



Geo-Logix
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21 September 2020

Mr Michael Rumble
Fabcot Pty Ltd
1 Woolworths Way
Bella Vista, NSW 2153

SUBJECT: Acid Sulfate Soil Assessment and Management Plan

SITE: 11-13 Percy Street, Auburn NSW 2144

Dear Michael,

Geo-Logix Pty Ltd (Geo-Logix) was engaged by Fabcot Pty Ltd to undertake an Acid Sulfate Soil (ASS) investigation for the commercial property located at 11-13 Percy Street Auburn NSW 2144 (Figure 1).

Based on review of the provided architectural plans (Attachment A). Geo-Logix understands that the proposed development comprises demolition of the current structures and construction of a new warehouse facility including a mezzanine workspace and carpark, lower floor packing area and a recessed lower carpark and loading bay for distribution of goods. The rear of the complex will comprise of a suspended slab constructed on piers, including a recessed loading dock on the raised platform. Geo-Logix expects portions of the proposed development to be supported by piered foundations. Depending upon selected pier types, excavation to bedrock may required, resulting is excavated spoil from deep in the soil profile.

OBJECTIVE AND SCOPE OF WORKS

The objective of the investigation was to assess whether soils on the site are actual or potential acid sulfate soils and provide acid sulfate soil (ASS) management procedures required to facilitate redevelopment.

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

- Review of ASS and geological maps for the area;
- Visual appraisal of the site conditions and locality;
- Completion of six ASS investigation boreholes (AS1 to AS6) spread across the site.
- Collection of representative soil samples for laboratory testing to assess for the presence of ASS; and
- Provision of this report detailing the results of the above investigation and management procedures for ASS.

SITE INFORMATION

Site Identification

The investigation area comprises the following properties:

Property Location	Lot and Deposited Plan (DP)	Approximate Area (m ²)
11 Percy Street, Auburn, NSW 2144	Lot 1 DP 1183821	32,500
13 Percy Street, Auburn, NSW 2144	Lot 2 DP 1183821	

Site Description

The following observations were made during site inspection and field works conducted by Geo-Logix in May and June 2019 and in May 2020.

The subject site is located in a commercial/industrial area in Auburn NSW. The site incorporates two rectangular shaped lots encompassing an area of approximately 3.25 Ha. The lots are bound by Percy Street to the northwest, Haslams Creek to the southeast and commercial/industrial on adjacent properties. Entry into the site is via two gates (North and South) from Percy Street.

At the time of the investigation Lot 1 was operating as Chameleon Touring Systems, a stage lighting and equipment supplier and Lot 2 as a Mitsubishi new vehicle accessories and auto detailing service centre. The Lot 1 building was located in the northwest portion of the site on the boundary with Percy Street. The building was constructed of metal cladding, a saw tooth roof and concrete floor slabs.

The Lot 2 building was located in the southeast portion of the site and was constructed to be level with Lot 1. The building was constructed of brick and metal cladding. The eastern portion of the building being constructed with a suspended concrete floor slab supported on concrete pillar. The undercroft area on lot 2 was paved with unbound gravel and used for vehicle parking. The northeast portion of Lot 2 comprised a car ramp and concrete and bitumen paved car parking.

The site is a split level with suspected cut and fill process used during the construction of the current site layout. Haslams Creek located on the south eastern site boundary was a concrete lined channel at the time of inspection.

Site cover outside building areas included approximately 15% asphalt in the eastern corner, used for car parking and 10% grass (in the southern corner and at the north western boundary with the remaining 75% being concrete pavements. The on-site pavements were generally in fair condition for their apparent age with little to no evidence of damage from differential settlements.

The site generally sloped downwards towards Haslams Creek in the east. Reference of Google Earth indicates the site is located at an elevation of 4–8 mAHD.

Acid Sulfate Soil Maps

Review of the Prospect-Parramatta ASS Risk Map (Department of Land and Water Conservation 1997) indicates the site is in an area of disturbed terrain, and notes: disturbed terrain often occurs during reclamation of low lying swamps for urban development. Soil investigation are required to assess these areas for acid sulfate potential.

Review of the Auburn Local Environmental Plan (LEP) 2010 ASS map indicates the site may be underlain by actual or potential acid sulfate soils. The site is classified as Class 2; council consent is required for any works below the natural ground surface or works by which the water table is likely to be lowered. Copies of the DLWC ASS Risk map and Auburn LEP ASS map are presented as Attachment B.

Regional Geology

Review of the NSW 1:100,000 Sydney Map (Geological Survey of NSW, 1983) indicates the western area of the site is underlain by Triassic age Ashfield shale of the Wianamatta Group comprising black to dark grey shale and laminate (Herbert, 1983). On the eastern portion of the site, surficial geology is mapped as Quaternary age alluvium comprised of silty to peaty quartz sand, silt, and clay with occasional ferruginous and humic cementation and common shell layers. The alluvium is expected to lie atop Ashfield shale.

Regional Hydrogeology

Regional groundwater is expected to follow the natural topography and generally flow northeast.

Reference to the NSW Natural Resource Atlas (NSW Government, 2020) indicates there are no registered groundwater bores within 500 m of the site.

INVESTIGATION METHODOLOGY

Fieldworks were undertaken on 5 June 2020. The investigation methodology is presented below.

Soil boreholes AS1 to AS6 were completed using a ute mounted drill rig equipped with solid stem augers. Soil boreholes were drilled up to depth of 6m below grade or until refusal on bedrock located at 5.7mbg in AS1, 5.2mbg in AS2 and 4.7mbg in AS3 in the lower portion of the site. Bore logs are presented in Attachment C, bore hole locations are detailed in Figure 2.

Encountered soils were logged in accordance with the Unified Soil Classification System (USCS). Samples were collected in zip lock bags at 1 m intervals. At each interval, two subsamples were tested in the field for pH and oxidised pH. Initially, in situ pH was tested using a Manutec pH soil test kit, then, oxidised pH was analysed using hydrogen peroxide followed by a pH test. Bagged samples were placed on ice in an esky for transport under chain of custody to Eurofins for analysis of chromium reducible sulfur in selected samples.

Quality assurance (QA) procedures adopted to prevent cross contamination between samples included the use of fresh disposable nitrile gloves for collecting each soil sample. The soil samples were collected directly from the flight of the auger.

Upon completion of the assessment, the soil bores were reinstated with drill cuttings.

ACID SULFATE SOIL FORMATION

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

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

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

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

ASS ASSESSMENT RESULTS

Site Subsurface Conditions

The following sections contain a summarised account of the site surface and subsurface. For detailed descriptions of individual locations please refer to the soil bore logs, provided as Attachment D.

Filling

Fill was a dark brown, moderately compacted clay mix of clay and gravel in the lower carpark area of the site. Stiff fill clay soil was also encountered in the upper carpark area at AS6.

Natural Soils

Natural soils were pale to moderate brown clay, generally moderate to high plasticity from 0.3mbg with underlying hard orange clays or deposited wet, clayey sands found beginning 2.5–3.5 mbg. AS6 differed from the lower AS1–AS5 containing high plasticity clays and lenses of rich organic lenses of dark organic material and a strong sulfurous odour was observed.

Groundwater

In the eastern (lower) portion of the site, groundwater inflow was observed generally at 2.5 mbg. No groundwater inflow was observed in boring AS6.

Laboratory Analysis and Results

Soil analytical results are summarised in Table 1. Laboratory reports are included as Attachment E.

ASS pH Screening

In each boring, samples of fill and natural soil from each metre were tested for natural pH and pH following oxidation with a peroxide solution to screen for AASS and PASS. The reaction of the soil during oxidation was recorded using a reaction rating scale of 0 (No reaction) to 4.0 (Extreme reaction).

The existing pH of natural soil was typically neutral, with a few profiles recording moderate acidity values (pH 4.6 to 8.5). Oxidation tests with hydrogen peroxide generally displayed moderate reactions for on-site soils. Following addition of hydrogen peroxide, a reduction in pH occurred in the majority of soil samples (up to a maximum of 3.5 pH units). The highest reaction ratings were obtained in samples from borings AS2, AS3 and AS6.

Chromium Suite Analysis

From each borehole, Geo-Logix submitted the two samples that returned the highest drop in pH following oxidation for chromium suite analysis. The laboratory results were compared against the acid sulfate soils action criteria defined in Table 4.4 of the NSW ASS Manual (ASSMAC, 1998). The action criteria for earthworks disturbing less than 1,000 tonnes of soil are:

- Coarse Soil (sands and sandy loams) – 18 mol H⁺/tonne acidity;
- Medium Soil (loams, silts and light clay) – 36 mol H⁺/tonne acidity; and
- Fine Soil (Silty clays, medium and heavy clays) – 62 mol H⁺/tonne acidity.

On-site soils were primarily fine grained with coars soil comprising a portion of on-site fill.

Based on the results of chromium suite analysis, the net acidity of on-site soils ranged from non-detect to 150 mol H⁺/tonne (Table 1). The action criteria was exceeded in two samples, AS2/3.8-4.0 and AS6/3.8-4.0, indicating the presence of ASS in these locations. Based on the in situ pH and Titratable Actual Acidity (TAA) for these samples, the soils are considered to be potential acid sulfate soils (PASS). No actual acid sulfate soils (AASS) were identified on site.

ACID SULFATE MANAGEMENT PLAN

An Acid Sulfate Soil Management Plan (ASSMP) to manage ASS during construction is detailed in the following sections. Unless confirmed otherwise by specific testing, Geo-Logix recommends that soils from beneath 2 m depth should be conservatively considered ASS unless otherwise demonstrated via assessment/testing by a suitably qualified person. Based on Geo-Logix's understanding of the proposed development this would primarily comprise spoil from the construction of piled foundations. Such spoil may be avoided by the use of screw piers where practical.

Temporary Stockpile Preparation

Excavated soil potentially comprising PASS is to be placed in a pre-designated area. The stockpile area is to be prepared adjacent to the soil removal area prior to the commencement of soil removal activities. The stockpile area should be located on asphalt or concrete sealed hard stand if possible, and lined with 200 micron high density polyethylene (HDPE) sheeting. If it is impractical to locate stockpile on a hardstand surface then an area should be prepared by levelling and removal of any material that could lead to perforation of the HDPE liner.

The HDPE sheets are to be rolled out perpendicular to the slope, with a minimum of 300 mm overlap. The up-gradient layer is to overlap the down gradient layer. Each side of the overlap is to be sealed with a PVC tape. The HDPE is to be bunded by hay bales. The HDPE is to extend over the hay bale and be 'locked' into position by a second hay bale placed on the HDPE and positioned behind the first hay bale.

The stockpiled soil is to be covered with plastic sheeting once all excavation is complete to prevent additional leachate generation from rainfall percolating through stockpiled material. All stormwater entry points down gradient of the worksite are to be blocked off using sand bags or similar during excavation activities. Sand bags can be removed once the stockpile is covered with plastic.

Acid Sulfate Management – Liming Dose

Immediately following stockpiling, the PASS is to be neutralised. Agricultural lime with a neutralising value of 95-98% is to be used as the liming agent.

Liming rates for all analysed samples were provided by the laboratory. As a conservative approach the upper dosing rate of 11 kg lime/tonne soil is recommended. Lime is to be mixed through stockpiled spoil using an excavator at a rate of 11 kg lime/tonne or 15 kg/m³ of soil. Once neutralised, the soil may be reused on-site.

Stockpile Leachate Collection

Any water/leachate draining from the stockpiled soils is to be collected in a sealed sump at the down-gradient end of the stockpile area. Any leachate is to be pumped from the sump into a holding tank prior to transport by a licensed liquid waste transporter for off-site disposal to a NSW EPA licensed waste facility.

Water in the holding tank should be monitored for pH daily and agricultural lime used to neutralise the water.

Collection of Groundwater from Dewatering

Depending upon the installation method, excavation for the proposed piers may require some degree of groundwater dewatering. Excavation dewatering can, by causing the depression of neighbouring groundwater, lead to the acidification of adjacent soils. For this reason, if such methods are adopted, it will be important to limit the extent and volume of dewatering by dewatering immediately prior to concrete placement.

When dewatering, the waste water is to be pumped into a holding tank prior to off-site disposal.

Waste Classification and Off-site Disposal

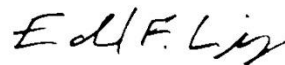
Any excess soil to be disposed off-site must be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines and must be disposed to a facility licensed to accept the waste. In addition to contaminants of potential concern (COPC), all soil to be disposed off-site should be analysed for oxidisable sulfur and pH.

Please do not hesitate to contact Geo-Logix directly (02) 9979 1722 should you require further information.

Yours sincerely,



Caden Pengelly
BEnvS
Environmental Scientist



Edward Lilly
BSc Civil Engineering
Associate

FIGURES

Figure 1: Site Vicinity Map

Figure 2: Sample Location Map

TABLES

Table 1: Summary of Soil Analytical Data – Acid Sulfate Soils

ATTACHMENTS

Attachment A: Proposed Architectural Plans

Attachment B: Auburn Local Environmental Plan 2010 ASS Map

Attachment C: Registered Groundwater Bore Search

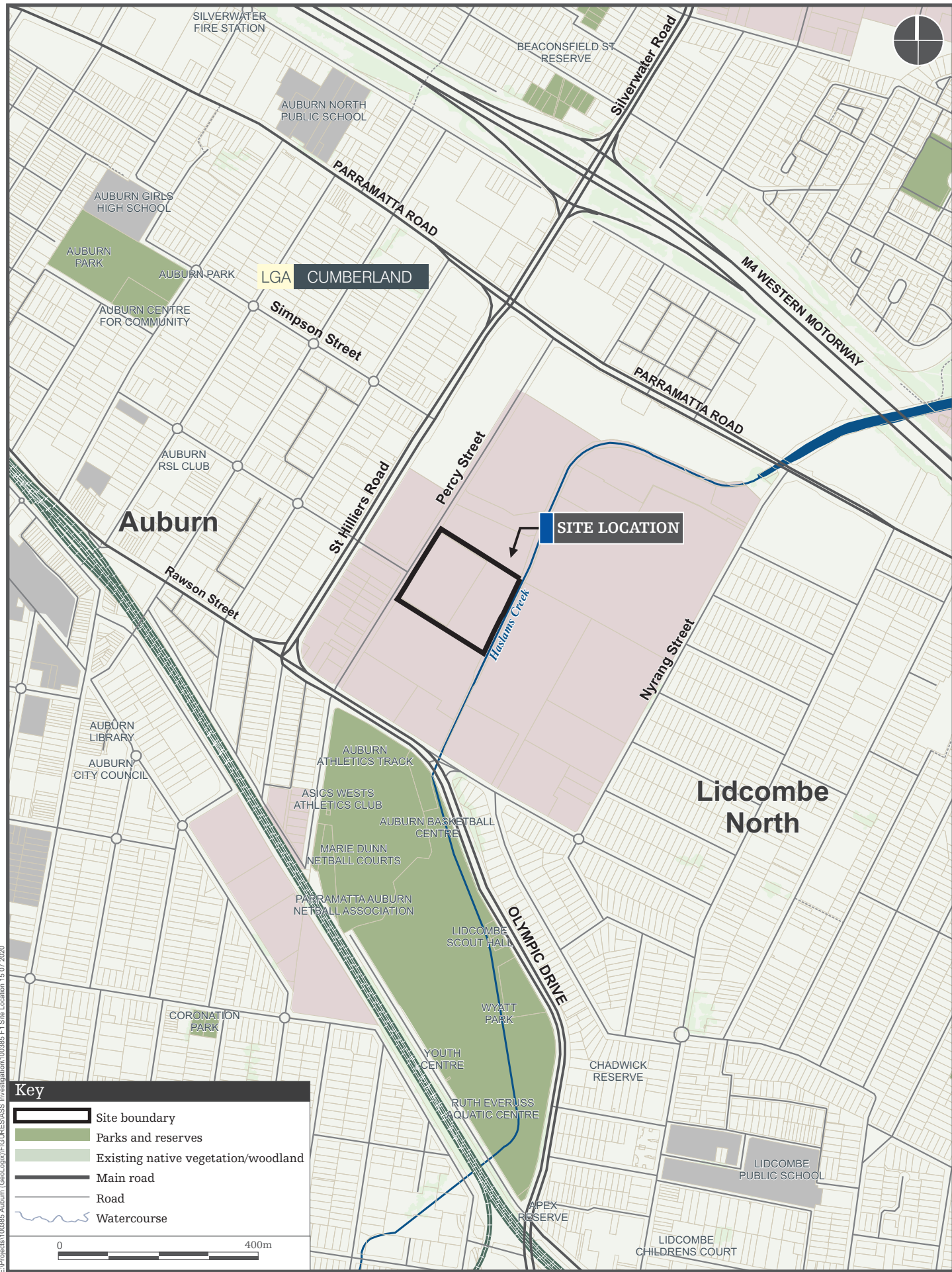
Attachment D: Borehole Logs

Attachment E: Laboratory Report

LIMITATIONS

It is understood that the Environmental advice provided by Geo-Logix is based on limited data. Geo-Logix has conducted the investigation in accordance with accepted methodologies and state and national guidelines for investigation of ASS. Geo-Logix has formed an interpretation based on scientific principal and experience. By accepting the advice presented in the Geo-Logix report you agree to indemnify Geo-Logix against any loss, damage, liability, claim, suits, demands and actions for advice which, as a result of local geological/hydrogeological anomalies caused pollution or exacerbated existing pollution. Geo-Logix accepts no responsibility for third party use of this report.

FIGURES



E:\Projects\100385 Auburn (GeoLogix)\FIGURES\ASS Investigation\100385 F1 Site Location 15.07.2020



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Other than for the sole purpose of work associated with the Acid Sulfate Soil Assessment and Management Plan as detailed herein, the use, reproduction and/or publication of this figure wholly, or in part, whether or not modified or altered, is strictly prohibited.

SITE VICINITY MAP

Acid Sulfate Soil Assessment and Management Plan
11-13 Percy Street, Auburn NSW

Project No. 2001036

Figure 1



ES:\Projects\1003036 Auburn - Geo-Logix\FIGURES\ASS Investigation\1003036 F2 Sample Location Map 15.07.2020 TO

TABLES

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
Acid Sulfate Soil Assessment and Management Plan
Project No.: 2001036

11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS1/0.0-0.2	AS1/0.9-1.0	AS1/1.9-2.0	AS1/2.9-3.0	AS1/3.9-4.0
	Units	Action Criteria			Depth (m)	0.0-0.2	0.9-1.0	1.9-2.0	2.9-3.0	3.9-4.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Fine	Fine	Fine	Fine	Fine
pH _F (natural)	pH Units	-	-	-		7.5	8.5	6.0	6.5	6.5
pH _{FOX} (oxidised)	pH Units	-	-	-		7.0	7.5	6.0	6.0	5.0
ΔpH	pH Units	-	-	-		0.5	1.0	0.0	0.5	1.5
Reaction Rating*	unitless	-	-	-		3.0	1.5	0.0	2.5	2.5
pH _{KCl}	pH Units	-	-	-		7	--	--	--	5.7
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		< 2	--	--	--	3.8
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		0.021	--	--	--	< 0.005
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		13	--	--	--	< 3
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		n/a	--	--	--	n/a
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		n/a	--	--	--	n/a
S _{NAS} - Net Acid Soluble Sulphur	% S	-	-	-		n/a	--	--	--	n/a
ANC Finess Factor	unitless	-	-	-		1.5	--	--	--	1.5
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		3.5	--	--	--	n/a
Net Acidity	% S	0.03	0.06	0.1		< 0.02	--	--	--	< 0.02
Net Acidity	eq. mol. H ⁺ /t	18	36	62		< 10	--	--	--	< 10
Liming Rate	kg CaCO ₃ /t	-	-	-		<1	--	--	--	<1

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
Acid Sulfate Soil Assessment and Management Plan
Project No.: 2001036

11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS1/4.9-5.0	AS2/0.0-0.2	AS2/0.8-1.0	AS2/1.8-2.0	AS2/2.8-3.0
	Units	Action Criteria			Depth (m)	4.9-5.0	0.0-0.2	0.8-1.0	1.8-2.0	2.8-3.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Fine	Coarse	Coarse	Fine	Fine
pH _F (natural)	pH Units	-	-	-		6.0	10.0	8.5	7.5	5.5
pH _{FOX} (oxidised)	pH Units	-	-	-		6.0	8.5	7.5	5.5	5.0
ΔpH	pH Units	-	-	-		0.0	1.5	1.0	2.0	0.5
Reaction Rating*	unitless	-	-	-		1.0	4.0	3.0	2.5	2.5
pH _{KCl}	pH Units	-	-	-		--	--	--	7.5	--
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		--	--	--	< 2	--
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		--	--	--	0.04	--
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		--	--	--	25	--
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		--	--	--	n/a	--
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		--	--	--	n/a	--
S _{NAS} - Net Acid Soluble Sulphur	% S	-	-	-		--	--	--	n/a	--
ANC Finess Factor	unitless	-	-	-		--	--	--	1.5	--
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		--	--	--	4.1	--
Net Acidity	% S	0.03	0.06	0.1		--	--	--	< 0.02	--
Net Acidity	eq. mol. H ⁺ /t	18	36	62		--	--	--	< 10	--
Liming Rate	kg CaCO ₃ /t	-	-	-		--	--	--	<1	--

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
Acid Sulfate Soil Assessment and Management Plan
Project No.: 2001036

11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS2/3.8-4.0	AS2/4.8-5.0	AS3/0.0-0.2	AS3/0.8-1.0	AS3/1.8-2.0
	Units	Action Criteria			Depth (m)	3.8-4.0	4.8-5.0	0.0-0.2	0.8-1.0	1.8-2.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Fine	Fine	Fine	Fine	Fine
pH _F (natural)	pH Units	-	-	-		7.5	7.0	9.0	8.5	6.5
pH _{FOX} (oxidised)	pH Units	-	-	-		4.0	6.5	8.0	7.5	5.5
ΔpH	pH Units	-	-	-		3.5	0.5	1.0	1.0	1.0
Reaction Rating*	unitless	-	-	-		2.5	1.0	4.0	2.0	2.5
pH _{KCl}	pH Units	-	-	-		5.7	--	--	--	--
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		19	--	--	--	--
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		0.21	--	--	--	--
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		130	--	--	--	--
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		n/a	--	--	--	--
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		n/a	--	--	--	--
S _{NAS} - Net Acid Soluable Sulphur	% S	-	-	-		n/a	--	--	--	--
ANC Finess Factor	unitless	-	-	-		1.5	--	--	--	--
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		n/a	--	--	--	--
Net Acidity	% S	0.03	0.06	0.1		0.24	--	--	--	--
Net Acidity	eq. mol. H ⁺ /t	18	36	62		150	--	--	--	--
Liming Rate	kg CaCO ₃ /t	-	-	-		11	--	--	--	--

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
Acid Sulfate Soil Assessment and Management Plan
Project No.: 2001036

11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS3/2.8-3.0	AS3/3.8-4.0	AS3/4.6-4.7	AS4/0.0-0.2	AS4/0.8-1.0
	Units	Action Criteria			Depth (m)	2.8-3.0	3.8-4.0	4.6-4.7	0.0-0.2	0.8-1.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Fine	Fine	Fine	Medium	Medium
pH _F (natural)	pH Units	-	-	-		6.0	7.0	7.5	9.0	8.0
pH _{FOX} (oxidised)	pH Units	-	-	-		4.5	4.5	6.5	8.5	6.5
ΔpH	pH Units	-	-	-		1.5	2.5	1.0	0.5	1.5
Reaction Rating*	unitless	-	-	-		2.0	2.0	1.0	4.0	2.5
pH _{KCl}	pH Units	-	-	-		4.9	4.6	--	8.5	--
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		33	31	--	< 2	--
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		0.012	0.005	--	0.092	--
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		7.4	3.3	--	57	--
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		n/a	n/a	--	n/a	--
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		n/a	n/a	--	n/a	--
S _{NAS} - Net Acid Soluble Sulphur	% S	-	-	-		n/a	n/a	--	n/a	--
ANC Finess Factor	unitless	-	-	-		1.5	1.5	--	1.5	--
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		n/a	n/a	--	8.8	--
Net Acidity	% S	0.03	0.06	0.1		0.07	0.06	--	< 0.02	--
Net Acidity	eq. mol. H ⁺ /t	18	36	62		40	34	--	< 10	--
Liming Rate	kg CaCO ₃ /t	-	-	-		3	2.6	--	<1	--

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
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11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS4/1.8-2.0	AS4/2.8-3.0	AS4/3.8-4.0	AS4/4.8-5.0	AS4/5.8-6.0
	Units	Action Criteria			Depth (m)	1.8-2.0	2.8-3.0	3.8-4.0	4.8-5.0	5.8-6.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Fine	Fine	Fine	Fine	Fine
pH _F (natural)	pH Units	-	-	-		7.0	8.0	8.0	8.5	8.5
pH _{FOX} (oxidised)	pH Units	-	-	-		6.5	7.5	7.0	8.5	8.0
ΔpH	pH Units	-	-	-		0.5	0.5	1.0	0.0	0.5
Reaction Rating*	unitless	-	-	-		1.0	2.0	1.0	0.0	1.0
pH _{KCl}	pH Units	-	-	-		--	7.3	--	--	--
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		--	< 2	--	--	--
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		--	< 0.005	--	--	--
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		--	< 3	--	--	--
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		--	n/a	--	--	--
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		--	n/a	--	--	--
S _{NAS} - Net Acid Soluble Sulphur	% S	-	-	-		--	n/a	--	--	--
ANC Finess Factor	unitless	-	-	-		--	1.5	--	--	--
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		--	1.4	--	--	--
Net Acidity	% S	0.03	0.06	0.1		--	< 0.02	--	--	--
Net Acidity	eq. mol. H ⁺ /t	18	36	62		--	< 10	--	--	--
Liming Rate	kg CaCO ₃ /t	-	-	-		--	<1	--	--	--

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
Acid Sulfate Soil Assessment and Management Plan
Project No.: 2001036

11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS5/0.0-0.2	AS5/0.8-1.0	AS5/1.8-2.0	AS5/2.8-3.0	AS5/3.8-4.0
	Units	Action Criteria			Depth (m)	0.0-0.2	0.8-1.0	1.8-2.0	2.8-3.0	3.8-4.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Coarse	Medium	Fine	Fine	Fine
pH _F (natural)	pH Units	-	-	-		8.5	8.0	6.5	7.5	8.0
pH _{FOX} (oxidised)	pH Units	-	-	-		8.0	7.5	6.5	7.5	6.0
ΔpH	pH Units	-	-	-		0.5	0.5	0.0	0.0	2.0
Reaction Rating*	unitless	-	-	-		4.0	3.0	1.0	2.0	1.0
pH _{KCl}	pH Units	-	-	-		--	--	6.8	--	7.1
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		--	--	< 2	--	< 2
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		--	--	0.009	--	< 0.005
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		--	--	5.8	--	< 3
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		--	--	n/a	--	n/a
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		--	--	n/a	--	n/a
S _{NAS} - Net Acid Soluable Sulphur	% S	-	-	-		--	--	n/a	--	n/a
ANC Finess Factor	unitless	-	-	-		--	--	1.5	--	1.5
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		--	--	2.6	--	0.74
Net Acidity	% S	0.03	0.06	0.1		--	--	< 0.02	--	< 0.02
Net Acidity	eq. mol. H ⁺ /t	18	36	62		--	--	< 10	--	< 10
Liming Rate	kg CaCO ₃ /t	-	-	-		--	--	<1	--	<1

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
Acid Sulfate Soil Assessment and Management Plan
Project No.: 2001036

11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS5/4.8-5.0	AS5/5.8-6.0	AS6/0.8-1.0	AS6/1.8-2.0	AS6/2.8-3.0
	Units	Action Criteria			Depth (m)	4.8-5.0	5.8-6.0	0.8-1.0	1.8-2.0	2.8-3.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Medium	Medium	Fine	Fine	Fine
pH _F (natural)	pH Units	-	-	-		7.5	7.5	7.5	7.0	7.0
pH _{FOX} (oxidised)	pH Units	-	-	-		7.5	7.5	6.5	6.0	7.0
ΔpH	pH Units	-	-	-		0.0	0.0	1.0	1.0	0.0
Reaction Rating*	unitless	-	-	-		0.0	0.0	2.0	1.5	1.5
pH _{KCl}	pH Units	-	-	-		--	--	--	--	--
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		--	--	--	--	--
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		--	--	--	--	--
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		--	--	--	--	--
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		--	--	--	--	--
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		--	--	--	--	--
S _{NAS} - Net Acid Soluble Sulphur	% S	-	-	-		--	--	--	--	--
ANC Finess Factor	unitless	-	-	-		--	--	--	--	--
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		--	--	--	--	--
Net Acidity	% S	0.03	0.06	0.1		--	--	--	--	--
Net Acidity	eq. mol. H ⁺ /t	18	36	62		--	--	--	--	--
Liming Rate	kg CaCO ₃ /t	-	-	-		--	--	--	--	--

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

Table 1: Summary of Soil Analytical Data - Acid Sulfate Soils
Acid Sulfate Soil Assessment and Management Plan
Project No.: 2001036

11-13 Percy Street
Auburn, NSW 2144

					Sample ID	AS6/3.8-4.0	AS6/4.8-5.0	AS6/5.8-6.0
	Units	Action Criteria			Depth (m)	3.8-4.0	4.8-5.0	5.8-6.0
		by Soil Type			Date	15/06/20	15/06/20	15/06/20
		Coarse	Medium	Fine	Soil Type	Fine	Fine	Fine
pH _F (natural)	pH Units	-	-	-		6.5	6.0	5.0
pH _{FOX} (oxidised)	pH Units	-	-	-		5.0	5.5	4.5
ΔpH	pH Units	-	-	-		1.5	0.5	0.5
Reaction Rating*	unitless	-	-	-		3.0	2.0	3.0
pH _{KCl}	pH Units	-	-	-		5.6	--	4.8
TAA - Titratable Actual Acidity	mol. H ⁺ /t	-	-	-		16	--	30
S _{CR} - Chromium Reducible Sulfur	% S	-	-	-		0.17	--	0.012
S _{CR} - Chromium Reducible Sulfur	eq. mol. H ⁺ /t	-	-	-		110	--	7.3
S _{KCl} - KCl Extractable Sulphur	% S	-	-	-		n/a	--	n/a
S _{HCl} - HCl Extractable Sulphur	% S	-	-	-		n/a	--	n/a
S _{NAS} - Net Acid Soluble Sulphur	% S	-	-	-		n/a	--	n/a
ANC Finess Factor	unitless	-	-	-		1.5	--	1.5
ANC _{BT} - Acid Neutralising Capacity	%CaCO ₃	-	-	-		n/a	--	n/a
Net Acidity	% S	0.03	0.06	0.1		0.2	--	0.06
Net Acidity	eq. mol. H ⁺ /t	18	36	62		120	--	37
Liming Rate	kg CaCO ₃ /t	-	-	-		9.2	--	2.8

Notes:

Action Criteria = ASSMAC (1998) Acid Sulfate Soils Assessment Guidelines, Table 4.4.

*Field Screen uses the following reaction rating to classify the rate the samples reacted to the peroxide:

0.0 No reaction 1.0 - No reaction to slight; 2.0 - Moderate reaction;
3.0 - Strong reaction with persistent froth; and 4.0 - Extreme reaction.

- = action criteria not available

< # or ND = analyte(s) not detected in excess of laboratory reporting limit

-- = sample not analysed

Bold/red indicates exceedance of action criteria

ATTACHMENT A



18/09/2023 3:13:38 PM C:\REVIT LOCAL 2020\11250_11250_NOWSA_ARCHITECTURAL_DWG.rvt

Client



Issue	Description	Date
P1	Draft DA	18.09.20

Builder and/or subcontractors shall verify all project dimensions before commencing on-site work or off-site fabrication. Figured dimensions shall take precedence over scaled dimensions. This drawing is copyright and cannot be reproduced in whole or in part or by any medium without the written permission of Nettleton Tribe Partnership Pty Ltd.

Builder

Builders Logo

Project Name
CFC Percy St. Auburn
Project Address
13 Percy Street, Auburn, NSW 2144



Drawing Title:
Site Plan

Author: **ES** Checker: Sheet Size: **A1**
Drawing Number: **11250_DA001**

Scale: **1:750**

Issue: **P1**

nettletontribe

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ATTACHMENT B



Auburn Local Environmental Plan 2010

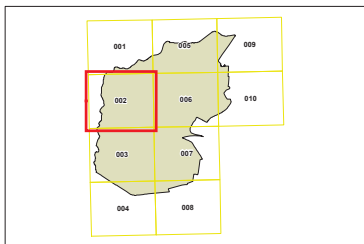
Acid Sulfate Soils Map - Sheet ASS_002

Acid Sulfate Soils

- 1 Class 1
- 2 Class 2
- 3 Class 3
- 4 Class 4
- 5 Class 5

Cadastre

Cadastre 25/05/2010 © Land and Property Information (LPI)

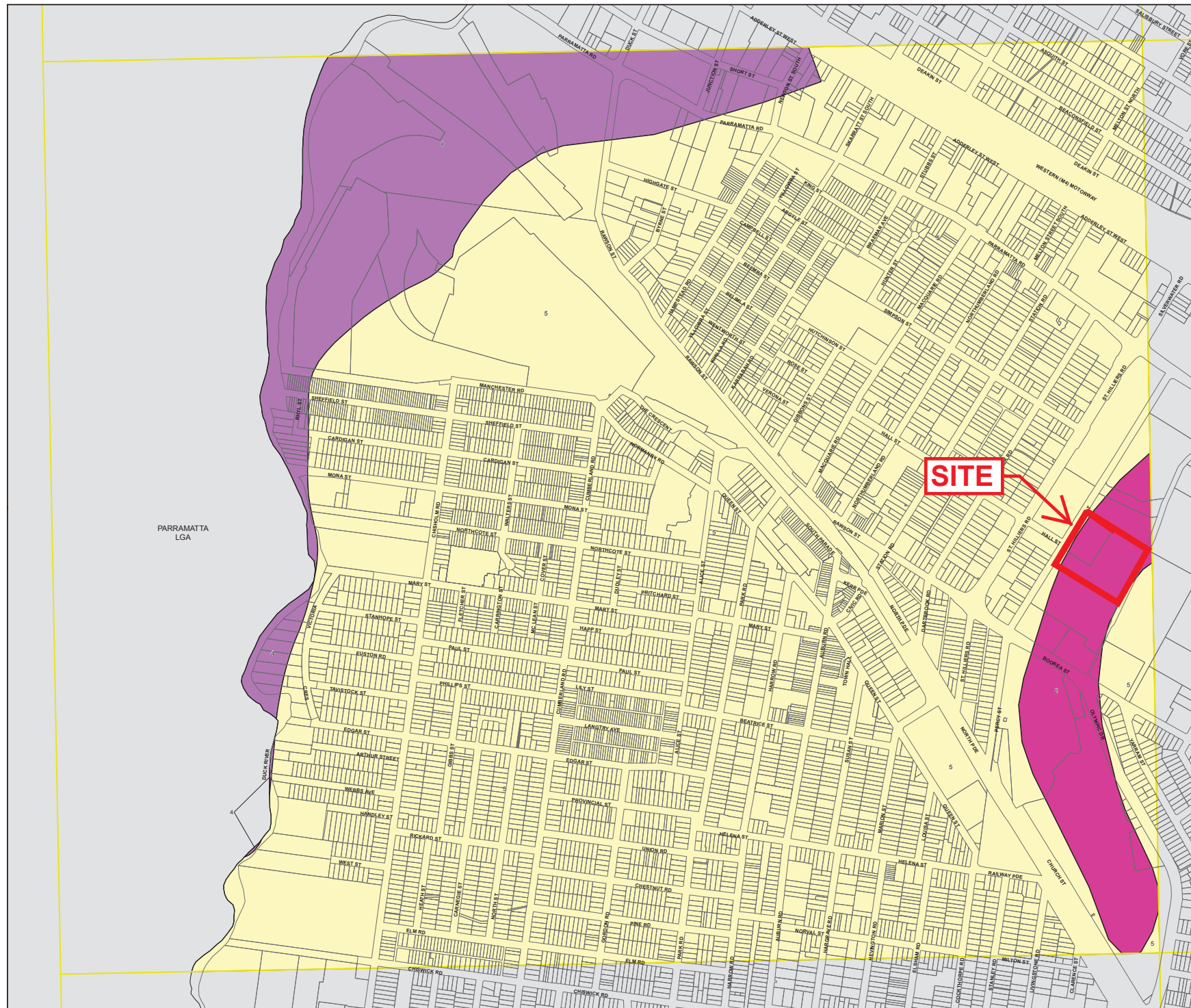


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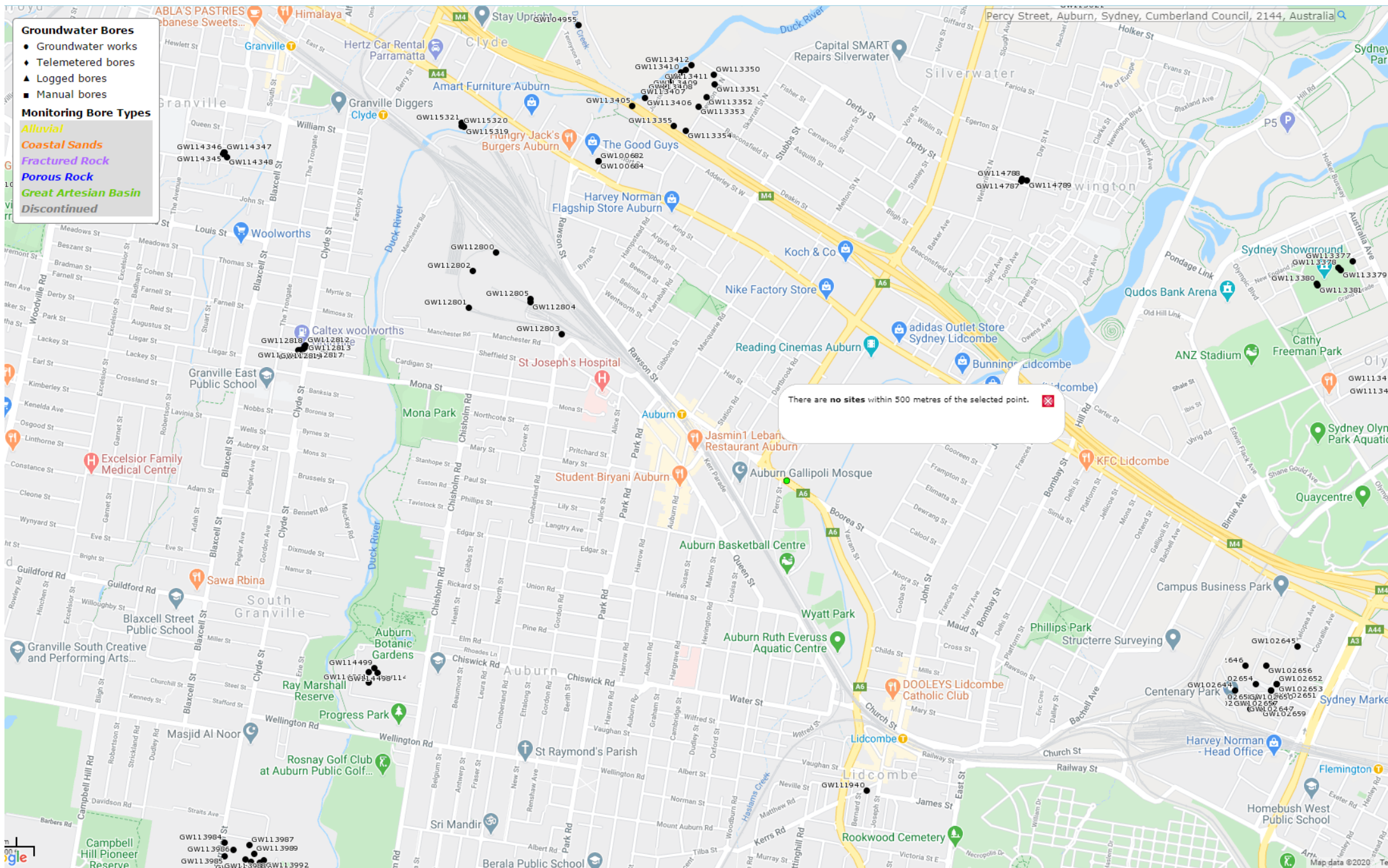
Scale: 1:10,000 @ A3

Projection: GDA 1994
MGA Zone 56

Map identification number: 0200_COM_ASS_002_010_20120910



ATTACHMENT C



ATTACHMENT D



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Geo-Logix Pty Ltd

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

Project Number: **2001036**
Hole Depth: **5.70 m**
Date Started: **15/06/2020**
Date Completed: **15/06/2020**

Project Name: **Acid Sulfate Soil Investigation**
Location / Site: **Auburn NSW**
Client:
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger (Ute Mounted)**

Method	Water Level	Depth (mBGL)	RL (mAHD)	Sample Type	HC Odour	Sample ID	pH _r	pH _{cox}	Reaction	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture
SFA		0.30		D	Z	AS1/0.0-0.2	7.5	7	3	CL			CLAY with Sand & Silt - moderate brown (5YR 3/4), 50% clay, 20% silt, 30% sand, medium plasticity, soft.	damp
		1.10		D	Z	AS1/0.9-1.0	8.5	7.5	1.5	CL			CLAY - light brown (5YR 5/6), 90% clay, 10% sand, medium plasticity, soft.	damp
		2.50		D	Z	AS1/1.9-2.0	6	6	0	CL			CLAY with Sand - dark yellowish orange (10YR 6/6) and pale yellowish brown (10YR 6/2), 80% clay, 20% sand, low plasticity, stiff.	dry
		3.50		D	Z	AS1/2.9-3.0	6.5	6	2.5	CL			CLAY - pale yellowish brown (10YR 6/2), 90% clay, 10% sand, low plasticity, firm.	dry
		4.20		D	Z	AS1/3.9-4.0	5.5	6	2.5	CL			CLAY & SAND - dark yellowish orange (10YR 6/6) and pale yellowish brown (10YR 6/2), 50% clay, 50% silt, low plasticity, soft.	moist
		5.30		D	Z	AS1/4.9-5.0	6.5	6	1	ML			Clayey Sandy SILT - dark yellowish orange (10YR 6/6) and pale yellowish brown (10YR 6/2), 20% clay, 50% silt, 30% sand, very loose.	wet
							7.5	7	1	SC			Clayey SAND - moderate yellowish brown (10YR 5/4), 40% clay, 60% sand, loose.	dry
													Refusal at 5.700 m	

Abbreviations

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type
D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
Encountered Groundwater
Stabilised Groundwater

Additional Comments



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

Logged By: **Caden Pengelly**
Checked By:

Date: **15/06/2020**
Date:



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

Project Number: **2001036**
Hole Depth: **5.20 m**
Date Started: **15/06/2020**
Date Completed: **15/06/2020**

Project Name: **Acid Sulfate Soil Investigation**
Location / Site: **Auburn NSW**
Client:
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger (Ute Mounted)**

Method	Water Level	Depth (mBGL)	RL (mAHD)	Sample Type	HC Odour	Sample ID	pH _f	pH _{cox}	Reaction	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture
				D	Z	AS2/0.0-0.2	1	8.5	4				FILL - moderate brown (5YR 3/4), 70% sand, 30% gravel, poorly compacted.	damp
		1		D	Z	AS2/0.8-1.0	8.5	7.5	3	Fill				
		1.50												
		2		D	Z	AS2/1.8-2.0	7.5	5.5	2.5				FILL - moderate brown (5YR 3/4), 90% clay, 10% silt, medium plasticity, poorly compacted.	damp
		2.10												
				D	Z	AS2/2.8-3.0 & D1 & T1	5.5	5	2.5	CH			CLAY - moderate brown (5YR 3/4), 85% clay, 15% silt, high plasticity, soft.	wet
		3												
		3.50												
		4		D	Z	AS2/3.8-4.0	7.5	4	2.5	CH			Silty CLAY - moderate brown (5YR 3/4), 63% clay, 35% silt, high plasticity, very soft.	wet
		4.50												
		5		D	Z	AS2/4.5-5.0	7	6.5	1	CL			CLAY with Sand - dark yellowish orange (10YR 6/6) and very pale orange (10YR 8/2), 75% clay, 25% sand, hard.	dry
		6											Refusal at 5.200 m	

Abbreviations

Hydrocarbon Odour
H High
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L Low
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Sample Type
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C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
▽ Encountered Groundwater
▽ Stabilised Groundwater

Additional Comments



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

Logged By: **Caden Pengelly**
Checked By:

Date: **15/06/2020**
Date:



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

Project Number: **2001036**
Hole Depth: **4.70 m**
Date Started: **15/06/2020**
Date Completed: **15/06/2020**

Project Name: **Acid Sulfate Soil Investigation**
Location / Site: **Auburn NSW**
Client:
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger (Ute Mounted)**

Method	Water Level	Depth (mBGL)	RL (mAHD)	Sample Type	HC Odour	Sample ID	pH _r	pH _{cox}	Reaction	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture
SFA		0.40		D	Z	AS3/0.0-0.2	9	8	4	Fill			FILL - dusky brown (5YR 2/2), 50% clay, 10% silt, 10% sand, 30% gravel, poorly compacted.	damp
		1.20		D	Z	AS3/0.8-1.0	8.5	7.5	2	Fill			FILL - light brown (5YR 5/6), 70% clay, 10% silt, 10% sand, 10% gravel, low plasticity, moderately compacted.	damp
		2		D	Z	AS3/1.8-2.0	6.5	5.5	2.5	CH			CLAY - dusky brown (5YR 2/2), 90% clay, 10% silt, high plasticity, soft.	moist
		3		D	Z	AS3/2.8-3.0	6	4.5	2	Natural				wet
		3.60		D	Z	AS3/3.8-4.0	7	4.5	2	CL			CLAY with Sand - light brown (5YR 5/6) and dark yellowish orange (10YR 6/6) and pale yellowish brown (10YR 6/2), 60% clay, 30% sand, 10% gravel, low plasticity, firm, increased organics.	damp
		4.30		D	Z	AS3/4.6-4.7	7.5	6.5	1	CL			CLAY with Sand - dark yellowish orange (10YR 6/6) and very pale orange (10YR 8/2), 70% clay, 30% sand, low plasticity, firm.	dry
		5											Refusal at 4.700 m	
		6												

Abbreviations

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type
D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
Encountered Groundwater
Stabilised Groundwater

Additional Comments



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

Logged By: **Caden Pengelly**
Checked By:

Date: **15/06/2020**
Date:



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

Project Number: **2001036**
Hole Depth: **6.00 m**
Date Started: **15/06/2020**
Date Completed: **15/06/2020**

Project Name: **Acid Sulfate Soil Investigation**
Location / Site: **Auburn NSW**
Client:
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger (Ute Mounted)**

Method	Water Level	Depth (mBGL)	RL (mAHD)	Sample Type	HC Odour	Sample ID	pH _r	pH _{cox}	Reaction	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture
SFA		0.40		D	Z	AS4/0.0-0.2	9	8.5	4	Fill			FILL - dusky brown (5YR 2/2), 20% clay, 20% silt, 20% sand, 40% gravel, poorly compacted.	dry
		1.20		D	Z	AS4/0.8-1.0	8	6.5	2.5	ML			SILT - pale yellowish brown (10YR 6/2), 10% clay, 80% silt, 10% sand, soft, medium dense.	moist
		1.70								ML			SILT with Clay - dark yellowish orange (10YR 6/6), 30% clay, 70% silt, soft, medium dense.	wet
		2		D	Z	AS4/1.8-2.0	7	6.5	1	CL			CLAY - pale yellowish brown (10YR 6/2) and dark yellowish orange (10YR 6/6), 60% clay, 15% silt, 15% sand, firm.	moist
		3		D	Z	AS4/2.8-3.0	8	7.5	2	Natural				damp
		3.30								MH			CLAY & SILT - pale yellowish brown (10YR 6/2) and pale yellowish orange (10YR 8/6), 50% clay, 50% silt, soft.	moist
		4		D	Z	AS4/3.8-4.0	8	7	1					
		4.20								CL			Sandy CLAY - very pale orange (10YR 8/2), 65% clay, 35% sand, firm.	wet
		5		D	Z	AS4/4.8-5.0	8.5	8.5	0					
		5.30								CL			CLAY with Silt - pale yellowish brown (10YR 6/2) and dusky brown (5YR 2/2), 60% clay, 25% silt, 15% sand, stiff, organics and rock fragments.	moist
		6		D	Z	AS4/5.8-6.0	8.58	8	1					
													Terminated at 6.000 m extent of auger.	

Abbreviations

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type
D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
Encountered Groundwater
Stabilised Groundwater

Additional Comments



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

Logged By: **Caden Pengelly**
Checked By:

Date: **15/06/2020**
Date:



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Geo-Logix Pty Ltd

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

Project Number: **2001036**
Hole Depth: **6.00 m**
Date Started: **15/06/2020**
Date Completed: **15/06/2020**

Project Name: **Acid Sulfate Soil Investigation**
Location / Site: **Auburn NSW**
Client:
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger (Ute Mounted)**

Method	Water Level	Depth (mBGL)	RL (mAHD)	Sample Type	HC Odour	Sample ID	pH _f	pH _{cox}	Reaction	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture
SFA	0.40			D	Z	AS5/0.0-0.2	8.5	8	4	Fill			FILL - dusky brown (5YR 2/2), 20% clay, 20% silt, 20% sand, 40% gravel, poorly compacted.	dry
	1.40			D	Z	AS5/0.8-1.0	8	7.5	3	Fill			FILL - dusky brown (5YR 2/2), 30% clay, 60% silt, 10% sand, poorly compacted.	wet
	2.60			D	Z	AS5/1.8-2.0	6.5	6.5	1	CL			CLAY - dark yellowish orange (10YR 6/6) and very pale orange (10YR 8/2), 70% clay, 30% sand, firm.	damp
	4.20			D	Z	AS5/2.8-3.0	7.5	7.5	2	CL			CLAY with Silt - dark yellowish orange (10YR 6/6) and very pale orange (10YR 8/2), 60% clay, 30% silt, 10% sand, soft, becoming wetter, slight increase in plasticity.	wet
				D	Z	AS5/3.8-4.0	8	6	1	Natural				
				D	Z	AS5/4.8-5.0	7.5	7.5	0	SM			Clayey Silty SAND - pale yellowish brown (10YR 6/2) and dark yellowish brown (10YR 4/2), 20% clay, 30% silt, 30% sand, soft, loose, becoming wetter, darker in colour.	wet
				D	Z	AS5/5.8-6.0	7.5	7.5	0					
													Terminated at 6.000 m extent of auger.	

Abbreviations

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type
D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
Encountered Groundwater
Stabilised Groundwater

Additional Comments



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

Logged By: **Caden Pengelly**
Checked By:

Date: **15/06/2020**
Date:



Geo-Logix
environment · geotech

Geo-Logix Pty Ltd

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

Project Number: **2001036**
Hole Depth: **6.00 m**
Date Started: **15/06/2020**
Date Completed: **15/06/2020**

Project Name: **Acid Sulfate Soil Investigation**
Location / Site: **Auburn NSW**
Client:
Contractor: **Fico Group Pty Limited**
Method: **Solid Flight Auger (Ute Mounted)**

Method	Water Level	Depth (mBGL)	RL (mAHD)	Sample Type	HC Odour	Sample ID	pH _f	pH _{tox}	Reaction	Material Type	USCS Symbol	Graphic Log	Material Description	Moisture
CC		0.25											CONCRETE HARDSTAND.	
		1		D	Z	AS6/0.8-1.0	7.5	6.5	2	Fill			FILL - moderate brown (5YR 3/4), 80% clay, 10% sand, low plasticity, stiff.	damp
		1.20												
		2		D	Z	AS6/1.8-2.0	7	6	1.5	CH			CLAY with Silt - dark yellowish brown (10YR 4/2), 70% clay, 30% silt, high plasticity, soft.	damp
		3		D	Z	AS6/2.8-3.0	7	7	1.5					
		3.20												
		4		D	Z	AS6/3.8-4.0	6.5	5	3	CH			CLAY - dark yellowish brown (10YR 4/2), 90% clay, 10% silt, high plasticity, very soft. Organics found at 3.5mbg.	moist
		4.30												
		5		D	Z	AS6/4.8-5.0	6	5.5	2	CH			CLAY - pale brown (5YR 5/2), 100% clay, high plasticity, very soft.	moist
		6		D	Z	AS6/5.8-6.0	5	4.5	3					
													Terminated at 6.000 m extent of auger.	

Abbreviations

Hydrocarbon Odour
H High
M Medium
L Low
Z Zero

Sample Type
D Disturbed
U Undisturbed
B Bulk
R Representative
C Continuous
J Jar
Asb Asbestos

Strength Testing
SPT Standard Penetration Test
DCP Dynamic Cone Penetrometer
PP Pocket Penetrometer

Water Levels
▽ Encountered Groundwater
▽ Stabilised Groundwater

Additional Comments



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

Logged By: **Caden Pengelly**
Checked By:

Date: **15/06/2020**
Date:

ATTACHMENT E

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



NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: **Ben Pearce**

Report **726054-S**
Project name **AUBURN**
Project ID **2001036**
Received Date **Jun 16, 2020**

Client Sample ID			AS1/0-0.2	AS1/3.9-4	AS2/1.8-2	AS2/3.8-4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn27081	S20-Jn27085	S20-Jn27089	S20-Jn27091
Date Sampled			Jun 15, 2020	Jun 15, 2020	Jun 15, 2020	Jun 15, 2020
Test/Reference	LOR	Unit				
Chromium Suite						
pH-KCL	0.1	pH Units	7.0	5.7	7.5	5.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	3.8	< 2	19
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	0.006	< 0.003	0.030
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.021	< 0.005	0.040	0.21
Chromium Reducible Sulfur -acidity units	3	mol H+/t	13	< 3	25	130
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO ₃	3.5	n/a	4.1	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	700	n/a	820	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	1.1	n/a	1.3	n/a
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	0.24
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	< 10	150
CRS Suite - Liming Rate ^{S01}	1	kg CaCO ₃ /t	< 1	< 1	< 1	11
Extraneous Material						
<2mm Fraction	0.005	g	55	75	44	62
>2mm Fraction	0.005	g	1.2	< 0.005	6.4	2.8
Analysed Material	0.1	%	98	100	87	96
Extraneous Material	0.1	%	2.2	< 0.1	13	4.4
% Moisture	1	%	22	18	24	32

Client Sample ID			AS3/2.8-3	AS3/3.8-4	AS4/0-0.2	AS4/2.8-3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn27096	S20-Jn27097	S20-Jn27099	S20-Jn27102
Date Sampled			Jun 15, 2020	Jun 15, 2020	Jun 15, 2020	Jun 15, 2020
Test/Reference	LOR	Unit				
Chromium Suite						
pH-KCL	0.1	pH Units	4.9	4.6	8.5	7.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	33	31	< 2	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.053	0.049	< 0.003	< 0.003
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.012	0.005	0.092	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	7.4	3.3	57	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	n/a	8.8	1.4
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	n/a	1800	280
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	n/a	n/a	2.8	0.44
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.07	0.06	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	40	34	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	3.0	2.6	< 1	< 1
Extraneous Material						
<2mm Fraction	0.005	g	73	60	52	52
>2mm Fraction	0.005	g	< 0.005	5.7	13	< 0.005
Analysed Material	0.1	%	100	91	81	100
Extraneous Material	0.1	%	< 0.1	8.6	19	< 0.1
% Moisture	1	%	27	19	16	15

Client Sample ID			AS5/1.8-2	AS5/3.8-4	AS6/3.8-4	AS6/5.8-6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn27108	S20-Jn27110	S20-Jn27116	S20-Jn27118
Date Sampled			Jun 15, 2020	Jun 15, 2020	Jun 15, 2020	Jun 15, 2020
Test/Reference	LOR	Unit				
Chromium Suite						
pH-KCL	0.1	pH Units	6.8	7.1	5.6	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	< 2	16	30
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	< 0.003	0.025	0.048
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.009	< 0.005	0.17	0.012
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.8	< 3	110	7.3
Sulfur - KCl Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	2.6	0.74	n/a	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	520	150	n/a	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt) ^{S03}	0.02	% S	0.83	0.24	n/a	n/a

Client Sample ID			AS5/1.8-2	AS5/3.8-4	AS6/3.8-4	AS6/5.8-6
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S20-Jn27108	S20-Jn27110	S20-Jn27116	S20-Jn27118
Date Sampled			Jun 15, 2020	Jun 15, 2020	Jun 15, 2020	Jun 15, 2020
Test/Reference	LOR	Unit				
Chromium Suite						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	0.20	0.06
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	< 10	120	37
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1	9.2	2.8
Extraneous Material						
<2mm Fraction	0.005	g	64	44	50	64
>2mm Fraction	0.005	g	2.1	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	97	100	100	100
Extraneous Material	0.1	%	3.1	< 0.1	< 0.1	< 0.1
% Moisture	1	%	26	19	31	24

Sample History

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

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Chromium Reducible Sulfur Suite			
Chromium Suite	Brisbane	Jun 19, 2020	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Jun 19, 2020	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	Jun 22, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

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

Project Name: AUBURN
Project ID: 2001036

Order No.: 3883
Report #: 726054
Phone: 02 9979 1722
Fax: 02 9979 1222

Received: Jun 16, 2020 1:12 PM
Due: Jun 23, 2020
Priority: 5 Day
Contact Name: Ben Pearce

Eurofins Analytical Services Manager : Ursula Long

Sample Detail

HOLD

Chromium Reductible Sulfur Suite

Moisture Set

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	AS1/0-0.2	Jun 15, 2020		Soil	S20-Jn27081		X	X
2	AS1/0.9-1	Jun 15, 2020		Soil	S20-Jn27082	X		
3	AS1/1.9-2	Jun 15, 2020		Soil	S20-Jn27083	X		
4	AS1/2.9-3	Jun 15, 2020		Soil	S20-Jn27084	X		
5	AS1/3.9-4	Jun 15, 2020		Soil	S20-Jn27085		X	X
6	AS1/4.9-5	Jun 15, 2020		Soil	S20-Jn27086	X		
7	AS2/0-0.2	Jun 15, 2020		Soil	S20-Jn27087	X		
8	AS2/0.8-1	Jun 15, 2020		Soil	S20-Jn27088	X		
9	AS2/1.8-2	Jun 15, 2020		Soil	S20-Jn27089		X	X
10	AS2/2.8-3	Jun 15, 2020		Soil	S20-Jn27090	X		

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

Project Name: AUBURN
Project ID: 2001036

Order No.: 3883
Report #: 726054
Phone: 02 9979 1722
Fax: 02 9979 1222

Received: Jun 16, 2020 1:12 PM
Due: Jun 23, 2020
Priority: 5 Day
Contact Name: Ben Pearce

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Chromium Reductible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
11	AS2/3.8-4	Jun 15, 2020		Soil	S20-Jn27091		X	X
12	AS2/4.8-5	Jun 15, 2020		Soil	S20-Jn27092	X		
13	AS3/0-0.2	Jun 15, 2020		Soil	S20-Jn27093	X		
14	AS3/0.8-1	Jun 15, 2020		Soil	S20-Jn27094	X		
15	AS3/1.8-2	Jun 15, 2020		Soil	S20-Jn27095	X		
16	AS3/2.8-3	Jun 15, 2020		Soil	S20-Jn27096		X	X
17	AS3/3.8-4	Jun 15, 2020		Soil	S20-Jn27097		X	X
18	AS3/4.6-4.7	Jun 15, 2020		Soil	S20-Jn27098	X		
19	AS4/0-0.2	Jun 15, 2020		Soil	S20-Jn27099		X	X
20	AS4/0.8-1	Jun 15, 2020		Soil	S20-Jn27100	X		
21	AS4/1.8-2	Jun 15, 2020		Soil	S20-Jn27101	X		
22	AS4/2.8-3	Jun 15, 2020		Soil	S20-Jn27102		X	X
23	AS4/3.8-4	Jun 15, 2020		Soil	S20-Jn27103	X		

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Contact Name: Ben Pearce

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Sample Detail						HOLD	Chromium Reducible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
24	AS4/4.8-5	Jun 15, 2020		Soil	S20-Jn27104	X		
25	AS4/5.8-6	Jun 15, 2020		Soil	S20-Jn27105	X		
26	AS5/0-0.2	Jun 15, 2020		Soil	S20-Jn27106	X		
27	AS5/0.8-1	Jun 15, 2020		Soil	S20-Jn27107	X		
28	AS5/1.8-2	Jun 15, 2020		Soil	S20-Jn27108		X	X
29	AS5/2.8-3	Jun 15, 2020		Soil	S20-Jn27109	X		
30	AS5/3.8-4	Jun 15, 2020		Soil	S20-Jn27110		X	X
31	AS5/4.8-5	Jun 15, 2020		Soil	S20-Jn27111	X		
32	AS5/5.8-6	Jun 15, 2020		Soil	S20-Jn27112	X		
33	AS6/0.8-1	Jun 15, 2020		Soil	S20-Jn27113	X		
34	AS6/1.8-2	Jun 15, 2020		Soil	S20-Jn27114	X		
35	AS6/2.8-3	Jun 15, 2020		Soil	S20-Jn27115	X		
36	AS6/3.8-4	Jun 15, 2020		Soil	S20-Jn27116		X	X

Australia

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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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

Project Name: AUBURN
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Report #: 726054
Phone: 02 9979 1722
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Received: Jun 16, 2020 1:12 PM
Due: Jun 23, 2020
Priority: 5 Day
Contact Name: Ben Pearce

Eurofins Analytical Services Manager : Ursula Long

Sample Detail						HOLD	Chromium Reductible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
37	AS6/4.8-5	Jun 15, 2020		Soil	S20-Jn27117	X		
38	AS6/5.8-6	Jun 15, 2020		Soil	S20-Jn27118		X	X
39	D1	Jun 15, 2020		Soil	S20-Jn27119	X		
40	D2	Jun 15, 2020		Soil	S20-Jn27120	X		
41	D3	Jun 15, 2020		Soil	S20-Jn27121	X		
42	AS1/5.6-5.7	Jun 15, 2020		Soil	S20-Jn27177	X		
Test Counts						30	12	12

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

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

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Chromium Suite									
pH-KCL			%	100			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	97			80-120	Pass	
Chromium Reducible Sulfur			%	94			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Chromium Suite									
				Result 1	Result 2	RPD			
pH-KCL	S20-Jn27089	CP	pH Units	7.5	7.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	S20-Jn27089	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	S20-Jn27089	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Chromium Reducible Sulfur	S20-Jn27089	CP	% S	0.040	0.040	1.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	S20-Jn27089	CP	mol H+/t	25	25	1.0	30%	Pass	
Sulfur - KCl Extractable	S20-Jn27089	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	S20-Jn27089	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	S20-Jn27089	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	S20-Jn27089	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	S20-Jn27089	CP	% CaCO3	4.1	4.1	<1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	S20-Jn27089	CP	% S	1.3	1.3	<1	30%	Pass	
ANC Fineness Factor	S20-Jn27089	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	S20-Jn27089	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	S20-Jn27089	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	S20-Jn27089	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S20-Jn27089	CP	%	24	26	7.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

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

Authorised By

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



Glenn Jackson General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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

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Sample Receipt Advice

Company name: **Geo-Logix P/L**
Contact name: Ben Pearce
Project name: AUBURN
Project ID: 2001036
COC number: Not provided
Turn around time: 5 Day
Date/Time received: Jun 16, 2020 1:12 PM
Eurofins reference: **726054**

Sample information

- ☒ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ☒ Sample Temperature of a random sample selected from the batch as recorded by Eurofins Sample Receipt : 3.4 degrees Celsius.
- ☒ All samples have been received as described on the above COC.
- ☒ COC has been completed correctly.
- ☒ Attempt to chill was evident.
- ☒ Appropriately preserved sample containers have been used.
- ☒ All samples were received in good condition.
- ☒ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☒ Appropriate sample containers have been used.
- ☐ Split sample sent to requested external lab.
- ☐ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Notes

All samples analysed, please advise otherwise. Extra sample AS1/5.6-5.7, placed on hold.

Contact notes

If you have any questions with respect to these samples please contact:

Ursula Long on Phone : or by e.mail: UrsulaLong@eurofins.com

Results will be delivered electronically via e.mail to Ben Pearce - bpearce@geo-logix.com.au.

Geo-Logix Pty Ltd

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F: (02) 9979 1222

CHAIN OF CUSTODY

Project Manager: Ben Pearce

Contact email: bpearce@gmail.com

Project Name: Auburn

Project Number: 2001036 Date Submitted: 16/6

Page 1 of 3

Purchase Order No: 3883

Quote Reference:

Send Invoice to: accounts@geo-logix.com.au

TAT required: standard

e Sulphur analysis

ANALYSIS REQUIRED

Lab ID	Sample ID	Date	Matrix					Comments	COMPOSITE	TRH - C6 - C10	TRH - C10 - C40	VOCs	BTEXN	PAHs	PCBs	OCPs	OPPs	Phenols	Metals - M8	Metals - Lead	Metals - Specify **	TCLP	Asbestos (ID only)	Asbestos (WA DOH)	Foreign Materials	Conductivity (EC)	pH	Chromium reduced	Hold	SUITE	Eurofins MGT Suite Codes
			soil	water	air	paint, filters	other																								
	AS1/0-0.2	15/6	/																								X			B1 TRH/BTEXN	
	AS1/0.9-1	15/6	/																										X		B1A TRH/MAH
	AS1/1.4-2	15/6	/																										X		B2 TRH/BTEXN/Pb
	AS1/2.4-3	15/6	/																										X		B2A TRH/MAH/Pb
	AS1/3.4-4	15/6	/																										X		B3 PAH/Phenols
	AS1/4.4-5	15/6	/																										X		B4 TRH/BTEXN/PAH
	AS2/0-0.2	15/6	/																								X				B4A TRH/BTEXN/PAH/Phenols
	AS2/0.8-1	15/6	/																										X		B5 TRH/BTEXN/M7
	AS2/1.8-2	15/6	/																										X		B6 TRH/BTEXN/M8
	AS2/2.8-3	15/6	/																										X		B7 TRH/BTEXN/PAH/M8
	AS2/3.8-4	15/6	/																										X		B7A TRH/BTEXN/PAH/Phenols/M8
	AS2/4.8-5	15/6	/																										X		B8 TRH/VOC/PAH/M8
	AS3/0-0.2	15/6	/																								X				B9 TRH/BTEXN/PAH/OCP/M8
	AS3/0.8-1	15/6	/																										X		B10 TRH/BTEXN/PAH/OCP/OPP/M8
	AS3/1.8-2	15/6	/																										X		B11 Na/K/Ca/Mg/Cl/SO ₄ /CO ₂ /HCO ₃ /NH ₃ /NO ₃
	AS3/2.8-3	15/6	/																										X		B11A B11/Alkalinity
	AS3/3.8-4	15/6	/																										X		B11B B11/EC/TDS
	AS3/4.6-6	15/6	/																										X		B12 TRH/BTEXN/Oxygenates/Ethanol
																													X		B12A TRH/BTEXN/Oxygenates
																													X		B13 OCP/PCB
																													X		B14 OCP/OPP
																													X		B15 OCP/OPP/PCB
																													X		B16 TDS/SO ₄ /CH ₄ /Al/BOD/COD/HPC/CUB
																													X		B17 SO ₄ /NO ₃ /Fe ⁺⁺ /HPC/CUB
																													X		B18 CH ₄ /SO ₄ /pH
																													X		B19 N/P/K
																													X		B20 CEC/WESP/Cu/Ma/Na/K

Metals**(circle) As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Cr⁶⁺, Cr³⁺, Fe²⁺, Fe³⁺, Be, B, Al, V, Mn, Fe, Co, Se, Sr, Sn, Mo, Ag, Ba, Ti, Bi, Sb

Chain of Custody

Relinquished by: Gerrydy Date/Time: 16/6 Signature: Gerrydy Received by: VICTOR HANNOUD Date/Time: 16/6/2022 Signature: [Signature]

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CHAIN OF CUSTODY

Project Manager: Ben Pearce

Contact email: bpearce@geo-logix.com.au

Project Name: Auburn

Project Number: 2001036 Date Submitted: 16/6

Page 2 of 3

Purchase Order No: 3883

Quote Reference:

Send Invoice to: accounts@geo-logix.com.au

TAT required: Standard

Handwritten: Sulphur analysis

ANALYSIS REQUIRED

Lab ID	Sample ID	Date	Matrix					Comments	COMPOSITE	TRH - C6 - C10	TRH - C10 - C40	VOCs	BTEXN	PAHs	PCBs	OCPs	OPP	Phenols	Metals - M8	Metals - Lead	Metals - Specify **	TCLP	Asbestos (ID only)	Asbestos (WA DOH)	Foreign Materials	Conductivity (EC)	pH	Chromium reduced	Hold	SUITE	Eurofins MGT Suite Codes
			soil	water	air	paint, filters	other																								
	AS4/0.0-2	15/6	✓																								✓				B1 TRH/BTEXN
	AS4/0.8-1	15/6	✓																												B1A TRH/MAH
	AS4/1.8-2	15/6	✓																												B2 TRH/BTEXN/Pb
	AS4/2.8-3	15/6	✓																												B2A TRH/MAH/Pb
	AS4/3.8-4	15/6	✓																								✓				B3 PAH/Phenols
	AS4/4.8-5	15/6	✓																												B4 TRH/BTEXN/PAH
	AS4/5.8-6	15/6	✓																												B4A TRH/BTEXN/PAH/Phenols
	AS5/0.0-2	15/6	✓																												B5 TRH/BTEXN/M7
	AS5/0.8-1	15/6	✓																												B6 TRH/BTEXN/M8
	AS5/1.8-2	15/6	✓																												B7 TRH/BTEXN/PAH/M8
	AS5/2.8-3	15/6	✓																												B7A TRH/BTEXN/PAH/Phenols/M8
	AS5/3.8-4	15/6	✓																												B8 TRH/VOC/PAH/M8
	AS5/4.8-5	15/6	✓																												B9 TRH/BTEXN/PAH/OCP/M8
	AS5/5.8-6	15/6	✓																												B10 TRH/BTEXN/PAH/OCP/OPP/M8
	AS6/0.8-1	15/6	✓																								✓				B11 Na/K/Ca/Mg/Cl/SO ₄ /CO ₂ /HCO ₃ /NH ₄ /NO ₃
	AS6/1.8-2	15/6	✓																												B11A B11/Alkalinity
	AS6/2.8-3	15/6	✓																												B11B B11/EC/TDS
	AS6/3.8-4	15/6	✓																								✓				B12 TRH/BTEXN/Oxygenates/Ethanol
	AS6/4.8-5	15/6	✓																												B12A TRH/BTEXN/Oxygenates
	AS6/5.8-6	15/6	✓																												B13 OCP/PCB
	AS6/6.8-1	15/6	✓																												B14 OCP/OPP
	AS6/7.8-2	15/6	✓																												B15 OCP/OPP/PCB
	AS6/8.8-3	15/6	✓																												B16 TDS/SD ₂ /CH ₄ /Al/BOD/COD/HPC/CUB
	AS6/9.8-4	15/6	✓																												B17 SO ₄ /NO ₃ /Fe ⁺⁺ /HPC/CUB
	AS6/10.8-5	15/6	✓																												B18 Cl ⁻ /SO ₄ /pH
	AS6/11.8-6	15/6	✓																												B19 N/P/K
	AS6/12.8-7	15/6	✓																								✓				B20 CEC/%ESP/Ca/Mg/Na/K

Metals**(circle) As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Cr⁶⁺, Cr³⁺, Fe²⁺, Fe³⁺, Be, B, Al, V, Mn, Fe, Co, Se, Sr, Sn, Mo, Ag, Ba, Ti, Bi, Sb

Chain of Custody

Relinquished by: Caden Perzally Date/Time: 16/6 Signature: [Signature] Received by: VICTOR HANNOON Date/Time: 16/6 Signature: [Signature]

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CHAIN OF CUSTODY

Project Manager: Ben Pearce
Contact email: bpearce@geo-logix.com.au
Project Name: Auburn
Project Number: 2001036 Date Submitted: 16/6

Page 3 of 3
Purchase Order No: 3883
Quote Reference:
Send Invoice to: accounts@geo-logix.com.au
TAT required: Standard

Sulphur analysis

ANALYSIS REQUIRED

Lab ID	Sample ID	Date	Matrix					Comments	COMPOSITE	TRH - C8 - C10	TRH - C10 - C40	VOCs	BTEXN	PAHs	PCBs	OCPs	OPPs	Phenols	Metals - M8	Metals - Lead	Metals - Specify **	TCLP	Asbestos (ID only)	Asbestos (WA DOH)	Foreign Materials	Conductivity (EC)	pH	Chromium, red	Hold	SUITE	Eurofins MGT Suite Codes
			soil	water	air	paint, filters	other																								
	AS6/4.8-5	15/6	/																												B1 TRH/BTEXN
	AS6/5.8-6	15/6	/																								X		X		B1A TRH/MAH
	D1	15/6	/																										X		B2 TRH/BTEXN/Pb
	D2	15/6	/																										X		B2A TRH/MAH/Pb
	D3	15/6	/																										X		B3 PAH/Phenols
																													X		B4 TRH/BTEXN/PAH
																													X		B4A TRH/BTEXN/PAH/Phenols
																															B5 TRH/BTEXN/M7
																															B6 TRH/BTEXN/M8
																															B7 TRH/BTEXN/PAH/M8
																															B7A TRH/BTEXN/PAH/Phenols/M8
																															B8 TRH/VOC/PAH/M8
																															B9 TRH/BTEXN/PAH/OCP/M8
																															B10 TRH/BTEXN/PAH/OCP/OPP/M8
																															B11 Na/K/Ca/Mg/Cl/SO ₄ /CO ₂ /HCO ₃ /NH ₃ /NO ₃
																															B11A B11/Alkalinity
																															B11B B11/EC/TDS
																															B12 TRH/BTEXN/Oxygenates/Ethanol
																															B12A TRH/BTEXN/Oxygenates
																															B13 OCP/PCB
																															B14 OCP/OPP
																															B15 OCP/OPP/PCB
																															B16 TDS/SO ₄ /CH ₄ /Alk/BOD/COD/HPC/CUB
																															B17 SO ₄ /NO ₃ /Fe ⁺⁺ /HPC/CUB
																															B18 Cl-SO ₄ /pH
																															B19 N/P/K
																															B20 CEC/%ESP/Ca/Mg/Na/K

Metals**(circle) As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Cr⁶⁺, Cr³⁺, Fe²⁺, Fe³⁺, Be, B, Al, V, Mn, F, Co, Se, Sr, Sn, Mo, Ag, Ba, Tl, Bi, Sb

Chain of Custody

Relinquished by: Coden Pearce Date/Time: 16/6 Signature: [Signature]
Received by: [Signature] Date/Time: 16/6/2023 Signature: [Signature]