Alliance Geotechnical

Engineering | Environmental | Testing

Report Type: Acid Sulfate Soils Assessment

Project Location: 51 Masons Parade, Point Frederick, NSW Lot 51 in DP732632

Client Name: Brisbane Waters (NSW) Legacy Club (c/ Grindley Construction)

> 29 July 2020 Report No: 10827-ER-2-1

We give you the right information to make the right decisions

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DOCUMENT CONTROL

Revision Status	Date	Author	Reviewer	Comments
Draft	13 July 2020	Isabelle Figatowski	Aidan Rooney	Issued for client comments

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Name	Isabelle Figatowski	Name	Aidan Rooney
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Executive Summary

Alliance Geotechnical Pty Ltd (AG) was engaged by Brisbane Waters (NSW) Legacy Club (c/ Grindley Construction) to undertake an Acid Sulfate Soils Assessment at 51 Masons Parade, Point Frederick, NSW (refer **Figure** 1, with the 'site' boundaries outlined in **Figure** 2).

AG understands that additional residential living units are proposed for the Legacy aged care facility, which will require demolition of existing structures, and construction of an apartment style residential aged care facility, roadways, and the installation of associated infrastructure and services. A contamination assessment of the site is required in accordance with the SEPP55.

The objectives of this project were to:

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

AG undertook the following scope of works to address the project objective:

- 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 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.

Conclusions

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

- Potential ASS were identified by preliminary laboratory analysis in eighteen (18) soil samples collected across the site, indicating that the soil materials which were encountered at depths between 0.5m and 4.5m bgl are potentially impacted by ASS;
- A further six (6) soil samples were submitted for CRS analysis and returned results indicating the presence of AASS and PASS collected from boreholes MW01-0.5, MW01-3.0, MW03-3.5, MW04-2.0, MW04-3.0 and MW04-4.5, 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 2.2 kgCaCO₃/tonne to 79 kgCaCO₃/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, AG makes the following recommendations:

• An acid sulfate soils management plan (ASSMP) should be developed for the site so 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 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 above recommendations must be read in conjunction with **Section 10**.

TABLE OF CONTENTS

DO	DOCUMENT CONTROLi		
TAI	BLE	OF CONTENTS	iv
1.	INT	RODUCTION	1
1.	1.	Project background	1
1.	2.	Objectives	2
1.	3.	Scope of Work	2
1.	4.	Previous investigation reports	2
	1.4.	1. Detailed Site Investigation (AG, 2020)	2
2.	SIT	E IDENTIFICATION	5
3.	SIT	E CONDITIONS AND SURROUNDING ENVIRONMENT	6
3.	1.	Hydrogeology and Groundwater Use	6
4.	AC	ID SULFATE SOILS ASSESSMENT	
5.	SA	MPLING AND ANALYTICAL PLAN	9
6.	FIE	ELDWORK	10
6.	1.	Soil Sampling	
6.	2.	Site Geology	
7.	LA	BORATORY ANALYSIS	11
8.	DIS	SCUSSION	12
8.	1.	Soil Observations	12
8.	2.	Field Peroxide Testing	
8.	3.	Chromium Reducible Sulfur	12
9.	CO	NCLUSIONS AND RECOMMENDATIONS	2
10.	ST	ATEMENT OF LIMITATIONS	3
11.	RE	FERENCES	4

FIGURES

Figure 1 S	Site Locality
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Figure 2 Site Layout

- Figure 3 Sampling Point Layout Plan
- Figure 4 Acid Sulfate Soils Impacted Areas

APPENDICES

- A Borehole Logs
- B Laboratory Certificates

1. INTRODUCTION

Acid Sulfate Soils (ASS) are naturally occurring soils and sediments containing iron sulfides due to sulfates in seawater mixing with iron rich land sediments and organic matter in the presence of Sulfate reducing bacteria in an anoxic environment. This occurred during the last major sea level rise (Holocene Period – past 10,000 years).

Actual Acid Sulfate Soils (AASS) are soils or sediment containing iron sulphides 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 sediment containing iron sulphides that have not oxidised and remain in predominantly anaerobic conditions generally below the groundwater table. The pH is commonly neutral and is more than pH 4.

This report uses the term ASS interchangeably for PASS and AASS except where specifically referenced

1.1. Project background

Alliance Geotechnical Pty Ltd (AG) was engaged by Brisbane Waters (NSW) Legacy Club (c/ Grindley Construction) to undertake an Acid Sulfate Soils Assessment at 51 Masons Parade, Point Frederick, NSW (refer **Figure** 1, with the 'site' boundaries outlined in **Figure** 2).

AG understands that additional residential living units are proposed for the Legacy aged care facility, which will require demolition of existing structures, and construction of an apartment style residential aged care facility, roadways, and the installation of associated infrastructure and services. A contamination assessment of the site is required in accordance with the SEPP55.

AG understands the development to comprise the following:

- Fifty-four (54) independent living units with basement car parking spaces designed to comply with the Gold Level of the Australian Liveable Housing Design Guidelines, consisting of:
 - Five 3-bedroom apartments;
 - Ten 2-bedroom apartments;
 - Thirty-nine 1-bedroom apartments;
- New community facilities including function rooms, café, community services and others;
- A new entry address, pick up and drop off point for residents and visitors, located adjacent to new community facilities;
- A new village community park boulevard is proposed, which will form a central green space for resident activities;
- Sheltered on-site parking, both in the building basement and above ground to the rear of the site;
- Height of building will be limited to a maximum of 5 storeys, with the residential development located at the front of the site to optimise access to views and the communal facilities located at the rear; and
- An indication of the surplus land area available for subdivision and sale.

AG has previously completed a contamination investigation (AG 2020, *Detailed Site Investigation*, Document Ref: 10827-ER-1-2, dated 4 February 2020) in accordance with NSW EPA guidelines to further assess land use contamination risks.

As the site is adjacent to an area classified as *disturbed terrain*, further investigation into the presence of acid sulfate soils across the site is considered warranted. As per industry practice, for the purposes

of investigation, a separate assessment for acid sulfate soils has been prepared in accordance with the *Acid Sulfate Soils Manual 1998* (ASSMAC 1998) *and the National Acid Sulfate Soil Guidance* (Australian Government 2018) (this report).

1.2. Objectives

The objectives of this project were to:

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

1.3. Scope of Work

AG undertook the following scope of works to address the project objective:

- 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 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.

1.4. Previous investigation reports

The following reports were considered during the undertaking of this project:

 AG 2020, 'Detailed Site Investigation, 51 Masons Parade, Point Frederick NSW' dated 30 June 2020, ref: 10827-ER-1-2;

A summary of these reports is presented in **Section 1.4.1**.

1.4.1. Detailed Site Investigation (AG, 2020)

AG understand that additional residential living units are proposed for the Legacy aged care facility, which will require demolition of existing structures, and construction of an apartment style residential aged care facility, roadways, and the installation of associated infrastructure and services. A contamination assessment of the site is required in accordance with the SEPP55.

The objectives of this project were to:

- Evaluate the possibility for contamination to be present at the site as a result of current and former land use activities;
- Identify risks to both human-health and environment receptors posed by contaminants identified from intrusive investigation at the site;
- Provide advice on the suitable (in the context of land contamination) of the soil and groundwater for the proposed land use setting at the site; and

• Provide recommendations for further investigation, management and/or remediation (if required).

The scope of works undertaken to address the investigation objectives, included:

- A desktop review of relevant information pertaining to the site;
- A site walkover to understand current site conditions;
- The preparation of a Sampling and Analysis Quality Plan (SAQP);
- Conduct an intrusive site investigation to establish ground conditions and to facilitate the collection of representative soil and groundwater samples;
- Laboratory analysis of selected samples collected during the field investigation; and
- An assessment of the contamination status of the site and the recommendation of any further remedial requirements associated with the redevelopment of the site (if necessary).

Conclusions

Based on the findings of desktop review information, fieldwork observations and laboratory analytical data, in the context of the proposed redevelopment scenario, AG makes the following conclusions:

- Site history records indicate that the site has been used historically for residential purposes;
- Based on the findings of the site history and land use, the most plausible sources of contamination were associated with historic filling, the weathering of building structures, pesticide use, and demolition of structures;
- Intrusive investigation at the site utilised 21 sampling locations for the description of site soils and collection of soil samples for laboratory analysis;
- A further 3 boreholes across the proposed development portion of the site were advanced, and groundwater wells installed for the description of site groundwater and collection of groundwater samples for laboratory analysis;
- Laboratory analytical results for TRH, BTEXN, PAH, OCP, OPP, PCB, HM, and Phenols reported concentrations below adopted investigation criteria in fill and natural soils;
- Asbestos was reported in soil sample TP19 analysed by the testing laboratory, in the form of friable asbestos;
- Laboratory analytical results for TRH, BTEXN, PAH, OCP, OPP, PCB, Phenols and Cations/Anions reported concentrations below adopted investigation criteria within groundwater; and
- Priority metals were reported at concentrations in groundwater below adopted investigation criteria, except for lead and zinc which exceeded the ANZG 95% protection of Marine Water criteria in GWM1, GWM3, GWM4 & DUP01, zinc in DUP01A, and nickel which exceeded the NEPM ASC health criteria in GWM3 & GWM4.

Recommendations

Based on the above conclusions, from a contamination perspective, the land in its current state is not suitable for the proposed development. The land could potentially made suitable for the proposed residential subdivision subject to the following recommendations being undertaken:

• A remedial action plan (RAP) should be prepared for the site, to address potentially unacceptable friable asbestos in soil related human health exposure risks at the site and nickel, lead and zinc in groundwater related exposure risks;

- The RAP should be prepared by a suitably experience environmental consultant with reference to NSW EPA (2020) and include (but not be limited to) the following:
 - o a remedial goal for the site;
 - an assessment of remedial options available to address the identified asbestos risks. These options may include removal offsite, in-situ containment, ex-situ containment, or a combination of these;
 - o the proposed testing to validate the site after remediation;
 - a contingency plan to address unexpected finds or if the selected remedial strategy fails; and
 - \circ a site management plan (for the remediation works).
- Consideration should be given to undertaking lateral delineation assessment works around detected asbestos contamination, as well as a more detailed groundwater assessment across the site, should there be a need to obtain further certainty around the nature and extent of remedial works required. The delineation work could be undertaken
 - prior to preparation of the RAP; or
 - following preparation of the RAP, with a RAP addendum issued incorporating the findings of the delineation assessment;
- Records of the lawful transport and disposal of asbestos containing materials and any other wastes removed from site, should be retained.

2. 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**.

Site Address	51 Masons Parade, Point Frederick, NSW	
Cadastral Identification	Lot 51 in DP732632	
Geographical Coordinates	6252325.399N	
	1463519.749E	
	(Source: Sixmaps)	
Site Area	1.253 hectares	
	(Source: SixMaps - <u>https://maps.six.nsw.gov.au/</u>)	
Zoning B4 – Mixed Use		
	(State Environmental Planning Policy (Gosford City Centre) 2018)	
Current Land Use	Medium density residential	
Proposed Land Use	Medium density residential	
Local Government Agency	Gosford City Council	

3. SITE CONDITIONS AND SURROUNDING ENVIRONMENT

A summary of available site and local data identifying topography, geology, soils, and hydrology is provided in **Table 3-1**.

Table 3-1 Summary	of Ground Conditions	and Surrounding	a Environment
	,		

Geology	A review of the Penrith 1:100,000 Geological Series Sheet (1 st Edition), indicates that the site is likely to be underlain by Quarternary (Qa), comprising alluvium, gravel, sand.	
Soil Landscape	Disturbed Terrain consists of landscape has been extensively disturbed by human activity and the features of the original landscape have been extensively modified. Includes extensive areas of coal mining in the Hunter valley and past coastal sand mined areas. Also occurs as numerous quarries and garbage tips, industrial sites and other areas where excavation and deposition of material has occurred.	
	(Source: <u>https://www.environment.nsw.gov.au/eSpade2WebApp</u>)	
Site Elevation	4 m (south western corner of the site) to 11 m (south eastern corner of the site) Australian Height Datum (AHD).	
Acid Sulfate Soil Risk	A review of NSW Department of Land and Water Conservation Acid Sulfate Soil Risk Map for the site indicates that the site lies in an area mapped as <i>No known occurrence</i> with respect to acid sulfate soils (ASS). However, the site is within close proximity to disturbed terrain to the west (Brisbane Waters).	
	Further assessment of ASS, in the context of this investigation is considered warranted.	
	(Source: <u>https://www.environment.nsw.gov.au/eSpade2WebApp</u>)	
Potential Depth of SiteFilling at the site is likely to be <1.5 m.Filling		
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	ce An unnamed creek to the immediate north of the site, with Brisbane Wate approximately 160 m to the west of the site.	

3.1. Hydrogeology and Groundwater Use

Available hydrogeological data and records of groundwater use, obtained for this investigation, are summarised below in **Table 3-2**.

Table 3-2 Backgroun	d Hydrogeological	Information
---------------------	-------------------	-------------

Depth to Watertable ¹	> 4.0 m
Inferred Groundwater Flow Direction	Based on prevailing site topography, groundwater flow direction in the vicinity of the site is inferred to be towards the south to west.
Local Groundwater Bore Records (≤ 500 m of site)	Review AG 2020 identified no registered groundwater bores within a 500 m radius of the site.

Potential Groundwater	Potential groundwater receptors include:
Receptors (including vapour flux receptors)	 Proposed users of the site (vapour).
	 Neighbouring residential properties and schools (vapour).
	 Basement users.
	Brisbane Water.

Notes:

¹ Sourced from <u>https://www.environment.nsw.gov.au/eSpade2WebApp</u>

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).

5. 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 m² in size. Given the approximate size of the construction footprint (6,411 m², a portion of the greater 12,530m² site footprint), AG consider a 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)) and the NSW EPA *Sampling Design Guidelines* (1995).

Four (4) boreholes will be advanced using a track mounted drill rig fitted with solid flight augers.

Soil samples will be collected at approximate 0.5 m intervals, or at changes in stratigraphy at each sampling location to a maximum depth of approximately 6.0 m below ground level.

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.

6. FIELDWORK

6.1. Soil Sampling

Soil sampling was undertaken by AG on the 3rd of June 2020.

A total of four (4) sample locations were drilled across the site using a track mounted drill rig fitted with solid flight augers. Samples for potential analysis were collected at 0.5 m intervals within the soil profile or with change of strata. The location of each borehole (MW01 to MW04) is presented in **Figure 3**. Soil samples were collected at approximate 0.5m intervals. A total of thirty-three (33) 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.

6.2. 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 each borehole location.

7. 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**.

8. DISCUSSION

8.1. Soil Observations

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

- 0.0 0.2/1.0 m bgl (FILL) Silty SAND, fine to medium grained, dark grey, with medium to high plasticity clay, trace fine fill rounded gravels, dry;
- 1.0 2.0 m bgl (FILL) SAND, fine to medium grained, pale brown, moist; and
- >2.0 bgl Clayey SAND, fine to medium grained, brown/grey, with shell fragments, low to medium plasticity clays.

During sample collection no signs of asbestos containing material (ACM), hydrocarbon odours or staining were noted.

8.2. Field Peroxide Testing

Thirty-three (33) 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 33 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. The reported pHf values were 5.4 or greater, indicating that actual acid sulfate soils are unlikely to be present onsite between the surface and 6.0m below ground level (bgl).

The soil samples were then subjected to hydrogen peroxide by the laboratory with the pH of the oxidised soil (pHfox) measured. Eighteen (18) of the samples analysed reported a pHfox result less than the preliminary screening criterion of <3.5. Soil sample MW03-3.5 reported the lowest pHfox value of 1.5 pH units with a maximum 4.9 pH units between pH and pHfox. A total of nineteen (19) soil samples reported an extreme reaction to the addition of hydrogen peroxide. The results indicated potential acid sulphate soils are likely to be present on the site between 0.0 and 6.0 m bgl.

8.3. Chromium Reducible Sulfur

A total of thirteen (13) soil samples were subjected to chromium reducible sulfur 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, AG has assumed that the soil type present on site is '*coarse texture sands to loamy sands*' 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:

- MW01-0.5;
- MW01-3.0; MW04-3.0; and
- MW03-3.5; MW04-4.5.

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

MW04-2.0;

•

The following soil samples indicated presence of both AASS and PASS and are assessed to require treatment:

Sample ID/ depth (m)	Net Acidity – Acidity units (mol H+/tonne)	Net Acidity – Sulfur units (%S)	Liming Rate (Kg CaCO3/T)
MW01/0.5	46	0.007	3.4
MW01/3.0	280	0.45	21
MW03/3.5	1100	1.7	79
MW04/2.0	100	0.17	7.7
MW04/3.0	50	0.08	3.7
MW04/4.5	29	0.05	2.2

9. CONCLUSIONS AND RECOMMENDATIONS

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

- Potential ASS were identified by preliminary laboratory analysis in eighteen (18) soil samples collected across the site, indicating that the soil materials which were encountered at depths between 0.5m and 4.5m bgl are potentially impacted by ASS;
- A further six (6) soil samples were submitted for CRS analysis and returned results indicating the presence of AASS and PASS collected from boreholes MW01-0.5, MW01-3.0, MW03-3.5, MW04-2.0, MW04-3.0 and MW04-4.5, 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 2.2 kgCaCO₃/tonne to 79 kgCaCO₃/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, AG makes the following recommendations:

- An acid sulfate soils management plan (ASSMP) should be developed for the site so 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 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 above recommendations must be read in conjunction with **Section 10**.

10. 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 Geotechnical Pty Ltd 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 Geotechnical Pty Ltd's engagement. The report must not be used for any purpose other than the purpose specified at the time AG was engaged to prepare the report.

Logs, figures, and drawings are generated for this report based on individual Alliance Geotechnical Pty Ltd 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 Geotechnical Pty Ltd reserves the right to review and amend this report.

11. REFERENCES

AG 2020, 'Detailed Site Investigation, 51 Masons Parade, Point Frederick NSW' dated 30 June 2020, ref: 10827-ER-1-2;

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 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

SITE FIGURES



- n			Site Locality		
	Alliance Geotechnical	Client Name:	Grindley Construction Pty Ltd	•	Figure Number: 1
	ENGINEERING ENVIRONMENTAL TESTING	Project Name:	Sulfate Soils Assessment	$\mathbf{\Lambda}$	Figure Date: 29 July 2020
	Manage the earth, eliminate the risk	Project Location:	51 Mason Parade, Point Frederick NSW	IN	Report Number: 10827-ER-2-1



		Site Layout		
Alliance Geotechnical	Client Name:	Grindley Construction Pty Ltd	Figure Number:	2
ENGINEERING ENVIRONMENTAL TESTING	Project Name:	Acid Sulfate Soils Assessment	Figure Date:	29 July 2020
Manage the earth, eliminate the risk	Project Location:	51 Mason Parade, Point Frederick NSW	Report Number:	10827-ER-2-1



Manage the earth, eliminate the risk

Project Location:

51 Mason Parade, Point Frederick NSW

Figure Number:	3
Figure Date:	2 9July 2020
Report Number:	10827-ER-2-1



Manage the earth, eliminate the risk

Project Location:

51 Mason Parade, Point Frederick NSW

Figure Number:	4
Figure Date:	29 July 2020
Report Number:	10827-ER-2-1

APPENDIX A

BOREHOLE LOGS



Alliance Geotechnical Pty Ltd

T: 1800 288 188

E: office@allgeo.com.au W: www.allgeo.com.au

Sheet: 1 of 1 Job No:

Started:

3/06/2020

BH No: MW01

Borehole Log

Client: Brisbane Waters NSW Legacy Club

Project:

2. NON CORED BOREHOLE (NO COORD/RL) 10827 GINT.GPJ GINT STD AUSTRALIA.GDT 17/6/20

8

Finished: 3/06/2020 Location: Borehole Size 110 mm Rig Type: Geoprobe 6712DT Driller: DC Logged: Hole Location: Refer Figure 10827-GR-1-A JA RL Surface: m Contractor: Stratacore Pty Ltd Bearing: ---Checked: Classification Symbol Consistency/ Density Index Moisture Condition Samples Graphic Log Material Description Tests Additional Observations Methoc Water Remarks Well RI Depth Details (m) (m) FILL: Silty SAND, fine to medium grained, dark grey, with medium to FILL М ADT high plasticity clay, trace fine fill rounded gravel. ES 0.5 Clayey SAND, fine to medium grained, grey, with shell fragments, low to medium plasticity clay. Tidal Seepage 3/06/2020 W VL MARINE DEPOSIT SC 1 ES 1.0 Clayey SAND, fine to medium grained, brown and dark grey, low to medium plasticity clay, with shell fragments. W SC L SPT 0, 0, 0 N=0 ES 1.5 ES 2.0 ES 2.5 SPT 0, 0, 0 N=0 ES 3.0 ES 3.5 Borehole MW01 terminated at 3.5m 4 5 6 7



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BH No: MW02 Sheet: 1 of 1 Job No:

Borehole Log

Client: Brisbane Waters NSW Legacy Club

Project: Location:

Started: 3/06/2020 Finished: 3/06/2020 Borehole Size 110 mm Drille 1 ٩٠ пс

Rig	Rig Type: Geoprobe 6712DT Hole Location: Refer Figure 10827-GR-1-A					rille	r: DC	Logged: JA								
RL	Sur	face: m	1			С	ontractor: Stratacore Pty Ltd Be	Bearing:				Checked:				
Method	Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks			Consistency/ Density Index	Additional Observations				
ADT				- - - 1		 SP	FILL: Silty SAND, fine to medium grained, dark grey, with medium to high plasticity clay, trace fine fill rounded gravel. SAND, fine to medium grained, pale brown.		ES 0.5 ES 1.0	D	 L	FILL FILL?				
				- - - 2		SC	Clayey SAND, fine to medium grained, grey, with shell fragments, low		SPT 0, 0, 0 N=0 ES 1.5 ES 2.0	w	VL	MARINE DEPOSIT				
	I Seepage 3/06/2020▼			- - - <u>3</u>		SC	to medium plasticity clay. Clayey SAND, fine to medium grained, brown and dark grey, low to medium plasticity clay, with shell fragments.		ES 2.5	w	VL					
	Tid						Borehole MW02 terminated at 3.5m		ES 3.0 ES 3.5	-						
2. NON CORED BOREHOLE (NO COORD/RL)					-											



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E: office@allgeo.com.au W: www.allgeo.com.au BH No: MW03 Sheet: 1 of 1 Job No:

Borehole Log

Client: Brisbane Waters NSW Legacy Club

Project:

Location:

Started: 3/06/2020 Finished: 3/06/2020

Borehole Size 110 mm

Rig Type: Geoprobe 6712DT Hole Location: Refer Figure 10827-GR-1-A Driller: DC Logge RL Surface: m Contractor: Stratacore Pty Ltd Bearing: Check Image: Surface: m Contractor: Stratacore Pty Ltd Bearing: Check Image: Surface: RL Decking graph graph graph Material Description Samples rests Remarks graph Addition of the surface of	Logged: JA Checked: apples sts iarks D FILL 5 0.5 M L FILL?
RL Surface: m Contractor: Stratacore Pty Ltd Bearing: Check Page 1 model model model Samples Remarks group of the second of the s	Imples sts inarks Implementation Implementation D FILL S 0.5 M L S 1.0 M L
Image: second	Inples enditional Observations sts D sarks D S 0.5 M S 1.0 M
Image: Sec Clayey SAND, fine to medium grained, pale brown. Image: Sec Clayey SAND, fine to medium grained, pale brown. Image: Sec Clayey SAND, fine to medium grained, pale brown. Image: Sec Clayey SAND, fine to medium grained, pale brown. Image: Sec Clayey SAND, fine to medium grained, pale brown. Image: Sec Clayey SAND, fine to medium grained, pale brown and dark grey, low to medium plasticity clay. Image: Sec Clayey SAND, fine to medium grained, brown and dark grey, low to medium plasticity clay. Image: Sec Clayey SAND, fine to medium grained, brown and dark grey, low to medium plasticity clay. Image: Sec	S 0.5 S 1.0 M L FILL?
	SPT 3,3 3-6 V \$1.5 V \$2.0 W VL \$2.0 W VL \$2.5 W VL \$3.5 V VL



Alliance Geotechnical Pty Ltd

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Borehole Log

Client: Brisbane Waters NSW Legacy Club

Project:

Location:

 Started:
 3/06/2020

 Finished:
 3/06/2020

Borehole Size 110 mm

R	Rig Type: Geoprobe 6712DT Hole Location: Refer Figure 10827-GR-1-A							Drille	er: DC	Logged: JA						
R	RL Surface: m Contractor: Stratacore Pty Ltd									ing:	Checked:					
Method		Water	Well Details	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description		Samples Tests Remarks	Moisture Condition	Consistency/ Density Index	Additional Observations			
E	5					\otimes		FILL: Silty SAND, fine to medium grained, dark grey, with medium to			D		FILL			
					-		SP	high plasticity clay, trace fine fill rounded gravel. Clayey SAND, fine to medium grained, brown, with shell fragments, lo to medium plasticity clay.	w	ES 0.5	М	L	MARINE DEPOSIT			
				-				1.00m: as above, but pale brown.		ES 1.0		VL - L				
					- - 2			2.00m: as above, but grey green.		SPT 2, 4, 4 N=8 ES 1.5 ES 2.0	w					
		age 3/06/2020		- - - -	-					ES 2.5						
		Tidal Seepa			<u>3</u> -			3.00m: as above, but dark grey.		SPT 0, 0, 0 N=0 ES 3.0 ES 3.5						
//6/20					 					ES 4.0						
USTRALIA.GDT 1					- - 5					SPT 0, 0, 0 N=0 ES 4.5 ES 5.0						
GPJ GINT SILUA					-					ES 5.5						
7 GINT					6											
						- - - -		Borehole MW04 terminated at 6m		ES 6.0						
2. NON CORE					8	-										

APPENDIX B

NATA ACCREDITED LABORATORY DOCUMENTATION



עייניא

ac=MRA

datas

NATA

WORLD RECOGNISED

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

NATA Accredited Accreditation Number 1261 Site Number 18217

Alliance Geotechnical 10 Welder Road Seven Hills NSW 2147

Attention:

Aidan Rooney

Report
Project name
Project ID
Received Date

723846-S LEGACY VILLIAGE REDEVELOPMENT PROJECT 10827 Jun 04, 2020

Client Sample ID Sample Matrix Eurofins Sample No.			MW01 0.5 Soil S20-Jn08009	MW01 1.0 Soil S20-Jn08010	MW01 1.5 Soil S20-Jn08011	MW01 2.0 Soil S20-Jn08012
Date Sampled			Jun 03, 2020	Jun 03, 2020	Jun 03, 2020	Jun 03, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.4	6.3	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	4.3	4.7	3.0
Reaction Ratings*S05	-	comment	3.0	2.0	2.0	2.0

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled Test/Reference	LOR	Unit	MW01 2.5 Soil S20-Jn08013 Jun 03, 2020	MW01 3.0 Soil S20-Jn08014 Jun 03, 2020	MW02 0.5 Soil S20-Jn08016 Jun 03, 2020	MW02 1.0 Soil S20-Jn08017 Jun 03, 2020
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.6	7.5	8.9	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.0	7.3	4.1
Reaction Ratings*S05	-	comment	2.0	4.0	4.0	4.0

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled Test/Reference	LOR	Unit	MW02 1.5 Soil S20-Jn08018 Jun 03, 2020	MW02 2.0 Soil S20-Jn08019 Jun 03, 2020	MW02 2.5 Soil S20-Jn08020 Jun 03, 2020	MW02 3.0 Soil S20-Jn08021 Jun 03, 2020
Acid Sulfate Soils Field pH Test		•				
pH-F (Field pH test)*	0.1	pH Units	7.4	6.5	6.4	6.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	3.2	3.1	2.8
Reaction Ratings* ^{S05}	-	comment	3.0	2.0	2.0	2.0



Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled			MW02 3.5 Soil S20-Jn08022 Jun 03, 2020	MW03 0.5 Soil S20-Jn08023 Jun 03, 2020	MW03 1.0 Soil S20-Jn08024 Jun 03, 2020	MW03 1.5 Soil S20-Jn08025 Jun 03, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	9.4	8.1	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.0	8.1	7.1	4.8
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	4.0

Client Sample ID Sample Matrix Eurofins Sample No.			MW03 2.0 Soil S20-Jn08026	MW03 2.5 Soil S20-Jn08027	MW03 3.0 Soil S20-Jn08028	MW03 3.5 Soil S20-Jn08029
Date Sampled			Jun 03, 2020	Jun 03, 2020	Jun 03, 2020	Jun 03, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.0	7.0	6.7	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	4.4	3.8	1.5
Reaction Ratings* ^{S05}	-	comment	2.0	1.0	2.0	4.0

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled Test/Reference	LOR	Unit	MW04 0.5 Soil S20-Jn08030 Jun 03, 2020	MW04 1.0 Soil S20-Jn08031 Jun 03, 2020	MW04 1.5 Soil S20-Jn08032 Jun 03, 2020	MW04 2.0 Soil S20-Jn08033 Jun 03, 2020
Acid Sulfate Soils Field pH Test		1				
pH-F (Field pH test)*	0.1	pH Units	7.1	6.7	6.3	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.2	5.1	3.6	3.2
Reaction Ratings* ^{S05}	-	comment	2.0	1.0	4.0	4.0

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled		Lipit	MW04 2.5 Soil S20-Jn08034 Jun 03, 2020	MW04 3.0 Soil S20-Jn08035 Jun 03, 2020	MW04 3.5 Soil S20-Jn08036 Jun 03, 2020	MW04 4.0 Soil S20-Jn08037 Jun 03, 2020
Acid Sulfate Scile Field pH Test	LUR	Unit				
Acid Sulfate Solis Field pri Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	6.7	6.5	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.9	3.2	3.2
Reaction Ratings* ^{S05}	-	comment	4.0	4.0	4.0	3.0

Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled			MW04 4.5 Soil S20-Jn08038 Jun 03, 2020	MW04 5.0 Soil S20-Jn08039 Jun 03, 2020	MW04 5.5 Soil S20-Jn08040 Jun 03, 2020	MW04 6.0 Soil S20-Jn08041 Jun 03, 2020
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.2	5.9	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.5	2.8	2.8	3.0
Reaction Ratings* ^{S05}	-	comment	3.0	3.0	3.0	2.0



Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Jun 04, 2020	7 Days

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

						ustral	ia		New Zealand				
ABN -	50 005 085 521	web : www.eurofin	Enviro	nment Te	sting P	Monter andeno hone : + ATA # 1 ite # 12	ne ey Road ng South +61 3 856 1261 54 & 142	Sydney Unit F3, Building 175 16 Mars Road Lane Cove West Phone : +61 2 95 NATA # 1261 Sit	F NSW 2066 900 8400 e # 18217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 20794	Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone : +64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 76 Phone : 0800 856 450 IANZ # 1290
Co Ad	npany Name: Alliance Geotechnical Iress: 10 Welder Road Seven Hills NSW 2147				Order No.: Report #: Phone: Fax:		lo.: #: 723846 1800 28 02 9675	88 188 5 1888		Received: Due: Priority: Contact Name:	Jun 4, 2020 6:20 PM Jun 12, 2020 5 Day Aidan Rooney		
Pro Pro	oject Name: oject ID:	LEGACY VII 10827	LIAGE REDE	VELOPMENT P	ROJECT						Eurofins Analytical S	Services Manager : And	rew Black
Sample Detail						CANCELLED	Acid Sulfate Soils Field pH Test						
Melh	ourne Laborato	ory - NATA Site	# 1254 & 142	71									
Svdr	ev Laboratory	- NATA Site # 1	8217			x							
Bris	pane Laboratory	v - NATA Site #	20794				x						
Pertl	h Laboratory - N	ATA Site # 237	736										
Exte	rnal Laboratory												
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	MW01 0.5	Jun 03, 2020		Soil	S20-Jn08009		X						
2	MW01 1.0	Jun 03, 2020		Soil	S20-Jn08010		X						
3	MW01 1.5	Jun 03, 2020		Soil	S20-Jn08011		X						
4	MW01 2.0	Jun 03, 2020		Soil	S20-Jn08012		X						
5	MW01 2.5	Jun 03, 2020		Soil	S20-Jn08013		X						
6	MW01 3.0	Jun 03, 2020		Soil	S20-Jn08014		X						
7	MW01 3.5	Jun 03, 2020		Soil	S20-Jn08015	Х							
8	MW02 0.5	Jun 03, 2020		Soil	S20-Jn08016		X						
9	MW02 1.0	Jun 03, 2020		Soil	S20-Jn08017		X						
		1	1	0	000 1-00040	1							

••• ourofine				Austral	lia			New Zealand					
ABN - 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com			Melbour 6 Monter Dandenc Phone : - NATA # Site # 12	ne rey Road ong South +61 3 856 1261 254 & 1427	Sydney Unit F3, Building F 175 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	Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone : +64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 76 Phone: 0800 856 450 IANZ # 1290				
Company Name: Address:	ompany Name: Alliance Geotechnical ddress: 10 Welder Road Seven Hills NSW 2147			e: Alliance Geotechnical 10 Welder Road Seven Hills NSW 2147				Oro Rej Pho Fax	o.: #: 723846 1800 288 188 02 9675 1888		Received: Due: Priority: Contact Name:	Jun 4, 2020 6:20 PM Jun 12, 2020 5 Day Aidan Rooney	
Project Name: Project ID:	LEGACY VII 10827	LIAGE REDEVELOPMEN	IT PROJECT					Eurofins Analytical	Services Manager : And	rew Black			
Sample Detail													
Melbourne Laborato	ory - NATA Site	# 1254 & 14271											
Sydney Laboratory	- NATA Site # 1	8217		Х									
Brisbane Laboratory	y - NATA Site #	20794			Х								
Perth Laboratory - N	ATA Site # 237	736											
11 MW02 2.0	Jun 03, 2020	Soil	S20-Jn08019		X								
2 MW02 2.5	Jun 03, 2020	Soil	S20-Jn08020		X								
3 MW02 3.0	Jun 03, 2020	Soil	S20-Jn08021		X								
4 MW02 3.5	Jun 03, 2020	Soil	S20-Jn08022		X								
5 MW03 0.5	Jun 03, 2020	Soil	S20-Jn08023		X								
6 MW03 1.0	Jun 03, 2020	Soil	S20-Jn08024		X								
7 MW03 1.5	Jun 03, 2020	Soil	S20-Jn08025		X								
8 MW03 2.0	Jun 03, 2020	Soil	S20-Jn08026		X								
9 MW03 2.5	Jun 03, 2020	Soil	S20-Jn08027		X								
0 MW03 3.0	Jun 03, 2020	Soil	S20-Jn08028		X								
1 MW03 3.5	Jun 03, 2020	Soil	S20-Jn08029		X								
2 MW04 0.5	Jun 03, 2020	Soil	S20-Jn08030		X								
					1 1/1								

••• eurofine				Austra	lia		New Zealand			
ABN - 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com		Testing ©eurofins.com	Melbourne 6 Monterey Road Dandenong South VIC 31 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271		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	Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone : +64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 76 Phone : 0800 856 450 IANZ # 1290	
Company Name: Address:	any Name: Alliance Geotechnical ss: 10 Welder Road Seven Hills NSW 2147			Ord Rep Pho Fax	o.: #: 723846 1800 288 188 02 9675 1888		Received: Due: Priority: Contact Name:	Jun 4, 2020 6:20 PM Jun 12, 2020 5 Day Aidan Rooney		
Project Name: Project ID:	LEGACY VILLIAG 10827	E REDEVELOPME	NT PROJECT					Eurofins Analytical	Services Manager : And	rew Black
	Sample	Detail		CANCELLED	Acid Sulfate Soils Field pH Test					
Melbourne Laborato	ry - NATA Site # 125	54 & 14271								
Sydney Laboratory -	NATA Site # 18217			Х						
Brisbane Laboratory	- NATA Site # 2079	4			X					
Perth Laboratory - N	ATA Site # 23736									
24 MW04 1.5	Jun 03, 2020	Soil	S20-Jn08032		X					
25 MW04 2.0	Jun 03, 2020	Soil	S20-Jn08033		X					
26 MW04 2.5	Jun 03, 2020	Soil	S20-Jn08034		X					
27 MW04 3.0	Jun 03, 2020	Soil	S20-Jn08035		X					
28 MW04 3.5	Jun 03, 2020	Soil	S20-Jn08036		X					
29 MW04 4.0	Jun 03, 2020	Soil	S20-Jn08037		X					
30 MW04 4.5	Jun 03, 2020	Soil	S20-Jn08038		X					
31 MW04 5.0	Jun 03, 2020	Soil	S20-Jn08039		X					
32 MW04 5.5	Jun 03, 2020	Soil	S20-Jn08040		X					
33 MW04 6.0	Jun 03, 2020	Soil	S20-Jn08041		X					
Test Counts				1	32					



Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site 1. 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.
- 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.
- This report replaces any interim results previously issued. 9.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days. **NOTE: pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ug/L: micrograms per litre
ppm: Parts per million	ppb: Parts per billion	%: Percentage
org/100mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100mL: Most Probable Number of organisms per 100 millilitres

renns	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
coc	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
СР	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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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



Quality Control Results

Test	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)*	S20-Jn08009	CP	pH Units	6.2	6.1	pass	30%	Pass	
Reaction Ratings*	S20-Jn08009	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S20-Jn08020	CP	pH Units	6.4	6.4	pass	30%	Pass	
Reaction Ratings*	S20-Jn08020	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate							-		
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S20-Jn08030	CP	pH Units	7.1	7.1	pass	30%	Pass	
Reaction Ratings*	S20-Jn08030	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate							-		
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	S20-Jn08040	CP	pH Units	5.9	5.9	pass	30%	Pass	
Reaction Ratings*	S20-Jn08040	CP	comment	3.0	3.0	pass	30%	Pass	



Comments

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

Qualifier Codes/Comments

Code

Description

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. S05

Authorised By

Andrew Black Myles Clark

Analytical Services Manager 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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Company	ALLIANCE GEO	DTECHNICAL	Project №	10827	Project Manager	Aidan Rooney	S	ampler(s)			Jhar	n Paule Arl	bizo
Address	10 WELDER ROAD	D, SEVEN HILLS	roject Name इ	Legacy Village Redevelopment Project			Han	ded ove	er by	Jhan Paule Arbizo				
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1	MW01 0.5	3/06/20	×											
2	MW01 1.0	3/06/20	×											
3	MW01 1.5	3/06/20	×											
4	MW01 2.0	3/06/20	×											
5	MW01 2.5	3/06/20	×											
6	MW01 3.0	3/06/20	×							100				
,	MW01 3.5	3/06/20	×											
8	MW02 0.5	3/06/20	×											
9	MW02 1.0	3/06/20	×											
10	MW02 1.5	3/06/20	×											
11	MW02 2.0	3/06/20	×											
12	MW02 2.5	3/06/20	×											
13	MW02 3.0	3/06/20	×											
14	MW02 3.5	3/06/20	×											
15	MW03 0.5	3/06/20	×											
16	MW03 1.0	3/06/20	×							1				1
17	MW03 1.5	3/06/20	X											
18	MW03 2.0	3/06/20	×											
19	MW03 2.5	3/06/20	×											
20	MW03 3.0	3/06/20	×											
		Total Counts	20											
ethod of Shipme	nt 🗵 Courier (#) 🗆 Hand	Delivered	D Postal Name Jac	ob Walker	Signature		Date			C	0	Time	1150
	Received By	Way Turcon	(DE	INE MEL PER ADL NTL DRW Signature	4	Date 14	16	Time			Q :_	20	Temperature	4.53

Submission of samples to the laboratory will be deemed as acceptance of Eurofins | mgt Standard Terms and Conditions unless agreed otherwise. A copy of Eurofins | mgt Standard Terms and Conditions is available on request.
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Company	ALLIANCE GEO	OTECHNICAL	Project №	10827	Project Manager	Aidan Rooney	- Sa	ampler(Ihan Paule	Arbizo
Address	10 WELDER ROAI	D, SEVEN HILLS W	Project Name	Legacy Village Redevelopment Project	EDD Format (ESdat, EQuIS, Custom)		Hand	ded ove	er by voice		F	Ihan Paule	Arbizo
Contact Nam	e		ereo") SUITE (Email	l for Re	esults		EI	nviro@allgeo	.com.au
Phone №			Total" or "Filh						Cont	ainers		Turnaro	ound Time (TAT)
Special Directi	ons		Analyses als are requested preas speci- must be used to arract Sul HIF and Phfox									Covernight	(Default wei be 5 days if not ficked (9am)* 2 Day*
Purchase Ord	er		e Where mel				Plastic	mL Plastic mL Plastic			PLAN BO ass or HDI	□ 3 Day*	☑ 5 Day * Surcharges apply
Quote ID №	Client Sample ID	Sampled Date/Time M (dd/mm/yy (S) hh:mm)	≗ atrix (Solid) Water (W))				=					sotseedsy) tettto Goods) nments / Dangerous Hazard Warning
1	MW03 3.5	3/06/20	×										
2	MW04 0.5	3/06/20	×										
3	MW04 1.0	3/06/20	×										
4	MW04 1.5	3/06/20	×										
5	MW04 2.0	3/06/20	×										
6	MW04 2.5	3/06/20	×										
7	MW04 3.0	3/06/20	×										
8	MW04 3.5	3/06/20	×										
9	MW04 4.0	3/06/20	×										
10	MW04 4.5	3/06/20	×										
11	MW04 5.0	3/06/20	X										
12	MW04 5.5	3/06/20	X										
13	MW04 6.0	3/06/20	×										
14													
15													
16													
17													
18													
19													
20													
		Total Counts	13		1								
ethod of Shipn	nent 🛛 Courier (#) = Ha	and Delivered	D Postal Name Jac	ob Walker	Signature	11	Date			c 2	Time	
Eurofins r	ngt Received By	all Tuckne	u CYDI BN	e mel PER ADL NTL DRW Signature	X	Dale M	10	Time		4		Temperature	4.53

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ac=MRA

datas

NATA

WORLD RECOGNISED

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

NATA Accredited Accreditation Number 1261 Site Number 20794

Alliance Geotechnical 10 Welder Road Seven Hills NSW 2147



Aidan Rooney

Report
Project name
Project ID
Received Date

727906-S LEGACY VILLIAGE REDEVELOPMENT PROJECT 10827 Jun 25, 2020

Client Sample ID			MW01-0.5	MW01-3.0	MW02-0.5	MW02-2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B20-Jn44524	B20-Jn44525	B20-Jn44526	B20-Jn44527
Date Sampled			Jun 03, 2020	Jun 03, 2020	Jun 03, 2020	Jun 03, 2020
Test/Reference	LOR	Unit				
Chromium Suite	•					
pH-KCL	0.1	pH Units	5.0	4.5	8.7	5.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	46	60	< 2	4.2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.073	0.097	< 0.003	0.007
Chromium Reducible Sulfur ^{S04}	0.005	% S	< 0.005	0.35	0.019	0.006
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	220	12	3.8
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	n/a	3.3	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	n/a	660	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) ^{S03}	0.02	% S	n/a	n/a	1.1	n/a
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.07	0.45	< 0.02	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	46	280	< 10	< 10
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	3.4	21	< 1	< 1
Extraneous Material						
<2mm Fraction	0.005	g	39	40	33	50
>2mm Fraction	0.005	g	< 0.005	0.92	15	< 0.005
Analysed Material	0.1	%	100	98	69	100
Extraneous Material	0.1	%	< 0.1	2.2	31	< 0.1
% Moisture	1	%	26	23	7.4	11



Client Sample ID			MW02-3.0	MW03-0.5	MW03-1.5	MW03-3.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B20-Jn44528	B20-Jn44529	B20-Jn44530	B20-Jn44531
Date Sampled			Jun 03, 2020	Jun 03, 2020	Jun 03, 2020	Jun 03, 2020
Test/Reference	LOR	Unit				
Chromium Suite						
pH-KCL	0.1	pH Units	5.7	8.7	7.0	3.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	4.8	< 2	< 2	180
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.008	< 0.003	< 0.003	0.29
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.009	0.019	0.008	1.1
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.5	12	5.0	680
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	0.33
HCI Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	0.75
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	0.42
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	200
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	0.32
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	6.2	1.0	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	1200	210	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) ^{S03}	0.02	% S	n/a	2.0	0.33	n/a
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	< 0.02	< 0.02	1.7
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	10	< 10	< 10	1100
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	< 1	< 1	< 1	79
Extraneous Material		_				
<2mm Fraction	0.005	g	59	39	47	45
>2mm Fraction	0.005	g	0.65	40	1.8	0.41
Analysed Material	0.1	%	99	49	96	99
Extraneous Material	0.1	%	1.1	51	3.7	0.9
% Moisture	1	%	16	7.7	12	29

Client Sample ID			MW04-2.0	MW04-3.0	MW04-4.5	MW04-6.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B20-Jn44532	B20-Jn44533	B20-Jn44534	B20-Jn44535
Date Sampled			Jun 03, 2020	Jun 03, 2020	Jun 03, 2020	Jun 03, 2020
Test/Reference	LOR	Unit				
Chromium Suite						
pH-KCL	0.1	pH Units	4.8	4.9	5.0	5.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	32	17	11	6.5
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.051	0.027	0.017	0.010
Chromium Reducible Sulfur ^{S04}	0.005	% S	0.11	0.053	0.030	0.015
Chromium Reducible Sulfur -acidity units	3	mol H+/t	71	33	19	9.6
Sulfur - KCI Extractable	0.02	% S	n/a	n/a	n/a	n/a
HCI Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCI Extractable Sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur	0.02	% S	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	n/a	n/a
Net Acid soluble sulfur - equivalent S% pyrite ^{S02}	0.02	% S	n/a	n/a	n/a	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	n/a	n/a	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	n/a	n/a	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s- ANCbt) ^{S03}	0.02	% S	n/a	n/a	n/a	n/a



Client Sample ID Sample Matrix Eurofins Sample No. Date Sampled			MW04-2.0 Soil B20-Jn44532 Jun 03, 2020	MW04-3.0 Soil B20-Jn44533 Jun 03, 2020	MW04-4.5 Soil B20-Jn44534 Jun 03, 2020	MW04-6.0 Soil B20-Jn44535 Jun 03, 2020
Test/Reference	LOR	Unit				
Chromium Suite						
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.17	0.08	0.05	0.03
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	100	50	29	16
CRS Suite - Liming Rate ^{S01}	1	kg CaCO3/t	7.7	3.7	2.2	1.2
Extraneous Material						
<2mm Fraction	0.005	g	63	51	71	63
>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	%	21	19	22	18



Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Chromium Reducible Sulfur Suite			
Chromium Suite	Brisbane	Jun 25, 2020	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
Extraneous Material	Brisbane	Jun 25, 2020	6 Week
- Method: LTM-GEN-7050/7070			
% Moisture	Brisbane	Jun 29, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			

		fine			A	ustral	ia					New Zealand	
		web : waw ourofin	Enviro	nment Te	esting	Monter Andence hone : - IATA #	ne ey Roa ng Sou -61 3 8 1261	h VIC 3175 64 5000	Sydney Unit F3, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 9900 8400 NATA # 1264 Sito # 19217	Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 20794	Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Sito # 23736	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone : +64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 76 Phone : 0800 856 450 IANZ # 1290
Co Ad	Company Name: Alliance Geotechnical Address: 10 Welder Road Seven Hills NSW 2147					nie # 12	O R P Fa	der No.: port #: none: ix:	727906 1800 288 188 02 9675 1888		Received: Due: Priority: Contact Name:	Jun 25, 2020 10:00 Jul 2, 2020 5 Day Aidan Rooney	АМ
Pro Pro	oject Name: oject ID:	LEGACY VII 10827	LIAGE REDE	EVELOPMENT F	ROJECT						Eurofins Analytical	Services Manager : An	drew Black
		Sa	mple Detail			Chromium Reducible Sulfur Suite	Moisture Set						
Melb	ourne Laborato	orv - NATA Site	# 1254 & 142	271									
Sydr	ney Laboratory	- NATA Site # 1	8217										
Bris	bane Laborator	y - NATA Site #	20794			Х	X						
Pert	h Laboratory - N	ATA Site # 237	736										
Exte	rnal Laboratory	,											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	MW01-0.5	Jun 03, 2020		Soil	B20-Jn44524	Х	X						
2	MW01-3.0	Jun 03, 2020		Soil	B20-Jn44525	Х	X						
3	MW02-0.5	Jun 03, 2020		Soil	B20-Jn44526	Х	X						
4	MW02-2.0	Jun 03, 2020		Soil	B20-Jn44527	Х	X						
5	MW02-3.0	Jun 03, 2020		Soil	B20-Jn44528	Х	X						
6	MW03-0.5	Jun 03, 2020		Soil	B20-Jn44529	Х	X						
7	MW03-1.5	Jun 03, 2020		Soil	B20-Jn44530	Х	X						
8	MW03-3.5	Jun 03, 2020		Soil	B20-Jn44531	Х	X						
9	MW04-2.0	Jun 03, 2020		Soil	B20-Jn44532	Х	X						
1	1	1			1	1	1						

••• eurofins					Austra	lia			New Zealand			
ABN - 50 005 085 521 web : www.eurofins.com.au e.mail : EnviroSales@eurofins.com				esting Irofins.com	Melbourne 6 Monterey Road Dandenong South VIC 3 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271			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	Perth 2/91 Leach Highway Kewdale WA 6105 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone : +64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 767 Phone : 0800 856 450 IANZ # 1290
Company Name: Alliance Geotechnical Address: 10 Welder Road Seven Hills NSW 2147					Order No.: Report #: Phone: Fax:		727906 1800 288 188 02 9675 1888		Received: Due: Priority: Contact Name:	Jun 25, 2020 10:00 Jul 2, 2020 5 Day Aidan Rooney	AM	
Project Name: Project ID:	LEGACY VII 10827	LLIAGE REDE	EVELOPMENT	PROJECT						Eurofins Analytical	Services Manager : Ar	drew Black
Sample Detail					hromium Reducible Sulfur Suite	loisture Set						
Melbourne Laborato	ry - NATA Site	# 1254 & 142	271		_		4					
Sydney Laboratory -	NATA Site # 1	8217					4					
Brisbane Laboratory	- NATA Site #	20794			X	X	4					
Perth Laboratory - N	ATA Site # 237	736	1	1			4					
11 MW04-4.5	Jun 03, 2020		Soil	B20-Jn44534	X	X	4					
12 MW04-6.0	Jun 03, 2020		Soil	B20-Jn44535	X	X	-					
Test Counts					12	12						



Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site 1. 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.
- 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.
- This report replaces any interim results previously issued. 9.

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days. **NOTE: pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ug/L: micrograms per litre
ppm: Parts per million	ppb: Parts per billion	%: Percentage
org/100mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
сос	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
СР	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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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



Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Chromium Suite									
pH-KCL			%	98			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	100			80-120	Pass	
Chromium Reducible Sulfur			%	95			80-120	Pass	
Acid Neutralising Capacity (ANCbt)			%	93			80-120	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Chromium Suite				Result 1	Result 2	RPD			
pH-KCL	B20-Jn44524	CP	pH Units	5.0	5.0	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B20-Jn44524	CP	mol H+/t	46	44	4.0	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B20-Jn44524	CP	% pyrite S	0.073	0.070	4.0	30%	Pass	
Chromium Reducible Sulfur	B20-Jn44524	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B20-Jn44524	СР	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCI Extractable	B20-Jn44524	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	B20-Jn44524	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B20-Jn44524	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B20-Jn44524	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B20-Jn44524	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B20-Jn44524	СР	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B20-Jn44524	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B20-Jn44524	СР	% S	0.07	0.07	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B20-Jn44524	СР	mol H+/t	46	44	n/a	30%	Pass	
CRS Suite - Liming Rate	B20-Jn44524	CP	kg CaCO3/t	3.4	3.3	4.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B20-Jn44524	CP	%	26	27	1.0	30%	Pass	
Duplicate									
Chromium Suite				Result 1	Result 2	RPD			
pH-KCL	B20-Jn44534	CP	pH Units	5.0	5.1	1.7	30%	Pass	
Acid trail - Titratable Actual Acidity	B20-Jn44534	CP	mol H+/t	11	9.0	19	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B20-Jn44534	CP	% pyrite S	0.017	0.014	19	30%	Pass	
Chromium Reducible Sulfur	B20-Jn44534	CP	% S	0.030	0.030	1.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	B20-Jn44534	СР	mol H+/t	19	19	1.0	30%	Pass	
Sulfur - KCI Extractable	B20-Jn44534	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	B20-Jn44534	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B20-Jn44534	СР	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B20-Jn44534	СР	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B20-Jn44534	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B20-Jn44534	СР	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B20-Jn44534	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B20-Jn44534	СР	% S	0.05	0.04	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity	R20 1-44524	CD	mol LI · /t	20	20	n/n	200/	Doco	
CPS Suito Limina Poto	B20-J1144534			29	20	n/a 6.0	30%	Pass	
CRS Suite - Liming Rate	D20-J1144534	UP	кg CaCO3/t	۷.۷	Z. 1	0.0	30%	Pass	



Duplicate								_	
				Result 1	Result 2	RPD			
% Moisture	B20-Jn44534	CP	%	22	21	6.0	30%	Pass	



Comments

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

Qualifier Codes/Comments

Code Description

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'
Retained Acidity is Reported when the pHKCI is less than pH 4.5
Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised By

Andrew Black Myles Clark Analytical Services Manager 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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#AU03_EnviroSampleBris

From: Sent: To: Subject:	Andrew Black Thursday, 25 June 2020 9:51 AM #AU03_EnviroSampleBris 5 DAY TAT ADDITIONAL ANALYSIS: FW: Eurofins Test Results, Invoice - Report 723846 : Site LEGACY VILLIAGE REDEVELOPMENT PROJECT (10827)
Follow Up Flag:	Follow up

Additional analysis thanks team for CrSuite

Flagged

Andrew Black Phone: +61 410 220 750 Email: AndrewBlack@eurofins.com

From: Jacob Walker < jacob.walker@allgeo.com.au> Sent: Thursday, 25 June 2020 9:50 AM To: Andrew Black < Andrew Black@eurofins.com > Cc: Aidan Rooney <<u>Aidan@allgeo.com.au</u>> Subject: RE: Eurofins Test Results, Invoice - Report 723846 : Site LEGACY VILLIAGE REDEVELOPMENT PROJECT (10827)

EXTERNAL EMAIL*

Hey Andrew,

Flag Status:

As discussed on the phone, can I please order CRS on the following samples, on a standard tat:

- Jn 08009 MW01-0.5; .
- MW01-3.0: •
- MW02-0.5;
- MW02-2.0; •
- MW02-3.0; •
- MW03-0.5; •
- MW03-1.5;
- MW03-3.5;
- 23293580 MW04-2.0;
- MW04-3.0;
- MW04-4.5; and
- MW04-6.0. •

Thanks mate!

Regards, Jacob Walker

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Environmental Consultant - 0424 066 612 | Email: jacob.walker@allgeo.com.au

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BS5N 066-069