7
DP 658304
VISHALS INDIAN RESTAURANT
PROPOSED LOT 152
PROPOSED AREA
1097m²
BRICK WORK SHOP
METAL ROOF
EXISTING BOUNDARY DP 365458
PROPOSED AREA
1969m²
16 BROUGHAM ST
EXISTING CAR PARK
LOT 7A
DP 365458
EXISTING 1.83m WIDE DRAINAGE EASEMENT
(SEE PLAN WITH DLG M544530)
LOT 501
DP 630522
SP 64387
DP 630522
BRICK FIRE STATION
TWO STOREY BRICK UNITS (TOWN HOUSES)
PROPOSED B'DRY REALIGNMENT
CONCRETE DRIVEWAY
PEDESTRIAN WALL
TERRACE
300mm PVC PIPE
COUNCIL SEWER MAIN (SCALED LOCATION ONLY)
APPROX. LOCATION OF PIPE
www.dialbeforeyoudig.com.au
DIAL 1100 BEFORE YOU DIG

CAUTIONS :

1) THIS SURVEY HAS BEEN PREPARED FOR THE PURPOSE OF DETAIL & CONTOUR ONLY. THE LOCATION OF ANY FENCING OR STRUCTURE IN RELATION TO THE BOUNDARIES HAS NOT NECESSARILY BEEN EXACTLY DETERMINED.
2) UTILITY SERVICES SHOWN HAVE BEEN LOCATED BY SURVEY WHERE THEY ARE VISIBLE AND APPARENT. HOWEVER, THE APPROXIMATE POSITION OF UNDERGROUND SERVICES MAY HAVE ALSO BEEN PLOTTED FROM UTILITY AUTHORITY PLANS, AND THIS PLAN MUST BE READ IN CONJUNCTION WITH THE RELEVANT UTILITY AUTHORITY PLANS.
3) THE LOCATION OF SERVICES ARE TO BE VERIFIED BY OBTAINING CURRENT INFORMATION FROM "DIAL BEFORE YOU DIG" (PHONE 1100) PRIOR TO DESIGN/CONSTRUCTION WORKS. ALTERNATIVELY, THE EXACT LOCATION OF SERVICES SHOULD BE DETERMINED BY FIELD SURVEY IN CONSULTATION WITH THE SERVICE AUTHORITIES WHERE DEEMED NECESSARY.

(A) – EXISTING RIGHT OF WAY, 3.0m WIDE (SEE DP 1016073)
(B) – EXISTING RIGHT OF WAY, 2.0m WIDE (SEE DP 1016073)
NOTE: THE RIGHT OF WAY SHOWN AS (B) IS LIMITED IN HEIGHT TO A LOWER LIMIT OF RL 8.75 AHD AND AN UPPER LIMIT OF RL 11.45 AHD (SEE DP 1016073)

CAD FILE: 190897_DETAIL.dwg
THIS PLOT: 05-06-2019 10:43
REFERENCE: 190897.000

SCALE: 1:200 @ A1 SHEET
DATUM: Australian Height Datum
DATE 31/05/2019

STEPHEN THORNE AND ASSOCIATES
TSS Total Surveying Solutions Pty Ltd
3/127 ERINA STREET, GOSFORD. 2250
Phone (02)4323-1255 Email stsurvey@bigpond.net.au
P.O. BOX 1315 GOSFORD NSW 2250
A.C.N. 603 458 546 A.B.N. 53 603 458 546

DETAIL AND CONTOUR SURVEY OVER
LOT 15 DP 1061216 & 7A DP 365458
No. 41–45 VICTORIA STREET, EAST GOSFORD

ORIGIN OF LEVELS PM 19194 RL=11.932 AHD

0 4 8 12 16 20
SCALE OF METRES 1:200

amendments

PLAN NUMBER 190897
ISSUE A
SHEET 1 OF 1 SHEETS

loopcreative

Elanora Hotel

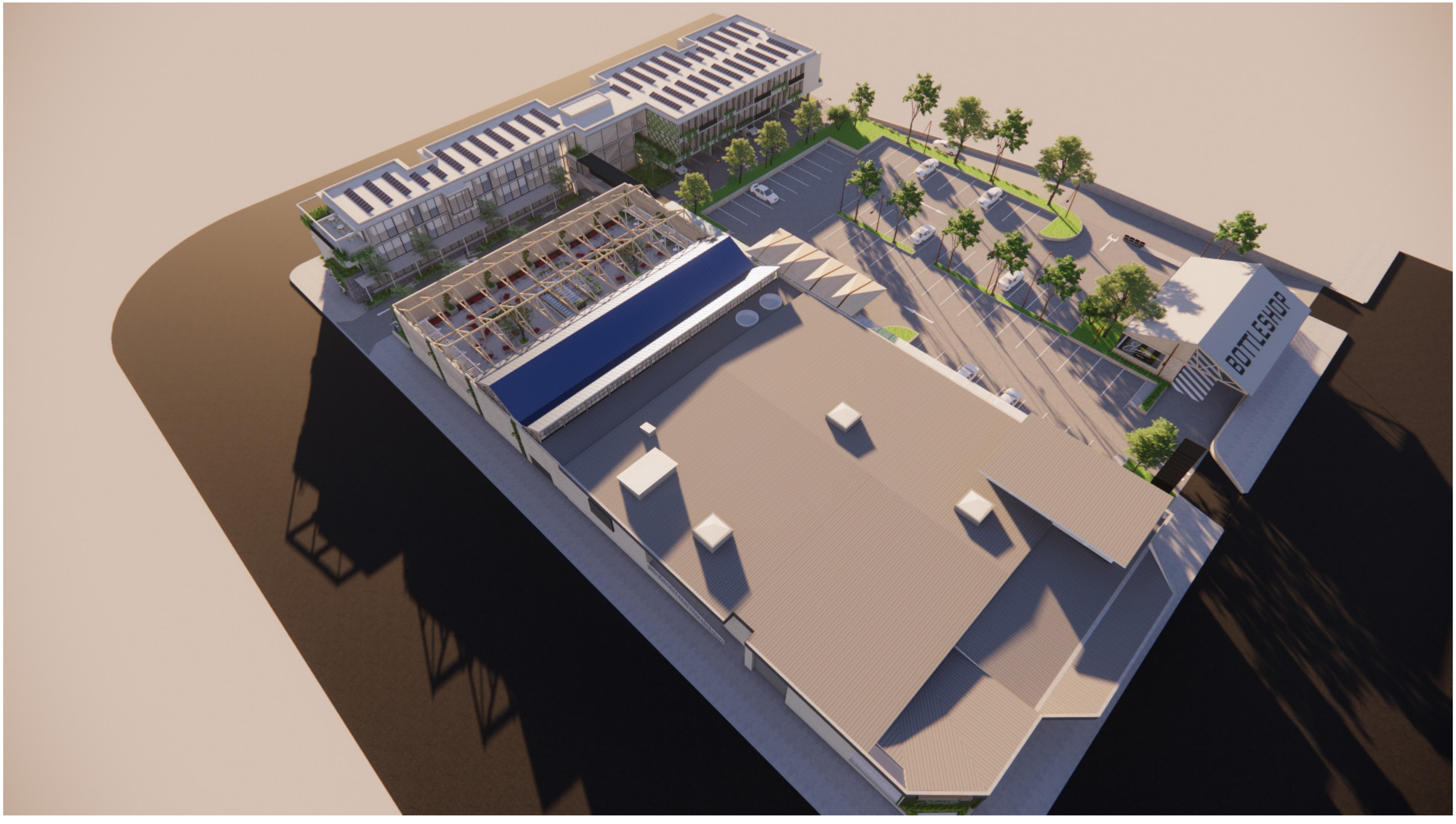
Concepts

01.03.2023

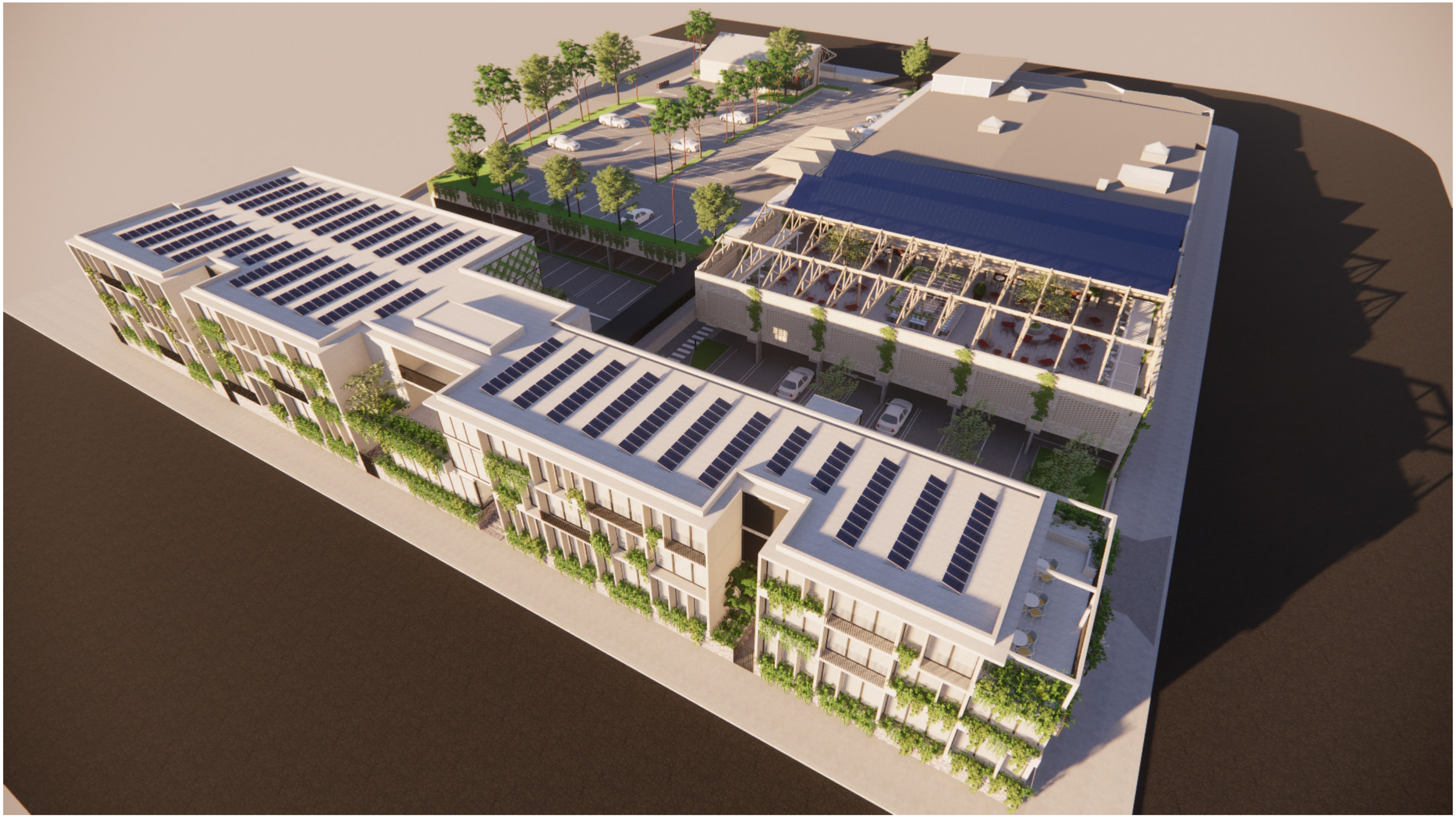
ROD FAUCHEUX Studio 55 / 61 Marlborough Street Surry Hills Sydney NSW Australia | +612 9698 6888
www.loopcreative.com.au

Concept

Concept



Concept



Concept

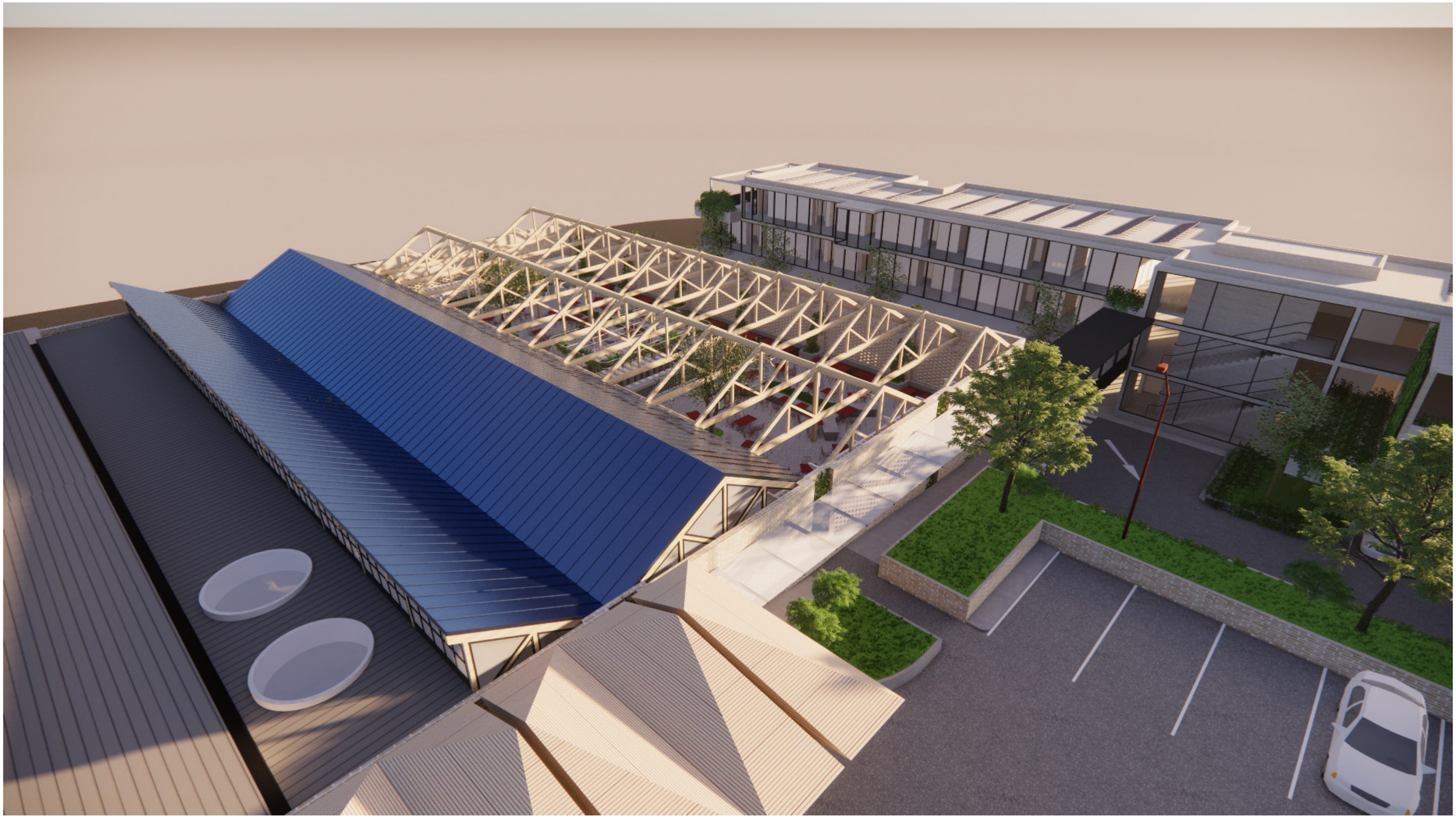
Concept

Concept

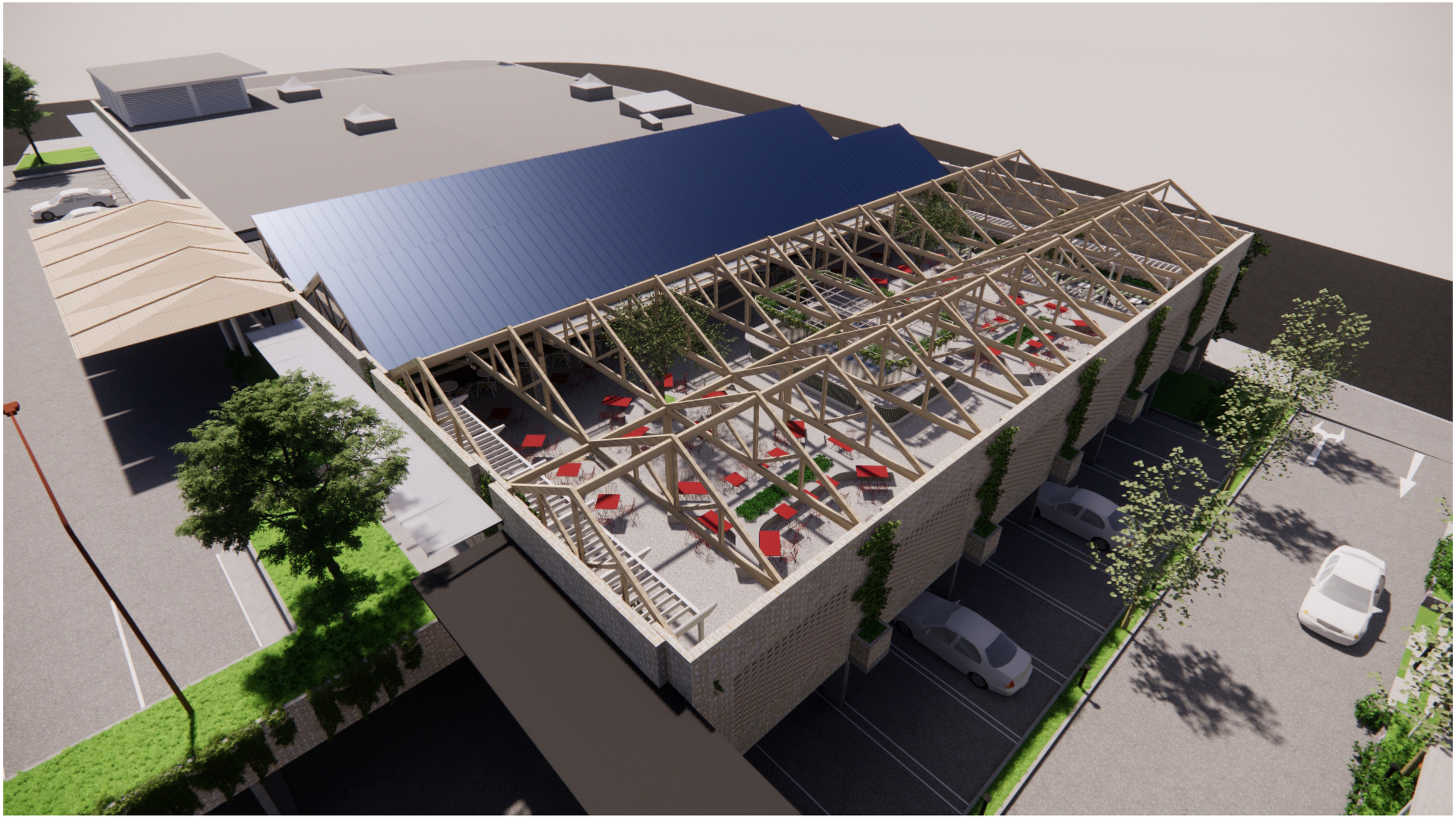
Concept

Concept

Concept



Concept

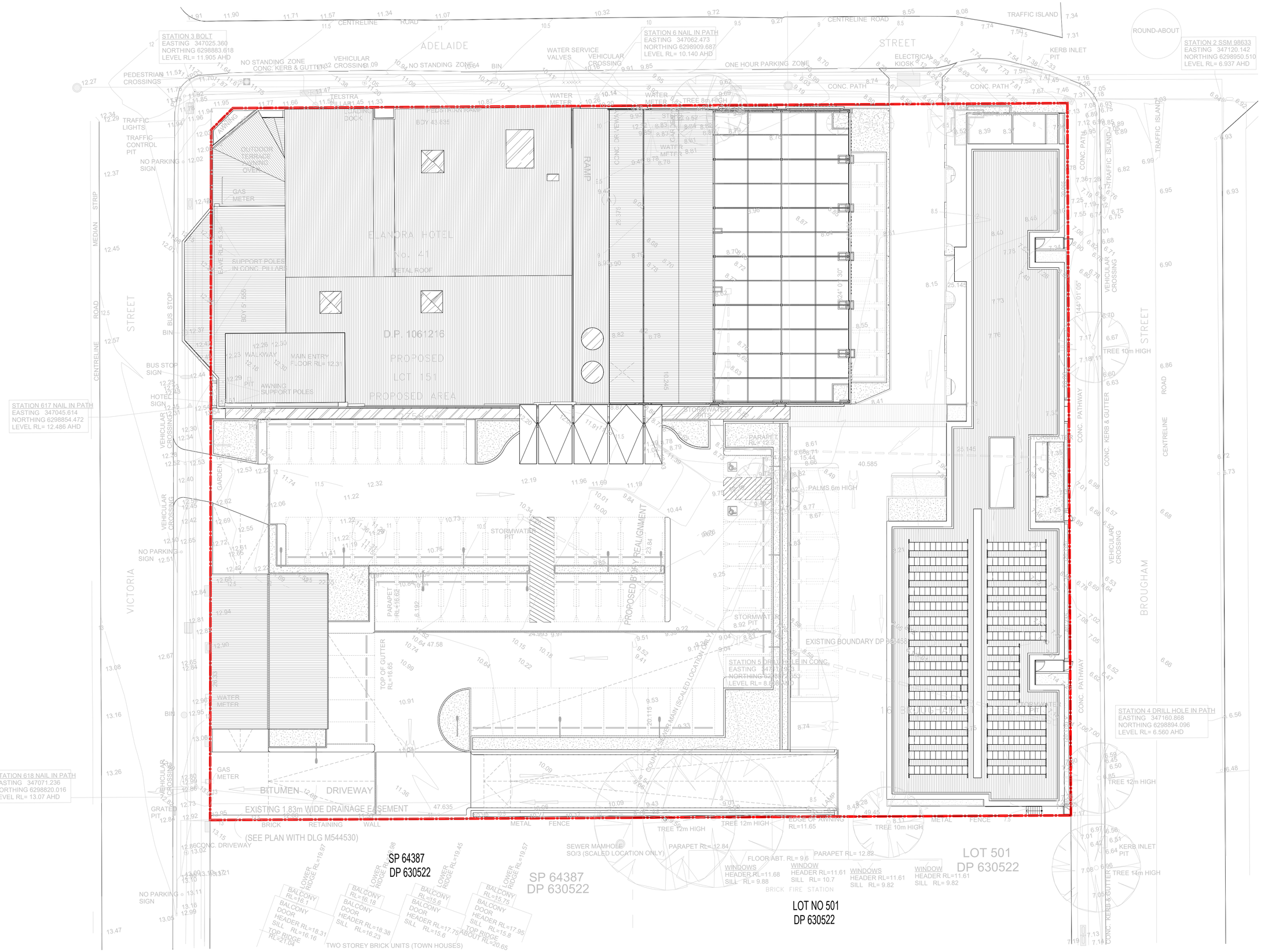


loopcreative

Elanora Hotel

Concepts

01.03.2023



1 SITE PLAN / SITE ANALYSIS
SCALE 1 : 200

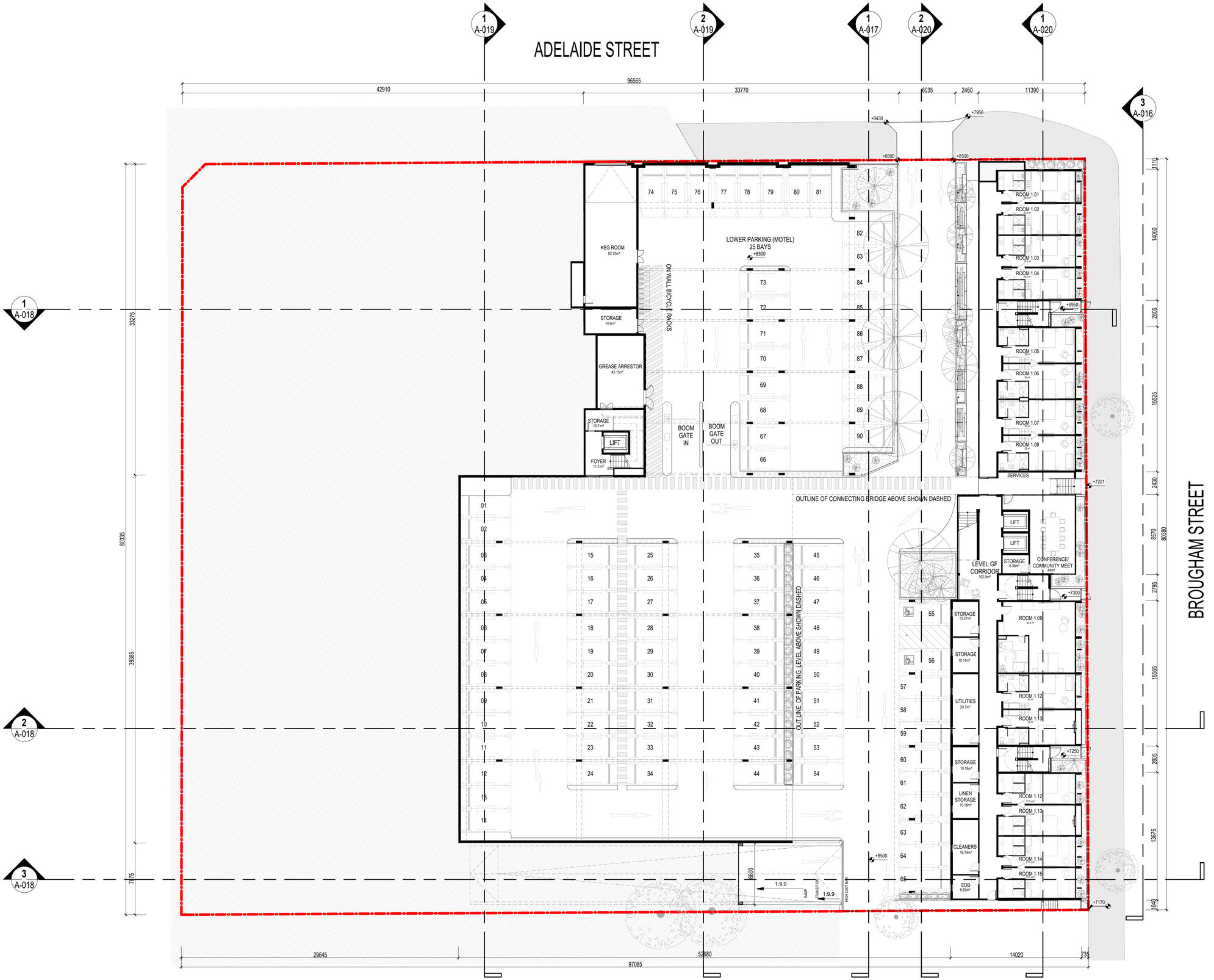
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	SITE PLAN / SITE ANALYSIS
Scale @A1	1 : 200
Project No	22039
Drawing No	A-011
Revision	01



A LOWER GROUND FLOOR PLAN
SCALE 1 : 200

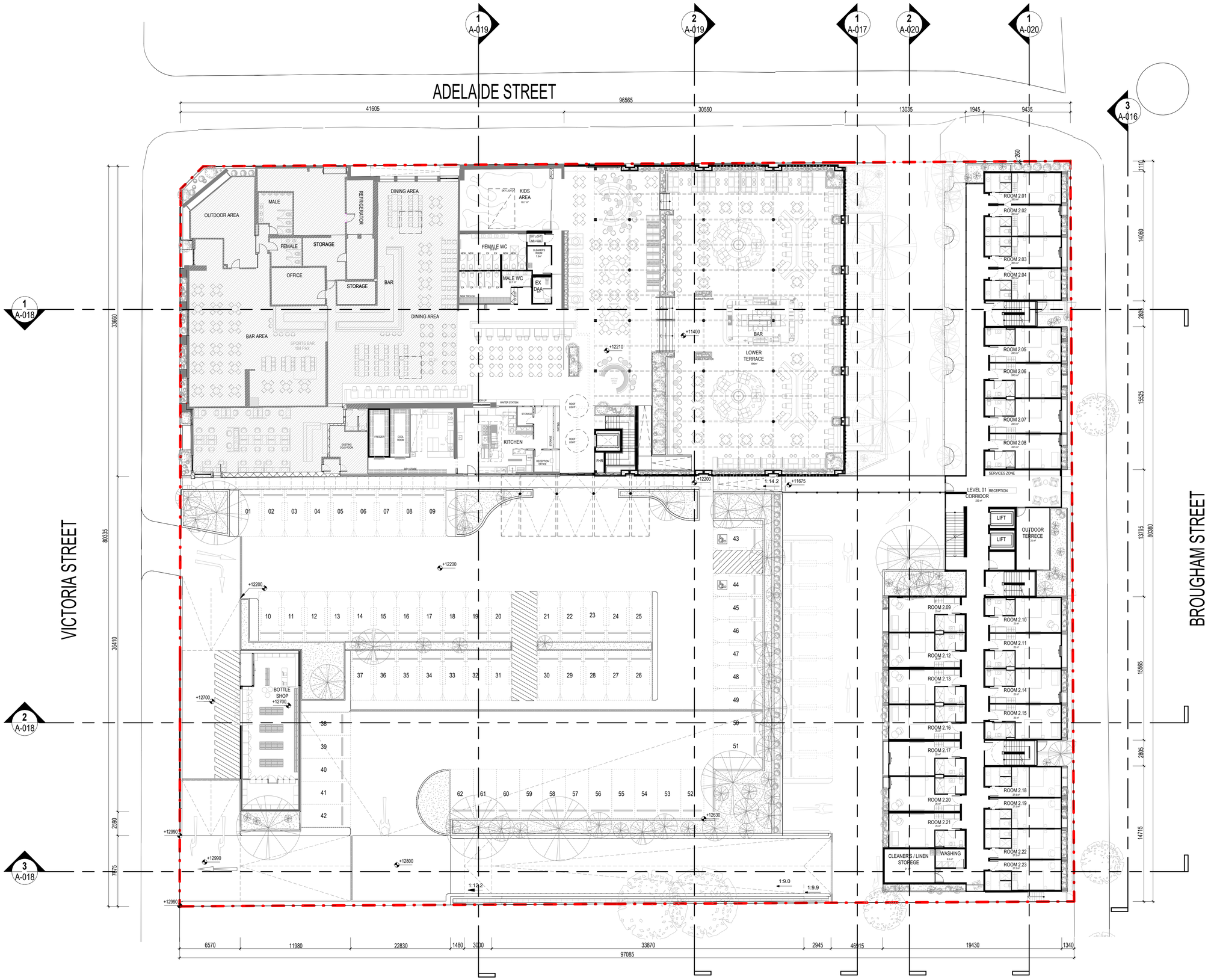
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	LOWER GROUND FLOOR PLAN
Scale @A1	1 : 200
Project No	22039
Drawing No	A-012
Revision	01



A GROUND FLOOR PLAN
SCALE 1 : 200

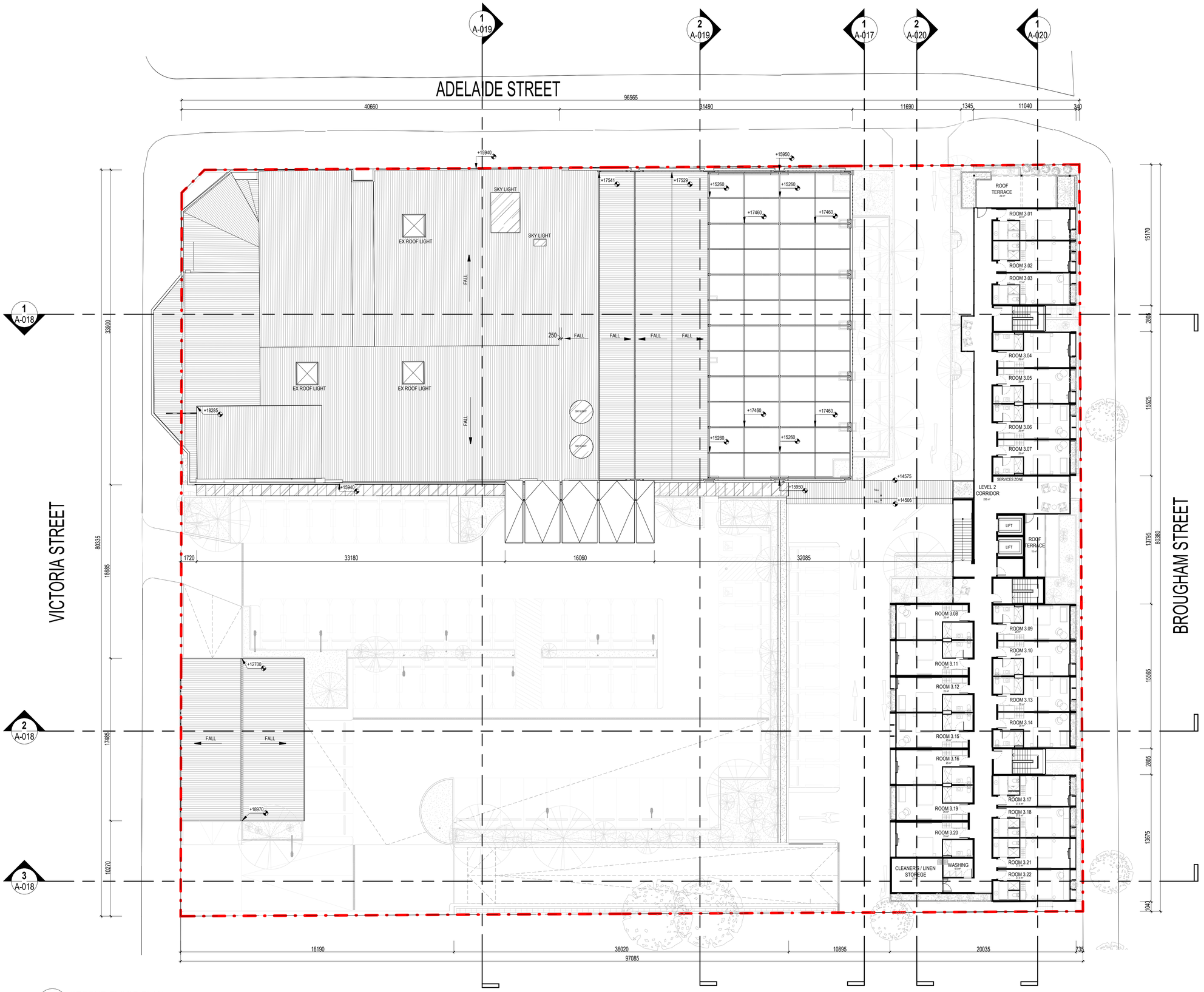
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	GROUND FLOOR PLAN
Scale @A1	1 : 200
Project No	22039
Drawing No	A-013
Revision	01



1 SECOND FLOOR PLAN
SCALE 1 : 200

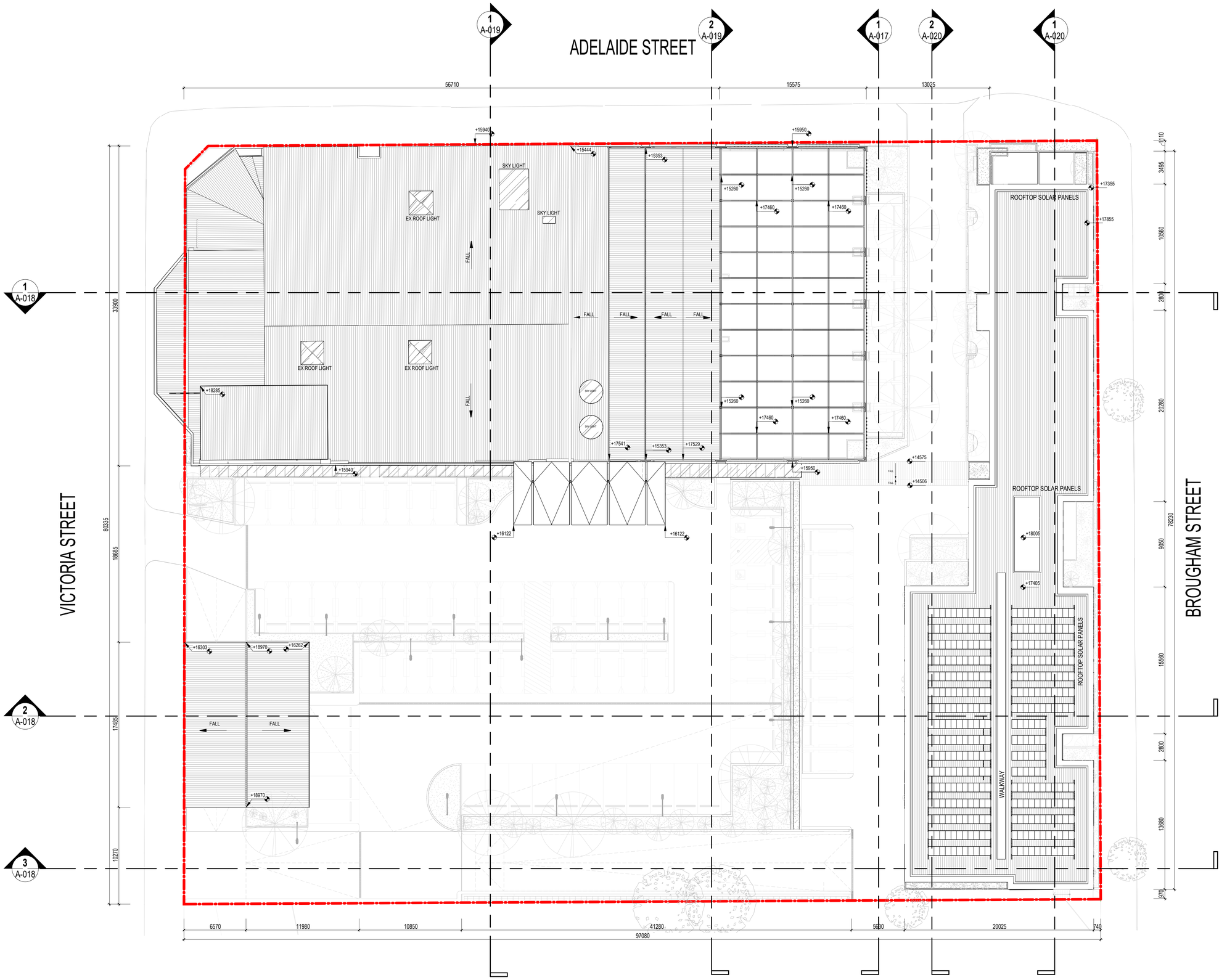
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	SECOND FLOOR PLAN
Scale @A1	1 : 200
Project No	22039
Drawing No	A-014
Revision	01



A ROOF PLAN
SCALE 1 : 200

loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

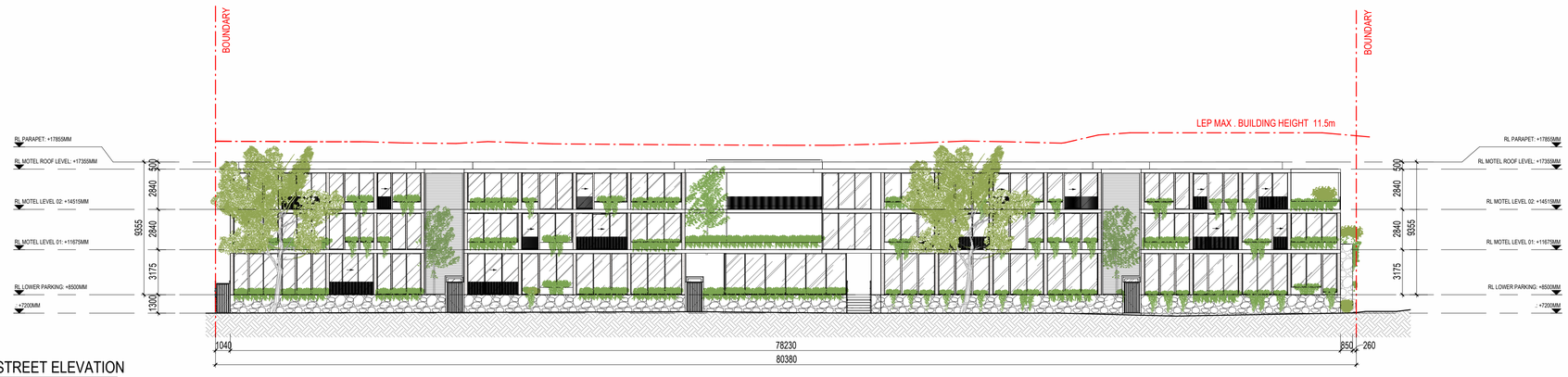
02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	ROOF PLAN
Scale @A1	1 : 200
Project No	22039
Drawing No	A-015
Revision	01

1 VICTORIA STREET ELEVATION
SCALE 1 : 200

2 ADELAIDE STREET ELEVATION
SCALE 1 : 200



3 BROUGHAM STREET ELEVATION
SCALE 1 : 200

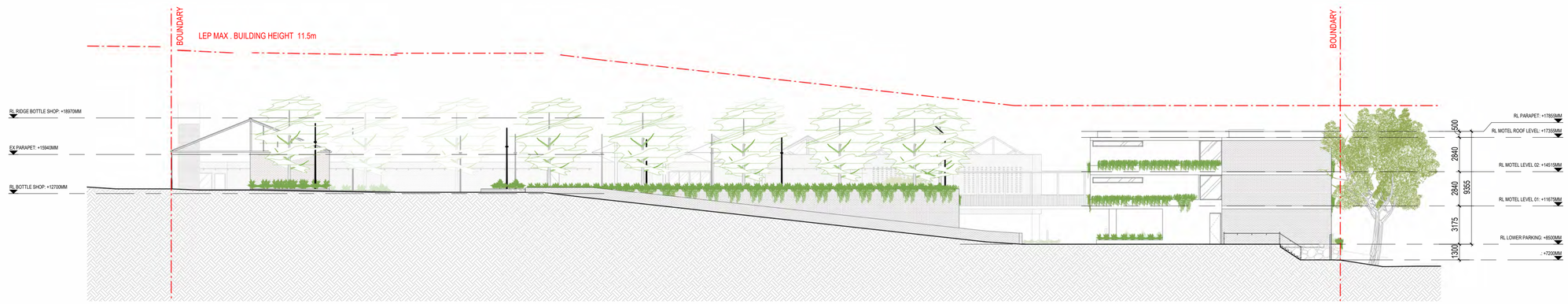
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

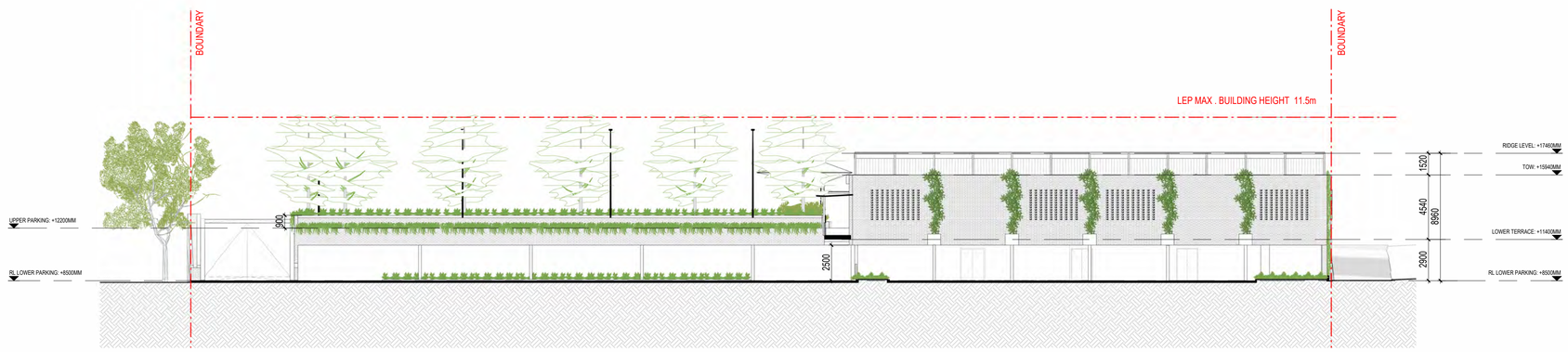
02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	ELEVATION
Scale @A1	1 : 200
Project No	22039
Drawing No	A-016
Revision	01



2 STREET ELEVATION
SCALE 1 : 200



1 INSIDE BROUGHAM ELEVATION
SCALE 1 : 200

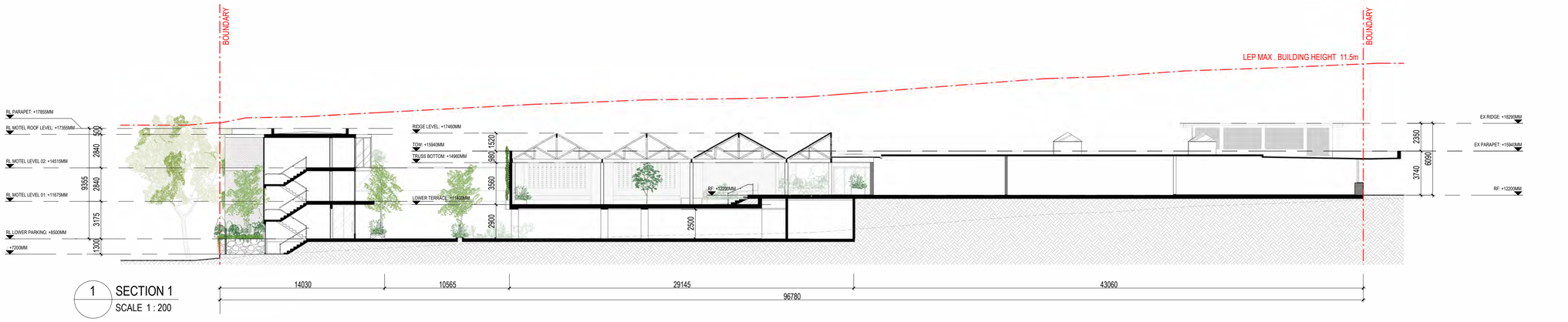
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

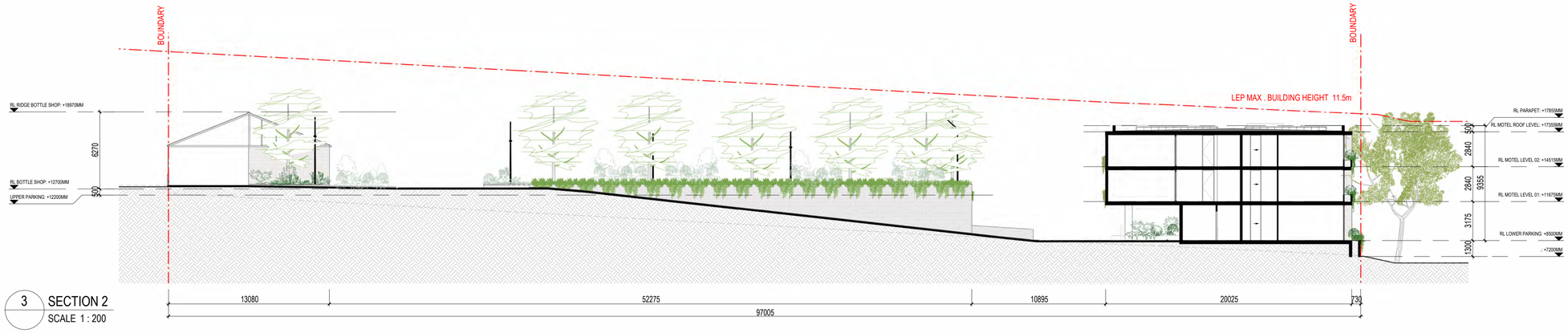
02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

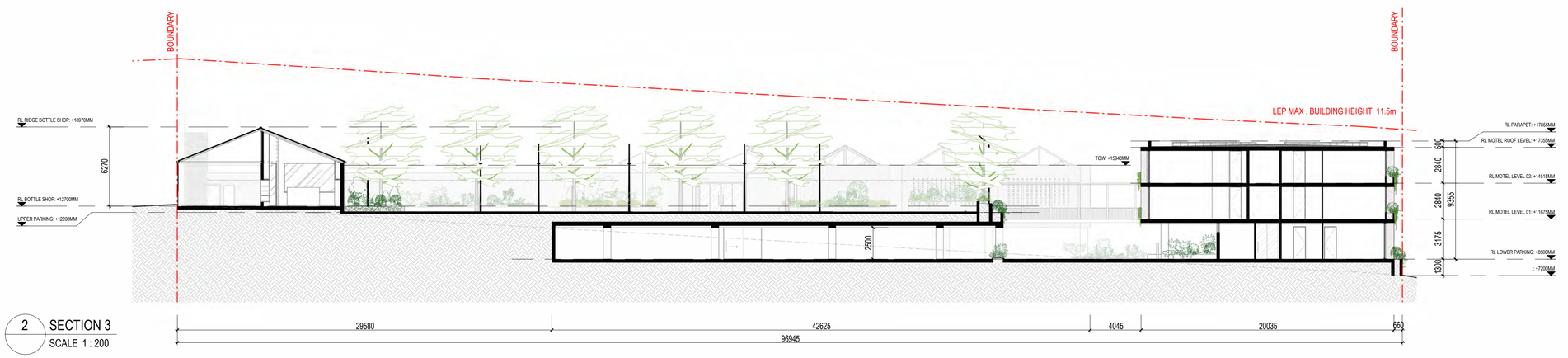
Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	ELEVATION
Scale @A1	1 : 200
Project No	22039
Drawing No	A-017
Revision	01



1 SECTION 1
SCALE 1 : 200



3 SECTION 2
SCALE 1 : 200



2 SECTION 3
SCALE 1 : 200

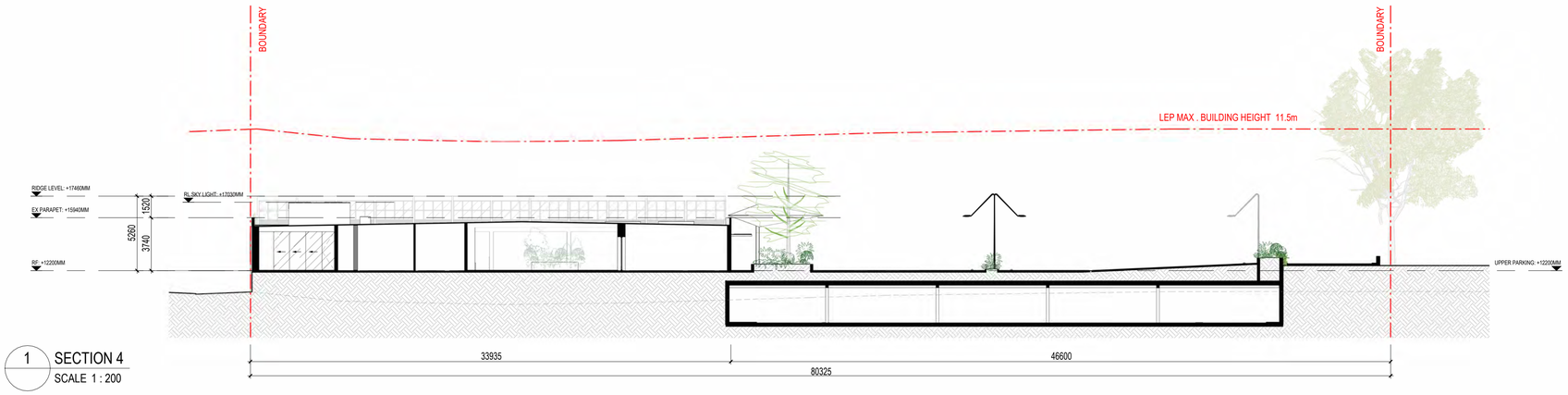
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

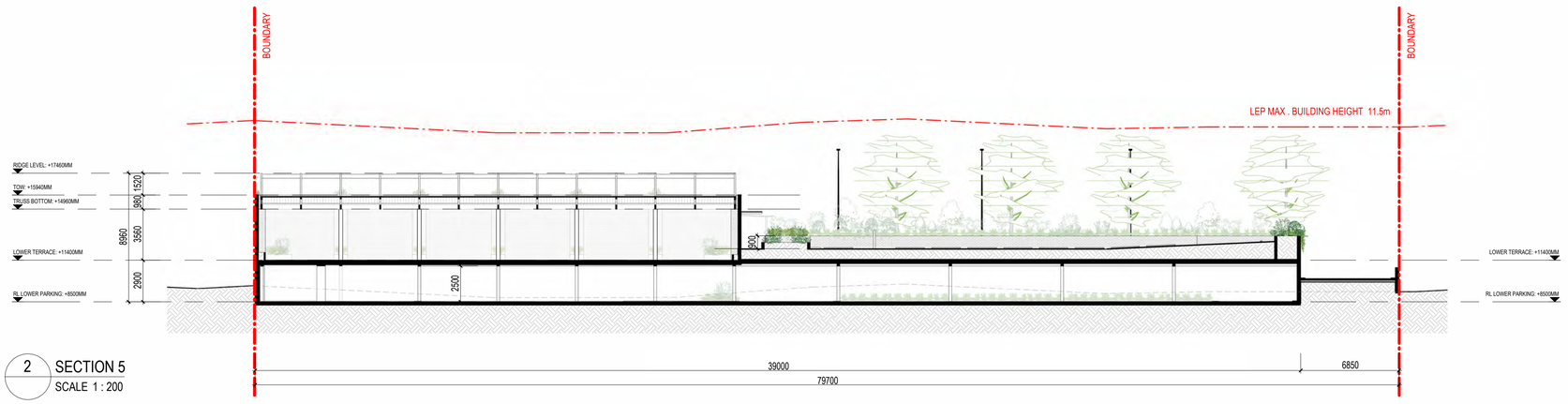
02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	SECTION
Scale @A1	1 : 200
Project No	22039
Drawing No	A-018
Revision	01



1 SECTION 4
SCALE 1 : 200



2 SECTION 5
SCALE 1 : 200

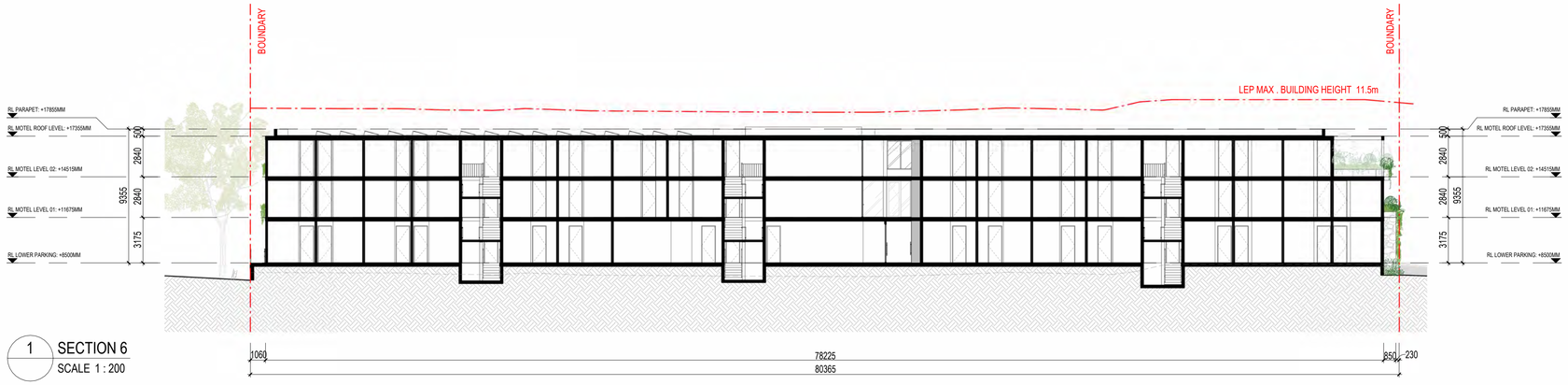
loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

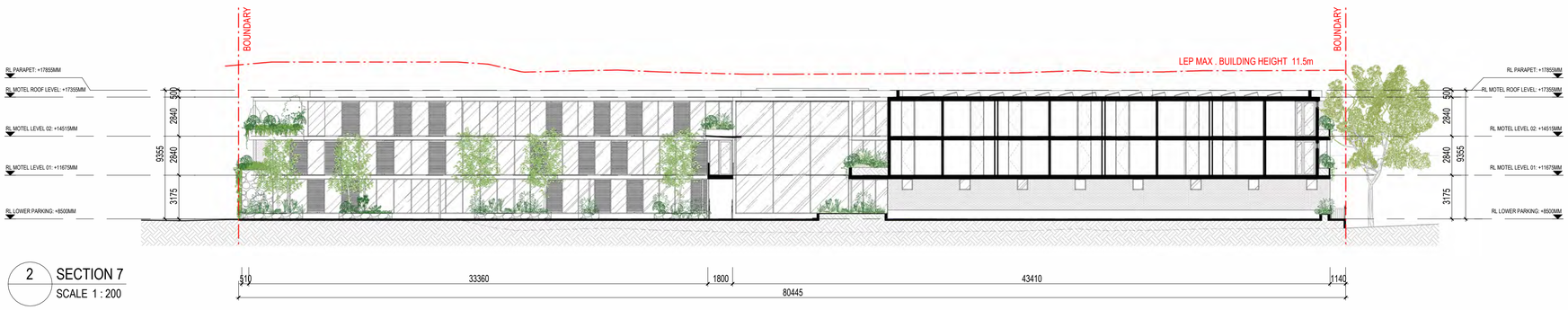
02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	SECTION 2
Scale @A1	1 : 200
Project No	22039
Drawing No	A-019
Revision	01



1 SECTION 6
SCALE 1 : 200



2 SECTION 7
SCALE 1 : 200

loopcreative

55/61 Marlborough St
Surry Hills NSW 2010
Australia

02 9698 6888
loopcreative.com.au

Rev	Description	Date
01	FOR INFORMATION	13.03.23

Client	Elanora Hotel
Project	Elanora Hotel Alterations & Additions 41 Victoria St, East Gosford NSW 2250
Drawing Title	SECTION 3
Scale @A1	1 : 200
Project No	22039
Drawing No	A-020
Revision	01

APPENDIX C: NATA ACCREDITED LABORATORY CERTIFICATES

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Ben Buckley
Client	FOUNDATION EARTH SCIENCES PTY LTD
Address	UNIT 119/14 LOYALTY ROAD NORTH ROCKS NSW 2151
Telephone	(Not specified)
Facsimile	(Not specified)
Email	ben@foundationes.com.au
Project	**E3019-2 East Gosford**
Order Number	**E3019-2**
Samples	33

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	**SE246006 R0**
Date Received	14/4/2023
Date Reported	21/4/2023

COMMENTS

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

SIGNATORIES

Dong LIANG

Metals/Inorganics Team Leader

Field pH for Acid Sulphate Soil [AN104] Tested: 21/4/2023

PARAMETER	UOM	LOR	ASSA1-1 SOIL 0.4-0.5 13/4/2023 SE246006.001	ASSA1-2 SOIL 0.9-1.0 13/4/2023 SE246006.002	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006.003	ASSA1-4 SOIL 1.9-2.0 13/4/2023 SE246006.004	ASSA1-5 SOIL 2.4-2.5 13/4/2023 SE246006.005
pHf	pH Units	-	6.7	4.9	4.8	4.3	4.5
pHfox	pH Units	-	5.1	3.9	3.7	4.0	4.0
Reaction Rate (pHfox)*	No unit	-	1	1	1	1	1
pH Difference*	pH Units	-10	1.5	1.0	1.1	0.3	0.5

PARAMETER	UOM	LOR	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006.006	ASSA1-7 SOIL 3.4-3.5 13/4/2023 SE246006.007	ASSA1-8 SOIL 3.9-4.0 13/4/2023 SE246006.008	ASSA2-0 SOIL 0.1-0.2 13/4/2023 SE246006.009	ASSA2-1 SOIL 0.5-0.6 13/4/2023 SE246006.010
pHf	pH Units	-	4.4	4.4	4.4	4.5	4.5
pHfox	pH Units	-	4.2	4.3	4.3	4.4	4.8
Reaction Rate (pHfox)*	No unit	-	1	1	1	1	1
pH Difference*	pH Units	-10	0.2	0.1	0.1	0.1	-0.3

PARAMETER	UOM	LOR	ASSA2-2 SOIL 1.0-1.1 13/4/2023 SE246006.011	ASSA2-3 SOIL 1.4-1.5 13/4/2023 SE246006.012	ASSA2-4 SOIL 2.0-2.0 13/4/2023 SE246006.013	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006.014	ASSA2-6 SOIL 3.0-3.1 13/4/2023 SE246006.015
pHf	pH Units	-	4.3	4.3	4.5	4.8	4.6
pHfox	pH Units	-	4.3	4.2	4.3	4.4	4.5
Reaction Rate (pHfox)*	No unit	-	1	1	1	2	1
pH Difference*	pH Units	-10	0.0	0.1	0.2	0.5	0.1

PARAMETER	UOM	LOR	ASSA2-7 SOIL 3.5-3.6 13/4/2023 SE246006.016	ASSA2-8 SOIL 3.9-4.0 13/4/2023 SE246006.017	ASSA3-1 SOIL 0.4-0.5 13/4/2023 SE246006.018	ASSA3-2 SOIL 1.0-1.1 13/4/2023 SE246006.019	ASSA3-3 SOIL 1.4-1.5 13/4/2023 SE246006.020
pHf	pH Units	-	4.9	4.7	5.1	4.5	4.4
pHfox	pH Units	-	4.7	4.5	4.9	4.5	4.3
Reaction Rate (pHfox)*	No unit	-	1	1	2	1	1
pH Difference*	pH Units	-10	0.2	0.2	0.2	0.1	0.1

PARAMETER	UOM	LOR	ASSA3-4 SOIL 1.9-2.0 13/4/2023 SE246006.021	ASSA3-5 SOIL 2.4-2.5 13/4/2023 SE246006.022	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006.023	ASSA3-7 SOIL 3.4-3.5 13/4/2023 SE246006.024	ASSA3-8 SOIL 3.9-4.0 13/4/2023 SE246006.025
pHf	pH Units	-	4.5	4.5	4.8	4.8	4.8
pHfox	pH Units	-	4.1	4.1	3.9	4.3	4.3
Reaction Rate (pHfox)*	No unit	-	1	1	1	1	1
pH Difference*	pH Units	-10	0.4	0.4	0.9	0.5	0.5

PARAMETER	UOM	LOR	ASSA4-1 SOIL 0.4-0.5 13/4/2023 SE246006.026	ASSA4-2 SOIL 0.9-1.0 13/4/2023 SE246006.027	ASSA4-3 SOIL 1.4-1.5 13/4/2023 SE246006.028	ASSA4-4 SOIL 1.9-2.0 13/4/2023 SE246006.029	ASSA4-5 SOIL 2.4-2.5 13/4/2023 SE246006.030
pHf	pH Units	-	6.3	4.5	4.7	4.6	5.0
pHfox	pH Units	-	6.1	5.1	4.5	4.3	4.5
Reaction Rate (pHfox)*	No unit	-	1	1	1	1	1
pH Difference*	pH Units	-10	0.2	-0.6	0.2	0.2	0.5

Field pH for Acid Sulphate Soil [AN104] Tested: 21/4/2023 (continued)

PARAMETER	UOM	LOR	ASSA4-6 SOIL 2.9-3.0 13/4/2023 SE246006.031	ASSA4-7 SOIL 3.4-3.5 13/4/2023 SE246006.032	ASSA4-8 SOIL 3.9-4.0 13/4/2023 SE246006.033
pHf	pH Units	-	**4.9**	**5.1**	**5.0**
pHfox	pH Units	-	**4.4**	**4.5**	**4.5**
Reaction Rate (pHfox)*	No unit	-	**1**	**1**	**1**
pH Difference*	pH Units	-10	**0.5**	**0.5**	**0.5**

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

SE246006 R0

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Ben Buckley	Manager	Huong Crawford
Client	FOUNDATION EARTH SCIENCES PTY LTD	Laboratory	SGS Alexandria Environmental
Address	UNIT 119/14 LOYALTY ROAD NORTH ROCKS NSW 2151	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	(Not specified)	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	ben@foundationes.com.au	Email	au.environmental.sydney@sgs.com
Project	**E3019-2 East Gosford**	SGS Reference	**SE246006 R0**
Order Number	**E3019-2**	Date Received	14 Apr 2023
Samples	33	Date Reported	21 Apr 2023

COMMENTS

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

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

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

SAMPLE SUMMARY

Sample counts by matrix	33 Soil	Date documentation received	14/4/2023
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	10.0°C	Turnaround time requested	Standard
Sample cooling method	Ice Bricks		

HOLDING TIME SUMMARY

SE246006 R0

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

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

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

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
ASSA1-1	SE246006.001	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA1-2	SE246006.002	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA1-3	SE246006.003	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA1-4	SE246006.004	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA1-5	SE246006.005	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA1-6	SE246006.006	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA1-7	SE246006.007	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA1-8	SE246006.008	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-0	SE246006.009	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-1	SE246006.010	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-2	SE246006.011	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-3	SE246006.012	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-4	SE246006.013	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-5	SE246006.014	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-6	SE246006.015	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-7	SE246006.016	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA2-8	SE246006.017	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-1	SE246006.018	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-2	SE246006.019	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-3	SE246006.020	LB277451	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-4	SE246006.021	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-5	SE246006.022	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-6	SE246006.023	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-7	SE246006.024	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA3-8	SE246006.025	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-1	SE246006.026	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-2	SE246006.027	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-3	SE246006.028	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-4	SE246006.029	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-5	SE246006.030	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-6	SE246006.031	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-7	SE246006.032	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023
ASSA4-8	SE246006.033	LB277452	13 Apr 2023	14 Apr 2023	11 May 2023	21 Apr 2023	11 May 2023	21 Apr 2023

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 give a different calculated RPD.

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE246006.010	LB277451.012	pHf	pH Units	-	4.5	4.7	30	4
		pHfox	pH Units	-	4.8	4.6	30	4
SE246006.020	LB277451.023	pHf	pH Units	-	4.4	4.4	30	1
		pHfox	pH Units	-	4.3	4.3	30	0
SE246006.030	LB277452.012	pHf	pH Units	-	5.0	4.9	30	2
		pHfox	pH Units	-	4.5	4.8	30	5
SE246006.033	LB277452.016	pHf	pH Units	-	5.0	5.0	30	0
		pHfox	pH Units	-	4.5	4.5	30	0

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 SPIKES

SE246006 R0

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

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

No matrix spikes were required for this job.

MATRIX SPIKE DUPLICATES

SE246006 R0

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

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: 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.

FOUNDATION EARTH SCIENCES

Chain of Custody Record

Client Details:	Foundation Earth Sciences PO Box 4405, East Gosford NSW 2250 email: ben@foundationes.com.au michael@foundationes.com.au; reece@foundationes.com.au ph: +61466 385 221	**Project Manager:** Michael Silk **Sampled By:** KV/DG	**Project #:** E3019-2 **Project Name:** East Gosford
Delivery Details:	SGS Laboratories Pty Ltd Unit 16, 33 Maddox Street, Alexandria NSW 2015 email: au.samplereceipt@sgs.com ph: +612 8594 0400	**Purchase Order #:** N/A **Page #:** 1	**Quote #:** **Turnaround:** Standard

#	Sample ID	Depth	Date Sampled	Matrix	Analytes															Sample Comments
					ph	CEC	%CLAY	ASS Field Test pH f & pH fox	TRH	BTEXN	PAH	OC	PCB	OPP	Phenol	Asbestos NEPM	Asbestos ID	PFAS	Suites	
1	ASSA1-1	0.4-0.5	13.04.2023	Soil				X												Keep
2	ASSA1-2	0.9-1.0	13.04.2023	Soil				X												Keep
3	ASSA1-3	1.4-1.5	13.04.2023	Soil				X												Keep
4	ASSA1-4	1.9-2.0	13.04.2023	Soil				X												Keep
5	ASSA1-5	2.4-2.5	13.04.2023	Soil				X												Keep
6	ASSA1-6	2.9-3.0	13.04.2023	Soil				X												Keep
7	ASSA1-7	3.4-3.5	13.04.2023	Soil				X												Keep
8	ASSA1-8	3.9-4.0	13.04.2023	Soil				X												Keep
9	ASSA2-0	0.1-0.2	13.04.2023	Soil				X												Keep
10	ASSA2-1	0.5-0.6	13.04.2023	Soil				X												Keep
11	ASSA2-2	1.0-1.1	13.04.2023	Soil				X												Keep
12	ASSA2-3	1.4-1.5	13.04.2023	Soil				X												Keep
13	ASSA2-4	2.0-2.0	13.04.2023	Soil				X												Keep
14	ASSA2-5	2.5-2.6	13.04.2023	Soil				X												Keep
15	ASSA2-6	3.0-3.1	13.04.2023	Soil				X												Keep
16	ASSA2-7	3.5-3.6	13.04.2023	Soil				X												Keep
17	ASSA2-8	3.9-4.0	13.04.2023	Soil				X												Keep
18	ASSA3-1	0.4-0.5	13.04.2023	Soil				X												Keep
19	ASSA3-2	1.0-1.1	13.04.2023	Soil				X												Keep
20	ASSA3-3	1.4-1.5	13.04.2023	Soil				X												Keep
21	ASSA3-4	1.9-2.0	13.04.2023	Soil				X												Keep
22	ASSA3-5	2.4-2.5	13.04.2023	Soil				X												Keep
23	ASSA3-6	2.9-3.0	13.04.2023	Soil				X												Keep
24	ASSA3-7	3.4-3.5	13.04.2023	Soil				X												Keep
25	ASSA3-8	3.9-4.0	13.04.2023	Soil				X												Keep
26	ASSA4-1	0.4-0.5	13.04.2023	Soil				X												Keep
27	ASSA4-2	0.9-1.0	13.04.2023	Soil				X												Keep
28	ASSA4-3	1.4-1.5	13.04.2023	Soil				X												Keep
29	ASSA4-4	1.9-2.0	13.04.2023	Soil				X												Keep
30	ASSA4-5	2.4-2.5	13.04.2023	Soil				X												Keep
31	ASSA4-6	2.9-3.0	13.04.2023	Soil				X												Keep
32	ASSA4-7	3.4-3.5	13.04.2023	Soil				X												Keep
33	ASSA4-8	3.9-4.0	13.04.2023	Soil				X												Keep

SGS EHS Sydney COC
SE246006

Special Directions and Coments: QUOTE NUMBER: FOUND - IE - MAR 23 - 328961

Relinquished by	KV	**Received By**	B. Rubaraj
Signature		**Signature**	
Date	14.04.2023	**Date**	14/4/23 @ 4:30

SAMPLE RECEIPT ADVICE

SE246006

CLIENT DETAILS

Contact	Ben Buckley
Client	FOUNDATION EARTH SCIENCES PTY LTD
Address	UNIT 119/14 LOYALTY ROAD NORTH ROCKS NSW 2151
Telephone	(Not specified)
Facsimile	(Not specified)
Email	ben@foundationes.com.au
Project	**E3019-2 East Gosford**
Order Number	**E3019-2**
Samples	33

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Fri 14/4/2023
Report Due	Fri 21/4/2023
SGS Reference	**SE246006**

SUBMISSION DETAILS

This is to confirm that 33 samples were received on Friday 14/4/2023. Results are expected to be ready by COB Friday 21/4/2023. Please quote SGS reference SE246006 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	33 Soil	Date documentation received	14/4/2023
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	10.0°C	Turnaround time requested	Standard
Sample cooling method	Ice Bricks		

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

COMMENTS

SAMPLE RECEIPT ADVICE

SE246006

CLIENT DETAILS

Client FOUNDATION EARTH SCIENCES PTY LTD

Project E3019-2 East Gosford

SUMMARY OF ANALYSIS

No.	Sample ID	Field pH for Acid Sulphate Soil
001	ASSA1-1 0.4-0.5	4
002	ASSA1-2 0.9-1.0	4
003	ASSA1-3 1.4-1.5	4
004	ASSA1-4 1.9-2.0	4
005	ASSA1-5 2.4-2.5	4
006	ASSA1-6 2.9-3.0	4
007	ASSA1-7 3.4-3.5	4
008	ASSA1-8 3.9-4.0	4
009	ASSA2-0 0.1-0.2	4
010	ASSA2-1 0.5-0.6	4
011	ASSA2-2 1.0-1.1	4
012	ASSA2-3 1.4-1.5	4
013	ASSA2-4 2.0-2.0	4
014	ASSA2-5 2.5-2.6	4
015	ASSA2-6 3.0-3.1	4
016	ASSA2-7 3.5-3.6	4
017	ASSA2-8 3.9-4.0	4
018	ASSA3-1 0.4-0.5	4
019	ASSA3-2 1.0-1.1	4
020	ASSA3-3 1.4-1.5	4
021	ASSA3-4 1.9-2.0	4
022	ASSA3-5 2.4-2.5	4
023	ASSA3-6 2.9-3.0	4
024	ASSA3-7 3.4-3.5	4

CONTINUED OVERLEAF

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

SAMPLE RECEIPT ADVICE

SE246006

CLIENT DETAILS

Client FOUNDATION EARTH SCIENCES PTY LTD

Project E3019-2 East Gosford

SUMMARY OF ANALYSIS

No.	Sample ID	Field pH for Acid Sulphate Soil
025	ASSA3-8 3.9-4.0	4
026	ASSA4-1 0.4-0.5	4
027	ASSA4-2 0.9-1.0	4
028	ASSA4-3 1.4-1.5	4
029	ASSA4-4 1.9-2.0	4
030	ASSA4-5 2.4-2.5	4
031	ASSA4-6 2.9-3.0	4
032	ASSA4-7 3.4-3.5	4
033	ASSA4-8 3.9-4.0	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 .

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Admin
Client	SGS I&E SYDNEY
Address	5058 201 I&E HSE SYDNEY (EX 5258) UNIT 16 33 MADDOX STREET ALEXANDRIA NSW 2015
Telephone	0285940400
Facsimile	0285940499
Email	au.environmental.sydney@sgs.com
Project	**E3019-2 East Gosford - Additional**
Order Number	**SE246006A**
Samples	5

LABORATORY DETAILS

Manager	Anthony Nilsson
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
SGS Reference	**CE166372 R0**
Date Received	26 Apr 2023
Date Reported	02 May 2023

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146/19038)

SIGNATORIES

Anthony NILSSON
Operations Manager

Parameter	Units	LOR	Sample Number: CE166372.001 Sample Matrix: Soil Sample Depth: 0.4-0.5 Sample Date: 13 Apr 2023 Sample Name: SE246006A.001	Sample Number: CE166372.003 Sample Matrix: Soil Sample Depth: 1.4-1.5 Sample Date: 13 Apr 2023 Sample Name: SE246006A.003
Moisture Content Method: AN002 Tested: 26/4/2023				
% Moisture	%w/w	0.5	**24**	**17**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023				
pH KCl	pH Units	-	**6.0**	**4.5**
Titratable Actual Acidity	kg H2SO4/T	0.25	<0.25	**1.3**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	<5	**27**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	<0.01	**0.04**
Sulphur (SKCl)	%w/w	0.005	<0.005	<0.005
Calcium (CaKCl)	%w/w	0.005	**0.054**	**0.021**
Magnesium (MgKCl)	%w/w	0.005	**0.013**	**0.012**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023				
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023				
Acid Soluble Sulfur (SHCl)	%w/w	0.005	-	<0.005
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023				
s-Net Acidity	%w/w S	0.005	<0.005	**0.047**
s-Net Acidity without ANC	%w/w S	0.005	**0.008**	**0.047**
a-Net Acidity	moles H+/T	5	<5	**29**
Liming Rate	kg CaCO3/T	0.1	<0.1	**2.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	<5	**29**
Liming Rate without ANCBT	kg CaCO3/T	0.1	<0.1	**2.2**
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023				
Peroxide pH (pH Ox)	pH Units	-	**4.6**	**4.8**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**1.8**
TPA as moles H+/tonne	moles H+/T	5	<5	**37**
TPA as S % W/W	%w/w S	0.01	<0.01	**0.06**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	**10**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**0.49**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	**0.02**
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005	<0.005	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5	<5
Sulphur (Sp)	%w/w	0.005	<0.005	<0.005
Calcium (Cap)	%w/w	0.005	**0.069**	**0.033**
Reacted Calcium (CaA)	%w/w	0.005	**0.015**	**0.013**
Reacted Calcium (CaA)	moles H+/T	5	**7**	**6**
Magnesium (Mgp)	%w/w	0.005	**0.018**	**0.019**
Reacted Magnesium (MgA)	%w/w	0.005	<0.005	**0.007**
Reacted Magnesium (MgA)	moles H+/T	5	<5	**5**
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	-	<0.005
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	-	<5

Parameter	Units	LOR	Sample Number CE166372.001 Sample Matrix Soil Sample Depth 0.4-0.5 Sample Date 13 Apr 2023 Sample Name SE246006A.001	Sample Number CE166372.003 Sample Matrix Soil Sample Depth 1.4-1.5 Sample Date 13 Apr 2023 Sample Name SE246006A.003
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023				
s-Net Acidity	%w/w S	0.005	<0.005	**0.047**
a-Net Acidity	moles H+/T	5	<5	**29**
Liming Rate	kg CaCO3/T	0.1	<0.1	**2.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	<5	**29**
Liming Rate without ANCE	kg CaCO3/T	0.1	<0.1	**2.2**

Parameter	Units	LOR	Sample Number: CE166372.006 Sample Matrix: Soil Sample Depth: 2.9-3.0 Sample Date: 13 Apr 2023 Sample Name: SE246006A.006
Moisture Content Method: AN002 Tested: 26/4/2023			
% Moisture	%w/w	0.5	**85**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023			
pH KCl	pH Units	-	**3.9**
Titratable Actual Acidity	kg H2SO4/T	0.25	**4.7**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**95**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.15**
Sulphur (SKCl)	%w/w	0.005	**0.015**
Calcium (CaKCl)	%w/w	0.005	**0.008**
Magnesium (MgKCl)	%w/w	0.005	**0.023**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023			
Chromium Reducible Sulfur (Scr)	%	0.005	**0.017**
Chromium Reducible Sulfur (Scr)	moles H+/T	5	**11**
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023			
Acid Soluble Sulfur (SHCl)	%w/w	0.005	**0.022**
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.17**
s-Net Acidity without ANC	%w/w S	0.005	**0.17**
a-Net Acidity	moles H+/T	5	**110**
Liming Rate	kg CaCO3/T	0.1	**8.2**
Verification s-Net Acidity	%w/w S	-20	**0.02**
a-Net Acidity without ANCBT	moles H+/T	5	**110**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**8.2**

Parameter	Units	LOR	Sample Number CE166372.006 Sample Matrix Soil Sample Depth 2.9-3.0 Sample Date 13 Apr 2023 Sample Name SE246006A.006
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023			
Peroxide pH (pH Ox)	pH Units	-	**4.3**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**6.4**
TPA as moles H+/tonne	moles H+/T	5	**130**
TPA as S % W/W	%w/w S	0.01	**0.21**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**35**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**1.7**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.06**
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	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5
Sulphur (Sp)	%w/w	0.005	**0.015**
Calcium (Cap)	%w/w	0.005	**0.011**
Reacted Calcium (CaA)	%w/w	0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5	<5
Magnesium (Mgp)	%w/w	0.005	**0.029**
Reacted Magnesium (MgA)	%w/w	0.005	**0.006**
Reacted Magnesium (MgA)	moles H+/T	5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	**0.007**
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	<5
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.16**
a-Net Acidity	moles H+/T	5	**98**
Liming Rate	kg CaCO3/T	0.1	**7.4**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	**98**
Liming Rate without ANCE	kg CaCO3/T	0.1	**7.4**

Parameter	Units	LOR	Sample Number CE166372.014 Sample Matrix Soil Sample Depth 2.5-2.6 Sample Date 13 Apr 2023 Sample Name SE246006A.014
Moisture Content Method: AN002 Tested: 26/4/2023			
% Moisture	%w/w	0.5	**13**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023			
pH KCl	pH Units	-	**4.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	**3.3**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**67**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.11**
Sulphur (SKCl)	%w/w	0.005	<0.005
Calcium (CaKCl)	%w/w	0.005	<0.005
Magnesium (MgKCl)	%w/w	0.005	**0.014**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023			
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023			
Acid Soluble Sulfur (SHCl)	%w/w	0.005	**0.007**
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.11**
s-Net Acidity without ANC	%w/w S	0.005	**0.11**
a-Net Acidity	moles H+/T	5	**69**
Liming Rate	kg CaCO3/T	0.1	**5.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**69**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**5.2**

Parameter	Units	LOR	Sample Number CE166372.014 Sample Matrix Soil Sample Depth 2.5-2.6 Sample Date 13 Apr 2023 Sample Name SE246006A.014
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023			
Peroxide pH (pH Ox)	pH Units	-	**5.1**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**4.3**
TPA as moles H+/tonne	moles H+/T	5	**87**
TPA as S % W/W	%w/w S	0.01	**0.14**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**20**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**0.98**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.03**
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	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5
Sulphur (Sp)	%w/w	0.005	<0.005
Calcium (Cap)	%w/w	0.005	**0.007**
Reacted Calcium (CaA)	%w/w	0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5	<5
Magnesium (Mgp)	%w/w	0.005	**0.018**
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	<0.005
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	<5
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.11**
a-Net Acidity	moles H+/T	5	**69**
Liming Rate	kg CaCO3/T	0.1	**5.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	**69**
Liming Rate without ANCE	kg CaCO3/T	0.1	**5.2**

Parameter	Units	LOR	Sample Number CE166372.023 Sample Matrix Soil Sample Depth 2.9-3.0 Sample Date 13 Apr 2023 Sample Name SE246006A.023
Moisture Content Method: AN002 Tested: 26/4/2023			
% Moisture	%w/w	0.5	**17**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023			
pH KCl	pH Units	-	**4.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	**4.2**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**85**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.14**
Sulphur (SKCl)	%w/w	0.005	<0.005
Calcium (CaKCl)	%w/w	0.005	**0.012**
Magnesium (MgKCl)	%w/w	0.005	**0.012**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023			
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023			
Acid Soluble Sulfur (SHCl)	%w/w	0.005	**0.008**
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.14**
s-Net Acidity without ANC	%w/w S	0.005	**0.14**
a-Net Acidity	moles H+/T	5	**87**
Liming Rate	kg CaCO3/T	0.1	**6.5**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**87**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**6.5**

Parameter	Units	LOR	Sample Number CE166372.023 Sample Matrix Soil Sample Depth 2.9-3.0 Sample Date 13 Apr 2023 Sample Name SE246006A.023
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023			
Peroxide pH (pH Ox)	pH Units	-	**4.2**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**5.0**
TPA as moles H+/tonne	moles H+/T	5	**102**
TPA as S % W/W	%w/w S	0.01	**0.16**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**17**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**0.86**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.03**
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	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5
Sulphur (Sp)	%w/w	0.005	<0.005
Calcium (Cap)	%w/w	0.005	**0.014**
Reacted Calcium (CaA)	%w/w	0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5	<5
Magnesium (Mgp)	%w/w	0.005	**0.016**
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	<0.005
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	<5
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.14**
a-Net Acidity	moles H+/T	5	**87**
Liming Rate	kg CaCO3/T	0.1	**6.5**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	**87**
Liming Rate without ANCE	kg CaCO3/T	0.1	**6.5**

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

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chromium Reducible Sulfur (Scr)	LB115561	%	0.005	<0.005	0 - 40%	103%
Chromium Reducible Sulfur (Scr)	LB115561	moles H+/T	5	<5		

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB115558	pH Units	-	6.1	0 - 3%	101%
Titratable Actual Acidity	LB115558	kg H2SO4/T	0.25	<0.25	0%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB115558	moles H+/T	5	<5	0%	105%
Titratable Actual Acidity (TAA) S%w/w	LB115558	%w/w S	0.01	<0.01	0%	106%
Sulphur (SKCl)	LB115558	%w/w	0.005	<0.005	3%	89%
Calcium (CaKCl)	LB115558	%w/w	0.005	<0.005	11%	104%
Magnesium (MgKCl)	LB115558	%w/w	0.005	<0.005	1%	98%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Peroxide pH (pH Ox)	LB115560	pH Units	-	6.0	2%	100%
TPA as kg H_2SO_4/tonne	LB115560	kg H2SO4/T	0.25	0.92	0%	115%
TPA as moles H+/tonne	LB115560	moles H+/T	5	19	0%	114%
TPA as S % W/W	LB115560	%w/w S	0.01	0.03	0%	114%
ANCE as % $CaCO_3$	LB115560	% CaCO3	0.01	<0.01	0%	
ANCE as moles H+/tonne	LB115560	moles H+/T	5	<5	0%	
ANCE as S % W/W	LB115560	%w/w S	0.01	<0.01	0%	
Sulphur (Sp)	LB115560	%w/w	0.005	<0.005	3%	90%
Calcium (Cap)	LB115560	%w/w	0.005	<0.005	4%	100%
Magnesium (Mgp)	LB115560	%w/w	0.005	<0.005	3%	94%

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

FOOTNOTES

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

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

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

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

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

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

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

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

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

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Ben Buckley
Client	FOUNDATION EARTH SCIENCES PTY LTD
Address	UNIT 119/14 LOYALTY ROAD NORTH ROCKS NSW 2151
Telephone	(Not specified)
Facsimile	(Not specified)
Email	ben@foundationes.com.au
Project	**E3019-2 East Gosford - Additional**
Order Number	**E3019-2**
Samples	33

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	**SE246006A R0**
Date Received	24/4/2023
Date Reported	2/5/2023

COMMENTS

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

SIGNATORIES

Moisture Content [AN002] Tested: 2/5/2023

PARAMETER	UOM	LOR	ASSA1-1 SOIL 0.4-0.5 13/4/2023 SE246006A.001	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006A.003	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006A.006	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006A.014	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006A.023
% Moisture	%w/w	0.5	**24**	**17**	**85**	**13**	**17**

TAA (Titratable Actual Acidity) [AN219] Tested: 2/5/2023

PARAMETER	UOM	LOR	ASSA1-1 SOIL 0.4-0.5 13/4/2023 SE246006A.001	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006A.003	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006A.006	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006A.014	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006A.023
pH KCl*	pH Units	-	**6.0**	**4.5**	**3.9**	**4.0**	**4.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	<0.25	**1.3**	**4.7**	**3.3**	**4.2**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	<5	**27**	**95**	**67**	**85**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	<0.01	**0.04**	**0.15**	**0.11**	**0.14**
Sulphur (SKCl)	%w/w	0.005	<0.005	<0.005	**0.015**	<0.005	<0.005
Calcium (CaKCl)	%w/w	0.005	**0.054**	**0.021**	**0.008**	<0.005	**0.012**
Magnesium (MgKCl)	%w/w	0.005	**0.013**	**0.012**	**0.023**	**0.014**	**0.012**

TPA (Titratable Peroxide Acidity) [AN218] Tested: 2/5/2023

PARAMETER	UOM	LOR	ASSA1-1 SOIL 0.4-0.5 13/4/2023 SE246006A.001	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006A.003	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006A.006	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006A.014	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006A.023
Peroxide pH (pH Ox)	pH Units	-	**4.6**	**4.8**	**4.3**	**5.1**	**4.2**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**1.8**	**6.4**	**4.3**	**5.0**
TPA as moles H+/tonne	moles H+/T	5	<5	**37**	**130**	**87**	**102**
TPA as S % W/W	%w/w S	0.01	<0.01	**0.06**	**0.21**	**0.14**	**0.16**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	**10**	**35**	**20**	**17**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**0.49**	**1.7**	**0.98**	**0.86**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	**0.02**	**0.06**	**0.03**	**0.03**
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5	<5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)*	%w/w	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne*	moles H+/T	5	<5	<5	<5	<5	<5
Sulphur (Sp)	%w/w	0.005	<0.005	<0.005	**0.015**	<0.005	<0.005
Calcium (Cap)	%w/w	0.005	**0.069**	**0.033**	**0.011**	**0.007**	**0.014**
Reacted Calcium (CaA)*	%w/w	0.005	**0.015**	**0.013**	<0.005	<0.005	<0.005
Reacted Calcium (CaA)*	moles H+/T	5	**7**	**6**	<5	<5	<5
Magnesium (Mgp)	%w/w	0.005	**0.018**	**0.019**	**0.029**	**0.018**	**0.016**
Reacted Magnesium (MgA)*	%w/w	0.005	<0.005	**0.007**	**0.006**	<0.005	<0.005
Reacted Magnesium (MgA)*	moles H+/T	5	<5	**5**	<5	<5	<5
Net Acid Soluble Sulphur as % w/w*	%w/w	0.005	-	<0.005	**0.007**	<0.005	<0.005
Net Acid Soluble Sulphur as moles H+/tonne*	moles H+/T	5	-	<5	<5	<5	<5

SPOCAS Net Acidity Calculations [AN220] Tested: 2/5/2023

PARAMETER	UOM	LOR	ASSA1-1 SOIL 0.4-0.5 13/4/2023 SE246006A.001	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006A.003	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006A.006	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006A.014	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006A.023
s-Net Acidity	%w/w S	0.005	<0.005	**0.047**	**0.16**	**0.11**	**0.14**
a-Net Acidity	moles H+/T	5	<5	**29**	**98**	**69**	**87**
Liming Rate*	kg CaCO3/T	0.1	<0.1	**2.2**	**7.4**	**5.2**	**6.5**
Verification s-Net Acidity*	%w/w S	-20	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
a-Net Acidity without ANCE*	moles H+/T	5	<5	**29**	**98**	**69**	**87**
Liming Rate without ANCE*	kg CaCO3/T	0.1	<0.1	**2.2**	**7.4**	**5.2**	**6.5**

Chromium Reducible Sulfur (CRS) [AN217] Tested: 2/5/2023

PARAMETER	UOM	LOR	ASSA1-1 SOIL 0.4-0.5 13/4/2023 SE246006A.001	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006A.003	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006A.006	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006A.014	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006A.023
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005	**0.017**	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5	**11**	<5	<5

HCl Extractable S, Ca and Mg in Soil/Solids ICP OES [AN014] Tested: 2/5/2023

PARAMETER	UOM	LOR	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006A.003	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006A.006	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006A.014	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006A.023
Acid Soluble Sulfur (SHCl)	%w/w	0.005	<0.005	**0.022**	**0.007**	**0.008**

Chromium Suite Net Acidity Calculations [AN220] Tested: 2/5/2023

PARAMETER	UOM	LOR	ASSA1-1 SOIL 0.4-0.5 13/4/2023 SE246006A.001	ASSA1-3 SOIL 1.4-1.5 13/4/2023 SE246006A.003	ASSA1-6 SOIL 2.9-3.0 13/4/2023 SE246006A.006	ASSA2-5 SOIL 2.5-2.6 13/4/2023 SE246006A.014	ASSA3-6 SOIL 2.9-3.0 13/4/2023 SE246006A.023
s-Net Acidity	%w/w S	0.005	<0.005	0.047	0.17	0.11	0.14
a-Net Acidity	moles H+/T	5	<5	29	110	69	87
Liming Rate*	kg CaCO3/T	0.1	<0.1	2.2	8.2	5.2	6.5
Verification s-Net Acidity*	%w/w S	-20	0.00	0.00	0.02	0.00	0.00
a-Net Acidity without ANCBT*	moles H+/T	5	<5	29	110	69	87
Liming Rate without ANCBT*	kg CaCO3/T	0.1	<0.1	2.2	8.2	5.2	6.5
s-Net Acidity without ANC	%w/w S	0.005	0.008	0.047	0.17	0.11	0.14

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN014	This method is for the determination of soluble sulfate (SO4-S) by extraction with hydrochloric acid. Sulphides should not react and would normally be expelled. Sulfate as Sulfur is determined by ICP.
AN214	Acid Neutralising Capacity (ANC)or Neutralising Value (NV): The crushed or as received sample is reacted with excess normal acid (HCl) and then back titrated with standard sodium hydroxide to determine the acid consumed. The result is expressed as kg H2SO4/tonne or %CaCO3. Based on AS4969-13.
AN217	Dried pulped sample is mixed with acid and chromium metal in a rapid distillation unit to produce hydrogen sulfide (H2S) which is collected and titrated with iodine (I2(aq)) to measure SCR.
AN218	Soil samples are subjected to extreme oxidising conditions using hydrogen peroxide. Continuous application of heat and peroxide ensure all sulfide is converted to sulfuric acid. Excess peroxide is broken down by a copper catalyst prior to titration for acidity. Calcium, magnesium, and sulfur are determined by ICP-OES. Also included is a carbonate modification step which, depending on pH after the initial oxidation, gives a measure of ANC.
AN219	Dried pulped sample is extracted for 4 hours in a 1 M KCl solution. The ratio of sample to solution is 1:40. The extract is titrated for acidity. Calcium, magnesium, and sulfur are determined by ICP-AES.
AN220	Chromium Suite: Scheme for the calculation of net acidities and liming rates using a Fineness Factor of 1.5.

FOOTNOTES

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

SE246006A R0

CLIENT DETAILS

Contact	Ben Buckley
Client	FOUNDATION EARTH SCIENCES PTY LTD
Address	UNIT 119/14 LOYALTY ROAD NORTH ROCKS NSW 2151
Telephone	(Not specified)
Facsimile	(Not specified)
Email	ben@foundationes.com.au
Project	**E3019-2 East Gosford - Additional**
Order Number	**E3019-2**
Samples	33

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	**SE246006A R0**
Date Received	24 Apr 2023
Date Reported	02 May 2023

COMMENTS

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

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

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

SAMPLE SUMMARY

Sample counts by matrix	5 Soil	Date documentation received	24/4/2023@12:29pr
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	10.0°C	Turnaround time requested	Standard
Sample cooling method	Ice Bricks		

HOLDING TIME SUMMARY

SE246006A R0

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

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

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

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 give a different calculated RPD.

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

SE246006A R0

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

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

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

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

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

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: 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.

E-MAILED 24/4 @ 12.29pm

SGS EHS Alexandria Laboratory

SE246006A COC

Received: 24-Apr-2023

FOUNDATION EARTH SCIENCES

Chain of Custody Record

Client Details:	**Foundation Earth Sciences** **PO Box 4405, East Gosford NSW 2250** **email: ben@foundationes.com.au** **michael@foundationes.com.au; reece@foundationes.com.au** **ph: +61466 385 221**	**Project Manager:** Michael Silk **Sampled By:** KV/DG	**Project #: E3019-2** **Project Name: East Gosford**
Delivery Details:	**SGS Laboratories Pty Ltd** **Unit 16, 33 Maddox Street, Alexandria NSW 2015** **email: au.samplereceipt@sgs.com** **ph: +612 8594 0400**	**Purchase Order #:** N/A **Page #:** 1	**Quote #:** **Turnaround: Standard**

#	Sample ID	Depth	Date Sampled	Matrix	Analytes															Sample Comments
								SPOCAS & Chromium Reducible Suites											Suites	
1	ASSA1-1	0.4-0.5	13.04.2023	Soil				X												Keep
2	ASSA1-3	1.4-1.5	13.04.2023	Soil				X												Keep
3	ASSA1-6	2.9-3.0	13.04.2023	Soil				X												Keep
4	ASSA2-5	2.5-2.6	13.04.2023	Soil				X												Keep
5	ASSA3-6	2.9-3.0	13.04.2023	Soil				X												Keep

Special Directions and Coments: Refer to Lab cert - SE246006 ---QUOTE NUMBER: FOUND - IE - MAR 23 - 328961

Relinquished by	MS	**Received By**	[signature]
Signature	MS	**Signature**	[signature]
Date	24.04.2023	**Date**	24/4/23 @ 12.29pm

source: SE_Autoscan.pdf page: 1 SGS Ref: SE246006A_COC

SAMPLE RECEIPT ADVICE

SE246006A

CLIENT DETAILS

Contact	Ben Buckley
Client	FOUNDATION EARTH SCIENCES PTY LTD
Address	UNIT 119/14 LOYALTY ROAD NORTH ROCKS NSW 2151
Telephone	(Not specified)
Facsimile	(Not specified)
Email	ben@foundationes.com.au
Project	**E3019-2 East Gosford - Additional**
Order Number	**E3019-2**
Samples	33

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 24/4/2023
Report Due	Tue 2/5/2023
SGS Reference	**SE246006A**

SUBMISSION DETAILS

This is to confirm that 33 samples were received on Monday 24/4/2023. Results are expected to be ready by COB Tuesday 2/5/2023. Please quote SGS reference SE246006A when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	5 Soil	Date documentation received	24/4/2023@12:29pm
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	10.0°C	Turnaround time requested	Standard
Sample cooling method	Ice Bricks		

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

COMMENTS

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

SAMPLE RECEIPT ADVICE

SE246006A

CLIENT DETAILS

Client FOUNDATION EARTH SCIENCES PTY LTD

Project E3019-2 East Gosford - Additional

SUMMARY OF ANALYSIS

No.	Sample ID	Acid Neutralising Capacity (ANC)	Chromium Reducible Sulfur (CRS)	Chromium Suite Net Acidity Calculations	HCl Extractable S, Ca and Mg in Soil/Solids ICP OES	Moisture Content	SPOCAS Net Acidity Calculations	TAA (Titratable Actual Acidity)	TPA (Titratable Peroxide Acidity)
001	ASSA1-1 0.4-0.5	6	2	7	1	1	6	7	21
003	ASSA1-3 1.4-1.5	6	2	7	1	1	6	7	21
006	ASSA1-6 2.9-3.0	6	2	7	1	1	6	7	21
014	ASSA2-5 2.5-2.6	6	2	7	1	1	6	7	21
023	ASSA3-6 2.9-3.0	6	2	7	1	1	6	7	21

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

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Admin
Client	SGS I&E SYDNEY
Address	5058 201 I&E HSE SYDNEY (EX 5258) UNIT 16 33 MADDOX STREET ALEXANDRIA NSW 2015
Telephone	0285940400
Facsimile	0285940499
Email	au.environmental.sydney@sgs.com
Project	**E3019-2 East Gosford - Additional**
Order Number	**SE246006A**
Samples	5

LABORATORY DETAILS

Manager	Anthony Nilsson
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
SGS Reference	**CE166372 R0**
Date Received	26 Apr 2023
Date Reported	02 May 2023

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(3146/19038)

SIGNATORIES

Anthony NILSSON
Operations Manager

Parameter	Units	LOR	Sample Number: CE166372.001 Sample Matrix: Soil Sample Depth: 0.4-0.5 Sample Date: 13 Apr 2023 Sample Name: SE246006A.001	Sample Number: CE166372.003 Sample Matrix: Soil Sample Depth: 1.4-1.5 Sample Date: 13 Apr 2023 Sample Name: SE246006A.003
Moisture Content Method: AN002 Tested: 26/4/2023				
% Moisture	%w/w	0.5	**24**	**17**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023				
pH KCl	pH Units	-	**6.0**	**4.5**
Titratable Actual Acidity	kg H2SO4/T	0.25	<0.25	**1.3**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	<5	**27**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	<0.01	**0.04**
Sulphur (SKCl)	%w/w	0.005	<0.005	<0.005
Calcium (CaKCl)	%w/w	0.005	**0.054**	**0.021**
Magnesium (MgKCl)	%w/w	0.005	**0.013**	**0.012**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023				
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023				
Acid Soluble Sulfur (SHCl)	%w/w	0.005	-	<0.005
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023				
s-Net Acidity	%w/w S	0.005	<0.005	**0.047**
s-Net Acidity without ANC	%w/w S	0.005	**0.008**	**0.047**
a-Net Acidity	moles H+/T	5	<5	**29**
Liming Rate	kg CaCO3/T	0.1	<0.1	**2.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	<5	**29**
Liming Rate without ANCBT	kg CaCO3/T	0.1	<0.1	**2.2**
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023				
Peroxide pH (pH Ox)	pH Units	-	**4.6**	**4.8**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**1.8**
TPA as moles H+/tonne	moles H+/T	5	<5	**37**
TPA as S % W/W	%w/w S	0.01	<0.01	**0.06**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	<5	**10**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	<0.25	**0.49**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	<0.01	**0.02**
ANCE as % $CaCO_3$	% CaCO3	0.01	<0.01	<0.01
ANCE as moles H+/tonne	moles H+/T	5	<5	<5
ANCE as S % W/W	%w/w S	0.01	<0.01	<0.01
Peroxide Oxidisable Sulphur (Spos)	%w/w	0.005	<0.005	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5	<5
Sulphur (Sp)	%w/w	0.005	<0.005	<0.005
Calcium (Cap)	%w/w	0.005	**0.069**	**0.033**
Reacted Calcium (CaA)	%w/w	0.005	**0.015**	**0.013**
Reacted Calcium (CaA)	moles H+/T	5	**7**	**6**
Magnesium (Mgp)	%w/w	0.005	**0.018**	**0.019**
Reacted Magnesium (MgA)	%w/w	0.005	<0.005	**0.007**
Reacted Magnesium (MgA)	moles H+/T	5	<5	**5**
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	-	<0.005
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	-	<5

Parameter	Units	LOR	Sample Number CE166372.001 Sample Matrix Soil Sample Depth 0.4-0.5 Sample Date 13 Apr 2023 Sample Name SE246006A.001	Sample Number CE166372.003 Sample Matrix Soil Sample Depth 1.4-1.5 Sample Date 13 Apr 2023 Sample Name SE246006A.003
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023				
s-Net Acidity	%w/w S	0.005	<0.005	**0.047**
a-Net Acidity	moles H+/T	5	<5	**29**
Liming Rate	kg CaCO3/T	0.1	<0.1	**2.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	<5	**29**
Liming Rate without ANCE	kg CaCO3/T	0.1	<0.1	**2.2**

Parameter	Units	LOR	Sample Number: CE166372.006 Sample Matrix: Soil Sample Depth: 2.9-3.0 Sample Date: 13 Apr 2023 Sample Name: SE246006A.006
Moisture Content Method: AN002 Tested: 26/4/2023			
% Moisture	%w/w	0.5	**85**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023			
pH KCl	pH Units	-	**3.9**
Titratable Actual Acidity	kg H2SO4/T	0.25	**4.7**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**95**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.15**
Sulphur (SKCl)	%w/w	0.005	**0.015**
Calcium (CaKCl)	%w/w	0.005	**0.008**
Magnesium (MgKCl)	%w/w	0.005	**0.023**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023			
Chromium Reducible Sulfur (Scr)	%	0.005	**0.017**
Chromium Reducible Sulfur (Scr)	moles H+/T	5	**11**
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023			
Acid Soluble Sulfur (SHCl)	%w/w	0.005	**0.022**
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.17**
s-Net Acidity without ANC	%w/w S	0.005	**0.17**
a-Net Acidity	moles H+/T	5	**110**
Liming Rate	kg CaCO3/T	0.1	**8.2**
Verification s-Net Acidity	%w/w S	-20	**0.02**
a-Net Acidity without ANCBT	moles H+/T	5	**110**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**8.2**

Parameter	Units	LOR	Sample Number CE166372.006 Sample Matrix Soil Sample Depth 2.9-3.0 Sample Date 13 Apr 2023 Sample Name SE246006A.006
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023			
Peroxide pH (pH Ox)	pH Units	-	**4.3**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**6.4**
TPA as moles H+/tonne	moles H+/T	5	**130**
TPA as S % W/W	%w/w S	0.01	**0.21**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**35**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**1.7**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.06**
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	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5
Sulphur (Sp)	%w/w	0.005	**0.015**
Calcium (Cap)	%w/w	0.005	**0.011**
Reacted Calcium (CaA)	%w/w	0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5	<5
Magnesium (Mgp)	%w/w	0.005	**0.029**
Reacted Magnesium (MgA)	%w/w	0.005	**0.006**
Reacted Magnesium (MgA)	moles H+/T	5	<5
Net Acid Soluble Sulphur as % w/w	%w/w	0.005	**0.007**
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	<5
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.16**
a-Net Acidity	moles H+/T	5	**98**
Liming Rate	kg CaCO3/T	0.1	**7.4**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	**98**
Liming Rate without ANCE	kg CaCO3/T	0.1	**7.4**

Parameter	Units	LOR	Sample Number CE166372.014 Sample Matrix Soil Sample Depth 2.5-2.6 Sample Date 13 Apr 2023 Sample Name SE246006A.014
Moisture Content Method: AN002 Tested: 26/4/2023			
% Moisture	%w/w	0.5	**13**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023			
pH KCl	pH Units	-	**4.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	**3.3**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**67**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.11**
Sulphur (SKCl)	%w/w	0.005	<0.005
Calcium (CaKCl)	%w/w	0.005	<0.005
Magnesium (MgKCl)	%w/w	0.005	**0.014**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023			
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023			
Acid Soluble Sulfur (SHCl)	%w/w	0.005	**0.007**
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.11**
s-Net Acidity without ANC	%w/w S	0.005	**0.11**
a-Net Acidity	moles H+/T	5	**69**
Liming Rate	kg CaCO3/T	0.1	**5.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**69**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**5.2**

Parameter	Units	LOR	Sample Number CE166372.014 Sample Matrix Soil Sample Depth 2.5-2.6 Sample Date 13 Apr 2023 Sample Name SE246006A.014
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023			
Peroxide pH (pH Ox)	pH Units	-	**5.1**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**4.3**
TPA as moles H+/tonne	moles H+/T	5	**87**
TPA as S % W/W	%w/w S	0.01	**0.14**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**20**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**0.98**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.03**
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	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5
Sulphur (Sp)	%w/w	0.005	<0.005
Calcium (Cap)	%w/w	0.005	**0.007**
Reacted Calcium (CaA)	%w/w	0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5	<5
Magnesium (Mgp)	%w/w	0.005	**0.018**
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	<0.005
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	<5
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.11**
a-Net Acidity	moles H+/T	5	**69**
Liming Rate	kg CaCO3/T	0.1	**5.2**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	**69**
Liming Rate without ANCE	kg CaCO3/T	0.1	**5.2**

Parameter	Units	LOR	Sample Number CE166372.023 Sample Matrix Soil Sample Depth 2.9-3.0 Sample Date 13 Apr 2023 Sample Name SE246006A.023
Moisture Content Method: AN002 Tested: 26/4/2023			
% Moisture	%w/w	0.5	**17**
TAA (Titratable Actual Acidity) Method: AN219 Tested: 27/4/2023			
pH KCl	pH Units	-	**4.0**
Titratable Actual Acidity	kg H2SO4/T	0.25	**4.2**
Titratable Actual Acidity (TAA) moles H+/tonne	moles H+/T	5	**85**
Titratable Actual Acidity (TAA) S%w/w	%w/w S	0.01	**0.14**
Sulphur (SKCl)	%w/w	0.005	<0.005
Calcium (CaKCl)	%w/w	0.005	**0.012**
Magnesium (MgKCl)	%w/w	0.005	**0.012**
Chromium Reducible Sulfur (CRS) Method: AN217 Tested: 27/4/2023			
Chromium Reducible Sulfur (Scr)	%	0.005	<0.005
Chromium Reducible Sulfur (Scr)	moles H+/T	5	<5
HCl Extractable S, Ca and Mg in Soil/Solids ICP OES Method: AN014 Tested: 2/5/2023			
Acid Soluble Sulfur (SHCl)	%w/w	0.005	**0.008**
Chromium Suite Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.14**
s-Net Acidity without ANC	%w/w S	0.005	**0.14**
a-Net Acidity	moles H+/T	5	**87**
Liming Rate	kg CaCO3/T	0.1	**6.5**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCBT	moles H+/T	5	**87**
Liming Rate without ANCBT	kg CaCO3/T	0.1	**6.5**

Parameter	Units	LOR	Sample Number CE166372.023 Sample Matrix Soil Sample Depth 2.9-3.0 Sample Date 13 Apr 2023 Sample Name SE246006A.023
TPA (Titratable Peroxide Acidity) Method: AN218 Tested: 27/4/2023			
Peroxide pH (pH Ox)	pH Units	-	**4.2**
TPA as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**5.0**
TPA as moles H+/tonne	moles H+/T	5	**102**
TPA as S % W/W	%w/w S	0.01	**0.16**
Titratable Sulfidic Acidity as moles H+/tonne	moles H+/T	5	**17**
Titratable Sulfidic Acidity as kg H_2SO_4/tonne	kg H2SO4/T	0.25	**0.86**
Titratable Sulfidic Acidity as S % W/W	%w/w S	0.01	**0.03**
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	<0.005
Peroxide Oxidisable Sulphur as moles H+/tonne	moles H+/T	5	<5
Sulphur (Sp)	%w/w	0.005	<0.005
Calcium (Cap)	%w/w	0.005	**0.014**
Reacted Calcium (CaA)	%w/w	0.005	<0.005
Reacted Calcium (CaA)	moles H+/T	5	<5
Magnesium (Mgp)	%w/w	0.005	**0.016**
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	<0.005
Net Acid Soluble Sulphur as moles H+/tonne	moles H+/T	5	<5
SPOCAS Net Acidity Calculations Method: AN220 Tested: 2/5/2023			
s-Net Acidity	%w/w S	0.005	**0.14**
a-Net Acidity	moles H+/T	5	**87**
Liming Rate	kg CaCO3/T	0.1	**6.5**
Verification s-Net Acidity	%w/w S	-20	**0.00**
a-Net Acidity without ANCE	moles H+/T	5	**87**
Liming Rate without ANCE	kg CaCO3/T	0.1	**6.5**

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

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chromium Reducible Sulfur (Scr)	LB115561	%	0.005	<0.005	0 - 40%	103%
Chromium Reducible Sulfur (Scr)	LB115561	moles H+/T	5	<5		

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH KCl	LB115558	pH Units	-	6.1	0 - 3%	101%
Titratable Actual Acidity	LB115558	kg H2SO4/T	0.25	<0.25	0%	NA
Titratable Actual Acidity (TAA) moles H+/tonne	LB115558	moles H+/T	5	<5	0%	105%
Titratable Actual Acidity (TAA) S%w/w	LB115558	%w/w S	0.01	<0.01	0%	106%
Sulphur (SKCl)	LB115558	%w/w	0.005	<0.005	3%	89%
Calcium (CaKCl)	LB115558	%w/w	0.005	<0.005	11%	104%
Magnesium (MgKCl)	LB115558	%w/w	0.005	<0.005	1%	98%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Peroxide pH (pH Ox)	LB115560	pH Units	-	6.0	2%	100%
TPA as kg H_2SO_4/tonne	LB115560	kg H2SO4/T	0.25	0.92	0%	115%
TPA as moles H+/tonne	LB115560	moles H+/T	5	19	0%	114%
TPA as S % W/W	LB115560	%w/w S	0.01	0.03	0%	114%
ANCE as % $CaCO_3$	LB115560	% CaCO3	0.01	<0.01	0%	
ANCE as moles H+/tonne	LB115560	moles H+/T	5	<5	0%	
ANCE as S % W/W	LB115560	%w/w S	0.01	<0.01	0%	
Sulphur (Sp)	LB115560	%w/w	0.005	<0.005	3%	90%
Calcium (Cap)	LB115560	%w/w	0.005	<0.005	4%	100%
Magnesium (Mgp)	LB115560	%w/w	0.005	<0.005	3%	94%

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

FOOTNOTES

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

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

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

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

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

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

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

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

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

CHAIN OF CUSTODY RECORD

COC#: SE246006A

Owner job:

Ship to: XML	Project Name:	Due date: 2/05/2023 12:29:21 PM
	Client: FOUNDATION EARTH SCIEN 24429703_14436737	Send Results to: AUENVSE
	Sampler Name: KV/DG	
Carrier:	Airbill #:	

Field Sample ID	Client ID	Date sampling	Time	Matrix	# of Containers	Analyses Requested										Comments
						AN214_ANC	NET_ACID_C	NET_ACID_S	AN219_SPOC	AN218_ANC	AN217_CRS	AN014	AN002_MOIS	ZCF_CHROMSUITE	ZCE_SPOCAS	
SE246006A.001	ASSA1-1	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.003	ASSA1-3	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.006	ASSA1-6	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.014	ASSA2-5	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.023	ASSA3-6	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	

SGS EHS Cairns COC

CE166372

Sample Condition Upon Receipt at Laboratory:	Cooler temperature:
Special Instructions/Comments: Job Booked by: Emily 24/4/23 Loggin Checked by:	

#1 Released by: (Sig)	Date:	#2 Released by: (Sig)	Date:	#3 Released by: (Sig)	Date:
Company Name:	Time	Company Name:	Time	Company Name:	Time
#1 Received by: (Sig) CV	Date: 26-04-23	#2 Received by: (Sig)	Date	#3 Received by: (Sig)	Date
Company Name:	Time: 12:15	Company Name:	Time:	Company Name:	Time:

Bag not intact (Sample #14 was splattered on others)
Others are sealed so hopefully, no mix of

5 x BULK

SAMPLE RECEIPT ADVICE

CE166372

CLIENT DETAILS

Contact	Admin
Client	SGS I&E SYDNEY
Address	5058 201 I&E HSE SYDNEY (EX 5258) UNIT 16 33 MADDOX STREET ALEXANDRIA NSW 2015
Telephone	0285940400
Facsimile	0285940499
Email	au.environmental.sydney@sgs.com
Project	**E3019-2 East Gosford - Additional**
Order Number	**SE246006A**
Samples	5

LABORATORY DETAILS

Manager	Anthony Nilsson
Laboratory	SGS Cairns Environmental
Address	Unit 2, 58 Comport St Portsmith QLD 4870
Telephone	+61 07 4035 5111
Facsimile	+61 07 4035 5122
Email	AU.Environmental.Cairns@sgs.com
Samples Received	Wed 26/4/2023
Report Due	Tue 2/5/2023
SGS Reference	**CE166372**

SUBMISSION DETAILS

This is to confirm that 5 samples were received on Wednesday 26/4/2023. Results are expected to be ready by COB Tuesday 2/5/2023. Please quote SGS reference CE166372 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	5 Soil	Date documentation received	26/4/2023
Samples received in good order	Yes	Samples received without headspace	N/A
Sample temperature upon receipt	Ambient	Turnaround time requested	3 Days
Sample container provider	SGS	Samples received in correct containers	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	1

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

COMMENTS

SAMPLE RECEIPT ADVICE

CE166372

CLIENT DETAILS

Client SGS I&E SYDNEY

Project E3019-2 East Gosford - Additional

SUMMARY OF ANALYSIS

No.	Sample ID	Acid Neutralising Capacity (ANC)	Chromium Reducible Sulfur (CRS)	Chromium Suite Net Acidity Calculations	HCl Extractable S, Ca and Mg in Soil/Solids ICP OES	Moisture Content	SPOCAS Net Acidity Calculations	TAA (Titratable Actual Acidity)	TPA (Titratable Peroxide Acidity)
001	SE246006A.001 0.4-0.5	6	2	7	1	1	6	7	21
003	SE246006A.003 1.4-1.5	6	2	7	1	1	6	7	21
006	SE246006A.006 2.9-3.0	6	2	7	1	1	6	7	21
014	SE246006A.014 2.5-2.6	6	2	7	1	1	6	7	21
023	SE246006A.023 2.9-3.0	6	2	7	1	1	6	7	21

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

CHAIN OF CUSTODY RECORD

COC#: SE246006A

Owner job:

Ship to: XML	Project Name:	Due date: 2/05/2023 12:29:21 PM
	Client: FOUNDATION EARTH SCIEN 24429703_14436737	Send Results to: AUENVSE
	Sampler Name: KV/DG	
Carrier:	Airbill #:	

Field Sample ID	Client ID	Date sampling	Time	Matrix	# of Containers	Analyses Requested										Comments
						AN214_ANC	NET_ACID_C	NET_ACID_S	AN219_SPOC	AN218_ANC	AN217_CRS	AN014	AN002_MOIS	ZCE_CHROMSUITE	ZCE_SPOCAS	
SE246006A.001	ASSA1-1	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.003	ASSA1-3	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.006	ASSA1-6	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.014	ASSA2-5	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	
SE246006A.023	ASSA3-6	13/04/2023	0:00:00	Soil		X	X	X	X	X	X	X	X	X	X	

SGS Alexandria Environmental

SE246006A SUBCON

Received: 24-Apr-2023

Sample Condition Upon Receipt at Laboratory:	Cooler temperature:
Special Instructions/Comments: Job Booked by: Emily 24/4/23 Loggin Checked by:	

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