northern beaches council

Memo

Planning & Place Division

To:	Panel Chair Northern Beaches Local Planning Panel
From:	Louise Kerr Director, Planning & Place
Date:	3 February 2022
Subject:	Additional Information for Deferred Item 4.2 – NBLPP Meeting 15 December 2021
Record Number:	2022/063805

Dear Panel,

At the meeting of the Local Planning Panel (NBLPP) on 15 December 2021, the NBLPP resolved to defer Item 4.2 , DA2020/1756 for the Construction of a Shop top Housing Development at 351-353 Barrenjoey Road, Newport.

The Panel resolved the following:

That the Northern Beaches Local Planning Panel, on behalf of Northern Beaches Council as the consent authority, ***defers*** *Application No. DA2020/1756 for demolition works and construction of a mixed use development (Shop Top Housing) at Lot 65 Sec 5 DP 6248 & Lot 64 DP 1090224 & Lot 66 Sec 5 DP 6248, 351-353 Barrenjoey Road, Newport for the applicant to provide an acid sulphate management plan to comply with Clause 7.1 of Pittwater Local Environmental Plan 2014.*

The information is to be submitted to Council by the 14 January 2022. The application will then be determined electronically by the Panel (as constituted on 15 December 2021), unless otherwise decided by the Chair. If the information is not submitted by the 14 January 2022, the matter will be determined on the basis of the current information before the Panel.

REASONS FOR DEFERRAL:

The submission of an acid sulphate management plan is required to comply with Clause 7.1 of Pittwater Local Environmental Plan 2014.

The Panel Chair has confirmed the grant of an extension for the information to be submitted to Council by 4 February 2022.

On 3 February 2022, Council received from the applicant the following Documents:

1. Acid Sulphate Soils Assessment, dated 28 January 2022 prepared by Alliance Geotechnical Pty Ltd.

2. Acid Sulphate Soils Management Plan, dated 2 February 2022 prepared by Alliance Geotechnical Pty Ltd.

Council has reviewed each of the documents and are satisfied that the information provided addresses the requirements of Clause 7.1 Pittwater LEP 2014.

The two documents are attached to this memo to allow the granting of consent by the Panel.

It is recommended that Condition 1 of the development consent is updated to reference the submitted Acid Sulphate Soils Assessment and Acid Sulphate Soils Management Plan as follows:

Amend Condition 1 Approved Plans and Documents to Read as follows:

Approved Plans and Supporting Documentation
The development must be carried out in compliance (except as amended by any other conditionof consent) with the following:

a) Approved Plans

Architectural Plans - Endorsed with Council's stamp		
Drawing No.	**Dated**	**Prepared By**
A011, Issue 07	21/06/2021	Crawford Architects
A101, Issue 24	21/11/2021	Crawford Architects
A102, Issue 34	21/11/2021	Crawford Architects
A103, Issue 33	21/11/2021	Crawford Architects
A104, Issue 32	21/11/2021	Crawford Architects
A105, Issue 28	21/11/2021	Crawford Architects
A300, Issue 23	21/11/2021	Crawford Architects
A301, Issue 19	21/11/2021	Crawford Architects
A302, Issue 18	21/11/2021	Crawford Architects
A310, Issue 16	21/11/2021	Crawford Architects
A311, Issue 16	21/11/2021	Crawford Architects
A312, Issue 09	21/11/2021	Crawford Architects
A320, Issue 08	21/06/2021	Crawford Architects

Engineering Plans		
Drawing No.	**Dated**	**Prepared By**
SW05 P3, SW00 P4, SW03 P4, SW01 P6, SW04 P6, SW02 P7	14 and 15 September 2021	Demlakian

Reports / Documentation – All recommendations and requirements contained within:		
Report No. / Page No. / Section No.	**Dated**	**Prepared By**
Acid Sulphate Soils Management Plan	**2 February 2022**	**Alliance Geotechnical Pty Ltd**
Geotechnical Report, 5622-G1, Rev 2	22 September 2021	Assettgeoenviro
Water Mangement Report, Ref 219120rpt20210914	14 September 2021	Demlakian
Statement of Compliance - BCA Access Report, Rev B	16 June 2021	ABS
BCA Report, Ref 19/0405	15 June 2021	Dix Gardner
Flood Management Report	6 March 2020	Demlakian

b) Any plans and / or documentation submitted to satisfy the Deferred CommencementConditions of this consent as approved in writing by Council.

c) Any plans and / or documentation submitted to satisfy the Conditions of this consent.

d) The development is to be undertaken generally in accordance with the following:

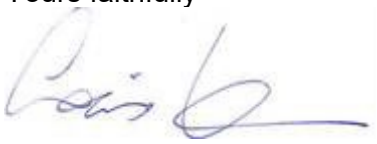
Landscape Plans		
Drawing No.	**Dated**	**Prepared By**
Dw 000, Issue E	17/06/2021	Site Image Landscape Architects
Dw 101, Issue E	17/06/2021	Site Image Landscape Architects
Dw 102, Issue F	21/06/2021	Site Image Landscape Architects
Dw 103, Issue F	21/06/2021	Site Image Landscape Architects
Dw 104, Issue A	21/06/2021	Site Image Landscape Architects
Dw 501, Issue D	06/12/2020	Site Image Landscape Architects

Waste Management Plan		
Drawing No/Title.	**Dated**	**Prepared By**
Waste Management Plan	December 2020	Crawford Architects

In the event of any inconsistency between conditions of this consent and the drawings/documents referred to above, the conditions of this consent will prevail.

Reason: To ensure the work is carried out in accordance with the determination of Council and approved plans.

Yours faithfully



Louise Kerr
Director, Planning & Place

Report Type:

Acid Sulfate Soils Assessment

Project Address:

351-353 Barrenjoey Road, Newport NSW

Client Name:

Atlen Construction Pty Ltd

28 January 2022
Report No: 14429-ER-1-1

alliance
geotechnical & environmental solutions

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Document Control

Revision	Report Date	Author	Reviewer	Commissioned by	Comment
0	28 January 2022	Jacob Walker	Mehran Asadabadi	Atlen Construction Pty Ltd	-

Author Signature		**Reviewer Signature**	
Name	Jacob Walker	**Name**	Mehran Asadabadi
Title	Environmental Consultant	**Title**	Senior Environmental Consultant

Executive Summary

Alliance Geotechnical Pty Ltd (Alliance) was engaged by Atlen Construction Pty Ltd (the client) to undertake an Acid Sulfate Soils Assessment (ASSA) at 351-353 Barrenjoey Road, Newport NSW.

It is understood that a current development proposal for construction of a multi-storey mixed use building comprising retails on the ground level, with residential above and two basement car park levels. The site is approximately 800 m^2. Alliance understands that an acid sulfate soils assessment of the site is required by the client to address acid sulfate concerns for the site in relation to proposed excavation relating to the construction of the residential building.

The objectives of this project were to:

- Provide an assessment of acid sulfate soils on the site with the proposed construction footprint; and
- Provide recommendations on further assessment, management of remediation of acid sulfate soils (if identified).

The following scope of works was utilised to address the project objectives:

- A desktop review of relevant acid sulfate soils risk planning maps, previous investigation reports and other relevant information relating to the site;
- Conduct an intrusive site investigation to a maximum depth of 6 m below ground level (as nominated by the client) to establish ground conditions and to facilitate the collection of representative soil samples;
- Laboratory analysis of selected samples collected during the field investigations; and
- Report the findings in accordance with Acid Sulfate Soils Manual 1998 (ASSMAC 1998) and the National Acid Sulfate Soil Guidance (Australian Government 2018) ASS and potential ASS risk across the project footprint.

Based on the desktop review data, fieldwork observations, and the laboratory analytical results, Alliance concludes that:

- Potential ASS were identified by preliminary laboratory analysis in thirteen (13) of the forty-eight (48) soil samples collected across the site, indicating that the soil materials which were encountered at depths between 1.5m and 6.0m bgl are potentially impacted by ASS;
- A further nine (9) soil samples were submitted for CRS analysis and returned results indicating the presence of AASS and PASS collected from boreholes BH03, indicating the presence of AASS and PASS from site surface to depths excavation across the site;
- The liming rate required for remediation of the AASS and PASS across the site is between 1.3 to 3.0 kg$CaCO_3$/tonne; and
- The identified potential ASS at the site are likely to be disturbed by the construction phase of the works.

Based on these conclusions, and in accordance with ASSMAC (1998), Alliance makes the following recommendations:

- An acid sulfate soils management plan (ASSMP) should be developed for the site to:

- Document the procedures and standards to be followed to manage the risks posed by potential ASS identified during construction;
- Outline the management measures to be implemented to minimise the potential for adverse environmental impacts resulting from the disturbance of ASS; and
- Manage the offsite disposal of excavated materials aligned to the NSW EPA Waste Classification Guidelines Part 1: Classifying Waste, November 2014 (NSW EPA, 2014a) and Waste Classification Guidelines Part 4: Acid Sulfate Soils (NSW EPA, 2014b).

This report, including its conclusions and recommendations, must be read in conjunction with the statement of limitations presented in **Section 7**.

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APPENDICES

1. Introduction

1.1. Background

Alliance Geotechnical Pty Ltd (Alliance) was engaged by Atlen Construction Pty Ltd (the client) to undertake an Acid Sulfate Soils Assessment (ASSA) at 351-353 Barrenjoey Road, Newport NSW.

It is understood that a current development proposal for construction of a multi-storey mixed use building comprising retails on the ground level, with residential above and two basement car park levels. The site is approximately 800 m^2. Alliance understands that an acid sulfate soils assessment of the site is required by the client to address acid sulfate concerns for the site in relation to proposed excavation relating to the construction of the residential building.

1.2. Objectives

The objectives of this project were to:

- Evaluate the site with regard to presence of acid sulfate soils (ASS) associated with the proposed mixed-use multi-storey building development; and
- Provide recommendations on further assessment, management of remediation of acid sulfate soils (if identified).

1.3. Scope of Work

The following scope of works was utilised to address the project objectives:

- A desktop review of relevant acid sulfate soils risk planning maps, previous investigation reports and other relevant information relating to the site;
- Conduct an intrusive site investigation to a maximum depth of 6.0 m below ground level (as nominated by the client) to establish ground conditions and to facilitate the collection of representative soil samples;
- Laboratory analysis of selected samples collected during the field investigations; and
- Report the findings in accordance with Acid Sulfate Soils Manual 1998 (ASSMAC 1998) and the National Acid Sulfate Soil Guidance (Australian Government 2018) ASS and potential ASS risk across the project footprint.

2. Site Setting

2.1. Site Identification

Site identification details and associated information is present in **Table 2-1**. The locality of the site is presented in **Figure 1**, with the general layout and site boundaries depicted in **Figure 2**.

Table 2-1 Site Identification Information

Site Address	351-353 Barrenjoey Road, Newport NSW
Cadastral Identification	Lot 64 in DP1090224 & Lot 65, Section 5 in DP6248
Geographical Coordinates	Central portion of site: ▪ 33°39'17" S ▪ 151°19'13" E (Source: Google Earth)
Site Area	800 m^2 (Source: https://maps.six.nsw.gov.au/)
Zoning	B2 – Local Centre (Canada Bay Development Control Plan 2017)
Current Land Use	Residential
Proposed Land Use	Residential
Local Government Agency	Pittwater Local Environment Plan 2014

2.2. Ground Conditions and Surrounding Environment

A summary of available site and local data identifying topography, geology, soils, and hydrology is provided in **Table 2-2**.

Table 2-2 Summary of Ground Conditions and Surrounding Environment

Geology	The Department of Mineral Resources Geological Survey of NSW Sydney 1:250,000 Geological Series Sheet 9130 (Edition 3) 1966, indicated that the site is likely to be underlain by Quaternary (Qa) alluvium, gravel, sand, silt and clay.
Topography and Site Elevation	The site topography is generally flat (RL 10 mAHD) with minor slopes to the east and south-east.
Acid Sulfate Soil Risk	Review of the Department of Land and Water Conservation NSW Acid Sulfate Soil Risk Map for Mona Vale (1:25,000 scale) indicates that the site lies within an area mapped as: ▪ Disturbed Terrain - which may include filled areas, which often occur during reclamation of low-lying swamps for urban development. Other disturbed terrain includes areas which have been mined or dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees. Soil investigations are required to assess these areas for acid sulfate potential.
Potential Depth of Site Filling	<2.0 m

Site Drainage	Drainage in hardstand areas is likely to be collected and discharged to the municipal stormwater system. Drainage in unsealed areas in likely to consist of direct soil infiltration and overland flow.
Nearest Surface Waterbody	Newport Beach is located approximately 300m to the east.

2.3. Hydrogeology and Groundwater

No available hydrogeological data and records of groundwater use were present for the site.

3. Desktop Assessment

Observations compiled during the site inspection, and via aerial photography interpretation, were compared against various geomorphic and site characteristics outlined in Stone et al (1998) indicating likely ASS occurrence. A comparison of site specific and geomorphic features with those indicative of potential ASS presence are presented in **Table 3-1**.

Table 3-1 ASS Desktop Assessment

Characteristic	Feature	Comment
Sediment Characteristics	Sediments of recent geological age (Holocene)	Yes Expected to underlie modern fill soils
	Marine or estuarine sediments	Yes Expected to underlie modern fill soils
	Areas identified in geological descriptions or in maps as bearing sulfide minerals, coal deposits or former marine shales/sediments	No
	Deep estuarine sediments greater than 10 m below ground surface (Holocene or Pleistocene age).	Unknown
Landscape Characteristics	Presence of ASS risk classes 1 to 5	Class 2
	Soil horizons less than 5 mAHD	No
	Waterlogged or scalded areas	Not identified
	Tidal lakes, coastal wetlands, or back swamp areas	No
	Interdune swales or coastal sand dunes	Not identified
Vegetation Characteristics	Areas where dominant vegetation is mangroves, reeds, rushes and other vegetation associated with areas of shallow watertables such as paperbarks (*Melaleuca spp.*) and casuarinas (*Casuarina spp.*), and some *Eucalytus spp*.	No

Based on the review of ASS characteristics features relating to the site, a number of indicators of ASS were identified that indicate potentially ASS presence onsite.

4. Acid Sulfate Soils Assessment

The criteria in Table 2.3 and Section 4 of the *Acid Sulfate Soils Manual 1998* (ASSMAC 1998) was adopted for making a preliminary assessment of whether acid sulfate soils may be present on the site, and for the purposes of selecting potential samples for chromium reducible sulfur analysis.

The action-based criteria set out in Table 4.4 of the Assessment Guidelines in *Acid Sulfate Soils Manual 1998* (ASSMAC 1998) was then adopted for the assessing the need for an acid sulfate soils management plan (ASSMP).

4.1. Sampling and Analytical Plan

Table 4.1 of the Assessment Guidelines in *Acid Sulfate Soils Manual 1998* (ASSMAC 1998), proposes a minimum of four sampling points on sites up to 10,000 m^2 in size. Given the approximate size of the construction footprint (800 m^2), Alliance consider a judgemental frequency of four (4) borehole locations is consistent with the criteria outlined in Table 4.1 of the Assessment Guidelines in *Acid Sulfate Soils Manual 1998* (ASSMAC 1998).

Soil samples will be collected at approximate 0.5 m intervals to a maximum depth of 6.0m below ground level (bgl). Alliance understands that the proposed excavation depth is no more than 5.0m bgl.

Soil samples will be subject to preliminary screening for acid sulfate soils (pHf and pHfox analysis). A selection of samples will then be submitted for field peroxide testing and chromium reducible sulfur analysis, by a NATA accredited laboratory. The criteria in Table 2.3 and Appendix 1 of the Assessment Guidelines in *Acid Sulfate Soils Manual 1998* (ASSMAC 1998) will be adopted for selecting potential samples for chromium reducible sulfur analysis.

4.2. Fieldwork

4.2.1. Soil Sampling

Soil sampling was undertaken by Alliance on the 17 January 2022.

A total of four (4) sample locations were drilled across the site using ute mounted drill rig equipment fitted with augers. Samples for potential analysis were collected at 0.5 m intervals within the soil profile. The location of each borehole (BH01 to BH04) is presented in **Figure 3**. Soil samples were collected at approximate 0.5m intervals. A total of forty-four (44) soil samples were collected as part of this project.

Each soil sample was placed in a leak proof plastic bag and wrapped tightly with duct tape to minimise contact with air and avoid moisture loss from the sample. The samples were then placed in an insulated container with ice, and transported immediately (following fieldwork) to the analytical laboratory under chain of custody protocols.

4.2.2. Site Geology

The soil types encountered during drilling work were logged with observations relating to acid sulfate soils (jarosite, mottling, sulfur odour etc) also recorded, if applicable.

Observations were made of soils encountered during sampling work. These observations were recorded on borehole logs. A copy of these logs is presented in **Borehole Logs, Appendix A.**

Inferred natural material was encountered at all borehole locations.

4.3. Laboratory Analysis

The samples collected were transported to the analytical laboratory (Eurofins | Mgt), using chain of custody (COC) protocols. The soil samples were scheduled for analysis for field screening of acid sulfate soils at the laboratory.

Laboratory analytical results are summarised within this report and the analytical laboratory certificates of analysis are presented in **Appendix B.**

5. Results and Site Characterisation

5.1. Soil Observations

The subsurface conditions encountered during the borehole drilling were observed to generally comprise:

- 0.0–0.5 m bgl – (FILL) Sandy CLAY, firm, brown, moist;
- 0.5– 4.5 m bgl – (NAT) Sandy CLAY, very stiff, pale brown/red, moist;
- 4.5– 6.0 m bgl – (NAT) Sandy CLAY / CLAY, grey, very wet / saturated; and

During sample collection, visual indicators of actual acid sulfate soils (AASS) (i.e. soils containing pale yellow deposits / coatings of jarosite) were not observed. Indicators of potential acid sulfate soils (PASS), including shell fragments and waterlogged sands, were not observed in soils examined.

5.2. Field Peroxide Testing

Forty-eight (48) soil samples were subjected to preliminary field screen assessment at the laboratory to assess the likelihood for acid sulfate soils. This preliminary assessment is comprised of

- (pHf) - assessing the pH of the soil as it would likely be in the natural environment; and
- (pHfox) - assessing the pH of the soil following the addition of hydrogen peroxide to oxidise sulfides in the soil matrix.

The forty-eight (48) soil samples were analysed for pHf to determine if the pH was less than the preliminary 'actual acid sulfate soil' screening criterion of pH<4. All samples analysed reported pHf values greater than pH 5.0. These findings indicate that actual acid sulfate soils (AASS) are unlikely to be present in soils onsite between the surface and 6.0 m below ground level (bgl).

The soil samples were then subjected to hydrogen peroxide oxidation by the laboratory with the pH of the oxidised soil (pHfox) measured. All samples analysed reported a pHfox result greater than the preliminary screening criterion of <pH 3.5. A total of three (3) soil samples reported an extreme reaction to the addition of hydrogen peroxide. Thirteen (13) samples analysed returned a pH difference between pHf and pHfox values greater than 1.0 The results indicated potential acid sulfate soils (PASS) are likely to be present on the site between surface and 6.0 m bgl at the entire site.

5.3. Chromium Reducible Sulfur

A total of nine (9) soil samples were subjected to chromium reducible sulfur suite laboratory analysis.

The chromium reducible sulfur laboratory analytical results were compared with the action criteria adopted that would trigger a need for an acid sulfate soils management plan (ASSMP). Although the final design is yet to be finalised, for the purpose of selecting site specific action criteria, as per Table 4.4 of ASSMAC 1998, Alliance has assumed that the soil type present on site is '*sandy loams to light clay'* and that more than 1,000 tonnes of soil would be disturbed as part of the proposed works.

The sulfur trail and acid trail analytical results for the soil samples analysed did not trigger the adopted action criteria (0.03 % S oxidisable and 18 mol H^+ / tonne, respectively), with the exception of soil samples BH03-4.0 & BH03-6.0 recorded sulfur trail of 0.06 % S & 0.04 % S oxidisable and acid trail 40 mol H^+ / tonne & 22 mol H^+ / tonne, which exceed the action criteria adopted.

The laboratory results are summarised in the table below and laboratory documentation is attached in **Appendix B**.

The following soil samples exceeded the adopted action criteria, triggering the requirement for treatment:

Sample ID/Depth (m)	Net Acidity – Acidity Units (mol H^+/tonne)	Net Acidity – Sulfur Units (%S)	Liming Rate (Kg $CaCO_3$/T)
BH03-4.0	40	0.06	3
BH03-6.0	22	0.04	1.7

6. Conclusions and Recommendations

Based on the desktop review data, fieldwork observations, and the laboratory analytical results, Alliance concludes that:

- Potential ASS were identified by preliminary laboratory analysis in thirteen (13) of the forty-eight (48) soil samples collected across the site, indicating that the soil materials which were encountered at depths between 1.5m and 6.0m bgl are potentially impacted by ASS;
- A further nine (9) soil samples were submitted for CRS analysis and returned results indicating the presence of AASS and PASS collected from boreholes BH03, indicating the presence of AASS and PASS from site surface to depths excavation across the site;
- The liming rate required for remediation of the AASS and PASS across the site is between 1.3 to 3.0 kg$CaCO_3$/tonne; and
- The identified potential ASS at the site are likely to be disturbed by the construction phase of the works.

Based on these conclusions, and in accordance with ASSMAC (1998), Alliance makes the following recommendations:

- An acid sulfate soils management plan (ASSMP) should be developed for the site to:
  - Document the procedures and standards to be followed to manage the risks posed by potential ASS identified during construction;
  - Outline the management measures to be implemented to minimise the potential for adverse environmental impacts resulting from the disturbance of ASS; and
  - Manage the offsite disposal of excavated materials aligned to the NSW EPA Waste Classification Guidelines Part 1: Classifying Waste, November 2014 (NSW EPA, 2014a) and Waste Classification Guidelines Part 4: Acid Sulfate Soils (NSW EPA, 2014b).

This report, including its conclusions and recommendations, must be read in conjunction with the statement of limitations presented in **Section 7**.

7. Statement of Limitations

The findings presented in this report are based on specific searches of relevant, government historical databases and anecdotal information that were made available during the course of this investigation. To the best of our knowledge, these observations represent a reasonable interpretation of the general condition of the site at the time of report completion.

This report has been prepared solely for the use of the client to whom it is addressed, and no other party is entitled to rely on its findings.

No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to personnel and which may impact on those opinions is not the responsibility of Alliance Geotechnical Pty Ltd. Should information become available regarding conditions at the site including previously unknown sources of contamination, Alliance reserves the right to review the report in the context of the additional information.

This report must be reviewed in its entirety and in conjunction with the objectives, scope, and terms applicable to Alliance's engagement. The report must not be used for any purpose other than the purpose specified at the time Alliance was engaged to prepare the report.

Logs, figures, and drawings are generated for this report based on individual Alliance consultant interpretations of nominated data, as well as observations made at the time site walkover/s were completed.

Data and/or information presented in this report must not be redrawn for its inclusion in other reports, plans or documents, nor should that data and/or information be separated from this report in any way.

Should additional information that may impact on the findings of this report be encountered or site conditions change, Alliance reserves the right to review and amend this report.

8. References

ASSMAC 1998, Ahern C R, Stone Y and Blunden B 1998, '*Acid Sulfate Soils Manual 1998'*, Acid Sulfate Soil Management Advisory Committee, Wollongbar, NSW Australia.

DLWC 1997, Acid Sulfate Soil Risk Mapping Series

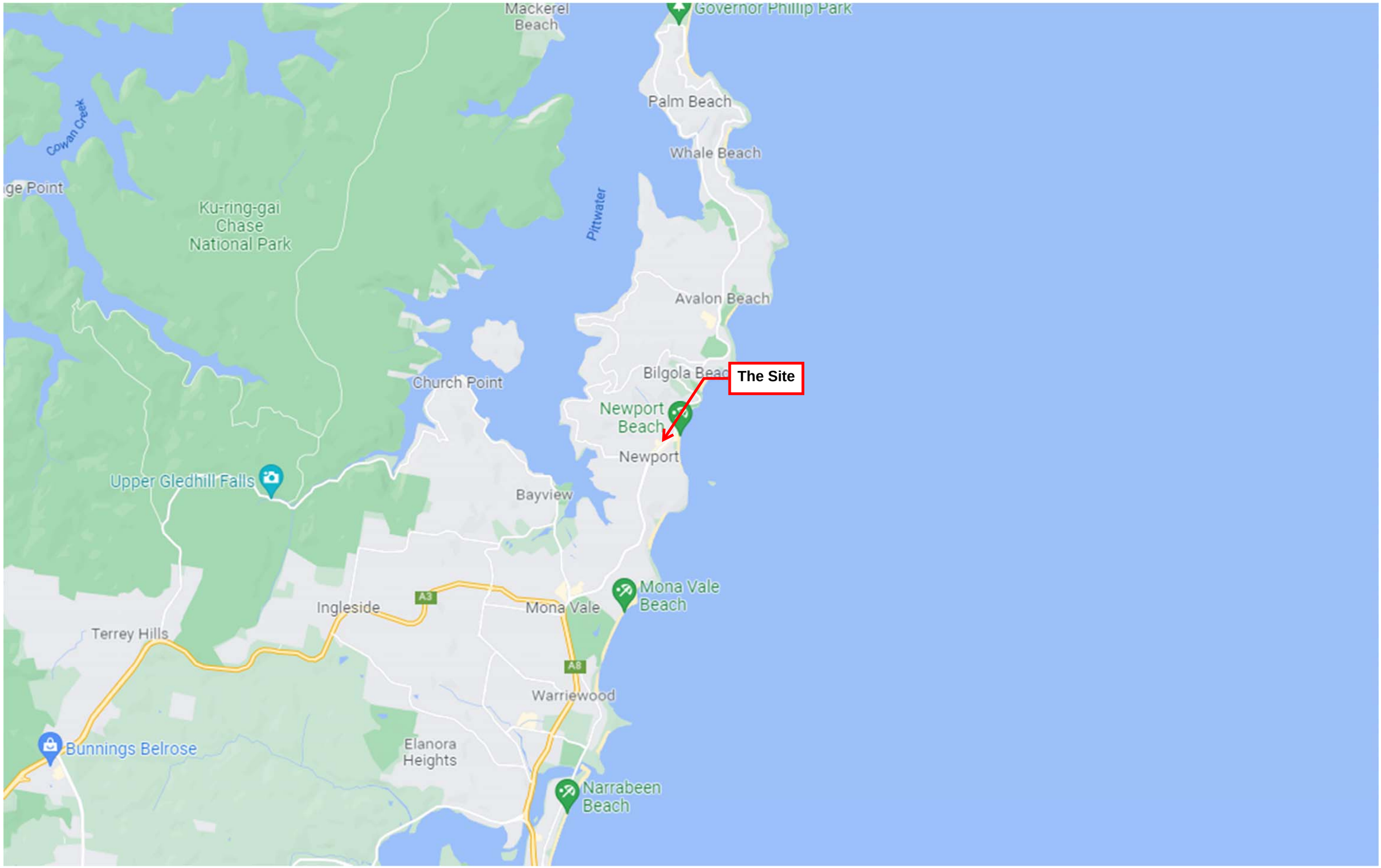
Sullivan 2018, Sullivan L, Ward N, Toppler N and Lancaster G, 2018 '*National Acid Sulfate Soils Guidance: National acid sulfate identification and laboratory methods manual*" Department of Agriculture and Water Resources, Canberra ACT

9. Abbreviations

ABC	Ambient Background Concentration
ACL	Added Contaminant Limit
ACM	Asbestos Containing Material
AEC	Areas of Environmental Concern
AF	Asbestos Fines
AS	Australian Standard
ASS	Acid Sulfate Soils
B(α)P	Benzo(α)pyrene
BTEXN	Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene
CEC	Cation Exchange Capacity
COC	Chain of Custody
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
CRC CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
DA	Development Application
DCP	Development Control Plan
DNAPL	Dense Non-aqueous Phase Liquid
DO	Dissolved Oxygen
DP	Deposited Plan
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EIL	Ecological Investigation Level
ESL	Ecological Screening Level
F1	TRH C_6-C_{10}
F2	TRH >C_{10}-C_{16}
F3	TRH >C_{16}-C_{34}
F4	TRH >C_{34}-C_{40}
FA	Friable Asbestos
HIL	Health Investigation Levels
HSL	Health Screening Levels
LEP	Local Environmental Plan

LOR	Limit of Reporting
mAHD	Metres Australian Height Datum
mBGL	Metres Below Ground Level
µg/L	Micrograms per litre
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
NATA	National Association of Testing Authorities
NEMP	National Environmental Management Plan
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
NL	Not Limiting
NSW DEC	New South Wales Department of Environment and Conservation
NSW OEH	New South Wales Office of Environment and Heritage
NSW EPA	New South Wales Environmental Protection Authority
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PFAS	Polyfluorinated Alkyl Sulfonate
ppm	Parts per million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance / Quality Control
RAP	Remedial Action Plan
SAQP	Sampling, Analysis, and Quality Plan
SEPP	State Environmental Protection Plan
SRA	Sample Receipt Advice
TEQ	Toxicity Equivalent Quotient
TPH	Total Petroleum Hydrocarbon
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
VOC	Volatile Organic Compounds
WA DOH	Western Australian Department of Health

FIGURES



Site Locality

Client Name:	Atlen Construction Pty Ltd	Figure Number:	1	N
Project Name:	Acid Sulfate Soils Assessment	Figure Date:	12 January 2022	
Project Location:	351-353 Barrenjoey Road, Newport	Report Number:	14429-ER-1-1	

Site Boundary & Proposed Borehole Location (for service locator to clear-additional BH's marked)

alliance

Client Name:	Atlen Construction Pty Ltd	Figure Number:	2
Project Name:	Acid Sulfate Soils Assessment	Figure Date:	12 January 2022
Project Location:	351-353 Barrenjoey Road, Newport	Report Number:	14429-ER-1-1

N

TABLES

Table 2
351-353 Barrenjoey Rd, Newport
Acid Sulfate Soils Results
14429

							Reference	BH01-0.5	BH01-1.0	BH01-1.5	BH01-2.0	BH01-2.5	BH01-3.0	BH01-3.5	BH01-4.0	BH01-4.5	BH01-5.0	BH01-5.5	BH01-6.0	BH02-0.5	BH02-1.0	BH02-1.5	BH02-2.0	BH02-2.5	BH02-3.0	BH02-3.5	BH02-4.0	BH02-4.5	BH02-5.0	BH02-5.5	BH02-6.0	BH03-0.5	BH03-1.0	BH03-1.5	BH03-2.0	BH03-2.5	BH03-3.0
							Sample ID	S22-Ja13948	S22-Ja13949	S22-Ja13950	S22-Ja13951	S22-Ja13952	S22-Ja13953	S22-Ja13954	S22-Ja13955	S22-Ja13956	S22-Ja13957	S22-Ja13958	S22-Ja13959	S22-Ja13960	S22-Ja13961	S22-Ja13962	S22-Ja13963	S22-Ja13964	S22-Ja13965	S22-Ja13966	S22-Ja13967	S22-Ja13968	S22-Ja13969	S22-Ja13970	S22-Ja13971	S22-Ja13972	S22-Ja13973	S22-Ja13974	S22-Ja13975	S22-Ja13976	S22-Ja13977
Group	**Analyte**	**Units**	**PQL**	**ASSMAC (1998)**	**DATASET AVERAGE**	**DATASET MINIMUM**	**DATASET MAXIMUM**																														
Field Screen	pHf	pH Units	0	>4	**6.4**	**5.0**	**8.6**	8.0	7.6	7.3	7.1	5.4	5.2	5.0	5.2	5.1	5.4	5.4	5.3	6.6	7.1	7.0	7.4	7.0	7.1	6.8	7.1	6.9	6.4	6.2	6.5	8.6	7.5	7.2	6.6	5.9	5.9
	pHfox	pH Units	0	<3.5	**5.5**	**4.2**	**7.2**	5.8	6.3	6.3	5.8	4.5	4.3	4.3	4.2	4.2	4.5	4.5	4.5	6.2	6.1	6.7	6.8	6.1	6.6	5.5	6.2	6.3	5.5	5.4	5.6	6.7	5.9	5.9	5.6	4.5	4.8
	Difference between pHF & pHFox	pH Units	0	1	**0.9**	**0**	**2.2**	2.2	1.3	1.0	1.3	0.9	0.9	0.7	1.0	0.9	0.9	0.9	0.8	0.4	1.0	0.3	0.6	0.9	0.5	1.3	0.9	0.6	0.9	0.8	0.9	1.9	1.6	1.3	1.0	1.4	1.1
	Reaction Rating	pH Units	0	XX	**1.2**	**1**	**4**	4	1	1	1	1	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
Chromium Reducible	CRS Suite - Net Acidity (Sulphur Units)	% S	0.02	> 0.03	-	**< 0.02**	**0.06**	< 0.02	-	-	< 0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.02	-	-	-	-	-	< 0.02	-	0.03	-	-	-
	CRS Suite - Net Acidity (Acidity Units)	mol H+/tonne	10	> 18	-	**< 10**	**40**	< 10	-	-	< 10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 10	-	-	-	-	-	< 10	-	17	-	-	-
	Liming Rate	Kg CaCo3/T	1.0		-	**< 1**	**3**	< 1	-	-	< 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 1	-	-	-	-	-	< 1	-	1.3	-	-	-

*** -** **No currently available criterion**
- - **No sample analysed**

Table 2
351-353 Barrenjoey Rd, Newport
Acid Sulfate Soils Results
14429

								Reference	BH03-3.5	BH03-4.0	BH03-4.5	BH03-5.0	BH03-5.5	BH03-6.0	BH04-0.5	BH04-1.0	BH04-1.5	BH04-2.0	BH04-2.5	BH04-3.0	BH04-3.5	BH04-4.0	BH04-4.5	BH04-5.0	BH04-5.5	BH04-6.0
								Sample ID	S22-Ja13978	S22-Ja13979	S22-Ja13980	S22-Ja13981	S22-Ja13982	S22-Ja13983	S22-Ja13984	S22-Ja13985	S22-Ja13986	S22-Ja13987	S22-Ja13988	S22-Ja13989	S22-Ja13990	S22-Ja13991	S22-Ja13992	S22-Ja13993	S22-Ja13994	S22-Ja13995
Group	**Analyte**	**Units**	**PQL**	**ASSMAC (1998)**	**DATASET AVERAGE**	**DATASET MINIMUM**	**DATASET MAXIMUM**																				
Field Screen	pHf	pH Units	0	<4	**6.4**	**5.0**	**8.6**	5.3	5.2	5.2	5.4	5.4	5.6	7.2	7.0	6.9	6.8	6.6	6.1	6.3	7.4	6.4	6.6	6.5	6.3
	pHfox	pH Units	0	<3.5	**5.5**	**4.2**	**7.2**	4.2	4.2	4.3	4.6	4.6	4.5	6.7	5.9	5.9	6.1	5.9	5.7	5.3	7.2	5.3	5.8	6.0	6.3
	Difference between pHF & pHFox	pH Units	0	1	**0.9**	**0**	**2.2**	1.1	1.0	0.9	0.8	0.8	1.1	0.5	1.1	1.0	0.7	0.7	0.4	1.0	0.2	1.1	0.8	0.5	0.0
	Reaction Rating	pH Units	0	XX	**1.2**	**1**	**4**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Chromium Reducible	CRS Suite - Net Acidity (Sulphur Units)	% S	0.02	> 0.03	-	**< 0.02**	**0.06**	-	0.06	-	-	-	0.04	-	< 0.02	-	-	-	-	-	-	0.03	-	-	-
	CRS Suite - Net Acidity (Acidity Units)	mol H+/tonne	10	> 18	-	**< 10**	**40**	-	40	-	-	-	22	-	< 10	-	-	-	-	-	-	18	-	-	-
	Liming Rate	Kg CaCo3/T	1.0		-	**< 1**	**3**	-	3	-	-	-	1.7	-	< 1	-	-	-	-	-	-	1.4	-	-	-

*** =** **No currently available criterion**
- = **No sample analysed**

APPENDIX A

BOREHOLE LOGS

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No: BH01
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
CC						CONCRETE				
SFA						FILL: Sandy CLAY with trace gravels, brown, stiff, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1		CLS	Sandy CLAY, orange, stiff, moist.	1.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
							1.5m			
			2		SW-SC	Clayey SAND, grey, loose, moist to wet with depth.	2.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments) were not observed, with the exception of waterlogged soils at depth.
							2.5m			
			3				3.0m			
							3.5m			
			4				4.0m			
	▼ GW Encountered						4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
						Test Pit BH01 terminated at 6m				
			7							

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No: BH02
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
CC						CONCRETE				
SFA						FILL: Sandy CLAY with trace gravels, brown, stiff, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1		CLS	Sandy CLAY, orange, stiff, moist.	1.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
							1.5m			
			2				2.0m			
					SW-SC	Clayey SAND, grey, loose, moist to wet with depth.	2.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments) were not observed, with the exception of waterlogged soils at depth.
			3				3.0m			
							3.5m			
			4				4.0m			
							4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
						Test Pit BH02 terminated at 6m				
			7							

1. NON CORED BOREHOLE 14429 ENVIRO LOGS.GPJ GINT STD AUSTRALIA.GDT 28/1/22

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No: BH03
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
SFA			0			FILL: Sandy CLAY, dark brown, soft, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1				1.0m			
							1.5m			
			2		CLS	Sandy CLAY, brown/orange becoming grey with depth, very stiff, moist.	2.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
							2.5m			
			3				3.0m			
							3.5m			
			4				4.0m			
							4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
			7			Test Pit BH03 terminated at 6m				

1. NON CORED BOREHOLE 14429 ENVIRO LOGS.GPJ GINT STD AUSTRALIA.GDT 28/1/22

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No: BH04
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
SFA						FILL: Sandy CLAY, dark brown, soft, moist.				Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
					CLS	Sandy CLAY, brown/orange becoming grey with depth, very stiff, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1				1.0m			
							1.5m			
			2				2.0m			
							2.5m			
			3				3.0m			
							3.5m			
			4				4.0m			
							4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
			7			Test Pit BH04 terminated at 6m				

1. NON CORED BOREHOLE 14429 ENVIRO LOGS.GPJ GINT STD AUSTRALIA.GDT 28/1/22

APPENDIX B

SITE PHOTOGRAPHS

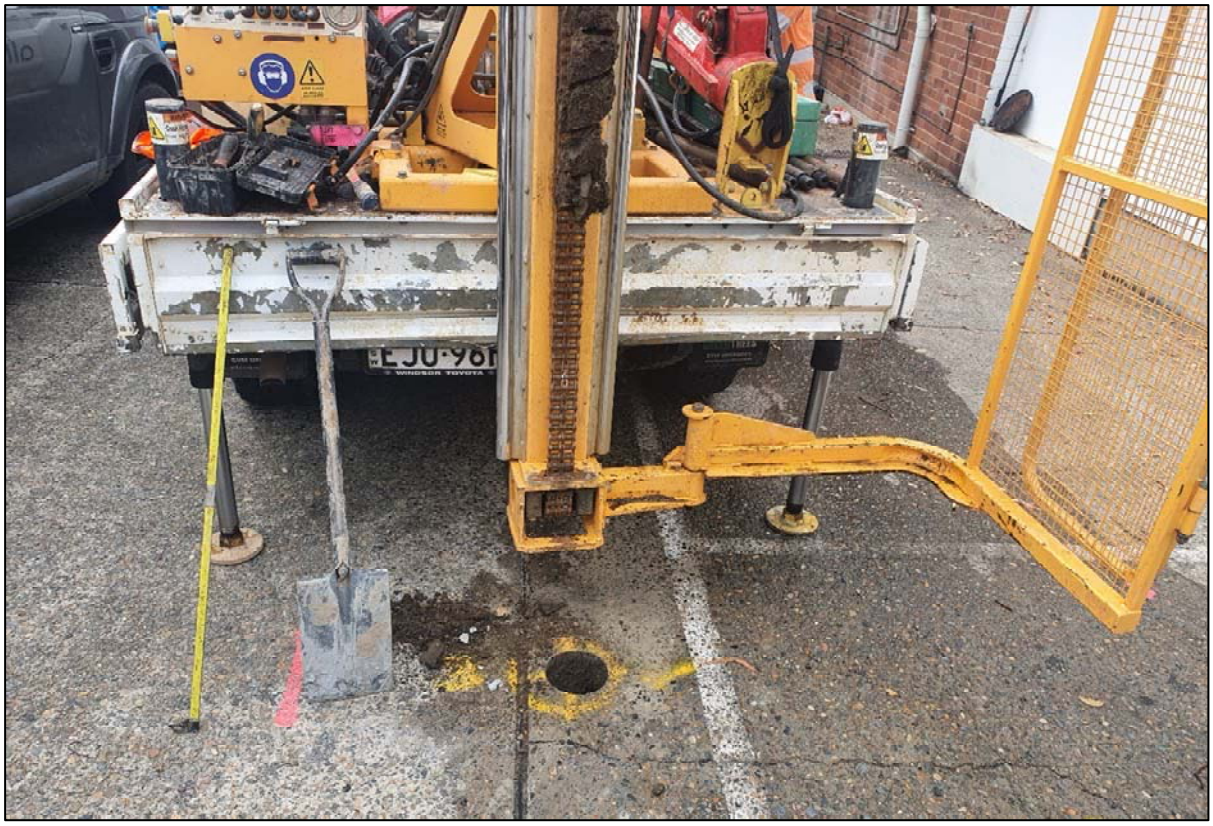

Image 1 View of borehole BH02

Image 2 View of soil from BH04

Image 3 View of retrieved soils from borehole BH04 (left) & BH01 (right).

APPENDIX C

LABORATORY CERTIFICATE

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Project Name: NEWPORT ASSA
Project ID: 14429

Order No.:
Report #: 855906
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jan 17, 2022 6:00 PM
Due: Jan 18, 2022
Priority: 1 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	BH01-0.5	Jan 17, 2022		Soil	S22-Ja13948	X
2	BH01-1.0	Jan 17, 2022		Soil	S22-Ja13949	X
3	BH01-1.5	Jan 17, 2022		Soil	S22-Ja13950	X
4	BH01-2.0	Jan 17, 2022		Soil	S22-Ja13951	X
5	BH01-2.5	Jan 17, 2022		Soil	S22-Ja13952	X
6	BH01-3.0	Jan 17, 2022		Soil	S22-Ja13953	X
7	BH01-3.5	Jan 17, 2022		Soil	S22-Ja13954	X
8	BH01-4.0	Jan 17, 2022		Soil	S22-Ja13955	X
9	BH01-4.5	Jan 17, 2022		Soil	S22-Ja13956	X

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Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
10	BH01-5.0	Jan 17, 2022		Soil	S22-Ja13957	X
11	BH01-5.5	Jan 17, 2022		Soil	S22-Ja13958	X
12	BH01-6.0	Jan 17, 2022		Soil	S22-Ja13959	X
13	BH02-0.5	Jan 17, 2022		Soil	S22-Ja13960	X
14	BH02-1.0	Jan 17, 2022		Soil	S22-Ja13961	X
15	BH02-1.5	Jan 17, 2022		Soil	S22-Ja13962	X
16	BH02-2.0	Jan 17, 2022		Soil	S22-Ja13963	X
17	BH02-2.5	Jan 17, 2022		Soil	S22-Ja13964	X
18	BH02-3.0	Jan 17, 2022		Soil	S22-Ja13965	X
19	BH02-3.5	Jan 17, 2022		Soil	S22-Ja13966	X
20	BH02-4.0	Jan 17, 2022		Soil	S22-Ja13967	X

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Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
21	BH02-4.5	Jan 17, 2022		Soil	S22-Ja13968	X
22	BH02-5.0	Jan 17, 2022		Soil	S22-Ja13969	X
23	BH02-5.5	Jan 17, 2022		Soil	S22-Ja13970	X
24	BH02-6.0	Jan 17, 2022		Soil	S22-Ja13971	X
25	BH03-0.5	Jan 17, 2022		Soil	S22-Ja13972	X
26	BH03-1.0	Jan 17, 2022		Soil	S22-Ja13973	X
27	BH03-1.5	Jan 17, 2022		Soil	S22-Ja13974	X
28	BH03-2.0	Jan 17, 2022		Soil	S22-Ja13975	X
29	BH03-2.5	Jan 17, 2022		Soil	S22-Ja13976	X
30	BH03-3.0	Jan 17, 2022		Soil	S22-Ja13977	X
31	BH03-3.5	Jan 17, 2022		Soil	S22-Ja13978	X

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Received: Jan 17, 2022 6:00 PM
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Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
32	BH03-4.0	Jan 17, 2022		Soil	S22-Ja13979	X
33	BH03-4.5	Jan 17, 2022		Soil	S22-Ja13980	X
34	BH03-5.0	Jan 17, 2022		Soil	S22-Ja13981	X
35	BH03-5.5	Jan 17, 2022		Soil	S22-Ja13982	X
36	BH03-6.0	Jan 17, 2022		Soil	S22-Ja13983	X
37	BH04-0.5	Jan 17, 2022		Soil	S22-Ja13984	X
38	BH04-1.0	Jan 17, 2022		Soil	S22-Ja13985	X
39	BH04-1.5	Jan 17, 2022		Soil	S22-Ja13986	X
40	BH04-2.0	Jan 17, 2022		Soil	S22-Ja13987	X
41	BH04-2.5	Jan 17, 2022		Soil	S22-Ja13988	X
42	BH04-3.0	Jan 17, 2022		Soil	S22-Ja13989	X

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email: EnviroSales@eurofins.com

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Melbourne
6 Monterey Road
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NATA # 1261 Site # 1254

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Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

Newcastle
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PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
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Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: NEWPORT ASSA
Project ID: 14429

Order No.:
Report #: 855906
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jan 17, 2022 6:00 PM
Due: Jan 18, 2022
Priority: 1 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
43	BH04-3.5	Jan 17, 2022		Soil	S22-Ja13990	X
44	BH04-4.0	Jan 17, 2022		Soil	S22-Ja13991	X
45	BH04-4.5	Jan 17, 2022		Soil	S22-Ja13992	X
46	BH04-5.0	Jan 17, 2022		Soil	S22-Ja13993	X
47	BH04-5.5	Jan 17, 2022		Soil	S22-Ja13994	X
48	BH04-6.0	Jan 17, 2022		Soil	S22-Ja13995	X
Test Counts						48

RECORD

ABN 50 005 085 521

☑ Sydney Laboratory — Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2066 — 02 9900 8400 — EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory — Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172 — 07 3902 4600 — EnviroSampleQLD@eurofins.com

☐ Perth Laboratory — Unit 2, 91 Leach Highway, Kewdale WA 6105 — 08 9251 9500 — EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory — 2 Kingston Town Close, Oakleigh, VIC 3166 — 03 8564 5000

Company	ALLIANCE GEOTECHNICAL	Project №	14429	Project Manager	M. Asadabadi
Address	10 WELDER ROAD, SEVEN HILLS NSW	Project Name	Newport ASSA	EDD Format (ESdat, EQuIS, Custom)	
Contact Name					
Phone №					
Special Directions					
Purchase Order					
Quote ID №					

Sampler(s)	Jacob Walker
Handed over by	
Email for Invoice	admin@allgeo.com.au
Email for Results	enviro@allgeo.com.au

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered".) SUITE code must be used to attract SUITE pricing.

Containers

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)*
☑ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	PH FIELD SCREEN (PHF / PHFOX)	CRS	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	BH01-0.5	17/01/22	S	×		×								
2	BH01-1.0	17/01/22	S	×		×								
3	BH01-1.5	17/01/22	S	×		×								
4	BH01-2.0	17/01/22	S	×		×								
5	BH01-2.5	17/01/22	S	×		×								
6	BH01-3.0	17/01/22	S	×		×								
7	BH01-3.5	17/01/22	S	×		×								
8	BH01-4.0	17/01/22	S	×		×								
9	BH01-4.5	17/01/22	S	×		×								
10	BH01-5.0	17/01/22	S	×		×								
11	BH01-5.5	17/01/22	S	×		×								
12	BH01-6.0	17/01/22	S	×		×								
13	BH02-0.5	17/01/22	S	×		×								
14	BH02-1.0	17/01/22	S	×		×								
15	BH02-1.5	17/01/22	S	×		×								
16	BH02-2.0	17/01/22	S	×		×								
17	BH02-2.5	17/01/22	S	×		×								
18	BH02-3.0	17/01/22	S	×		×								
19	BH02-3.5	17/01/22	S	×		×								
20	BH02-4.0	17/01/22	S	×		×								
21	BH02-4.5	17/01/22	S	×		×								
22	BH02-5.0	17/01/22	S	×		×								
23	BH02-5.5	17/01/22	S	×		×								
24	BH02-6.0	17/01/22	S	×		×								
	Total Counts			24		##								

Method of Shipment: ☑ Courier (#) ☐ Hand Delivered ☐ Postal — Name: JACOB WALKER — Signature — Date — Time

Eurofins | mgt Laboratory Use Only

Received By		SYD | BNE | MEL | PER | ADL | NTL | DRV	Signature		Date	/ /	Time	:	Temperature 2.8
Received By	S. DALLI	SYD | BNE | MEL | PER | ADL | NTL | DRV	Signature		Date	17/1/22	Time	6:00pm	Report № 855906

RECORD

ABN 50 005 085 521

☑ **Sydney Laboratory** Unit F3 Bld.F, 16 Mars Rd, Lane Cove West, NSW 2066 02 9900 8400 EnviroSampleNSW@eurofins.com

☐ **Brisbane Laboratory** Unit 1, 21 Smallwood Pl., Murarrie, QLD 4172 07 3902 4600 EnviroSampleQLD@eurofins.com

☐ **Perth Laboratory** Unit 2, 91 Leach Highway, Kewdale WA 6105 08 9251 9600 EnviroSampleWA@eurofins.com

☐ **Melbourne Laboratory** 2 Kingston Town Close, Oakleigh, VIC 3166 03 8564 5000

Company	ALLIANCE GEOTECHNICAL	Project №	14429	Project Manager	M. Asadabadi	Sampler(s)	Jacob Walker
Address	10 WELDER ROAD, SEVEN HILLS NSW	Project Name	Newport ASSA	EDD Format (ESdat, EQuIS, Custom)		Handed over by	
Contact Name						Email for Invoice	admin@allgeo.com.au
Phone №						Email for Results	enviro@allgeo.com.au
Special Directions							
Purchase Order							
Quote ID №							

Analyses (Note: Where metals are requested, please specify "Total" or "Filtered". SUITE code must be used to attract SUITE pricing.)

Containers

Turnaround Time (TAT) Requirements (Default will be 5 days if not ticked)

☐ Overnight (9am)*
☑ 1 Day* ☐ 2 Day*
☐ 3 Day* ☐ 5 Day
* Surcharges apply
☐ Other ( )

№	Client Sample ID	Sampled Date/Time (dd/mm/yy hh:mm)	Matrix (Solid (S) Water (W))	PH FIELD SCREEN (PHF / PHFOX)	CRS	1L Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	BH03-0.5	17/01/22	S	✖		✖								
2	BH03-1.0	17/01/22	S	✖		✖								
3	BH03-1.5	17/01/22	S	✖		✖								
4	BH03-2.0	17/01/22	S	✖		✖								
5	BH03-2.5	17/01/22	S	✖		✖								
6	BH03-3.0	17/01/22	S	✖		✖								
7	BH03-3.5	17/01/22	S	✖		✖								
8	BH03-4.0	17/01/22	S	✖		✖								
9	BH03-4.5	17/01/22	S	✖		✖								
10	BH03-5.0	17/01/22	S	✖		✖								
11	BH03-5.5	17/01/22	S	✖		✖								
12	BH03-6.0	17/01/22	S	✖		✖								
13	BH04-0.5	17/01/22	S	✖		✖								
14	BH04-1.0	17/01/22	S	✖		✖								
15	BH04-1.5	17/01/22	S	✖		✖								
16	BH04-2.0	17/01/22	S	✖		✖								
17	BH04-2.5	17/01/22	S	✖		✖								
18	BH04-3.0	17/01/22	S	✖		✖								
19	BH04-3.5	17/01/22	S	✖		✖								
20	BH04-4.0	17/01/22	S	✖		✖								
21	BH04-4.5	17/01/22	S	✖		✖								
22	BH04-5.0	17/01/22	S	✖		✖								
23	BH04-5.5	17/01/22	S	✖		✖								
24	BH04-6.0	17/01/22	S	✖		✖								
	Total Counts			24		##								

Method of Shipment: ☑ Courier (#) ☐ Hand Delivered ☐ Postal | Name: JACOB WALKER | Signature | Date | Time

Eurofins | mgt Laboratory Use Only

Received By | SYD | BNE | MEL | PER | ADL | NTL | DRW | Signature | Date | Time | Temperature 22.8

Received By: S. DALLI | SYD | BNE | MEL | PER | ADL | NTL | DRW | Signature | Date: 17/1/22 | Time: 6:07 pm | Report № 855906

Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

Attention: **Mehran Asadabadi**

Report **855906-S**
Project name NEWPORT ASSA
Project ID 14429
Received Date Jan 17, 2022

Client Sample ID			**BH01-0.5**	**BH01-1.0**	**BH01-1.5**	**BH01-2.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S22-Ja13948**	**S22-Ja13949**	**S22-Ja13950**	**S22-Ja13951**
Date Sampled			**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	7.6	7.3	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.8	6.3	6.3	5.8
Reaction Ratings*[S05]	0	-	4.0	1.0	1.0	1.0

Client Sample ID			**BH01-2.5**	**BH01-3.0**	**BH01-3.5**	**BH01-4.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S22-Ja13952**	**S22-Ja13953**	**S22-Ja13954**	**S22-Ja13955**
Date Sampled			**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.2	5.0	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.3	4.3	4.2
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			**BH01-4.5**	**BH01-5.0**	**BH01-5.5**	**BH01-6.0**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**S22-Ja13956**	**S22-Ja13957**	**S22-Ja13958**	**S22-Ja13959**
Date Sampled			**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	5.4	5.4	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.2	4.5	4.5	4.5
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH02-0.5	BH02-1.0	BH02-1.5	BH02-2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13960	S22-Ja13961	S22-Ja13962	S22-Ja13963
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	7.1	7.0	7.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.2	6.1	6.7	6.8
Reaction Ratings*[S05]	0	-	4.0	4.0	1.0	1.0

Client Sample ID			BH02-2.5	BH02-3.0	BH02-3.5	BH02-4.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13964	S22-Ja13965	S22-Ja13966	S22-Ja13967
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.0	7.1	6.8	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.1	6.6	5.5	6.2
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH02-4.5	BH02-5.0	BH02-5.5	BH02-6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13968	S22-Ja13969	S22-Ja13970	S22-Ja13971
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	6.4	6.2	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.3	5.5	5.4	5.6
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH03-0.5	BH03-1.0	BH03-1.5	BH03-2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13972	S22-Ja13973	S22-Ja13974	S22-Ja13975
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.6	7.5	7.2	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	5.9	5.9	5.6
Reaction Ratings*[S05]	0	-	3.0	1.0	1.0	1.0

Client Sample ID			BH03-2.5	BH03-3.0	BH03-3.5	BH03-4.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13976	S22-Ja13977	S22-Ja13978	S22-Ja13979
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	5.9	5.3	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.8	4.2	4.2
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH03-4.5	BH03-5.0	BH03-5.5	BH03-6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13980	S22-Ja13981	S22-Ja13982	S22-Ja13983
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.4	5.4	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.6	4.6	4.5
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH04-0.5	BH04-1.0	BH04-1.5	BH04-2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13984	S22-Ja13985	S22-Ja13986	S22-Ja13987
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.2	7.0	6.9	6.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	5.9	5.9	6.1
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH04-2.5	BH04-3.0	BH04-3.5	BH04-4.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13988	S22-Ja13989	S22-Ja13990	S22-Ja13991
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	6.1	6.3	7.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.9	5.7	5.3	7.2
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Client Sample ID			BH04-4.5	BH04-5.0	BH04-5.5	BH04-6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S22-Ja13992	S22-Ja13993	S22-Ja13994	S22-Ja13995
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	6.6	6.5	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	5.8	6.0	6.3
Reaction Ratings*[S05]	0	-	1.0	1.0	1.0	1.0

Sample History

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

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
Acid Sulfate Soils Field pH Test	Sydney	Jan 18, 2022	7 Days

- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests

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email: EnviroSales@eurofins.com

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NATA # 1261 Site # 1254

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

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Perth
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Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

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35 O'Rorke Road
Penrose, Auckland 1061
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IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: NEWPORT ASSA
Project ID: 14429

Order No.:
Report #: 855906
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jan 17, 2022 6:00 PM
Due: Jan 18, 2022
Priority: 1 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	BH01-0.5	Jan 17, 2022		Soil	S22-Ja13948	X
2	BH01-1.0	Jan 17, 2022		Soil	S22-Ja13949	X
3	BH01-1.5	Jan 17, 2022		Soil	S22-Ja13950	X
4	BH01-2.0	Jan 17, 2022		Soil	S22-Ja13951	X
5	BH01-2.5	Jan 17, 2022		Soil	S22-Ja13952	X
6	BH01-3.0	Jan 17, 2022		Soil	S22-Ja13953	X
7	BH01-3.5	Jan 17, 2022		Soil	S22-Ja13954	X
8	BH01-4.0	Jan 17, 2022		Soil	S22-Ja13955	X
9	BH01-4.5	Jan 17, 2022		Soil	S22-Ja13956	X

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Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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4/52 Industrial Drive
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PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

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Perth
46-48 Banksia Road
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Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

Eurofins Environment Testing NZ Limited
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IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: NEWPORT ASSA
Project ID: 14429

Order No.:
Report #: 855906
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jan 17, 2022 6:00 PM
Due: Jan 18, 2022
Priority: 1 Day
Contact Name: Mehran Asadabadi

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA # 1261 Site # 1254						
Sydney Laboratory - NATA # 1261 Site # 18217						X
Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
10	BH01-5.0	Jan 17, 2022		Soil	S22-Ja13957	X
11	BH01-5.5	Jan 17, 2022		Soil	S22-Ja13958	X
12	BH01-6.0	Jan 17, 2022		Soil	S22-Ja13959	X
13	BH02-0.5	Jan 17, 2022		Soil	S22-Ja13960	X
14	BH02-1.0	Jan 17, 2022		Soil	S22-Ja13961	X
15	BH02-1.5	Jan 17, 2022		Soil	S22-Ja13962	X
16	BH02-2.0	Jan 17, 2022		Soil	S22-Ja13963	X
17	BH02-2.5	Jan 17, 2022		Soil	S22-Ja13964	X
18	BH02-3.0	Jan 17, 2022		Soil	S22-Ja13965	X
19	BH02-3.5	Jan 17, 2022		Soil	S22-Ja13966	X
20	BH02-4.0	Jan 17, 2022		Soil	S22-Ja13967	X

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web: www.eurofins.com.au
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NATA # 1261 Site # 1254

Sydney
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16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

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Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
21	BH02-4.5	Jan 17, 2022		Soil	S22-Ja13968	X
22	BH02-5.0	Jan 17, 2022		Soil	S22-Ja13969	X
23	BH02-5.5	Jan 17, 2022		Soil	S22-Ja13970	X
24	BH02-6.0	Jan 17, 2022		Soil	S22-Ja13971	X
25	BH03-0.5	Jan 17, 2022		Soil	S22-Ja13972	X
26	BH03-1.0	Jan 17, 2022		Soil	S22-Ja13973	X
27	BH03-1.5	Jan 17, 2022		Soil	S22-Ja13974	X
28	BH03-2.0	Jan 17, 2022		Soil	S22-Ja13975	X
29	BH03-2.5	Jan 17, 2022		Soil	S22-Ja13976	X
30	BH03-3.0	Jan 17, 2022		Soil	S22-Ja13977	X
31	BH03-3.5	Jan 17, 2022		Soil	S22-Ja13978	X

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Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
32	BH03-4.0	Jan 17, 2022		Soil	S22-Ja13979	X
33	BH03-4.5	Jan 17, 2022		Soil	S22-Ja13980	X
34	BH03-5.0	Jan 17, 2022		Soil	S22-Ja13981	X
35	BH03-5.5	Jan 17, 2022		Soil	S22-Ja13982	X
36	BH03-6.0	Jan 17, 2022		Soil	S22-Ja13983	X
37	BH04-0.5	Jan 17, 2022		Soil	S22-Ja13984	X
38	BH04-1.0	Jan 17, 2022		Soil	S22-Ja13985	X
39	BH04-1.5	Jan 17, 2022		Soil	S22-Ja13986	X
40	BH04-2.0	Jan 17, 2022		Soil	S22-Ja13987	X
41	BH04-2.5	Jan 17, 2022		Soil	S22-Ja13988	X
42	BH04-3.0	Jan 17, 2022		Soil	S22-Ja13989	X

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Brisbane Laboratory - NATA # 1261 Site # 20794						
Mayfield Laboratory - NATA # 1261 Site # 25079						
Perth Laboratory - NATA # 2377 Site # 2370						
External Laboratory						
43	BH04-3.5	Jan 17, 2022		Soil	S22-Ja13990	X
44	BH04-4.0	Jan 17, 2022		Soil	S22-Ja13991	X
45	BH04-4.5	Jan 17, 2022		Soil	S22-Ja13992	X
46	BH04-5.0	Jan 17, 2022		Soil	S22-Ja13993	X
47	BH04-5.5	Jan 17, 2022		Soil	S22-Ja13994	X
48	BH04-6.0	Jan 17, 2022		Soil	S22-Ja13995	X
Test Counts						48

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/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 5.4
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

.

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. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S22-Ja13957	CP	pH Units	5.4	5.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	S22-Ja13957	CP	pH Units	4.5	4.6	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S22-Ja13967	CP	pH Units	7.1	7.2	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	S22-Ja13967	CP	pH Units	6.2	6.2	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S22-Ja13968	CP	pH Units	6.9	6.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	S22-Ja13968	CP	pH Units	6.3	6.4	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S22-Ja13978	CP	pH Units	5.3	5.3	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	S22-Ja13978	CP	pH Units	4.2	4.2	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S22-Ja13988	CP	pH Units	6.6	6.5	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	S22-Ja13988	CP	pH Units	5.9	5.8	pass	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
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Andrew Black — Analytical Services Manager

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.

3 DAY TAT ADDITIONAL ANALYSIS: FW: Eurofins Test Results, Invoice - Report 855906 : Site NEWPORT ASSA (14429)

Andrew Black <AndrewBlack@eurofins.com>
Wed 1/19/2022 10:36 AM
To: #AU03_EnviroSampleBris <EnviroSampleBris@eurofins.com>
Urgent 3 day TAT additional for Cr Suite thanks team

Andrew Black
Analytical Services Manager

Eurofins | Environment Testing
Unit 7
7 Friesian Close
SANDGATE, NSW, 2304
AUSTRALIA
Phone: +61 2 9900 8490
Mobile: +61 410 220 750

For sample receipt enquiries (eg. SRAs, changes to analysis) please contact EnvirosampleNSW@eurofins.com or 02 9900 8421 (7am – 9pm).
For despatch enquiries (eg. courier bookings, bottle orders) please contact AU04_Despatch_SYD@eurofins.com or 0488 400 929 (8am – 4pm).

Email: AndrewBlack@eurofins.com
Website: eurofins.com.au/environmental-testing

From: Jacob Walker <jacob.walker@allgeo.com.au>
Sent: Wednesday, 19 January 2022 10:31 AM
To: Andrew Black <AndrewBlack@eurofins.com>; Mehran Asadabadi <mehran@allgeo.com.au>
Subject: RE: Eurofins Test Results, Invoice - Report 855906 : Site NEWPORT ASSA (14429)

EXTERNAL EMAIL*

Hi Andrew,

Can I please get CRS analysis done on the following samples on an urgent tat:

- BH01-0.5 - S22-Ja13948;
- BH01-2.0 - S22-Ja13951;
- BH02-3.5 - S22-Ja13966;
- BH03-0.5 - S22-Ja13972;
- BH03-2.5 - S22-Ja13976;
- BH03-4.0 - S22-Ja13979;
- BH03-6.0 - S22-Ja13983;
- BH04-1.0 - S22-Ja13985; and
- BH04-4.5 - S22-Ja13992.

DHS RCD 19/1
BG in Syd.
856341

Thanks!

Regards,

Jacob Walker
Environmental Consultant
Mobile: 0424 066 612 | **Email:** jacob.walker@allgeo.com.au

alliance
geotechnical & environmental solutions

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Admin Email:	admin@allgeo.com.au
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Office & Lab:	8-10 Welder Road, Seven Hills NSW 2147
Postal Address:	PO Box 275, Seven Hills NSW 1730

From: AndrewBlack@eurofins.com <AndrewBlack@eurofins.com>
Sent: Tuesday, 18 January 2022 9:11 PM
To: Mehran Asadabadi <mehran@allgeo.com.au>
Cc: enviro <enviro@allgeo.com.au>
Subject: Eurofins Test Results, Invoice - Report 855906 : Site NEWPORT ASSA (14429)

Kindest Regards,

Andrew Black
Analytical Services Manager

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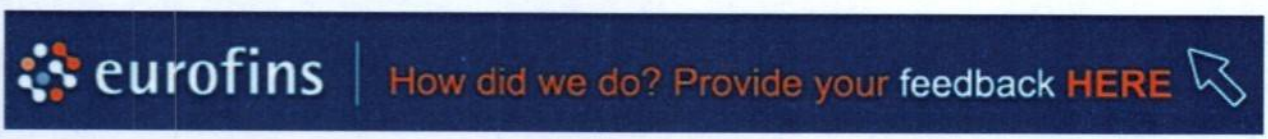
SANDGATE NSW 2304
AUSTRALIA
Phone: +61 299 008 490
Mobile: +61 410 220 750
Email: AndrewBlack@eurofins.com
Website:[http://]environment.eurofins.com.au
View our latest EnviroNotes
How did we do? Provide your feedback here



Alliance Geotechnical
10 Welder Road
Seven Hills
NSW 2147

Attention: **Jacob Walker**

Report **856341-S**
Project name NEWPORT ASSA
Project ID 14429
Received Date Jan 19, 2022

Client Sample ID			**BH01-0.5**	**BH01-2.0**	**BH02-3.5**	**BH03-0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B22-Ja16869**	**B22-Ja16870**	**B22-Ja16871**	**B22-Ja16872**
Date Sampled			**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**	**Jan 17, 2022**
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	8.3	5.6	6.1	9.0
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	< 0.003	0.010	< 0.003	< 0.003
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	< 2	7.0	2.0	< 2
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	3.3	< 3	< 3	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	N/A	N/A	N/A	N/A
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	10	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	0.41	N/A	N/A	1.4
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	0.13	N/A	N/A	0.44
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	82	N/A	N/A	280
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Extraneous Material						
<2mm Fraction	0.005	g	43	46	45	45
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
% Moisture	1	%	14	11	13	11

Client Sample ID			BH03-2.5	BH03-4.0	BH03-6.0	BH04-1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B22-Ja16873	B22-Ja16874	B22-Ja16875	B22-Ja16876
Date Sampled			Jan 17, 2022	Jan 17, 2022	Jan 17, 2022	Jan 17, 2022
Test/Reference	LOR	Unit				
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	4.7	4.4	4.7	6.8
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.030	0.060	0.040	< 0.003
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	17	40	22	< 2
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	< 3	< 3	< 3	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	N/A	< 0.005	N/A	N/A
HCl Extractable Sulfur	0.005	% S	N/A	< 0.005	N/A	N/A
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.02	% S	N/A	< 0.02	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.02	% S	N/A	< 0.02	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	10	mol H+/t	N/A	< 10	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A	N/A	N/A	0.24
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	N/A	N/A	N/A	0.08
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A	N/A	N/A	47
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	0.03	0.06	0.04	< 0.02
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	17	40	22	< 10
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	1.3	3.0	1.7	< 1
Extraneous Material						
<2mm Fraction	0.005	g	42	39	37	42
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
% Moisture	1	%	13	13	14	14

Client Sample ID			BH04-4.5
Sample Matrix			Soil
Eurofins Sample No.			B22-Ja16877
Date Sampled			Jan 17, 2022
Test/Reference	LOR	Unit	
Actual Acidity (NLM-3.2)			
pH-KCL (NLM-3.1)	0.1	pH Units	5.4
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	0.030
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	18
Potential Acidity - Chromium Reducible Sulfur			
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	< 0.005
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	< 3
Extractable Sulfur			
Sulfur - KCl Extractable	0.005	% S	N/A
HCl Extractable Sulfur	0.005	% S	N/A

Client Sample ID			BH04-4.5
Sample Matrix			**Soil**
Eurofins Sample No.			**B22-Ja16877**
Date Sampled			**Jan 17, 2022**
Test/Reference	LOR	Unit	
Retained Acidity (S-NAS)			
Net Acid soluble sulfur (SNAS) NLM-4.1	0.02	% S	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.02	% S	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	10	mol H+/t	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0
Acid Neutralising Capacity (ANCbt)			
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	N/A
ANC Fineness Factor		factor	1.5
Net Acidity (Including ANC)			
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	0.03
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	18
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	1.4
Extraneous Material			
<2mm Fraction	0.005	g	38
>2mm Fraction	0.005	g	< 0.005
Analysed Material	0.1	%	100
Extraneous Material	0.1	%	< 0.1
% Moisture	1	%	17

Sample History

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

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	Jan 19, 2022	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Jan 19, 2022	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Sydney	Jan 19, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Alliance Geotechnical
Address: 10 Welder Road
Seven Hills
NSW 2147

Project Name: NEWPORT ASSA
Project ID: 14429

Order No.:
Report #: 856341
Phone: 1800 288 188
Fax: 02 9675 1888

Received: Jan 19, 2022 10:36 AM
Due: Jan 24, 2022
Priority: 3 Day
Contact Name: Jacob Walker

Eurofins Analytical Services Manager : Andrew Black

Sample Detail						Chromium Reducible Sulfur Suite	Moisture Set
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							X
Brisbane Laboratory - NATA # 1261 Site # 20794						X	
Mayfield Laboratory - NATA # 1261 Site # 25079							
Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	BH01-0.5	Jan 17, 2022		Soil	B22-Ja16869	X	X
2	BH01-2.0	Jan 17, 2022		Soil	B22-Ja16870	X	X
3	BH02-3.5	Jan 17, 2022		Soil	B22-Ja16871	X	X
4	BH03-0.5	Jan 17, 2022		Soil	B22-Ja16872	X	X
5	BH03-2.5	Jan 17, 2022		Soil	B22-Ja16873	X	X
6	BH03-4.0	Jan 17, 2022		Soil	B22-Ja16874	X	X
7	BH03-6.0	Jan 17, 2022		Soil	B22-Ja16875	X	X
8	BH04-1.0	Jan 17, 2022		Soil	B22-Ja16876	X	X
9	BH04-4.5	Jan 17, 2022		Soil	B22-Ja16877	X	X

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Sydney Laboratory - NATA # 1261 Site # 18217		X
Brisbane Laboratory - NATA # 1261 Site # 20794	X	
Mayfield Laboratory - NATA # 1261 Site # 25079		
Perth Laboratory - NATA # 2377 Site # 2370		
External Laboratory		
Test Counts	9	9

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.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/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 5.4
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	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
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

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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. 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.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. 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							
Actual Acidity (NLM-3.2)							
pH-KCL (NLM-3.1)	%	95			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	103			80-120	Pass	
LCS - % Recovery							
Potential Acidity - Chromium Reducible Sulfur							
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)	%	97			80-120	Pass	
LCS - % Recovery							
Extractable Sulfur							
HCl Extractable Sulfur	%	105			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	B22-Ja16869	CP	pH Units	8.3	8.2	<1	30%	Pass	
Titratable Actual Acidity (NLM-3.2)	B22-Ja16869	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Titratable Actual Acidity (NLM-3.2)	B22-Ja16869	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
Duplicate									
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD			
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)	B22-Ja16869	CP	% S	0.005	0.005	<1	30%	Pass	
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	B22-Ja16869	CP	mol H+/t	3.3	3.3	<1	30%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	B22-Ja16869	CP	% S	N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	B22-Ja16869	CP	% S	N/A	N/A	N/A	30%	Pass	
Duplicate									
Retained Acidity (S-NAS)				Result 1	Result 2	RPD			
Net Acid soluble sulfur (SNAS) NLM-4.1	B22-Ja16869	CP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (s-SNAS) NLM-4.1	B22-Ja16869	CP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (a-SNAS) NLM-4.1	B22-Ja16869	CP	mol H+/t	N/A	N/A	N/A	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	B22-Ja16869	CP	% CaCO3	0.41	0.45	9.0	30%	Pass	
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	B22-Ja16869	CP	% S	0.13	0.14	9.0	30%	Pass	
ANC Fineness Factor	B22-Ja16869	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Net Acidity (Including ANC)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity - NASSG (Including ANC)	B22-Ja16869	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity - NASSG (Including ANC)	B22-Ja16869	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate - NASSG (Including ANC)	B22-Ja16869	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B22-Ja16870	CP	%	11	12	10	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 (CaCO3) 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/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if 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:

Emma Beesley	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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Eurofins Analytical Services Manager : Andrew Black

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Sydney Laboratory - NATA # 1261 Site # 18217							X
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Perth Laboratory - NATA # 2377 Site # 2370							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	BH01-0.5	Jan 17, 2022		Soil	B22-Ja16869	X	X
2	BH01-2.0	Jan 17, 2022		Soil	B22-Ja16870	X	X
3	BH02-3.5	Jan 17, 2022		Soil	B22-Ja16871	X	X
4	BH03-0.5	Jan 17, 2022		Soil	B22-Ja16872	X	X
5	BH03-2.5	Jan 17, 2022		Soil	B22-Ja16873	X	X
6	BH03-4.0	Jan 17, 2022		Soil	B22-Ja16874	X	X
7	BH03-6.0	Jan 17, 2022		Soil	B22-Ja16875	X	X
8	BH04-1.0	Jan 17, 2022		Soil	B22-Ja16876	X	X
9	BH04-4.5	Jan 17, 2022		Soil	B22-Ja16877	X	X

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Perth Laboratory - NATA # 2377 Site # 2370		
External Laboratory		
Test Counts	9	9

Acid Sulfate Soils Management Plan

Project
351-353 Barrenjoey Road, Newport NSW

Client Name
Atlen Construction Pty Ltd

Date
2/02/2022

Report No
14429-ER-1-2

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geotechnical & environmental solutions

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Document Control

Revision	Report Date	Author	Reviewer	Commissioned by	Comment
0	2 February 2022	Jacob Walker	Nathan Foster	Atlen Construction Pty Ltd	-

Important Information About This Report

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No warranties are made as to the information provided in this report. All conclusions and recommendations made in this report are of the professional opinions of personnel involved with the project and while normal checking of the accuracy of data has been conducted, any circumstances outside the scope of this report or which are not made known to personnel and which may impact on those opinions is not the responsibility of Alliance.

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Data and/or information presented in this report must not be redrawn for its inclusion in other reports, plans or documents, nor should that data and/or information be separated from this report in any way.

Should additional information that may impact on the findings of this report be encountered or site conditions change, Alliance reserves the right to review and amend this report.

Executive Summary

Alliance Geotechnical Pty Ltd (Alliance) was engaged by Atlen Construction Pty Ltd to undertake an Acid Sulfate Soils Management Plan (ASSMP) at 351-353 Barrenjoey Road, Newport NSW (refer Figure 1, with the 'site' boundaries outlined in Figure 2).

At the commencement of the project, Alliance had the following project appreciation:

- Acid Sulfate Soils (ASS) are naturally occurring soils and sediments containing mainly iron sulfides and iron disulfides. Exposure of these soil sulfides to oxygen has the potential to produce sulfuric acid which can have a significant impact on the environment. Leaching of sulfuric acid into waterways can cause serious water quality problems, resulting in fish kills and also damage to infrastructure.
- Acid sulfate soils can be broken down into two types when can often be found together in the same soil profile. Actual Acid Sulfate Soils (AASS) are soils or sediments containing iron sulfides that are acidic due to the partial or total oxidation (aeration) with a pH of 4 or less in dry conditions. Potential Acid Sulfate Soils (PASS) are soils or sediments containing iron sulfides that have not yet oxidised and remain in predominantly anaerobic conditions generally below the groundwater table. The pH of PASS is commonly 5.5 or more, making them neutral or slightly alkaline.
- This report uses the term ASS interchangeably for PASS and AASS except where specifically referenced.
- It is understood that a current development proposal for construction of a multi-storey mixed use building comprising retails on the ground level, with residential above and two basement car park levels. The site is approximately 800 m^2. Alliance understands that an acid sulfate soils assessment of the site is required by the client to address acid sulfate concerns for the site in relation to proposed excavation relating to the construction of the residential building.
- This ASSMP is required to assist the client to address acid sulfate soils risks presented in Alliance (2022).

The objectives of this project were to:

- Document the procedures and standards to be followed to manage the risks posed by acid sulfate soils identified during previous investigations;
- Outline the management measures to be implemented to minimise the potential for adverse human health or environmental impacts resulting from the disturbance of ASS; and
- Manage the offsite disposal of excavated materials aligned to the NSW EPA Waste Classification Guidelines Part 1: Classifying Waste, November 2014 (NSW EPA, 2014a) and Waste Classification Guidelines Part 4: Acid Sulfate Soils (NSW EPA, 2014b)

The following scope of works was undertaken address the project objectives:

- A desktop review of previous reports; and
- Assessment of data and reporting.

The nominated scope of works was undertaken with reference to relevant sections of ASSMAC (1998), NASSG (2018), NSW EPA (2014a) and NSW EPA (2014b).

On completion of the treatment and reuse or offsite disposal of impacted material, a post works closure report is to be prepared. The report should include, but not be limited too, information relating to the:

- Works completed including final grade and depth to remaining ASS;
- Locations and construction methods for the treatment pad/s;
- Daily monitoring undertaken (soil and water)
- Volume of soil material excavated;
- Volume and rate of lime application to excavated soils;
- Volume and rate of lime application (if any) to effluent;
- Validation results for soil and surface water (if any);
- Unexpected finds or contingency measures implemented;
- Volume and waste classification of material removed from the site;
- Load tracking records:
- Waste tracking records; and
- Waste disposal records.

This report must be read in conjunction with the ***Important Information About This Report*** statements at the front of this report.

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1 Introduction

1.1 Background

Alliance Geotechnical Pty Ltd (Alliance) was engaged by Atlen Construction Pty Ltd to prepare an Acid Sulfate Soils Management Plan (ASSMP) for proposed works at 351-353 Barrenjoey Road, Newport NSW (refer **Figure 1**, with the 'site' boundaries outlined in **Figure 2**).

At the commencement of the project, Alliance had the following project appreciation:

- Acid Sulfate Soils (ASS) are naturally occurring soils and sediments containing inorganic iron sulfides and iron disulfides, that when exposured.to oxygen, have the potential to produce sulfuric acid which can have a significant impact on the environment. Leaching of sulfuric acid into waterways can cause serious water quality problems, resulting in fish kills and also damage to infrastructure.
- Acid sulfate soils can be broken down into two types when can often be found together in the same soil profile. Actual Acid Sulfate Soils (AASS) are soils or sediments containing iron sulfides that are acidic due to the partial or total oxidation (aeration) with a pH of pH 4 or less in dry conditions. Potential Acid Sulfate Soils (PASS) are soils or sediments containing iron sulfides that have not yet oxidised and remain in predominantly anaerobic conditions generally below the groundwater table. The pH of PASS is commonly pH 5.5 or more, making them neutral or slightly alkaline.
- This report uses the term ASS interchangeably for PASS and AASS, except where specifically referenced.
- It is understood that a current development proposal for construction of a multi-storey mixed use building comprising retails on the ground level, with residential above and two basement car park levels. The site is approximately 800 m^2. Alliance understands that an acid sulfate soils assessment of the site is required by the Client to address acid sulfate concerns for the site in relation to proposed excavation relating to the construction of the residential building.
- This ASSMP is required to assist the Client to address acid sulfate soils risks presented in Alliance (2022).

1.2 Objectives

The objectives of this project were to:

- Document the procedures and standards to be followed to manage the risks posed by acid sulfate soils identified during previous investigations;
- Outline the management measures to be implemented to minimise the potential for adverse human health or environmental impacts resulting from the disturbance of ASS; and
- Manage the offsite disposal of excavated materials aligned to the NSW EPA (2014a) Waste Classification Guidelines Part 1: Classifying Waste and NSW EPA (2014b) Waste Classification Guidelines Part 4: Acid Sulfate Soils.

1.3 Scope of Work

The following scope of works was undertaken address the project objectives:

- A desktop review of previous reports; and
- Assessment of data and reporting.

The nominated scope of works was undertaken with reference to relevant sections of ASSMAC (1998), NASSG (2018), NSW EPA (2014a) and NSW EPA (2014b).

2 Site Identification

2.1 Site Details

Site identification details are presented in **Table 2.1**.

Table 2.1 Site Identification Details

Cadastral Identification	Lot 64 in DP1090224 & Lot 65, Section 5 in DP6248
Geographic Coordinates (SIX Maps)	33°39'17" S 151°19'13" E
Site Area	Approximately 800 m^2
Local Government Authority	Northern Beaches Council
Current Zoning	B2 – Local Centre

2.2 Site Layout

The layout of the site is present in **Figure 2**. The layout plan also includes locations on site of:

- Site access points;
- Current buildings / structures; and
- Surface water bodies on site and immediately adjacent to the site.

3 Site Environmental Setting

3.1 Geology

The Department of Mineral Resources Geological Survey of NSW Sydney 1:250,000 Geological Series Sheet 9130 (Edition 3) 1966, indicated that the site is likely to be underlain by Quaternary (Qa) alluvium, consisting of gravel, sand, silt, and clay.

3.2 Site Topography and Elevation

The site topography is generally flat (RL 10 mAHD) with minor slopes facing to the east and south-east.

3.3 Acid Sulfate Soils

Review of the Department of Land and Water Conservation NSW Acid Sulfate Soil Risk Map for Mona Vale (1:25,000 scale) indicates that the site lies within an area mapped as:

- Disturbed Terrain - which may include filled areas, which often occur during reclamation of low-lying swamps for urban development. Other disturbed terrain includes areas which have been mined, dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees. Soil investigations are required to assess these areas for acid sulfate potential.

Further assessment of acid sulfate soils, in the context of this project is considered warranted.

3.4 Hydrogeology and Hydrology

A review of maps held on file by Alliance, indicated that the nearest surface waterbody to the site is the Tasman Sea (Newport Beach), located approximately 300m east of the site.

Based on prevailing site topography, groundwater flow direction in the vicinity of the site is inferred to be towards the east-south-east.

A search of https://realtimedata.waternsw.com.au/water.stm indicated that there are eleven registered groundwater bores located within a 500m radius of the site. The closest five groundwater bores to the site and their intended uses are outlined below:

- GW106070 – domestic;
- GW111119 – monitoring bore, standing water level – 4.8m bgs;
- GW114958 – monitoring bore;
- GW114959 – monitoring bore; and
- GW114960 – monitoring bore.

A copy of the online search record is presented in **Appendix A**.

4 Summary of Previous Acid Sulfate Soil Investigation

Investigation of ASS at the site was previously completed by Alliance, with findings documented in the following report:

- Alliance (2022), Acid Sulfate Soils Assessment, 351-353 Barrenjoey Road, Newport NSW', dated July 2020, Ref: 10827-ER-2-1.

The objective of the assessment was to assess site soils for the presence of ASS within the proposed construction footprint at the site and provide recommendations on further assessment or management should ASS be identified.

The scope of works utilised for the assessment consisted of:

- A review of available acid sulfate soils risk planning maps, previous investigation reports, and associated mapping and databases;
- A preliminary desktop assessment to consider the possibility of ASS being present onsite;
- An intrusive site investigation to a maximum depth of 6 m below ground level (as nominated by the Client) to establish ground conditions and to facilitate the collection of representative soil samples;
- Laboratory analysis of selected samples collected during the field investigations; and
- Preparation of a report documenting the investigation findings in accordance with Acid Sulfate Soils Manual 1998 (ASSMAC, 1998) and the National Acid Sulfate Soil Guidance (Australian Government, 2018).

Intrusive investigation was performed at four (4) borehole locations to a maximum depth of 6.0 mbgl. Soil samples were collected at 0.5m intervals during auger advancement at each borehole location for subsequent laboratory analysis.

Preliminary field screen assessment of forty-eight (48) soil samples was completed by the laboratory. Reported field pH values (pH_F) in soil samples were >pH 5.0, indicating that actual acid sulfate soils (AASS) were unlikely to be present in soils onsite to a depth of 6.0 mbgl. pH values reported for soil samples following peroxide oxidation (pH_{FOX}) were greater than the screening criterion of pH 3.5. Three (3) soil samples reported an extreme reaction to hydrogen peroxide, while a pH reduction greater than 1.0 pH unit (i.e. $pH_F - pH_{FOX}$) was identified for thirteen (13) samples analysed. As a results of the field screen assessment, potential acid sulfate soils (PASS) were considered to be potential present within site soils to 6.0 mbgl.

Nine (9) soil samples were selected for quantitative ASS analysis using Chromium Reducible Sulfur Suite analysis by the analytical laboratory. Results were compared with the ASSMAC (1998) action criteria pertaining to *sandy loams to light clay* and a disturbed soil mass > 1,000 tonnes of soil. The sulfur trail and acid trail analytical results for the soil samples analysed were less than the adopted action criteria (0.03 %S and 18 mol H+ / tonne, respectively), with the exception of soil samples BH03-4.0 and BH03-6.0, which recorded sulfur trail of 0.06 % S & 0.04 % S oxidisable and acid trail 40 mol H+ / tonne & 22 mol H+ / tonne, above the action criteria adopted. Results indicate the presence of AASS and PASS collected from boreholes BH03, indicate the presence of AASS and PASS from the site surface to proposed excavation depth within soils at the site.

Based on the findings of the ASS Assessment, Alliance recommended that an Acid Sulfate Soil Management Plan (ASSMP) be prepared to:

- Document the procedures and standards to be followed to manage the risks posed by potential ASS identified during construction;
- Outline the management measures to be implemented to minimise the potential for adverse environmental impacts resulting from the disturbance of ASS; and
- Manage the offsite disposal of excavated materials aligned to the NSW EPA Waste Classification Guidelines Part 1: Classifying Waste, November 2014 (NSW EPA, 2014a) and Waste Classification Guidelines Part 4: Acid Sulfate Soils (NSW EPA, 2014b).

5 ASS Screening & Assessment Criteria

Assessment of ASS is generally divided into two components:

- Measuring the pH values of soil to understand the likely presence of PASS; and
- Chemical analysis, by a NATA accredited laboratory, to confirm the presence/absence of ASS.

The indicators of ASS and the assessment criteria are provided in *Acid Sulfate Soil Management Guidelines*, NSW Acid Sulfate Soil Management Advisory Committee, August 1998 (ASSMAC, 1998), and have been summarised in **Sections 5.1** and **5.2**.

5.1 Screening

Field screening can be utilised to assess the effectiveness of the treatment prior to sample collection for submission to the testing laboratory for validation and/or waste classification purposes. A summary of the values and the associated management measures are outlined in **Table 6.1**.

Table 5.1 pHF and pHFOX Indicators of ASS

pHF Value	pHFOX Value	pH Change	Effervescence	Management
Greater than 5.5	Greater than 4.5	Less than 2	Non to mild	AASS and PASS unlikely. No action required.
Greater than 5.6	less than 3	Greater than 2	Mild - extreme	PASS suitable for burial below the water table within 16 hours.
Greater than 4.5 but less than 6	Greater than 3.5	Less than 1	Non to mild	AASS and PASS unlikely. No action required.
Greater than 4 but less than 5.6	less than 3	Greater than 1	Mild - strong	Some AASS possible and PASS may exist. Material requires treatment.
Less than or equal to 4	Less than 4	Less than 1	Non to mild	AASS are likely. Material requires treatment.
Less than or equal to 4	less than 3	Greater than 2	Mild - strong	AASS and PASS likely. Material requires treatment.

5.2 Assessment Criteria

The action criteria for ASS are dependent on the volume of material as well as the soil type to be excavated. **Table 5.2** outlines the action criteria provided in the *Acid Sulfate Soil Manual,* August 1998, (ASSMAC). As greater than 1,000 tonnes of soils is proposed for excavation during the proposed development works, Alliance have applied action criteria of 0.03%S oxidisable and 18 mol H^+ / tonne in the assessment and management of soils at the site.

Table 5.2 Action Criteria Based on ASS Soil Analysis for Three Broad Texture Categories

Type of Material		*Action Criteria 1-1000 tonnes disturbed*		*Action Criteria if more than 1000 tonnes disturbed*	
Texture range.McDonald et al. (1990)	*Approx. clay content (%< 0.002 mm)*	*Sulfur trail % S oxidisable (oven-dry basis) eg SCRos or SPos*	*Acid trail mol H^+/tonne (oven-dry basis) eg, TPA or TSA*	*Sulfur trail % S oxidisable (oven-dry basis) eg SCRos or SPos*	*Acid trail mol H^+/tonne (oven-dry basis) eg, TPA or TSA*
Coarse Texture Sands to loamy sands	≤5	0.03	18	0.03	18
Medium Texture Sandy loams to light clays	5 - 40	0.06	36	0.03	18
Fine Texture Medium to heavy clays and silty clays	≥40	0.1	62	0.03	18

5.3 Waste Disposal Criteria

NSW EPA (2014b) indicates that offsite disposal of ASS can be managed in three ways:

1. Excavation and offsite disposal of PASS by placement under the water table within 24 hours (must be received at the proposed disposal location within 16 hours);

   OR

2. Onsite treatment with subsequent validation sampling confirming neutralising of the ASS and assessment for chemical parameters as well;

   OR

3. Disposal of untreated ASS to a facility licenced to accept the untreated ASS.

In addition to the ASS assessment, NSW EPA stipulate that a waste classification analysis be carried out on material requiring offsite disposal in accordance with the NSW EPA (2014a) *Waste Classification Guidelines*.

Should offsite disposal of PASS for reburial or offsite disposal of untreated ASS at a licenced facility be selected as a disposal option, the proposed facility should be contacted to determine any licence specific conditions on disposal that may exist. The initial site screening, prior to offsite disposal of PASS for reburial, will generally consist of field screening of ASS, with measurements of pH_F required to be pH 5.6 or higher. Regardless of the classification of the soil, disposal will be at the discretion of the receiving facility. Approval to dispose of the excavated material at the receiving facility will be required prior to transport from the site.

5.3.1 Assessment Criteria for Treated ASS

Following application of lime and subsequent mixing, samples of the treated soil are to be collected at a rate outlined in **Section 6.9**. Initial sample analysis should be undertaken using field screening techniques (refer **Section 6.5**) with the results compared to assessment criteria outlined in **Table 5.1**. Field screening results (pH_F and pH_{FOX}) less than pH 5.5 and pH 4.5, respectively, are to trigger further lime application, re-mixing, and re-screening.

Sample results returning field screening results (pH_F and pH_{FOX}) greater than pH 5.5 and pH 4.5, respectively, should be submitted for laboratory analysis for pH_F and pH_{FOX} in combination with waste classification sample collection, as outlined in **Section 6.9**. The laboratory results are then to be assessed against the criteria outlined in **Table 5.2**.

5.4 Effluent Disposal Criteria

Should effluent be generated from the area of ASS treatment, or associated with any dewatering activity, effluent will require chemical assessment prior to discharge. The relevant criteria for assessment of effluent to be discharged to stormwater are outlined in the NEPM (2013) and ANZG (2018) . The trigger values for marine water for a level of protection for 95% of species is considered appropriate given the location of the site and proximity to Tasman Sea (Newport Beach).

Dewatering of groundwater from the site must only be undertaken following approval, in the form of a licence, from Water NSW. Discharge of groundwater, post-treatment, into the municipal stormwater system should be undertaken following approval from Northern Beaches Council . If groundwater is expected to be encountered during the proposed development, a groundwater management plan would be required. Alternatively, a licenced waste removal contractor could be engaged to remove the effluent subject to sampling assessment outlined by the chosen contractor.

6 Soil Management Strategy

6.1 Overview

The following management strategies have been prepared in general accordance with guidance provided in *Acid Sulfate Soil Management Guidelines*, NSW Acid Sulfate Soil Management Advisory Committee, August 1998 (ASSMAC, 1998) and the NSW DECC (2007) *Acid Sulfate Soil Remediation Guidelines for Coastal Floodplains in New South Wales* (NSW DECC, 2007).

Based on the findings of the previous ASS Assessment (refer **Section 4**) the soil material is likely to be excavated and disposed offsite as ASS (either treated or untreated, but subject to the licenced disposal facility conditions and waste classification).

Treatment of ASS (where required) will be conducted in designated treatment areas using the liming rate provided in **Section 6.7.**

6.2 Roles and Responsibilities

The assigned Principal Contractor must:

- be responsible for the proposed project work until the work is completed;
- ensure that persons involved with proposed project work have undertaken occupational health and safety training;
- keep records of induction training for site workers and site-specific training;
- ensure that subcontractors (if any) provide safe work method statements for the activities for which they are engaged;
- monitor subcontractors to ensure that they are complying with the safe work method statements; and
- maintain a hazardous substance register for hazardous substances used or present on the site.

The Principal Contractor is responsible for co-ordinating health and safety activities for the project. Other responsibilities of the Principal Contractor include:

- compliance with work health and safety and environmental legislation, regulations, standards, codes, and the site-specific rules relating to safety contained in this ASSMP;
- ensuring that sufficient funds are available to procure the necessary health and safety equipment such as personal protective equipment (PPE);
- managing accident and emergency procedures; and
- managing workplace injury management and rehabilitation.

The Principal Contractor has the authority to suspend or modify work practices and administrate disciplinary actions for individuals whose conduct does not meet the minimum site requirements set forth herein.

It should be noted that lime should be treated with care as incorrect use and/ or handling can result in adverse impacts on human health and the surrounding environment. As such persons associated with application or treatment of the ASS should be suitably trained for the type of work being undertaken. A job safety analysis (JSA) (or a safe work method statement (SWMS)) should be in place prior to undertaking works involving ASS. The JSA or SWMS should be reviewed and approved by the principal contractor.

A suitably qualified and experienced environmental consultant is required to assess the treatment of ASS including collection of validation samples. Further the environmental consultant will be responsible for providing a waste classification assessment for offsite disposal of material.

6.3 Excavation

Excavation work will be required within the proposed locations to depths of approximately 6.0m bgl and Installation of building foundations including potential drilling to bedrock. **Table 6.2** presents the appropriate management strategy for the excavation of material located onsite. A graphic representation of the soil material is provided in borehole logs from Alliance (2022), which are present in **Appendix B.**

Table 6.2 Management Requirements for Soil Materials

Designation	Approximate depth (m bgl)	Soil type	Management
Onsite Treatment/ offsite disposal	Site surface to excavation depth	Clay and sandy clay	Material excavated and transported to the designated pads for lime treatment for offsite disposal. Once treated, sample excavated material as outlined in **Section 7.8** for re-use onsite or waste classification and offsite disposal. OR Excavation and re-burial beneath groundwater at an offsite licensed facility (subject to acceptance and pH screening results). OR extraction and offsite disposal to a facility licenced to accept untreated ASS (subject to disposal facility's specific conditions)

Sample collection and analysis will be required to provide appropriate waste classifications for all material to be disposed offsite. Results would require comparison to the NSW EPA *Waste Classification Guidelines* (NSW EPA, 2014a).

The ASS requiring treatment (if selected as the management option) will be excavated and placed in designated treatment areas, with lime application at the rate outlined in **Section 6.7.** Following completion of excavation to the design levels, a sample is to be collected from the existing surface and subject to field screening. Should the results indicate ASS, lime will be spread across the area of excavation at the rates outlined in **Section 6.7**. The surface will then be covered the same day with geofabric.

6.4 Stockpiling

The excavated soil material is to be placed into designated ASS treatment areas if not transported directly offsite to an appropriately licenced facility. The stockpiled material should be placed in layers to allow application of lime and associated mixing as outlined in **Section 6.7**. The stockpiles are to be covered to minimise potential rainfall contact will ASS or treated ASS material. Once the stockpiled material has been treated, as outlined in **Section 6.7,** validation samples should be collected by an appropriately experienced environmental consultant and transported to a NATA accredited laboratory for analysis. Stockpiled material is to remain in the designated area until the NATA accredited laboratory reports indicate that the stockpiled material has been successfully treated and is suitable for reuse onsite or waste classification for offsite disposal, as outlined in **Section 6.9**.

Records of sources of excavated material and the location of the treatment areas should be maintained as outlined in **Section 8**.

6.5 Field Screening

Onsite field screening is a procedure available to monitor the effectiveness of the initial treatment method and to reduce the reoccurrence of ASS validation results failing. The first component of the procedure includes adding deionised water to the pH_F soil sample in a shallow test tube or similar and mix such that a grout mix paste is generated. Insert the calibrated pH meter and record the data.

The second component of the field screening (pH_{FOX}) requires the addition of peroxide to the second sample from the same stockpile. The peroxide is to be 30% hydrogen peroxide adjusted to pH between pH 4.5 and pH 5.5. The pH_{FOX} test should be conducted in a heat resistant test tube or similar as vigorous reactions can result in generation of temperatures greater than 80°C. A few millilitres of hydrogen peroxide should be added to cover the soil and the mixture stirred. Hydrogen peroxide should be slowly added (dependant on the reaction) until a grout like paste is generated. The calibrated pH meter should be insert in to the mixture and data recorded.

Comparison of pH_F and the pH_{Fox} results with the trigger levels in **Section 5.1** will determine whether the stockpiled material has likely been successfully treated for ASS, or if the stockpiled material requires application of additional lime and mixing.

Once the field screening results indicate that the stockpiled material has been successfully treated as outlined in **Table 5.1,** validation samples should be collected by an appropriately experienced environmental consultant and transported to a NATA accredited laboratory for analysis. Stockpiled material is to remain in the designated area until the NATA accredited laboratory reports indicate that the stockpile has been successfully treated and is suitable for reuse onsite or adequately waste classified for offsite disposal, as outlined in **Section 6.9**.

It should be noted that hydrogen peroxide and pH adjusting chemicals should be treated with care as incorrect use and/or handling can result in adverse impacts on human health. As such, person associated with field screening should be suitably trained with a safe work method statement or similar generated. This document will require review and approval by the principal contractor prior to undertaking the works. Further, any waste generated should be handled and managed as outlined in **Section 5.3** or as outlined in the waste management procedures provided in the overarching environmental management plan for the project.

6.6 Preparation of the Treatment Area

Prior to placement of soil in the designated treatment area/s, the area/s (or pad/s) will be graded such that water will flow to one corner with a sump installed to allow extraction of the water (if required). Water could be generated during dust suppression or rainfall events and should be designed with consideration of the size of the pad/s. A plastic liner (two layers of HDPE) with no leakage at overlaps is to be installed across the treatment pad/s. Hay bales, earthen mounds or similar will be placed around the designated treatment pad/s with the plastic overtopping the bales, earthen mounds or similar secured. This will effectively provide a bunded area/s. Coarse crushed sandstone, coarse crushed gravel or similar drainage medium is to be placed over the plastic liner and is to be a minimum of 0.2 m thick. Subdividing large treatment pads may be preferable to enable sequencing of treatment batches and validation of the same.

All excavated material that is AASS and PASS and is unsuitable for offsite disposal for burial (at an appropriately licenced facility) is to be immediately placed in the treatment pad/s on the drainage material.

Tarps or HDPE plastic should be available to cover the stockpiles to minimise rainfall contacting the ASS. This will minimise the size of the required sump of the containment areas.

6.7 Treatment of ASS

The excavated material requiring treatment is to be placed in the bunded area in a layer not greater than 0.3 m thick. Lime is to be applied to the soil at a liming rate of:

- 3.0 kg of $CaCO_3$ / tonne of ASS

This application rate assumes fine agricultural lime less than 200 µm (micron). Application of alternate lime would require an assessment of the effective neutralising value with the assessment of suitability undertaken by a suitably experience environmental consultant. Further, it should be noted that, as validation data becomes available from the treated soils, the liming rate may require adjustment based on this additional information.

The lime requires mixing through the soil matrix to effectively neutralise the ASS. The mixing should be undertaken immediately following application to the soil.

Should available treatment area/s be insufficient to receive the material requiring treatment at less than 0.3 m in thickness, additional material requiring treatment is to be placed in 0.3 m layers on the treatment pad/s after lime application and mixing is undertaken on the lower 0.3 m layer (following collection of treatment validation soil samples).

Alternatively, treated soil can be removed from site for storage at a suitably licenced facility (licenced to accept PASS and AASS) while waiting waste classification results.

Following treatment of the excavated material, validation samples are to be collected by an appropriately experienced environmental consultant at the rate outlined in **Section 6.9**. Should the validation samples indicate that the ASS has not been effectively neutralised, further lime application and mixing followed by additional validation sample collection will be required. An amended liming rate will be determined based on the failed analytical results (if required).

It should be noted that lime should be treated with care as incorrect use and/ or handling can result in adverse impacts on human health and the surrounding environment. As such, person associated with application or treatment of the ASS should be suitably trained with a safe work method statement or similar generated. This document will require review and approval by the principal contractor for the project.

If periods of high rainfall are forecast, the stockpiles will be covered with measures implemented to divert non-impacted stormwater from the treatment pad/s.

6.8 Treatment of Effluent

Effluent generated from the treatment area will require assessment and potential treatment prior to offsite discharge. Alternatively, a licenced liquid waste removal contractor could be engaged to remove the effluent.

Where the effluent is proposed for discharge to stormwater, sampling is required to assess treatment requirements (if any) prior to discharge. Water samples are to be collected by a suitably qualified and experienced environmental consultant. The water samples are to be subjected to field screening (using a calibrated water quality meter) and laboratory analysis, as a minimum for:

- pH, dissolved oxygen, temperature, electric conductivity (water quality meter);

- Metals (aluminium, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, and zinc) (laboratory);
- PAH;
- TRH;
- BTEX;
- pH (laboratory);
- Electrical Conductivity; and
- Total dissolved solids (laboratory).

Discharge of effluent into Council stormwater system should be undertaken following an approval from Northern Beaches Council. A groundwater dewatering management plan would be required prior to undertaking the dewatering works.

Where required, lime is to be added to the effluent to adjust the pH to the level acceptable for discharge. It is considered likely that adjusting the pH will result in precipitation of metals concentrations should they exceed the NEPM (2013) water quality guidelines. A suitably qualified and experienced environmental consultant should be engaged to assist in determining the appropriate application rate for treatment of the effluent. Items to be considered are the type of neutralising agent (e.g., agricultural lime has a low solubility in water) and the method of application. Further, care should be exercised such that the water doesn't become alkaline.

Additional water samples will be required from the treated effluent prior to discharge to confirm successful treatment.

6.9 Off-Site Disposal

It should be noted that acceptance of the waste is at the discretion of the receiving body. As such, the waste classification assessment report is to be submitted to the proposed disposal facility, for approval, prior to transport off site.

Wastes are to be classified, managed, and disposed in accordance with the relevant council and NSW EPA guidelines and Legislation.

6.9.1 Sample Collection

Soil material proposed for offsite disposal is to be sampled at the rate outlined in **Table 6.9.1.**

Table 6.9.1. Stockpile Sampling Density for ASS Treatment, Validation and Waste Classification

Stockpile Volume (m^3)	Number of Samples
<75	3
75 - <100	4
100 - <125	5
125 - <150	6
150 - <175	7

Stockpile Volume (m^3)	Number of Samples
175 - <200	8

Treatment validation soil samples are to be analysed for:

- Field screen (pHf/pHfox).

Waste classification soil samples (if required) are to be analysed for

- metals (arsenic, cadmium, chromium, lead, mercury, and nickel);
- total recoverable hydrocarbons (TRH);
- polycyclic aromatic hydrocarbons (PAH);
- benzene, toluene, ethylbenzene, and xylene (BTEX);
- organochlorine pesticides (OCP);
- polychlorinated biphenyls (PCB); and
- Asbestos.

Soil samples are to be collected and waste classification reports are to be completed by a suitably qualified and experienced environmental consultant. The analytical results obtained laboratory analysis require comparison to the contaminant concentrations outlined in NSW EPA (2014a) *Waste Classification Guidelines Part 1: Classifying Waste*. The landfill should be informed that the ASS has been treated in accordance with the neutralising techniques outlined in the ASSMAC (1998), the ASSMP, and that the waste has also been classified in accordance with the NSW EPA (2014a).

6.9.2 Offsite Disposal for Reburial

Although not recommended by Alliance, PASS which could be present onsite and proposed for removal and offsite reburial below the water table, will require transport and acceptance at a suitably licenced facility within 16 hours. Each truck load will require measurement of the pH of the soil prior to leaving site. Where the soil is less than pH 5.6 (or alternate pH as directed by the receiving facility), the load will be considered unsuitable for offsite disposal and will be placed in the treatment areas. Where the pH of the load is greater than pH 5.6 (or the alternate pH as outlined by the receiving facility), the material will be considered suitable for offsite disposal. Records of pH measurement and the corresponding truck registration details are to be maintained as outlined in **Section 8**. Further, a record sheet recording pH measurements at the time of loading, as well as other relevant details, will be retained in the truck for providing to the landfill facility. If additional forms are required by the receiving body, the associated documentation will require completion as required.

The sample collected from each truck load will be subjected to pH screening using a calibrated meter. Deionised water will be added to the soil sample in a shallow test tube or similar and mixed such that a grout mix paste is generated. The pH probe will be inserted, and the data recorded, and any additional records required by the receiving facility should be provided.

Each load will be covered and transported to the licenced landfill facility immediately after excavation and pH testing (to confirm suitability for offsite disposal as PASS). No loads are to leave site after 2:30pm to allow sufficient time to arrive at the disposal facility prior to its closure. In the event that a load is rejected, or the load does not arrive at the disposal facility on the same day (i.e. vehicle breakdown or similar) the load is to be returned to the site for treatment as outlined in **Section 6.7**. The load and waste tracking records are to be updated accordingly (refer **Section 8**).

7 Dewatering Management Strategy

Alliance understands that the proposed development is unlikely to require dewatering during bulk excavation works. Any dewatering of groundwater from the site should be undertaken following an approval to abstract from Department of Industry – Water. Discharge of groundwater into the municipal stormwater system should be undertaken following an approval from Northern Beaches Council. A groundwater dewatering management plan will be required prior to undertaking any dewatering works.

8 Monitoring

Soil sample collection and review of data to assess the effectiveness of the treatment of ASS is required and should be undertaken at the rate outlined in **Section 6.9**. Where the samples are to assess the successful treatment of ASS, analysis is required by a laboratory accredited by National Association of Testing Authorities (NATA) for pH_F, pH_{FOX}, and chromium reducible sulfur (if required by the receiving facility).

Effluent samples (if generated) are also to be submitted to a NATA accredited laboratory for the parameters outlined in **Section 6.8**.

Monitoring of site works (to be included in the final report as outlined in **Section 11**) is to include, but not be limited to, records of:

- Field screening results (pH_F and pH_{FOX}) for the various soil layers;
- Date and volume of soil material excavated;
- Location of placement of the excavated material;
- Treatment measures implemented (if ASS) including liming rate, mixing methodology and date mixed;
- Validation analytical results confirming treatment of the ASS (if any);
- Amendments to treatment measures following review of the failed validation analytical results (if required);
- Disposal location of the excavated material;
- Records of truck and loads leaving the site;
- Waste tracking documentation;
- Waste disposal receipts;
- Copies of specific documentation required by the receiving facility (if any);
- Water quality meter measurements (including date) for effluent in sumps associated with the treatment pad/s (if relevant); and
- Calibration records for meters.

8.1 Soil

Records of encountered soil types will be compared to the laboratory results for effectiveness of the field screening as well as used as a guide for amending liming rates (if required).

Prior to offsite disposal of soil material, a waste classification assessment report will be required for submission to the receiving body.

8.1.1 AASS

Sample collection and review of the data to assess the success of the treatment of ASS is required and should be undertaken at the rate outlined in **Table 6.9.1**. Due to the likely volume of soil material requiring treatment, a robust recording system will be required.

In addition, waste tracking documentation (where relevant) will be required as well as disposal receipts from the receiving facility. Tracking of all truck loads leaving or entering the site will be required with the following information recorded:

- Date and time;
- Truck registration;
- Approximate volume;
- Soil type;
- Disposal location; and

8.1.2 PASS

Soil material considered to be PASS and proposed for offsite disposal and reburial (refer **Section 6.9.2**) will require additional sampling and data collection. Each load of soil proposed for offsite disposal to a suitably licenced facility will require pH testing (refer **Section 6.5**) with the data recorded on the tracking sheet. This sheet is to be retained by the truck and provided to the receiving facility on arrival. Additional documentation may be required by the receiving facility and should be completed and retained with the vehicle for delivery with each load (as required).

8.2 Surface Water and Groundwater

Groundwater seepage into drains is the most significant pathway for acid discharge from acid sulfate soil landscapes. The anticipated depth of excavation is considered unlikely to extend beyond the groundwater table. As such, changes to site drainage may have implications for acid generation onsite. When acid sulfate soils are drained, the sulfide can become exposed to oxygen and produce sulfuric acid. This can directly affect the ecology of surrounding wetlands and the export of acid from acid sulfate soils and the drainage pattern of any out-flowing streams. Consideration of potential changes to the hydrologic regime may be necessary to predict the magnitude of the impacts on acid sulfate soils, and in the design/redesign of drainage or water management systems.

If the excavation works are resulting in the generation of acid sulfate soils, remediation by injection of an alkaline solution must be completed to buffer any acid generation.

If effluent is generated and directed to the holding sump of the treatment pad/s, this effluent can be reused on the treatment pad/s for dust suppression. Alternatively, the water would require assessment using a water quality meter and may be suitable for use for dust suppression on the remainder of the site. Advice should be sought from an experienced environmental consultant and the assessment of the results will be required to provide guidance on the likelihood for adverse impact on soils and vegetation.

Should offsite discharge be the proposed management strategy, water samples would be required for submission to a NATA accredited laboratory for analysis for the parameters outlined in **Section 6.8.** The water samples are to be collected by an experienced environmental consultant. The analytical results are to be compared to the relevant guidelines (refer **Section 5.4**). Following comparison of the laboratory results to the respective guidelines, there may be a requirement for treatment of the effluent prior to discharge. Following treatment additional monitoring samples may be required. A water quality report should be prepared prior to discharge.

Should discharge into local stormwater be the proposed management strategy, an approval would be required from the Central Coast Council. An assessment of discharge water may be required. Where the effluent is not suitable for discharge, or immediate disposal is required, collection by a suitably licensed water transport company for disposal to a suitably licenced disposal facility will be required. Records of water quality monitoring, volume generated, volume removed, waste disposal records, waste tracking records, water quality reports and waste disposal receipts are required.

9 Contingencies

While this ASSMP provides a framework for management of the soil material based on the current understanding of the site conditions, potential changes to site conditions may occur during site works. Some potential contingencies are outlined in **Sections 9.1** to **9.3.**

9.1 Soil Excavations

Extended delays due to equipment failure has the potential for ASS material within excavations and trenches to be exposed to air resulting in oxidation of the PASS and generation of AASS. This could result in acidification of the soil and/or groundwater. In the event of extended delays, the existing surface should be kept wet, or lime applied to the excavation batter walls at the approximate rates outlined in **Section 6.7**.

During excavation there is a potential that ASS may spill from the excavation equipment, transport equipment or from the treatment area during mixing (low likelihood). Spilt ASS has the potential to impact on surface soils and/or groundwater (if effluent is generated). Spilt soil should be collected, transported (where required) and placed in the treatment area as soon as practical.

Increased size of excavations due to changed site conditions have the potential for excavations to remain open for longer period of time and the surrounding groundwater to be depressed. This could result in the oxidation of PASS in the walls and base of the excavation. Acidification of the soil, groundwater and potential impacts on ground infrastructure that may be installed could occur. In the event of extended delays, the soil should be kept wet, or lime applied to the excavation batter walls at the rate outlined in **Section 6.7.**

Should a load of PASS be rejected at the licenced receiving facility, the load is to be transported back to site for placement in the treatment pads as soon as possible (and on the same day). An investigation is to be undertaken into the reason for the rejection. Appropriate measures are to be implemented to reduce the likelihood of reoccurrence.

9.2 Stockpiles

Extra soil material generated during excavation work could result in insufficient stockpiling area with the designated treatment area. This could result in excavated PASS oxidising with potential impact on surface soils and/or groundwater (if effluent is generated) if placed outside the treatment area. Excavation should cease once the treatment area is at capacity until temporary storage of the ASS, such as skip bins, is organised for containment. Following treatment, successful validation, and removal of material from the treatment area, the temporary contained material should be placed in the treatment area for application of lime and mixing as outlined in **Section 6.7.**

There is potential that insufficient lime is available at the time of excavation. his could result in PASS oxidising within the treatment area. Should the material contained with the treatment area not be treated with lime, acid effluent may be generated during dust suppression activities or during precipitation. To minimise the potential for generation of acidic effluent, when lime is not available for treatment, stockpiled material is to be covered at all times until an alternate lime source is found.

The mixing methodology may not result in even distribution of lime throughout the ASS matrix. Should the validation sample results indicate ineffective mixing, alternate measure will be used including the use of rotary hoe attachment.

Lime application may not occur in the event of equipment breakdown or delayed delivery. This could result in oxidation of PASS within the treatment area and the generation of acid effluent during dust suppression activities or rain events. To minimise the potential for generation of acidic effluent, when lime is not available for treatment, stockpiled material is to be covered at all times until an alternate lime source is found and successfully mixed.

9.3 Surface Water

Unexpected precipitation has the potential to result in effluent generation from the stockpiled soil in the treatment area (assuming the stockpiled material is not covered). There is a potential that this effluent may be impacted if remediation activities have not been completed. While a sump or similar containment measure exists, the potential for overtopping cannot be precluded. As such, tarps or HDPE plastic should be placed over the stockpiled material as soon as possible to minimise further stormwater contact with the soil. Stormwater runoff that has not contacted the stockpiled material is suitable for management through the existing stormwater management systems.

There is a potential that an unforeseen rainfall event could fill open excavations. Should the excavations be open for less than 24 hours or the contingency measures outlined in **Section 9.1** be implemented, the potential for acid effluent generation from the excavations is considered unlikely. However, where the contingencies outlined above have not been implemented and the excavation have been open for greater than 24 hours, acidic effluent may be generated. The water should be collected and contained with analysis by a suitably experienced and qualified environmental consultant as outlined in **Section 6.8**.

10 Post Construction Monitoring

Post construction monitoring will only be conducted if groundwater treatment is required and will consist of monthly monitoring events from groundwater monitoring wells onsite. Water samples will be collected by a suitable trained and experienced environmental consultant with monitoring continuing until rectification measures have been successful.

11 Reporting

On completion of the treatment and reuse or offsite disposal of impacted material, a post works closure report is to be prepared. The report should include, but not be limited too, information relating to the:

- Works completed including final grade and depth to remaining ASS;
- Locations and construction methods for the treatment pad/s;
- Daily monitoring undertaken (soil and water)
- Volume of soil material excavated;
- Volume and rate of lime application to excavated soils;
- Volume and rate of lime application (if any) to effluent;
- Validation results for soil and surface water (if any);
- Unexpected finds or contingency measures implemented;
- Volume and waste classification of material removed from the site;
- Load tracking records:
- Waste tracking records; and
- Waste disposal records.

This report must be read in conjunction with the ***Important Information About This Report*** statements at the front of this report.

12 References

Alliance 2021, ‘Acid Sulfate Soils Assessment, 351-353 Barrenjoey Road, Newport NSW’, dated July 2020, Ref: 10827-ER-2-1

ANZG 2018, Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

NSW DECC 2007, Acid Sulfate Soil Remediation Guidelines for Coastal Floodplains in New South Wales

NSW Acid Sulfate Soil Management Advisory Committee 1998, Acid Sulfate Soil Management Guidelines, August 1998

NSW EPA 2014a, Waste Classification Guidelines Part 1: Classifying Waste, November 2014

NSW EPA 2014b, Waste Classification Guidelines Part 4: Acid Sulfate Soils, November 2014

NSW EPA 2016, ‘Environmental Guidelines: Solid Waste Landfills, Second Edition’, dated 2016, Ref: EPA 2016/0259

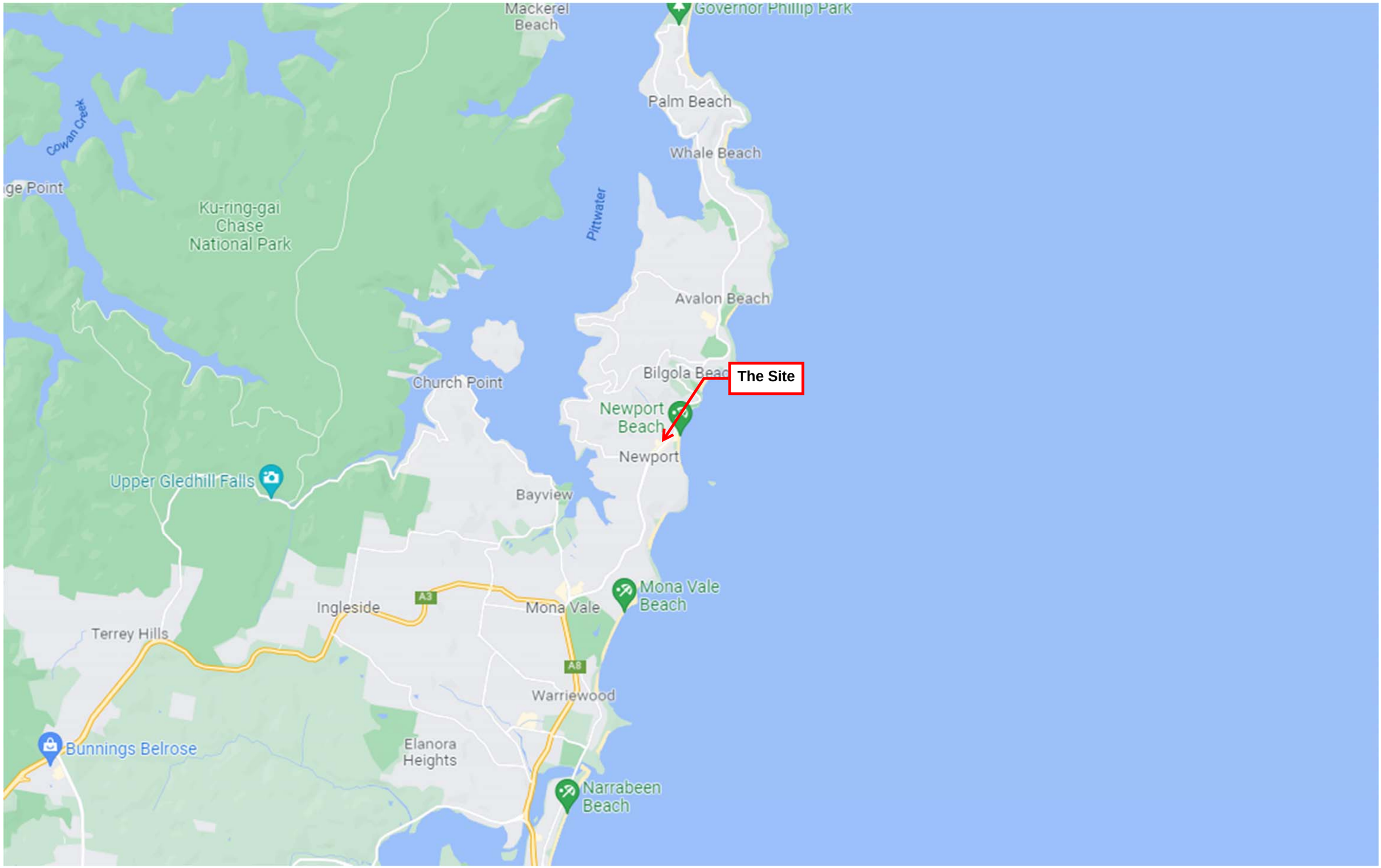
NSW EPA 2017, ‘Contaminated Land Management, Guidelines for the NSW Site Auditor Scheme (3rd edition)’, dated October 2017, Ref: EPA 2017P0269.

NSW EPA 2020, ‘Assessment and management of hazardous ground gases’ dated May 2020, Ref: EPA 2019P2047

Sullivan, L., Ward, N., Toppler, N., and Lancaster, G. 2018, ‘National Acid Sulfate Soils Guidance: National acid sulfate soils sampling and identification methods manual’ dated June 2018

VIC EPA 2009, ‘Industrial Waste Resource Guidelines’ dated June 2009, Ref: IWRG702.

FIGURES



Site Locality

alliance	Client Name:	Atlen Construction Pty Ltd	Figure Number:	1
	Project Name:	Acid Sulfate Soils Management Plan	Figure Date:	31 January 2022
	Project Location:	351-353 Barrenjoey Road, Newport	Report Number:	14429-ER-1-2

N

Borehole Locations

alliance	Client Name:	Atlen Construction Pty Ltd	Figure Number:	2	N
	Project Name:	Acid Sulfate Soils Management Plan	Figure Date:	31 January 2022	
	Project Location:	351-353 Barrenjoey Road, Newport	Report Number:	14429-ER-1-2	

APPENDIX A – Groundwater Records

WaterNSW

home help contact customise

State Overview

State Overview

Rivers and Streams

favourites search download sites find a site

⊞ Real Time Data - Riv...

Daily River Reports

⊞ Daily River Reports

Dams

favourites search download sites find a site

⊞ Real Time Data - Maj...

Groundwater (Telemetered data)

favourites search download sites

contact WaterNSW

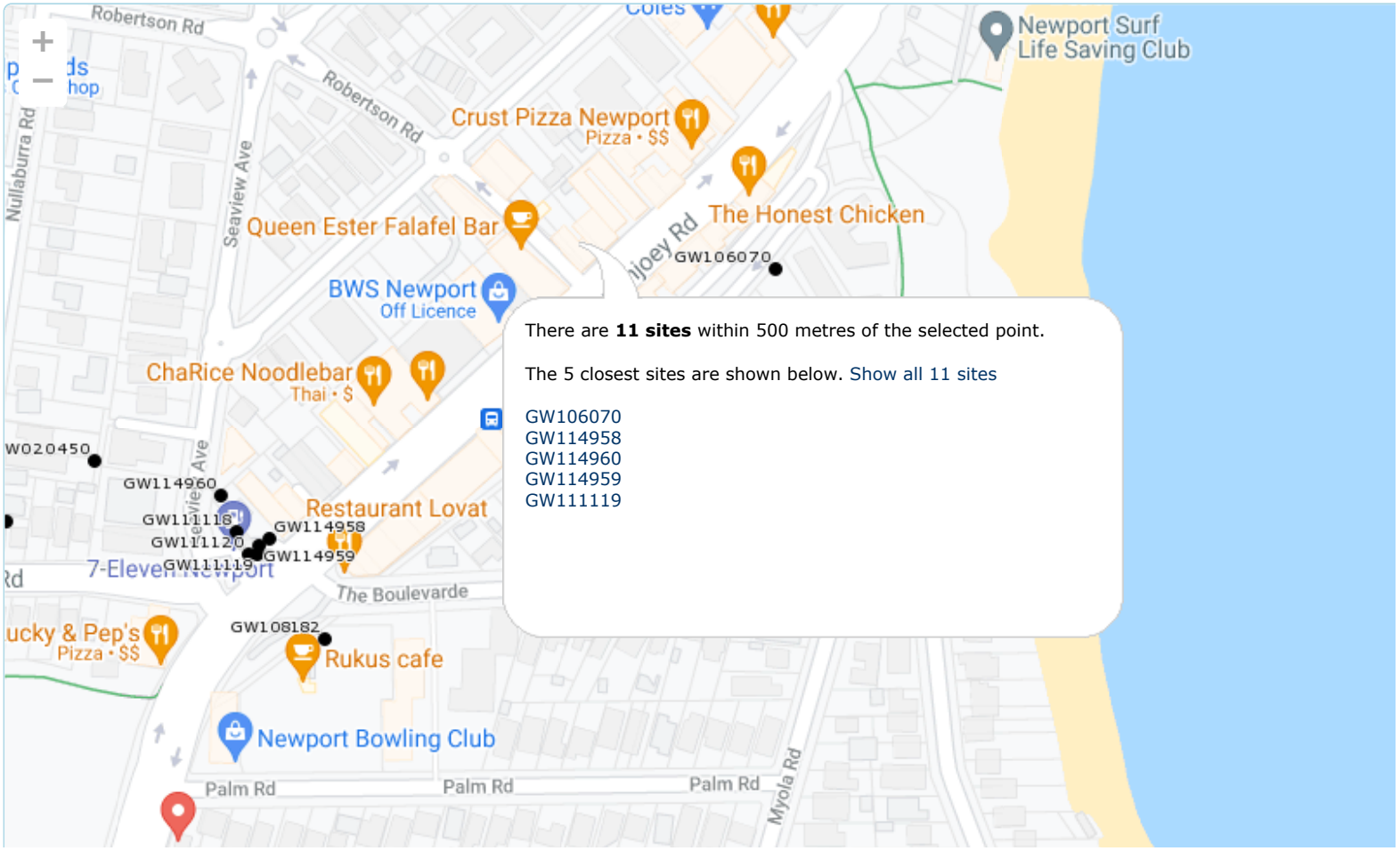
All Groundwater Site Details

ALL GROUNDWATER MAP

bookmark this page

All data times are Eastern Standard Time

Map Info



WaterNSW
Work Summary

GW114958

Licence:
Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Auger - Solid
Owner Type: Private

Commenced Date:
Completion Date: 27/09/2010
Final Depth: 10.90 m
Drilled Depth: 11.00 m

Contractor Name: Numac Drilling Services Pty Ltd
Driller: Unkown Unknown
Assistant Driller:

Property:
GWMA:
GW Zone:
Standing Water Level (m):
Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBERLAND	NARRABEEN	46/5/6248
Licensed:			

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6274677.000
Easting: 344076.000
Latitude: 33°39'22.9"S
Longitude: 151°19'06.2"E

GS Map: -
MGA Zone: 56
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	10.90	50			Auger - Solid Flight

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	FILL,MOIST DARK BROWN,LOOSE,SILT,CLAY	Fill	
1.00	4.00	3.00	SANDY CLAY MOIST,MOTTLED,SANDSTONE	Sandy Clay	
4.00	11.00	7.00	SANDSTONE, MOIST, PALE TAN,WEATERED	Sandstone	

Remarks

27/09/2010: Form A Remarks:
Coordinates provided by LAS,
L. Franchi
12/08/2015: Nat Carling, 12-Aug-2015; Updated work type & coordinate source, fixed rock type error.

***** End of GW114958 *****

WaterNSW
Work Summary

GW111119

Licence:
Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Auger - Solid
Owner Type: Private

Commenced Date:
Completion Date: 09/07/2010
Final Depth: 7.00 m
Drilled Depth: 7.00 m

Contractor Name: Numac Drilling Services Pty Ltd
Driller: Simon Benjamin Tant
Assistant Driller: Dean Ryan

Property:
GWMA:
GW Zone:
Standing Water Level (m): 4.800
Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBERLAND	NARRABEEN	B//322724
Licensed:			

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6274668.000
Easting: 344069.000
Latitude: 33°39'23.2"S
Longitude: 151°19'05.9"E

GS Map: -
MGA Zone: 56
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	7.00	55			Auger - Solid Flight
1		Annulus	Waterworn/Rounded	3.50	7.00				Graded
1	1	Casing	Pvc Class 18	0.00	4.00	55			Seated on Bottom, Other
1	1	Opening	Slots - Horizontal	4.00	7.00	55		0	Casing - Machine Slotted, PVC Class 18, Other, SL: 40.0mm, A: 3.80mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
5.00	7.00	2.00	Unknown	4.80					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	FILL	Fill	
1.00	5.00	4.00	SAND CLAYEY DRY	Sand	
5.00	6.50	1.50	SAND MOIST CLAYEY	Sand	
6.50	7.00	0.50	SAND SATURATED CLAYEY	Sand	

***** End of GW111119 *****

WaterNSW
Work Summary

GW106070

Licence:
Licence Status:
Authorised Purpose(s):
Intended Purpose(s): DOMESTIC

Work Type: Spear
Work Status: Supply Obtained
Construct.Method:
Owner Type: Private

Commenced Date:
Completion Date: 16/04/2004
Final Depth: 2.20 m
Drilled Depth: 2.20 m

Contractor Name:
Driller: Warren James Warwick
Assistant Driller:

Property:
GWMA:
GW Zone:
Standing Water Level (m):
Salinity Description:
Yield (L/s): 2.000

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBERLAND	NARRABEEN	21//7424
Licensed:			

Region: 10 - Sydney South Coast
River Basin: 212 - HAWKESBURY RIVER
Area/District:
CMA Map: 9130-1S
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: (Unknown)
Northing: 6274836.000
Easting: 344365.000
Latitude: 33°39'17.9"S
Longitude: 151°19'17.5"E

GS Map: -
MGA Zone: 56
Coordinate Source: GIS - Geogra

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	2.20	90			(Unknown)
1	1	Opening	Screen - Gauze/Mesh	1.40	2.00	40		0	Steel - ERW, A: 0.06mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
1.40	2.00	0.60	Unknown			2.00			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.60	0.60	sandy loam	Sandy Clay Loam	
0.60	2.00	1.40	sand, coarse	Sand	
2.00	2.20	0.20	gravel	Gravel	
2.20	2.20	0.00	rock	Rock	

Remarks

26/11/2009: updated from original form A

***** End of GW106070 *****

WaterNSW
Work Summary

GW114960

Licence:
Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Hand Auger
Owner Type: Private

Commenced Date:
Completion Date: 28/09/2010
Final Depth: 8.00 m
Drilled Depth: 8.00 m

Contractor Name: Numac Drilling Services Pty Ltd
Driller: Unkown Unknown
Assistant Driller:

Property:
GWMA:
GW Zone:
Standing Water Level (m):
Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBERLAND	NARRABEEN	46/5/6248
Licensed:			

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6274702.000
Easting: 344048.000
Latitude: 33°39'22.1"S
Longitude: 151°19'05.1"E

GS Map: -
MGA Zone: 56
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	8.00	50			Hand Auger

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.10	0.10	CONCRETE	Fill	
0.10	0.75	0.65	FILL,MOIST DARK BROWN,LOOSE,SAND,SANDSTONE	Fill	
0.75	0.85	0.10	CLAYEY SAND	Clayey Sand	
0.85	2.40	1.55	SANDY CLAY,MINOR IRONSTONE	Sandy Clay	
2.40	8.00	5.60	SANDSTONE, SLIGHTLY MOIST,PALE GREY AND RED	Sandstone	

Remarks

27/07/2015: Coordinates provided by LAS.
12/08/2015: Nat Carling, 12-Aug-2015; Updated work type & coordinate source, fixed rock type error.

***** End of GW114960 *****

WaterNSW
Work Summary

GW114959

Licence:
Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore
Work Status: Equipped
Construct.Method: Hand Auger
Owner Type: Private

Commenced Date:
Completion Date: 27/09/2010
Final Depth: 9.00 m
Drilled Depth: 9.00 m

Contractor Name: Numac
Driller: Unkown Unknown
Assistant Driller:

Property:
GWMA:
GW Zone:
Standing Water Level (m):
Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	CUMBERLAND	NARRABEEN	46/5/6248
Licensed:			

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6274673.000
Easting: 344071.000
Latitude: 33°39'23.0"S
Longitude: 151°19'06.0"E

GS Map: -
MGA Zone: 56
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	9.00	50			Hand Auger

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.50	1.50	FILL MOIST,DARK BROWN,STEEL	Fill	
1.50	2.00	0.50	SANDSTONE SLIGHTLY MOIST	Sandstone	
2.00	2.70	0.70	SANDY CLAY	Sandy Clay	
2.70	2.90	0.20	CLAYEY SAND	Clayey Sand	
2.90	3.00	0.10	SLIGHTLY MOIST SAND	Sand	
3.00	3.50	0.50	SANDSTONE RED TO BROWN	Sandstone	
3.50	9.00	5.50	SANDSTONE TAN TO PALE, TAN	Sandstone	

Remarks

27/09/2010: Form A Remarks:
Coordinates provided by LAS.
12/08/2015: Nat Carling, 12-Aug-2015; Updated work type & coordinate source, fixed rock type error.

***** End of GW114959 *****

APPENDIX B – Alliance (2022) Borehole Logs

alliance
geotechnical & environmental solutions

Alliance Geotechnical Pty Ltd
T: 1800 288 188
E: office@allgeo.com.au
W: www.allgeo.com.au

No: BH01
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
CC						CONCRETE				
SFA						FILL: Sandy CLAY with trace gravels, brown, stiff, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1		CLS	Sandy CLAY, orange, stiff, moist.	1.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
							1.5m			
			2		SW-SC	Clayey SAND, grey, loose, moist to wet with depth.	2.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments) were not observed, with the exception of waterlogged soils at depth.
							2.5m			
			3				3.0m			
							3.5m			
			4				4.0m			
	▼ GW Encountered						4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
						Test Pit BH01 terminated at 6m				
			7							

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No: BH02
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
CC						CONCRETE				
SFA						FILL: Sandy CLAY with trace gravels, brown, stiff, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1		CLS	Sandy CLAY, orange, stiff, moist.	1.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
							1.5m			
			2				2.0m			
					SW-SC	Clayey SAND, grey, loose, moist to wet with depth.	2.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments) were not observed, with the exception of waterlogged soils at depth.
			3				3.0m			
							3.5m			
			4				4.0m			
							4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
						Test Pit BH02 terminated at 6m				
			7							

1. NON CORED BOREHOLE 14429 ENVIRO LOGS.GPJ GINT STD AUSTRALIA.GDT 28/1/22

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No: BH03
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
SFA			0			FILL: Sandy CLAY, dark brown, soft, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1				1.0m			
							1.5m			
			2		CLS	Sandy CLAY, brown/orange becoming grey with depth, very stiff, moist.	2.0m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
							2.5m			
			3				3.0m			
							3.5m			
			4				4.0m			
							4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
			7			Test Pit BH03 terminated at 6m				

1. NON CORED BOREHOLE 14429 ENVIRO LOGS.GPJ GINT STD AUSTRALIA.GDT 28/1/22

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No: BH04
Sheet: 1 of 1
Job No: 14429

Test Pit Log

Client: Alten Construction Pty Ltd
Project: Acid Sulfate Soils Assessment
Location: 351-353 Barrenjoey Road, Newport NSW **Hole Location:** Refer to Figure 2
Started: 17/01/2022
Finished: 17/01/2022
Test Pit Size: 0.1 m

Rig Type: Solid Flight Auger **Hole Coordinates** E, N **Driller:** **Logged:** JW
RL Surface: m **Contractor:** Alliance **Bearing:** --- **Checked:** MA

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations
SFA						FILL: Sandy CLAY, dark brown, soft, moist.				Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
					CLS	Sandy CLAY, brown/orange becoming grey with depth, very stiff, moist.	0.5m			Visual indicators of acid sulfate soils (i.e. soils containing pale yellow deposits / coatings of jarosite, shell fragments and waterlogged sands) were not observed.
			1				1.0m			
							1.5m			
			2				2.0m			
							2.5m			
			3				3.0m			
							3.5m			
			4				4.0m			
							4.5m			
			5				5.0m			
							5.5m			
			6				6.0m			
			7			Test Pit BH04 terminated at 6m				

1. NON CORED BOREHOLE 14429 ENVIRO LOGS.GPJ GINT STD AUSTRALIA.GDT 28/1/22